FARMING PRACTICES IN PRE-MODERN ICELAND

by

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ABSTRACT

This thesis re-evaluates farming practices in Iceland up to c.1600. Advancing Þorvaldur Thoroddsen's early twentieth century work, I incorporate modern archaeological investigations and recent scholarship to advance the discussions of Iceland's livestock economy. The thesis draws on a range of written sources, including literature, legal texts and the *máldagar* (church-charters), as well as archaeological disciplines and environmental sciences to consider the whole process of farming. It examines neglected aspects of animal husbandry and, in the process, challenges some assumptions about practices and suggests new avenues for research.

I start with a re-examination of farm buildings and pasture, both on and off the farm to give a more holistic view of fodder acquisition. The following chapter evaluates the textual sources for the economic value of livestock and reveals stability in the relative livestock values, though the *kúgildi* varied in value over the centuries. The next chapter addresses herd sizes on farms and the composition of these herds to gain an insight into the purpose of these animals, not just their numbers. No attempt is made to calculate livestock population estimates because of the sporadic nature of the sources. The fourth chapter utilises the vast corpus of *máldagar* to analyse the farming economies of church-farms (*staðir* and *bændakirkjur*), including patterns of livestock keeping based on the churches' characteristics. It then examines the changing nature of livestock farming between the twelfth and sixteenth centuries, on local, regional and countrywide scales. The final chapter considers livestock products and consumption beyond the much discussed milk, meat and wool economies. I also examine the evidence for products such as traction and horses for more than their meat.

Cattle and sheep provide the core focus, though horses, pigs and goats are included where sources permit. This incorporation allows a fuller understanding of the interactions between different aspects of farming. The traditional narrative usually frames Icelandic farming as experiencing a continuous decline in conditions and productivity over the centuries. Yet this has been increasingly questioned in recent scholarship. I argued here that Icelandic farming generally moved towards a wool-producing economy in an attempt to adapt to changing conditions. Masked by this wool economy generalisation, however, were a diversity of farming practices. It is only by examining the

complexities of these practices do we discover that Icelandic farming was not declining, but adapting to the challenges of this period.

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INTRODUCTION

1.1 SCOPE OF THESIS

The Settlement of Iceland began in the ninth century, and the population relied on farming, in part, for their continued survival. The last great work on this topic, *Lýsing Íslands*, was published in the early twentieth century, yet much scholarship has been undertaken to advance our understanding of farming since then.[1] This present study is an in-depth, critical examination of pastoral farming and the advances made since the 1920s. It re-assesses the written evidence and integrates archaeological material that was unavailable a hundred years ago.[2] Another multi-volume work, *Landbúnaðarsaga Íslands*, has been published since this thesis commenced but it stops short of examining the full range of farming topics that the sources provide evidence for, and so is not as in-depth as this present study.[3] Both of these works will be discussed in more detail below. The chronological scope of this thesis is from the Settlement, commonly acknowledged to have begun from the late ninth century, to the late sixteenth century. It will provide a view of animal husbandry on an extended time scale, as this topic is too often discussed on a short time scale that restricts discussion of long term changes. It is generally acknowledged that Iceland underwent many changes during this period, including climatic, social, and political changes. Short chronologies are unable to track these changes, which results in an inability to determine whether alterations in farming practices were responses to short term social or economic changes or part of longer term trends.

At the same time, research into farming practices suffers from a scarcity of sources due to the fragmentary nature of evidence related to agriculture. This scarcity hinders the resolution of investigations because it is not possible to examine farming on an annual basis. In fact, we can usually only discuss pre-industrial Icelandic farming on a centurial, or at best decadal basis. A longer time scale mitigates the drawbacks of both of these points. Therefore, this thesis shall extend up until the end of the sixteenth century to encapsulate a grey area in Icelandic history between the perceived prosperous earlier centuries and the hard times of the

[1] Þorvaldur Thoroddsen, *Lýsing Íslands* I-IV (Copenhagen, 1908-1922).
[2] Further advancements in scholarly resources have been the resources of the North Atlantic Biocultural Organization (NABO) and Fornleifastofnun Íslands (the Institute of Archaeology, Iceland), providing a repertoire for reports and 'grey' literature that would otherwise be stored in numerous places. http://www.nabohome.org/; http://www.instarch.is/skyrslur.html
[3] Árni Daníel Júlíusson and Jónas Jónsson, *Landbúnaðarsaga Íslands* I-IV (Reykjavík, 2013). See Chapter Four.

seventeenth century with outbreaks of human and livestock diseases, tougher trade regulations and a cooler climate. The late sixteenth century is a convenient end point for this thesis as the youngest published *máldagar*, church-charters, are dated to this time.[4] The inclusion of unpublished *máldagar* would have entailed significantly more time than permitted for this thesis. Further, a later end point would entail the inclusion of additional source types that extend into the early modern period and would require an artificial break point in the middle of these later sources, which would undermine the value of these later sources. By using this time frame, we will be able to see long-term economic transitions in farming, as all scholars agree that Iceland underwent social, political and economic changes during these centuries. Moreover, by looking in detail at farms we can also detect the role of human agency. In short, farming can reflect local, regional, domestic and international factors.

This thesis examines farming practices, referring to what goes on beyond the farmstead, to the wider landscape and the management of resources. It is an all-encompassing term to include pastoral and any non-livestock farming. Animal husbandry, by contrast, focuses on the domestic animals and their routine. It has a narrower meaning and only overlaps with farming practices to the extent that livestock depend on the acquisition of sufficient fodder to ensure their survival through the winter. While the farmstead contains the main buildings to house the livestock over winter, grazing also took place off the farm to take advantage of all available fodder.[5] In this thesis, the farmstead means the fixed location of the buildings and home-fields, while the farm refers to the farmstead *and* access to resources in the wider geographical area. These resources might include grazing and shielings further away from the farmstead, where livestock could take advantage of the extra pasture. This is an important distinction, because, while a farmstead may be abandoned or moved, the land that surrounds the farmstead may be continuously exploited in some way.[6] A farm, however, should not be equated with a household. As evidenced in the land registers of the early eighteenth century, if not before, a farm could consist of more than one household. In a similar manner, from the

[4] See Section 1.4.3.
[5] The practice of off farm grazing is attested by the written sources and archaeology, and is still a part of modern Icelandic farming. A fuller explanation can be found in Section 2.
[6] A. Dugmore, M. Church, K. Mairs, T. McGovern, S. Perdikaris and O. Vésteinsson, 'Abandoned Farms, Volcanic Impacts, and Woodland Management: Revisiting Þjórsárdalur, the "Pompeii of Iceland"', *Arctic Anthropology* 44(1) (2007), pp.1-11, p.3.

twelfth century some farm-owners donated part of their *heimaland*, the home-land of a farm, to the Church, resulting in varying degrees of joint ownership.[7]

Unlike in other regions of north-western Europe, where farming consisted of a balance between pastoral (animal) and arable (crop) farming, in Iceland farming relied heavily on livestock with limited arable farming, which was only undertaken until the 1500s.[8] Briefly, several explanations have been given for the limited nature of arable farming, including a cultural preference for pastoral farming, the unsuitability of the Icelandic soils, a loss of soil fertility, a cooler, wetter climate that discouraged arable farming and cheaper imports of grain.[9] In the Icelandic context discussions of arable farming have been restricted to grain crops. Evidence for other types of arable farming, such as legumes and vegetables, though present in the sagas, is severely limited.[10] The rarity of arable farming makes Iceland, as well as the Faroes and Greenland, distinct from other farming societies in north-western Europe because the population survived mainly on a diet of animal and fish products. This thesis is concerned with animal husbandry, but as pastoral and arable are sometimes difficult to separate, wider farming practices must be included where relevant to enable a fuller understanding of production.

While pastoral farming formed the basis of the economy in Iceland, arable farming and fishing need to be mentioned because they did contributed to the economy, though arable farming was restricted to small areas and largely abandoned by the sixteenth century.[11] For example, at Reykholt (Borgarfjörður) barley was grown from the settlement until the thirteenth century.[12] Barley grains from twelfth and thirteenth centuries' dwelling contexts show consumption, but there is uncertainty whether they were from domestically cultivated

[7] See Section 5.1.
[8] I. Simpson, W. Adderley, G. Guðmundsson, M. Hallsdóttir, M. Sigurgeirsson and M. Snæsdóttir, 'Soil limitations to Agrarian Land Production in Premodern Iceland', *Human Ecology*, 30(4) (2002), pp.423-443, p.424.
[9] C. Zutter, 'Icelandic Plant and Land-use Patterns: Archaeobotanical Analysis of the Svalbarð Midden (6706-60), Northeastern Iceland', in C. Morris and D. Rackham (eds.) *Norse and Later Settlement and Subsistence in the North Atlantic* (Glasgow, 1992), pp.139-148, p.144; Simpson et al., 'Soil limitations', p.440; A. Ogilvie, 'Local knowledge and travellers' tales: a selection of climatic observations in Iceland,' in C. Caseldine, A. Russell, J. Harðardóttir and O. Knudsen (eds.), *Iceland - Modern Processes and Past Environments*, Developments in Quaternary Science 5 (London, 2005), pp. 257-287, p.265; Gunnar Karlsson, *Lífsbjörg Íslendinga* (Reykjavík, 2009), pp.164-165.
[10] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* IV, p.165.
[11] Simpson et al., 'Soil limitations', p.424.
[12] Egill Erlendsson, 'Plant Macrofossil and Pollen Evidence from the Surrounding Area', in G. Sveinbjarnardóttir (ed.) *Reykholt: Archaeological Investigations at a High Status Farm in Western. Iceland*, (Reykjavík, 2012), pp.253-254, p.254.

or foreign imports.[13] Pollen analysis, however, of a tenth to thirteenth-century midden deposit and from the surrounding areas, dated c.900-c.1200, indicates that barley was present and was being being cultivated locally.[14] There is no evidence for barley cultivation in the area surrounding Reykholt after c.1200, and no grains were found in the seventeenth-century dwelling contexts demonstrating the reduction, if not absence, of cereals by this point.[15] With regard to fishing, it is difficult to examine the extent that fish contributed to the economy because the literary and documentary sources do not pay attention to fishing.[16] Animal husbandry is usually recorded in more detail than wild resources, possibly because livestock was a standard requirement for all farms whereas fishing was seen as an additional resource.[17] The role of fishing in the medieval economy is currently undergoing re-assessment, emphasising the overseas trade from the thirteenth century and the wealth generated from fishing.[18] Therefore, the pastoral economy in Iceland was not the sole way to create wealth. Trade, such as in fish, and access to traded goods would influence the dependence on farming for subsistence and as access to fishing differed around the country, so would the extent of the dependency.

This study endeavours to utilise a diverse range of sources to provide a more robust understanding of the pastoral economy in Iceland than has been done in previous studies. All sources have their limitations, but as this thesis will show an inter-disciplinary approach allows a greater examination of farming practices. Some scholars have occasionally used

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[13] Garðar Guðmundarsson and G. Hill, 'Charred Remains of Grains and Seeds from Hearth [99]', in G. Sveinbjarnardóttir (ed.) *Reykholt: Archaeological Investigations at a High Status Farm in Western. Iceland*, (Reykjavík, 2012), pp.242-243, pp.242-243.

[14] Egill Erlendsson, 'Pollen Analysis on Samples from Context [577], in G. Sveinbjarnardóttir (ed.) *Reykholt: Archaeological Investigations at a High Status Farm in Western. Iceland*, (Reykjavík, 2012), pp.247-249, pp.247, 249; E. Erlendsson, K. Vickers, F. Gathorne-Hardy, J. Bending, B. Gunnarsdóttir, G. Gísladóttir and K.J. Edwards, 'Late-Holocene Environmental History of the Reykholt Area, Borgarfjörður, Western Iceland', in H. Þorláksson and Þ.B. Sigurðardóttir (eds) *From Nature to Script: Reykholt, Environment, Centre and Manuscript Making*, (Reykjavík, 2012), pp.17-48, p.31; E. Erlendsson and K.J. Edwards, 'Gróðurfarsbreytingar á Íslandi við Landnám' *Árbók hins íslenzka fornleifafélags* (2010), pp.29-56, pp.42-43.

[15] Erlendsson et al, 'Late-Holocene Environmental History of the Reykholt Area', p.35; C. Zutter, 'The Post-Medieval Passageway Farm', in G. Sveinbjarnardóttir (ed.) *Reykholt: Archaeological Investigations at a High Status Farm in Western. Iceland*, (Reykjavík, 2012), pp.251-253, p.253.

[16] P.P. Boulhosa, 'Of Fish and Ships in Medieval Iceland', in S. Imsen (ed.) *The Norwegian Domination and the Norse World c.1100-c.1400* (Trondheim, 2010), pp.175-197, p.176.

[17] W. I. Miller, *Bloodtaking and Peacemaking: Feud, Law, and Society in Saga Iceland* (London, 1990), p.105.

[18] Boulhosa, 'Of Fish and Ships in Medieval Iceland', p.176; Helgi Þorláksson, 'King and Commerce: The foreign trade of Iceland in medieval times and the impact of royal authority', in S. Imsen (ed.) *The Norwegian Domination and the Norse World c.1100-c.1400* (Trondheim, 2010), pp.149-173, p.153; S. Perdikaris and T. McGovern, 'Codfish and Kings, Seals and Subsistence: Norse Marine Resource use in the North Atlantic', in T. Rick and J. Erlandson (eds) *Human Impacts on Marine Environments*, (UCLA, 2008), pp.187-214, p.206; Harrison, et al., 'Gásir in Eyjafjörður', p.100.

such sources as the sagas and *máldagar* for illustrative purposes and so failed to appreciate the full significance of such evidence. This work aims to incorporate the information that various sources provide to re-evaluate what we know about farming practices in Iceland up until c.1600.

1.2 ICELANDIC SOCIETY AND ECONOMY

Before examining the scholarship on farming practices, it is necessary to be aware of key events and processes that occurred during the time frame of this study. These shall now be addressed. Iceland was permanently settled first at the end of the ninth century (the *landnám*).[19] Most of the earliest activity has been dated to just after the deposition of the so-called '*landnám* tephra' dated to 871±2 AD, though there are exceptions.[20] The *Alþing*, the annual General Assembly, was founded during the Settlement Period, probably in the early tenth century. At the *Alþing*, a law code was proclaimed for the whole of Iceland, but it was left to the prosecutors to enforce any judgements because Iceland had no centralised authority. The *Alþing* of either 999 or 1000 AD officially adopted Christianity in Iceland.[21] Each chieftain was supposed to attend the *Alþing* with their followers. The followers were to pay a tax to meet the expenses of those travelling to the *Alþing*, if their property was valued over a minimum threshold. Iceland was divided into administrative Quarters (North, South, East and West). Each Quarter was further divided into smaller areas, *þing*, and each *þing* held their own spring and autumn assemblies, to settle disputes and proclaim local laws and judgements.[22] If disputes could not be settled, or were between people from different *þing* then the dispute would go to the *Alþing*.

Current scholarship proposes that Iceland was not the relatively egalitarian society it was once thought to be.[23] From the Settlement period, society was stratified into chieftains, householders, free people and slaves.[24] By the end of the eleventh century slavery seems to

[19] Gunnar Karlsson, *Iceland's 1100 Years: the history of a marginal society* (London, 2000), p.13.
[20] D.M. Zori, 'The Norse in Iceland', *Oxford Handbooks in Archaeology* (Oxford, 2016), pp.1-36, p.5.
[21] Orri Vésteinsson, *The Christianization of Iceland: priests, power and social change* (Oxford, 2000), p.17.
[22] Karlsson, *Iceland's 1100 Years*, pp.20-23.
[23] O. Vésteinsson, 'A divided society: peasants and the aristocracy in Medieval Iceland' *Viking and medieval Scandinavia* 3 (2007), pp.117-139, pp.1-2 gives a good overview of previous scholarship. Other examples of current scholarship include: D. Bolender, J. Steinberg and E. Durrenberger, 'Unsettled Landscapes: Settlement Patterns and the Development of Social Inequality in Northern Iceland', in L. Cliggett and C. Pool (eds.) *Economies and the transformation of landscape* (Plymouth, 2008), pp.217-238, p.218; Gísli Pálsson, *The Textual Life of Savants: Ethnography, Iceland, and the Linguistic Turn* (London, 2004), p.91.
[24] Vésteinsson, 'A divided society, pp.1-2.

have disappeared. It is thought that the superseding of slaves by tenants distributed the labour force away from the main farmstead and replaced the cost of keeping slaves with wage labour, which Sigurðsson argues was cheaper.[25] Regardless of the reasoning behind the disappearance of slaves, the point of concern in this thesis is that slaves were mentioned in both *Grágás* and *Íslendingasögur*, but not in *Sturlunga saga*.[26] To the saga writers, at least, society had undergone changes since settlement.

Another change also occurred with submission to the Norwegian Crown between 1262 and 1264. Chieftains were replaced by sheriffs, who collected taxes and fulfilled other judicial roles. These sheriffs were under the control of a governor or a bailiff working on behalf of the governor. The officials that formed the new system of power were, however, usually selected from families that once held chieftaincies.[27] Therefore, while the titles might have changed when Iceland swore allegiance to Norway, the same group of people still held power in Iceland. Throughout this time period exchange networks existed in which products were moved from the lower levels up. For example, tenants were required to provide landlords with fodder and labour.[28] Of course, this was partly reciprocated through the provision of legal advocacy or physical protection.[29] Products also moved beyond the chieftains' or sheriffs' control. As the trading centre of Gásir illustrates, long distance trade networks extended beyond Iceland.[30] In farming terms, this meant that farms had to generate a surplus of goods in addition to their subsistence needs, which then circulated in wider exchange networks, and some of these products were exported.

The need to produce surplus goods was due to, amongst other things, obligations such as tithes and rents. The establishment and development of tenancy through the medieval period is a matter of debate. However, the main point is that a tenant needed to be able to produce a surplus to pay rent, and that rent was paid in animal products. The proportion of tenant

[25] Jón Viðar Sigurðsson, *Chieftains and Power in the Icelandic Commonwealth* Translation by J. Lundskær-Nielsen (Odense, 1999), p.227, 230.
[26] See Section 1.4.1.
[27] Karlsson, *Iceland's 1100 Years*, p.92.
[28] T. Amorosi,P. Buckland, K. Edwards, I. Mainland, T. McGovern, J. Sadler and P. Skidmore, 'They did not Live by Grass Alone: the Politics and Palaeoecology of Animal Fodder in the North Atlantic Region' *Environmental Archaeology* 1 (1998), pp.41-54, p.42.
[29] Árni Daníel Júlíusson, 'Peasant unrest in Iceland' in K. Katajala (ed.) *Northern Revolts: Medieval and Early Modern Peasant Unrest in the Nordic Countries* (Helsinki, 2004), pp.118-148, p.119.
[30] R. Harrison, H. Roberts and W. Adderley, 'Gásir in Eyjafjörður: International exchange and local economy in medieval Iceland' *Journal of the North Atlantic* 1 (2008), pp.99-119.

farmers to independent farmers is thought to have risen steadily throughout the Commonwealth and Middle Ages.[31] It has been argued that inequalities arose in Icelandic society in the eleventh century when tenant farms were established at the edge of a farm's land.[32] Others, however argue that inequalities were present in the settlement pattern from *landnám*.[33] Jóhannesson argued that the elite and the Church established small farms that were not able to support themselves and that eventually forced farms to become tenant farms.[34] From the twelfth century, land was donated to the Church, and once it became Church property, land seldom reverted back to private ownership. Thus by the early sixteenth century the Church was the biggest single landowner in Iceland, owning approximately 45% of all land.[35]

Iceland was never an egalitarian society, and some have suggested that tenancy was firmly established before the twelfth and thirteenth centuries. The difficulty, though, is discovering when farms with different statuses were created.[36] Vésteinsson goes further by arguing that the establishment of large estates was done within decades of the settlement beginning while a phase of 'planned settlement' may have lasted until the eleventh century.[37] This is an earlier start date for tenancy and predates the evidence of inequalities in the saga sources. The *Íslendingasögur* have been used to portray a society of multiple local chieftains who heavily depended on the support of free farmers during the early centuries of Icelandic settlement, yet this social control of power consolidation is no longer thought to be the case.[38] Sigurðsson acknowledges the difficulty in discovering the extent of tenancy in this early period but estimates that one quarter of all farms during the Commonwealth Period were run by tenants.[39] Vésteinsson argues that by the twelfth century five-sixths of all householders were practically tenant farms, being socially and politically dependent on chieftains.[40] Charting the extent of tenancy up until the seventeenth century is difficult because of the lack of evidence.

[31] Amorosi et al., 'They did not Live by Grass Alone' p.44.
[32] Bolender, et al., 'Unsettled Landscapes', pp.218-219.
[33] Vésteinsson, 'A divided society, p.130.
[34] Jón Jóhannesson, *A History of the Old Icelandic Commonwealth* (Manitoba, 1974), pp.346-347.
[35] E. Orrman, 'The condition of the rural population', in K. Helle (ed.) *The Cambridge History of Scandinavia vol. 1: Prehistory to 1520* (Cambridge, 2003), pp.581-610, p.583.
[36] Árni Daníel Júlíusson, 'Signs of Power: Manorial Demesnes in Medieval Iceland', *Viking and Medieval Scandinavia* 6 (2010), pp.1-29, p.8-9.
[37] Orri Vésteinsson, 'Patterns of Settlement in Iceland: A Study in Prehistory' *Saga Book of the Viking Society for Northern Research* 25 (1998), pp.1-29.
[38] Vésteinsson, 'A divided society, pp.117-118.
[39] Sigurðsson, *Chieftains and Power*, p.116.
[40] Vésteinsson, 'A divided society', p.131.

Nevertheless, by the late seventeenth century, a land register shows that 95% of all farms were tenant properties. Yet even in this case, the compilers of the register had difficulties distinguishing independent (*lögbýli*/*lögbýlisjörð*) from dependent (*hjábýli*/*hjáleiga*) farms.[41] Therefore, we are unsure of the extent of tenancy in Iceland prior to the late seventeenth century.

Iceland's landscape and climate varies across the country, however, it is not always possible to detect the impact of geography on farming in the medieval period. Generally, the south tends to be flatter and benefits from a milder boreal climate, as does the West, though the West contains more valley-systems. The north and east have more fjords and valley-systems with a colder, sub-arctic climate. The Westfjords, in contrast, have steep, narrow fjords with little pasture land. This is potentially significant because access to good quality pasture land, along with the cattle ownership that this facilitated, underpinned positions of power.[42]

The environment of Iceland also varied across the centuries and it is useful to point out here that there is a connection between environment and farming, for example, farms in Iceland have always been confined to the coast and fjords, with the uplands providing grazing areas.[43] The distribution of settlements, though, has changed over the centuries. The 'over-optimistic pioneer frontier' of the tenth century reveals how far early Icelanders settled inland only for the farms to be abandoned later. It has been argued that this abandonment was coupled with land degradation, such as deforestation and the loss of vegetation cover.[44] It is unclear how far land degradation would have impacted on farming and how far this can be measured in the available sources, but environment needs to be kept in mind.

As will be discussed in more detail in Chapter One, there is some debate about the extent of land degradation.[45] Estimates vary as to the extent and the aspect of erosion measured,

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[41] Björn Lárusson, *The Old Icelandic Land Registers* (Lund, 1967), p.29.
[42] T. McGovern, O. Vésteinsson, A. Friðriksson, M. Church, I. Lawson, I. Simpson, A. Einarsson, A. Dugmore, G. Cook, S. Perdikaris, K. Edwards, A. Thomson, W. Adderley, A. Newton, G. Lucas, R. Edvardsson, O. Aldred and E. Dunbar, 'Landscapes of Settlement in Northern Iceland: Historical Ecology of Human Impact and Climate Fluctuation on the Millennial Scale', *American Anthropologist*, 109(1) (2007), pp.27-51, pp.27-51.
[43] The interior is unsuitable for habitation or livestock as it consists of glaciers and desert.
[44] A. Dugmore, M. Church, K. Mairs, T. McGovern, A. Newton and G. Sveinbjarnardóttir, 'An Over-Optimistic Pioneer Fringe? Environmental Perspectives on Medieval Settlement Abandonment in Þórsmörk, South Iceland' in J. Arneborg and B. Grønnow (eds.) *Dynamics of Northern Societies: Proceedings of the SILA/NABO Conference on Arctic and North Atlantic Archaeology Copenhagen, May 10th-14th, 2004* (Copenhagen, 2006), pp.335-345, p.30.
[45] See Section 2.2.

whether deforestation, vegetation cover or soil erosion.[46] Further, it is unclear if the rate of deforestation was constant throughout Icelandic history. While deforestation has been viewed as extensive and rapid across Iceland after *landnám*, more recent research has shown this was not the case.[47] Pollen evidence from Mývatn, northern Iceland, has revealed that the rate of deforestation was more gradual than the pollen evidence suggests for the south.[48] Vésteinsson et al. suggest that after the initial clearance of woodland during the settlement the extent of upland woodlands survived in a similar state until the eighteenth and nineteenth centuries, when social and economic factors led to the deterioration of these woodland resources.[49] With respect to farming, deforestation was beneficial as it opened up grassland for grazing livestock. Vegetation loss and soil erosion, on the other hand, would negatively impact the extent of grazing land and the amount of fodder available to livestock.

1.3 THE HISTORIOGRAPHY OF LIVESTOCK FARMING IN ICELAND

With an awareness of social structures, and the climatic and environmental conditions, it is now possible to move on to discuss issues surrounding farming practices in Iceland. A central issue to discussions of animal husbandry in Iceland has been perceived 'decline' or 'stagnation', whether social, political, or environmental depends on the topic being discussed. Some allude to such declines in farming by arguing for a reduction in the number of livestock or the falling proportion of cattle, especially cows, compared with sheep over the centuries.[50] These examples are given as evidence of an overall downturn in conditions from the 'Golden Age' of plenty during the Commonwealth period, followed by Iceland's submission to the

[46] McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.29; F. Gathorne-Hardy, E. Erlendsson, P. Langdon and K. Edwards, 'Lake sediment evidence for late Holocene climate change and landscape erosion in western Iceland', *Journal of Paleolimnology* 42 (2009), pp.413-426, p.414; K. Smith, 'Landnám: the settlement of Iceland in archaeological and historical perspective' *World Archaeology* 26(3) Colonization of Islands (1995), pp.319-347, p.322.
[47] McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.30.
[48] T. McGovern, S. Perdikaris, Á. Einarsson and J. Sidell, 'Coastal connections, local fishing, and sustainable egg harvesting: patterns of Viking Age inland wild resource use in Mývatn district, Northern Iceland', *Environmental Archaeology* 11(2) (2006), pp.187-205, p.188.
[49] O. Vésteinsson and I. Simpson, 'Fuel utilisation in pre-industrial Iceland. A micro-morphological and historical analysis', in G. Guðmundsson (ed.), *Current Issues in Nordic Archaeology: Proceedings of the 21st Conference of Nordic Archaeologists 6-9 September 2001 Akureyri Iceland* (Reykjavík, 2004), pp.181-188, p.185.
[50] Júlínusson, 'Signs of Power', p.16; Gunnar Karlsson, *Lífsbjörg Íslendinga frá 10. öld til 16. aldar* (Reykjavík, 2009), pp.152-153; G. Lucas, 'Pálstóftir: A Viking Age Shieling in Iceland', *Norwegian Archaeological Review*, 41(1) (2008), pp.85-100, p.97; Thráinn Eggertsson, 'Analyzing Institutional Successes and Failures: A Millennium of Common Pastures in Iceland', *International Review of Law and Economics* 12 (1992), pp.423-437, pp.424, 435; K. Hastrup, *Nature and Policy in Iceland 1400-1800: An Anthropological Analysis of History and Mentality* (Oxford, 1990), p.75; Þorvaldur Thoroddsen, *Lýsing Íslands* III, p.285.

Norwegian Crown that changed the political organisation of the country, while the Church gained strength and wealth from the twelfth century. The traditional historical narrative has charted the changing fortunes of Iceland from a time of prosperity to one of increased hardship.[51] The Danish Trade Monopoly that began in the seventeenth century cemented the suffering by leaving Icelanders at the mercy of foreign merchants.[52] In addition, society became stricter with law-breakers being severely punished by the authorities.[53] The late seventeenth and turn of the eighteenth century was marked by outbreaks of smallpox, reducing the population and adding to the list of disasters that were recorded for these centuries. The impression given is of an independent country brought to its knees by foreign powers, suffering from mistreatment before independence was gained once again.[54] Within this ideological framework, research into the agricultural history of Iceland followed the same trajectory with pre-1400 livestock numbers being more abundant compared to livestock numbers post-1400, with decreases in cattle and relatively more sheep.[55]

More modern research has questioned many of these assumptions, from the egalitarian nature of early society to the extent of the hardships suffered.[56] Indeed, some scholars have demonstrated the fluctuating nature of farming over the centuries with increases *and* decreases in livestock on farms.[57] It was not until the fifteenth century that several things combined to significantly affect Iceland: two plague epidemics, problems with international trade, and more unpredictable weather to name a few. These factors undoubtedly resulted in a loss of productivity that did not affect all the Icelandic population equally. Yet, there was not

[51] Karlsson, *Iceland's 1100 Years*', p.187.
[52] Sigurður Thorarinsson, 'Population Changes in Iceland', *Geographical Review* 51(4) (1961), pp.519-533, p.520; Gisli Gunnarsson, *Monopoly Trade and Economic Stagnation: Studies in the Foreign Trade of Iceland 1602-1787* (Lund, 1983), p.12; J. L. Byock, 'History and the sagas: the effect of nationalism' in Gíli Pálsson (ed.) *From Sagas to Society: Comparative Approaches to Early Iceland* (London, 1992), pp.44-59, pp.48-49; J. L. Byock, *Viking Age Iceland* (London, 2001), p.152; K. Oslund, 'Imagining Iceland: narratives of nature and history in the North Atlantic' *The British Journal for the History of Science* 35 (2002), pp.313-334, p.322; Baldur Þórhallsson and Tómas Joensen, 'Iceland's External Affairs from 1550-1815: Danish societal and political cover concurrent with a highly costly economic policy' *Stjórnamál og Stjórnsýsla* 2(10) (2014), pp.191-216, p.213.
[53] Karlsson, *Iceland's 1100 Years*', p.135.
[54] Gunnar Karlsson, 'A century of research on early Icelandic society' in A. Faulkes and R. Perkins (eds.) *Viking Revaluations Viking Society Centenary Symposium 1992* (London 1993), pp.15-25, provides an overview of scholarship, especially p.15.
[55] The best example is Þorvaldur Thoroddseen's *Lýsing Íslands* discussed below.
[56] G. Hambrecht, 'Zooarchaeology and the Archaeology of Early Modern Iceland', *Journal of the North Atlantic* 1 (2009), pp.3-22, p.5; Júlíusson, 'Signs of Power', p.4.
[57] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, p.123; Benedikt Eyþórsson, *Búskapur og rekstur staðar í Reykholti 1200-1900* (Reykjavík, 2008), p.152; Árni Daníel Júlíusson, 'Valkostir sögunnar: Um landbúnað fyrir 1700 og þjóðfélagsþróun á 14.-16. öld', *Saga* 36 (1998), pp.77-111, pp.77, 83-84. Also, see Chapter Five.

the continuous reduction in farming livestock to justify such a negative view of farming practices over the centuries. As the chronology of this thesis ends c.1600, some of these above mentioned processes are outside the scope of this study, but it is necessary to understand how discussions undertaken in the following chapters are part of wider debates concerning Icelandic history. This thesis acknowledges that while Iceland did suffer from hardship, the theory of decline is a little extreme. Instead, changes should be seen as adaptation.

Icelanders' management of their livestock since settlement has been a topic of numerous publications, the most well-known being Þorvaldur Thoroddsen's *Lýsing Íslands* (1908-1922).[58] The four volume work covers a vast range of topics, from geological features to plant species, and includes detailed sections on livestock and the utilisation of land. Published a century ago, it pre-dated the blossoming of archaeological research in Iceland. It was not until later that archaeology became firmly established and now excavations incorporate a range of techniques, such as zooarchaeology, soil analysis and climatic reconstructions, all of which were unavailable in the early twentieth century. Thus Þorvaldur was unable to draw upon the evidence available to us today, and which provides new insights into the past economy.

Modern scholarship has also attempted to place variations in farming practices in wider environmental and climatic contexts due to the availability of evidence through these various avenues of research.[59] Þorvaldur, understandably, did not have this evidence available to him. His disconnection between farming and wider conditions can also be seen when he charted variations in the weather, noting cold and mild years and when livestock losses were recorded.[60] He does not explicitly connect weather conditions to farming, preferring to state in another volume that the number of livestock in Iceland fluctuated because of land productivity.[61] Þorvaldur states that in earlier centuries, especially between the thirteenth and sixteenth centuries, hayfields were probably larger because bigger cattle herds were kept and so more hay was needed.[62] Then conditions worsened, but he did not specify what these

[58] Þorvaldur Thoroddsen, *Lýsing Íslands* I-IV.
[59] Examples include: G. Gísladóttir, E. Erlendsson, R. Lal and J. Bigham, 'Erosional effects on terrestrial resources over the last millennium in Reykjanes, southwest Iceland', *Quaternary Research* 73 (2010), pp.20-32, p.27; Gathorne-Hardy, 'Lake sediment evidence', p.424.
[60] Þorvaldur Thoroddsen, *Lýsing Íslands* II, pp.371-381.
[61] Thoroddsen, *Lýsing Íslands* III, p.225.
[62] Ibid., p.91.

conditions were, so from the mid-sixteenth to the eighteenth century, hayfields became smaller and small farms and hill farms were given up or the land farmed only periodically.[63]

Another consequence of the time was that *Diplomatarium Islandicum*, a publication that transcribes medieval documents, and was used by Þorvaldur, had only published up to volume eleven by the time *Lýsing Íslands* final volume was published. Another four volumes of *Diplomatarium Islandicum* were published from 1923 to 1950 containing evidence for the period 1200 to 1570, mostly dated to the sixteenth century.[64] It is not known if Þorvaldur consulted these unpublished documents, but he does not include them in his *Lýsing Íslands*. Thus, this study advances the topic of farming because it has examined all the *máldagar* in *Diplomatarium Islandicum*, of which nearly 1,200 *máldagar* contain information on livestock, as well as numerous other transcribed documents.[65]

1.3.1 Livestock Numbers

For all its limitations, Þorvaldur's work still remains the foundation of all historical agricultural discussions, so it is necessary to return to his work before moving on to more recent scholarship. Þorvaldur was aware, for example, that the numbers of livestock recorded in the *Íslendingasögur* could be exaggerated, as he points out with the case of Hrólfur rauðskeggur in *Landnámabók*.[66] Nevertheless, Þorvaldur argued that there were more cattle during the Commonwealth period and that there were more cows per household than at the time when he was writing. With regard to animal husbandry, he thought non-milking sheep were left outside most days while milking-ewes were put out on pasture where possible.[67] His assertions were based on the saga evidence that pertained to large farms. He acknowledged that there was a lack of evidence for smaller independent farmers and dependent farmers, showing that the extant livestock figures were not representative of Icelandic farms in general.[68] His view was that non-milking cattle were more numerous than in the early twentieth century and that practices had also changed in the intervening centuries. In the Commonwealth period, oxen were allowed out to graze during the winter and were driven to

[63] Thoroddsen, *Lýsing Íslands* III, pp.92-93.
[64] *Diplomatarium Islandicum: Íslenzkt fornbréfasafn, sem hefir inni að halda bréf og gjörninga, dóma og máldaga, og aðrar skrár, er snerta Ísland eða íslenzka menn* I-XVI (Reykjavík, 1857-1950). A sixteenth volume was published (1952-1972) containing documents dated between 1415 and 1589, related to international trade.
[65] See Section 1.4.3.
[66] Thoroddsen, *Lýsing Íslands* III, p.279; *Landnámabók*, ÍF I, chapter 355, p.358.
[67] Thoroddsen, *Lýsing Íslands* III, p.281.
[68] Ibid., p.214.

the uplands pasture during the summer, habits that were no longer practised in Þorvaldur's day.[69] As a point of contrast that few have considered, Þorvaldur stated that cows were better fed and cared for in his time than in previous centuries. Thus, while discussions have centred on the number of animals raised in Iceland, it may be the case that there were fewer animals but they were better fed and so individual animals were more productive.[70] If this was the case, then a reduction in livestock numbers would not necessarily have resulted in a reduction in output. Unfortunately, it is not until the early modern period that we have records of the amount of fodder feed to livestock.

Þorvaldur also saw many similarities with sheep farming practices between the Middle Ages and his own time, but still adhered to the idea of a downturn in farming in the later medieval and early modern period. According to Þorvaldur, in the thirteenth century sheep numbers were relatively higher to the number of cattle based on numbers obtained from *máldagar*, but had fallen in the intervening centuries.[71] Further, he argued that sheep numbers were considerable in the fourteenth to sixteenth centuries but not as high as cattle, though there are fewer sources from the fifteenth century onwards.[72] Þorvaldur, like others after him, based his comparison on the legal texts' approximate equivalent of one head of cattle for six sheep, a ratio which is thought to reflect the relative value of what each animal produced.[73] Þorvaldur saw a change in farming in the seventeenth century with monasteries owning fewer non-milking livestock after the Reformation. This century, in his view, was the harshest century in terms of weather. Most animals were kept outside, so when the bad weather came the livestock suffered for want of shelter. In addition, the 1600s were punctuated by several outbreaks of livestock disease. He noted that further difficulty is added to any investigations into this century because of the dearth of sources.[74] The evidence for other centuries may have been scarce but at least there was something available, be it sagas or *máldagar*. It is not until the end of the seventeenth century that information becomes available in the form of land registers.

[69] Thoroddsen, *Lýsing Íslands* III, p.215.
[70] Ibid., p.257.
[71] Thoroddsen, *Lýsing Íslands* III, pp.283-284.
[72] Ibid., pp.285-286.
[73] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, p.123.
[74] Thoroddsen, *Lýsing Íslands* III, p.286.

Jón Jóhannesson, several decades after Þorvaldur, in his *A History of the Old Icelandic Commonwealth*, briefly summarised farming practices during the Commonwealth period as part of his survey of medieval Iceland.[75] While this is shorter and less detailed than Þorvaldur Thoroddsen's work, Jón was aware that livestock populations fluctuated through time and practices differed across the country. He saw the rise in sheep numbers relative to cattle as representing a decline in the economy, not an adaptation to conditions in Iceland.[76]

A significant recent survey that incorporates a discussion of animal husbandry is Gunnar Karlsson's *Lífsbjörg Íslendinga frá 10. öld til 16. aldar*.[77] Gunnar appears to think it is possible and necessary, to calculate livestock numbers from the fragmentary sources. He attempts to calculate the change in population numbers for cows, oxen and sheep between the Middle Ages and the early eighteenth century. His choice of time period is important because within it there are so many impacting factors on farming, from the supposedly prosperous earlier centuries through to the harsher sixteenth and seventeenth centuries. His starting point is the number of *þingfarakaupsbændr* (sg. *þingfarakaupsbóndi*, assembly-tax-paying householders[78]) and makes allowances for the inclusion of large farm estates, which gives a total of 5,040 farms. Then he uses sagas' evidence of livestock numbers to calculate the approximate total livestock population and estimates there to have been an average of ten cows on each farm in the Middle Ages.[79] While this figure is an average, it fails to include farmers whose farms did not qualify for the assembly tax, and does not take into account the differences between independent and dependent farms. These livestock figures are based on numbers given in the sagas that are related due to their exceptionality, and thus cannot be taken as representative of the majority of Icelandic farms during these early centuries. Gunnar is comparing figures from higher status farms from sagas with a land register that includes farms of all statuses, except for the east of Iceland.[80]

Gunnar estimates that there had been a 55% decline in animal numbers from the Middle Ages to an early eighteenth century land register, suggesting a dramatic reduction in the number of

[75] Jóhannesson, *A History of the Old Icelandic Commonwealth*, pp.288-296.
[76] Ibid., pp.289, 294.
[77] Karlsson, *Lífsbjörg Íslendinga* (Reykjavík, 2009).
[78] Vésteinsson, *The Christianization of Iceland*, p.296.
[79] Karlsson, *Lífsbjörg Íslendinga*, p.152.
[80] Gunnar is utilising *Jarðabók of Árni Magnússson and Páll Vídalin* record farms across Iceland except in eastern Iceland (Múlasýsla and Skaftafellssýsla), as these volumes were lost in a fire. Other seventeenth century land registers are available, but do not record livestock numbers, see Section 1.4.4.

both cattle and sheep during the later Middle Ages.[81] He is basing his calculations on our only available evidence for the Icelandic human population, which is Ari fróði's figure for the number of assembly-tax paying farmers c.1100.[82] Unfortunately, this fugure does not tell us how many non-assembly-tax paying farmers there were in Iceland at this time and so we cannot account for their livestock. The reliance on this specific time also fails to appreciate potential fluctuations in livestock numbers over the centuries, making it seem that there was a continuous downward trend in livestock numbers between these two points in time. It is very likely that livestock numbers would have varied over this time period, especially during plague outbreaks. In addition, it is difficult to examine changes in livestock population over the centuries when the first land register to record livestock was compiled shortly after and during a number of famines, and outbreaks of human and livestock disease, specifically smallpox in 1670-1672 and 1707-1709.[83] Both smallpox outbreaks would have resulted in less livestock being reared, so it is unsurprising that fewer animals were recorded at the start of the eighteenth century than estimated for the Middle Ages. Calculating pre-1700 countrywide livestock populations for Iceland isa thankless task because of the limitations of our sources and so the result can only very be a general figure. As discussed in this thesis, it is more rewarding to examine local changes with evidence at several points over the centuries than attempting to calculate total countrywide livestock numbers.

Árni Daníel Júlíusson and Jónas Jónsson have published the most recent synthetic work on Icelandic farming in the shape of the four-volume *Landbúnaðarsaga Íslands*.[84] Árni Daníel and Jónas divide the timeframe of Icelandic farming addressed in this present thesis (up until 1600) into three phases: 900-1100 AD, 1100-1400 AD, and 1400-1600 AD.[85] 900-1100 AD is characterised as a time of adaptation, and in agreement with Þorvaldur, during this time the most emphasis was on cattle farming.[86] 1100-1400 AD is presented as a time of growth by Árni Daníel and Jónas, where the land was fully settled but the organisation of the land was still developing and estates come into existence. There was relative stability in livestock proportions in this period, though the number of sheep was increasing to varying degrees

[81] Karlsson, *Lífsbjörg Íslendinga*, p.153.
[82] *Íslendingabók*, ÍF I, chapter 10, p.23.
[83] Thoroddsen, *Lýsing Íslands* III, pp.276, 286 lists outbreaks of animal disease between the sixteenth and eighteenth centuries.
[84] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I-IV.
[85] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, p.83.
[86] Thoroddsen, *Lýsing Íslands* III, p.214.

across the country.[87] Similarly, Þorvaldur stated that cattle numbers remained constant in the 1200s and 1300s, whereas based on *máldagar* evidence, the 1200s was the century with most sheep ownership, more so than in the later medieval period.[88]

Differences arise between Þorvaldur, and Árni Daníel and Jónas as to when significant changes in livestock populations occurred. Árni Daníel and Jónas see 1400-1600 AD as a time of much change in livestock numbers as sheep increased but cattle reduced because, amongst other factors, the lack of labour caused by the plagues.[89] The plagues greatly affected farming because they reduced the labour force, causing large numbers of livestock to be slaughtered, thus less vegetation was needed and the hayfields became smaller.[90] Árni Daníel and Jónas argue that the overall number of cattle in the 1400s was less than in the 1200s and 1300s, and in the early 1500s there was a move towards sheep farming and less dry-cattle were reared relative to milking cattle.[91] Þorvaldur, however, argued that it was not until the 1600s that cattle farming decreased because of farming methods, unfavourable trade. In addition, bad weather conditions meant people had to trade more than they done previously, and needed tradable goods, of which sheep products were in demand.[92] Þorvaldur saw sheep owning still being relatively less than cattle owning during 1500s, probably based on the ratio of one neat to six sheep, though livestock herds became smaller on church-owned farms after the Reformation.[93] With regard to church-farms, monasteries and bishoprics, Árni Daníel and Jónas assert that they maintained the same number of cattle or increased them during the 1400s, while larger secular farms increased the size of their cattle herds through inheritance after the plagues.[94] In short, the difference between these scholars' arguments is when sheep surpassed cattle. While there were some changes earlier, Þorvaldur saw significant changes in livestock numbers and relative proportions in the 1600s due to the increased need to generate desirable good for trade. Árni Daníel and Jónas, on the other hand, saw sheep increasing though considerable changes did not take place until the early 1500s, and by this time non-milking cattle had decreased in comparison to milking cows.

[87] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands*., I, p.123.
[88] Thoroddsen, *Lýsing Íslands* III, pp.225, 284.
[89] Thoroddsen, *Lýsing Íslands*, I, p.184.
[90] Ibid., I, p.177.
[91] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, p.184 and III, p.125.
[92] Thoroddsen, *Lýsing Íslands* III, p.228.
[93] Thoroddsen, *Lýsing Íslands* III, p.286.
[94] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* III, p.124.

If we turn to archaeological evidence, the worsening conditions is often shown by proportionally less cattle in the zooarchaeological record compared to sheep, or a reduction in the relative number of cows to ewes in the documentary sources. Some have argued that hardship can be seen in the quantity of fish relative to domestic livestock in the zooarchaeological record, as fish was used as a buffer against the variability of agricultural production caused by the unpredictability of the climate.[95] The abandonment of farm sites has also been used to illustrate decline in land productivity in Iceland. Firstly, the abandonment of sites in the uplands before 1200 has been argued to be due to the cooler climate, degradation of vegetation or farms being established without sufficient resources, forcing the inhabitants to move.[96] Socio-political factors have also been advanced as an explanation.[97] Later, the abandonment of farm sites in the fifteenth century has been shown to be due to the loss of human population from the two plague epidemics. The slow re-establishing of these farm sites have been taken as evidence for the slow recovery of the human population.[98] It is unsurprising that a loss of human population caused sites to be abandoned. The survivors would not have been able to maintain farms without a sufficient workforce, thus survivors came together to farm. The plague, however, was not the sole reason for later medieval farm abandonment, and a re-examination of the sources have questioned the high mortality rates asserted in earlier scholarship.[99]

1.3.2 Source Limitations

Þorvaldur Thoroddsen was aware of the limitations of the different kinds of sources he had access to. He stated, when utilising the *máldagar* to investigate the fourteenth and fifteenth centuries, that more is known about the biggest farms, for example chieftaincies, bishopric, monasteries and *staðir* (church-farms with ownership of more than 50% of the *heimaland*), than small independent and tenant farms. A large part of the herds on these smaller farms,

[95] Smith, 'Landnám: the settlement of Iceland', p.341; A. Dugmore, D. Borthwick, M. Church, A. Dawson, K. Edwards, C. Keller, P. Mayewski, T. McGovern, K. Mairs and G. Sveinbjarnardóttir, 'The role of Climate in Settlement and Landscape Change in the North Atlantic Islands: An Assessment of Cumulative Deviations in High-Resolution Proxy Climate Records', *Human Ecology* 35(2) (2007), pp.169-178, p.170.
[96] G. Sveinbjarnardóttir, K. Mairs, M. Church and A. Dugmore, 'Settlement History, Land Holding and Landscape Change, Eyjafjallahreppur, Iceland', in J. Arneborg and B. Grønnow (eds.) *Dynamics of Northern Societies: Proceedings of the SILA/NABO Conference on Arctic and North Atlantic Archaeology Copenhagen, May 10th-14th, 2004* (Copenhagen, 2006), pp.323-334, p.332; Dugmore et al., 'Abandoned Farms', p.9.
[97] Dugmore et al., 'An Over-Optimistic Pioneer Fringe?', pp.335-346.
[98] Gunnar Karlsson, 'Plague without rats: the case of fifteenth-century Iceland', *Journal of Medieval History*, 22(3) (1996), pp.263-284, p.273.
[99] C. Callow and C. Evans, 'The mystery of plague in medieval Iceland', *Journal of Medieval History* 42(2) (2016), pp.254-284, pp.255-256.

Þorvaldur stated, probably were leased-livestock from the chieftains' farms and large church-farms, a big difference from the economy of the Saga Age.[100]

An issue with the inclusion of saga evidence in research is illustrated in Jón Jóhannesson's work as he too utilised the sagas, along with the legal and charter evidence. He concentrated on farms known from the sagas, yet seems unclear about how far to use the saga evidence. For example, he was certain that a specific byre was the byre burnt in 1010, as told in *Njal's saga*, but then doubts the saga over whether another farm was owned by a particular farmer.[101] Furthermore, he is not always clear where he got his information when examining livestock population. Jón's work came before the modern advancements of archaeology and environmental sciences; however, he was aware of the expanding avenues of evidence as he introduced soil analysis to his discussion.

Gunnar Karlsson's examination, on the other hand, benefits from recent advancements and draws upon zooarchaeology, as well as the excavations of the physical remains of byres to be able to estimates the number of cattle that the byres could have held. For example, by incorporating the full range of techniques now available to us, he argues that the space for each animal differed between excavated sites.[102] It is useful because it gives an approximation to the number of cattle on the farm at one point in time, presuming, amongst other things, that all the animals housed were cattle. Archaeological data, however, does not provide information on the livestock housed in byres and so documentary sources are needed to elaborate upon this topic.

Árni Daníel and Jónas draw upon all the source types mentioned above, however unlike the others, they examine the *máldagar* evidence in greater detail to chart variation in cow and ewe numbers between the fourteenth, and then the fifteenth and sixteenth centuries.[103] Previously, selected *máldagar* had been used to illustrate exceptional numbers of livestock on certain farms. Árni Daníel and Jónas view the figures from a country wide perspective. They also follow the zooarchaeological approach in their methodology to give ratios for the relative proportions of cattle to sheep, and then compare their ratio from the *máldagar* with

[100] Thoroddsen, *Lýsing Íslands* III, p.284. For a detailed discussion of church-farms, see Chapter Four.
[101] Jóhannesson, *A History of the Old Icelandic Commonwealth*, pp.289, 298.
[102] Karlsson, *Lífsbjörg Íslendinga*, pp.128-129.
[103] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, pp.124, 181.

the zooarchaeological ratio. While both ratios are showing the relative numbers, they are calculated from evidence at the two ends of the farming process: for the *máldagar* the production pattern, and the zooarchaeology the consumption pattern. In addition, the *máldagar* tend to record only the milking stock (cows and ewes), whereas zooarchaeology included the animals that were disposed at a site. Thus, these ratios do not represent the same thing and an understanding of how both ratios are calculated needs to be kept in mind.

Quite rightly, these works all propose that the first centuries of Icelandic settlement were a time of adaptation. The question arises of when the change to a sheep dominated farming economy occurred. The fifteenth century was a time of human demographic change due to the outbreaks of two plagues. The Church established a more secure economic basis during the twelfth century, and again profited in livestock during the fifteenth century, as did large estate owners. Another question arises about whether these changes suggest a 'decline' or an adaption to the different conditions. In addition, questions about whether these changes were universal across Iceland, and were constant or fluctuated are also raised.

Any discussion of past economies in Iceland needs to consider the wider context, as farming did not only rely on cattle and sheep. Other species, both domestic and wild, were consumed. The zooarchaeological data provides us with insights into the changing relationships between the domestic species and also the wild resources. This overview is necessary because both domestic and wild resources contributed to people's survival. The settlers brought with them a standard package of domestic animals that they had brought to all the North Atlantic colonies to help them settle the unknown lands. This package included cattle, sheep, horses, pigs and goats.[104] Based on a limited number of archaeofaunal collections – publications usually refer to fewer than fifteen – a general pattern has been noted. By the mid-tenth century pigs and goats vanished from 'normal Icelandic farmyards', possibly as farming practices adapted to suit the Icelandic environment.[105] Overall, for the ninth and tenth centuries the zooarchaeology demonstrates the utilisation of wild and domestic resources that then changed to mainly domestic species between the eleventh and twelfth centuries.[106]

[104] McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.30.
[105] T. McGovern, S. Perdikaris and C. Tinsley, 'Economy of Landnám: The Evidence of Zooarchaeology,' in A. Wawn and T. Sigurðardottir (eds.), *Approaches to Vinland* (Reykjavik, 2001) pp.154-166, p.157.
[106] McGovern et al., 'Coastal connections, local fishing', p.191.

Further adjustments to livestock herds took place in the twelfth century when the number of caprine bone fragments begins to increase relative to cattle bone fragments.[107] It has been argued that sheep were better suited to the Icelandic environment whereas cattle needed larger amounts of better quality fodder.[108] For sites dated to between the thirteenth and fifteenth century, marine species accounted for 50%-70% of the NISP bone fragments.[109] Sheep still dominated the domestic species in the eighteenth century, however, marine species were now generally outnumbering domestic species in the archaeofaunal collections.[110] These patterns are from a small number of sites and so need to be viewed with some caution, though the figures are continuously being reassessed in light of new excavations. Nevertheless, this small number of sites demonstrate that there were changes in the acquisition of resources, yet it only shows the consumption of different species, it does not show how species were reared before they were consumed. While fish were utilised for their primary products only, for example meat and oil, cattle and sheep could produce milk, wool and provide traction before they were consumed.[111] The zooarchaeological collections, sometimes, are only able to provide information on species, not age or sex, and thus limit our understanding, for example, of the proportion of young to old or female to male animals discovered. Therefore, as with all other sources for the past economies of Iceland, zooarchaeology has advanced our knowledge but has limitations of its own. Only by considering critically all evidence can we gain a fuller understanding of the pastoral economy of Iceland.

1.4 SOURCES

The source material for this study varies in type. No one form of evidence covers the whole period. The literary sources have been much discussed, while the documentary sources for the latter half of the period found in *Diplomatarium Islandicum* have only recently begun to be discussed in detail.[112] A summary of the sources utilized in this research is essential because the sources govern the time frame and research topics that can be discussed.

[107] McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.41.
[108] S. Friðriksson, 'Grass and Grass Utilization in Iceland', *Ecology*, 53(5) (1972), pp.785-796, p.790.
[109] McGovern et al., 'Economy of Landnám', p.159. NISP (Number of Identified Specimens Present).
[110] Hambrecht, 'Zooarchaeology and the Archaeology', p.15.
[111] Wool played a major role in the Icelandic economy as it was made into *vaðmál*, a course, durable woollen clothe, that was used as a unit of currency and a significant export item.
[112] Compare for example the amount of scholarship on the sagas to publications related to diplomatic documents and a clear preference for saga research emerges. A detailed discussion is included below.

1.4.1 Sagas

The saga evidence can be divided into various genres, the *Íslendingasögur* (Sagas of Icelanders), *Sturlunga saga* and the *biskupasögur* (Bishops' sagas). These groupings are modern categories, not concepts used by the writers of these sagas.

The *Íslendingasögur*, or the Family sagas, of which there are about forty, recall events set in the tenth and eleventh centuries, but were written from the thirteenth century onwards.[113] The dating of the sagas, either absolutely or in relation to each other, is difficult because the manuscripts that have survived are copies dating from the fourteenth, fifteenth and sixteenth centuries. The potential inaccuracies of oral tradition have cast doubt on whether these sagas contain useful evidence of tenth and eleventh century society. Most scholars now agree that these sagas are twelfth and thirteenth century constructs about the past, and contain a combination of oral tradition and contemporary inspiration.[114] Due to this uncertainty, and that the *Íslendingasögur* generally show a stable, established system of farming with no indication of adaptation that must have occurred when the settlers arrived, this thesis sees the sagas as twelfth and thirteenth century representations of earlier times.

Sturlunga saga is a collection of sagas written by different authors about events that occurred in the twelfth to mid thirteenth centuries.[115] It derives its name from one of the most powerful families in Iceland at the end of the Commonwealth Period: the *Sturlungar*.[116] None of the sagas that are found in *Sturlunga saga* survive independently outside the collection.[117] *Sturlunga saga*, in contrast to the *Íslendingsögur*, has been thought to be a closer representation of Icelandic society because of the short time span between the events depicted and the texts' compilation, ranging between twenty and seventy years.[118] Nevertheless, the contemporary nature of *Sturlunga saga* meant the writers could misrepresent individuals and

[113] Vesteinn Ólason, 'Family Sagas' in R. McTurk *A Companion to Old Norse-Icelandic Literature and Culture*, (Oxford, 2005) pp.101-118, pp.101-102.
[114] Sigurðsson, *Chieftains and Power*, p.22; V. Ólason, 'The Sagas of Icelanders', in A. Faulkes and R. Perkins (eds.) *Viking Revaluations Viking Society Centenary Symposium 1992* (London 1993), pp. 26-42, p.37; Miller, *Bloodtaking and Peacemaking,* pp.16-26 shows the extent that it is possible to reconstruct Icelandic society mainly based on the sagas and Miller's approach can be found on pp.44, 50.
[115] J. McGrew, *Sturlunga Saga Volume* I (New York, 1970) and J. McGrew and G. Thomas, *Sturlunga Saga Volume II Shorter Sagas of the Icelanders* (New York, 1974) provide an English translation of this compilation.
[116] J. L. Byock, *Medieval Iceland: Society, Sagas, and Power* (2nd edn., Enfield Lock, 1993), p.4.
[117] P. Sørensen, *Saga and Society: An Introduction to Old Norse Literature* Translation by J. Tucker (Odense, 1993), p.49.
[118] Sigurðsson, *Chieftains and Power*, p.18; Úlfar Bragason, 'Sagas of Contemporary History (*Sturlunga saga*): Texts and Research' in R. McTurk *A Companion to Old Norse-Icelandic Literature and Culture*, (Oxford, 2005) pp.427-446, p.441.

families for social or political reasons, and the 'realist tone' does not ensure truthfulness.[119] The closeness to the events could, however, mean that the texts more accurately represent mundane aspects of life such as farming.

The next grouping of sagas is the *biskupasögur*, also known as ecclesiastical contemporary sagas. These are essentially hagiographical writings about native Icelandic bishops. Like *Sturlunga saga*, the *biskupasögur* record events from the twelfth to fourteenth centuries, but were not written until the thirteenth and fourteenth centuries. They were probably originally written in Latin before being translated into Icelandic.[120] The *biskupasögur* were written at a time when Iceland had no native saints and are seen as an attempt to popularise native saints.[121] What distinguishes the *biskupasögur* from secular contemporary sagas is not always clear as they are set in the same time period, have common characters and one of the *biskupasögur* are found in the *Sturlunga saga* collection, such as *Guðmundar saga góða*.[122]

1.4.2 Legal Texts

The legal texts, of which there are four (*Grágás*, *Járnsíða*, *Jónsbók* and *Búalög*) give different views on Icelandic society than the sagas because the former are prescriptive law, the latter literary. These legal texts shall now be discussed in turn. The earliest law code, *Grágás*, was committed to writing in the early twelfth century and the formulaic nature of some sections is thought to reflect the law codes' origin in oral tradition.[123] The law code survives in two manuscripts, *Konungsbók* and *Staðarhólsbók*, both dated to the second half of the thirteenth century.[124] These manuscripts were private compilations of laws and each has sections that are missing in the other.[125] It has been suggested that these legal texts were committed to writing in order to preserve an element of Icelandic society at a time when society was undergoing changes.[126] Nevertheless, it has been shown that *Grágás* was shaped by European laws of the twelfth and thirteenth centuries.[127]

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[119] C. Clover, 'Icelandic Family Sagas (Íslendingasögur)' in C. J. Clover and J. Lindow (eds.) *Old Norse-Literature: a critical guide* (1985), pp.239-315, pp.255; Bragason, 'Sagas of Contemporary History', p.440.
[120] Byock, *Medieval Iceland*, p19.
[121] M. Cormack, *The Saints of Iceland: Their Veneration from the Conversion to 1400* (Bruxelles, 1994), p.10.
[122] Bragason, 'Sagas of Contemporary History', p.427.
[123] Sørensen, *Saga and Society*, p.95.
[124] *Konungsbók* is mostly used in this study, destinated as K whereas *Staðarhólsbók* is destinated as S.
[125] Byock, *Medieval Iceland*, p.25.
[126] Miller, *Bloodtaking and Peacemaking*, p.43.
[127] Sigurðsson, *Chieftains and Power*, p.19.

Grágás covers nearly every aspect of daily life, including farming. The level of detail is demonstrated by *Grágás* being the longest of all the medieval Scandinavian law codes. It is three and a half times the length of the next longest Scandinavian law code, the Danish East Sjælland Laws.[128] *Grágás* represents an idealised world and a snapshot of the time it was written, though the manuscripts do provide conflicting evidence within themselves.[129]

The late thirteenth century saw new legal codes introduced by the Norwegian king. In 1271, *Járnsíða* was introduced to Iceland. It was largely based on Norwegian law, 83% of the laws were Norwegian with 17% taken from *Grágás*.[130] It took two years to be approved and was unpopular in Iceland.[131] The only sections of *Grágás* that remained untouched were the Christian Laws.[132] *Járnsíða* was replaced by *Jónsbók* in 1281 and was closer to *Grágás* than *Járnsíða*.[133] *Jónsbók* shared 56% of the same laws as *Grágás* but did not contain any ecclesiastical laws.[134] The Christian Law section continued in use until 1275 in the diocese Skálhólt and 1354 in the diocese of Hólar.[135] *Jónsbók* was amended several times by later royal decrees, and remained in use until the eighteenth century.[136]

The final legal text to be used in this study is *Búalög* and is usually referred to as an Icelandic 'agricultural law' or 'house-hold law' text as it contains clauses on both household and agricultural matters.[137] The oldest manuscripts date to the fifteenth century, though several later copies exist, and many contain the same clauses. It is argued that the later revised manuscripts show the changing social and economic conditions of Iceland up until the late eighteenth century.[138] *Búalög* prescribes on all sorts of issues, such as the teaching of the alphabet to household members, the standard value for goods and assigned price for the certain farming tasks, amongst other things. Up until the eighteenth century *Jónsbók* remained in use with *Búalög* acting as a supplementing text.

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[128] Byock, *Medieval Iceland*, p.26.
[129] A. Dennis, P. Foote and R. Perkins, *Laws of Early Iceland Grágás The codex regius of Grágás with material from other manuscripts* I (Winnipeg, 1980), pp.9-10.
[130] J. Schulman, *Jónsbók: The Laws of Later Iceland* (Saarbrücken, 2010), p.xiv.
[131] G. Sandvik and J. Sigurðsson, 'Laws' in R. McTurk *A Companion to Old Norse-Icelandic Literature and Culture*, (Oxford, 2005) pp.223-244, p.227.
[132] Dennis et al., *Laws of Early Iceland* I, p.5.
[133] Byock, *Medieval Iceland*, p.76.
[134] Schulman, *Jónsbók*, p.xv.
[135] Dennis et al., *Laws of Early Iceland* I, p.6.
[136] Sandvik and Sigurðsson, 'Laws', p.228.
[137] Júlíusson, 'Signs of Power', p.21; Hastrup, *Nature and Policy*, p.54.
[138] Hastrup, *Nature and Policy*, p.54.

1.4.3 Documentary evidence

As has been referred to above, other documents survive from this time period and these include *máldagar* (sg. *máldagi*, church-charters), price-lists, contracts and judgements. These, along with the other documents, have been collected in the *Diplomatarium Islandicum* collection.[139] After the introduction of the Christian Law section to *Grágás* in the early twelfth century, it was a legal requirement for each church to produce a *máldagi*, a list of all its property that was to be read out in public.[140] These *máldagar* were collected together by the bishops of the two dioceses in Iceland during the fourteenth century. For the diocese of Hólar two complete and one incomplete collection survive, and the diocese of Skálhólt has one complete collection, all dated to the fourteenth century.[141] Some of the original documents survive, though most are seventeenth-century copies. Where the originals survive, comparisons have shown that the copies are accurate suggesting overall the copies may be true to the originals.[142] Doubts, however, have been raised about the accuracy of the dates assigned by the *Diplomatarium Islandicum* editors because of the difficulty in and lack of evidence for dating, and it has even been argued that the assigned dates should be ignored.[143] While it is essential, as with any source, to bear the dating issue in mind, to ignore the dating would remove a source of diverse material from this study and cause more problems than it would solve. Instead, it would be better to use the documents as general indicators of animal husbandry from around the time of the assigned date, not as specific, snap-shots.

Within this thesis, the main documents used are the *máldagar* because they contain a wealth of information about the property owned by churches. However, the use of *máldagar* in previous research has been somewhat piecemeal. When *máldagar* have been used it is usually for illustrative purposes, such as to point out the largest livestock herds. Few studies have used the full range of documents available.[144] Some have even gone so far as to state that the *máldagar*, along with the other diplomatic documents, were 'dull' in comparison to the

[139] *Diplomatarium Islandicum*. Hereafter *DI* in footnotes.
[140] *Grágás* (1852) K.4, p.15.
[141] Cormack, *The Saints of Iceland*, p.25.
[142] Gunnar F. Guðmundsson, 'Icelandic Cartularies', in Lilja Árnadóttir and Ketil Kiran (eds.) *Church and Art: The Medieval Church in Norway and Iceland* (Reykjavík, 1997), pp.61-64, pp.63-64.
[143] Cormack, *The Saints of Iceland*, p.26.
[144] Cormack, *The Saints of Iceland*, p.26; E. Sigurdsson, '*Máldagabœkur* and Administrative Literacy in Fourteenth-Century Iceland', *Quaestio insularis* 13 (2013), pp.28-49; Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, pp.121-124, 181-184, 192-193. These studies that have utilised the full range of *máldagar* available to research different topics, demonstrating the versatility of the source type.

literary sources from earlier centuries.[145] More recently, Árni Daníel Júlíusson and Jónas Jónsson have demonstrated the usefulness of the *máldagar* in their examination of medieval farming.[146] This study has examined the entire published corpus and collated livestock information for a total of 1,163 *máldagar*. By drawing on this information, it is possible to build up a picture of livestock practices and regional differences on church-farms. On occasion, other diplomatic texts have been used and these will be indicated where appropriate.[147]

Three price-lists are also included in *Diplomatarium Islandicum* that provide information on the value of livestock. One from the spring assembly at Árnessþing, dated to c.1200, and the other two from the *Alþing*, dated to c.1100 and c.1280.[148] As will be shown when the value of livestock is examined, there are slight differences between the valuations.[149] The spring assembly will be used to show the local valuations, whereas the *Alþing* show a general value across Iceland. These are the only extant price-lists so caution is needed when extrapolating annual or general trend.

1.4.4 Land Registers

There are several land registers, *Jarðabækur*, from the end of the seventeenth century, however, the most useful for investigating livestock is the *Jarðabók Árni Magnússon and Páll Vídalín* (1702-1712).[150] *Jarðabók* contains records for all of Iceland, except for the eastern regions of Múlasýsla and Skaftafellssýsla.[151] As such, the register is not a complete record for Iceland at the start of the eighteenth century, and any differences in information pre-1707 and post-1709 must be viewed within the context of the smallpox epidemic. Nevertheless, it was the first register that recorded, farm-by-farm, the livestock population of Iceland. As mentioned above, some scholars use the *Jarðabók* data as a point of comparison with livestock population in earlier centuries. This thesis does not follow that methodology. Instead, *Jarðabók* will be used as a point of comparison for the sixteenth century when

[145] Vésteinsson, *The Christianization of Iceland*, p.1.
[146] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, pp.178, 181, 184, *passim*.
[147] A fuller discussion of the *máldagar* is contained in Chapter Four below.
[148] DI I, pp.315-317; DI I, pp.162-167; DI II, pp.167-171.
[149] See Section 3.1, especially Table 1.
[150] *Jarðabók Árni Magnússon and Páll Vídalín* I-XI (Reykjavík, 1980-1988), hereafter referred to as *Jarðabók*; Lárusson, *Old Icelandic Land Registers,* pp.25-27.
[151] Karlsson, *Iceland's 1100 Years*, p.162.

discussing lesser mentioned livestock species. The register is outside of the time frame of this study so will not be discussed systematically.

1.4.5 Archaeological evidence

The archaeological material in Iceland comes from a variety of sites and from excavations of differing quality. The earliest excavations were concerned with providing physical evidence to confirm saga narrative. These excavations sought structural remains, and once these had been found excavations were halted and resulted in single-phase site plans. This approach relied on the belief of the historical accuracy of the sagas. As the twentieth century developed, so did archaeology. Excavations now investigated multiple phases not the last context, however, the archaeology was still often explained in terms of the literary evidence. The early heavy concentration on sites of significance in sagas inevitably led to reactionary approach from the mid-twentieth century, which disregarded the literary material. Whilst this new approach widened the scope of research, it has been criticised for rejecting the literary framework but at the same time relying on it for things like names and dates.[152] Further, more late medieval and early modern excavations have taken place, though investigations at Viking Age and early medieval sites are still disproportionally more common than later sites.[153]

A glimpse at the published and grey literature from the last two decades or so will reveal the widespread use of inter-disciplinary approaches within archaeology. The research focus has also been expanded so it is no longer single farmsteads, but now the wider landscape or regions are being investigated. From the 1990s onwards, after initial single site excavations there were moves to expand research to encompass the surrounding regions, such as in Mývatn, Svalbarð, Gásir and Þjórsárdalur.[154] These regional investigations have examined several neighbouring sites and utilising a range of methods whether for open-area excavations

[152] Adolf Friðriksson, *Sagas and Popular Antiquarianism in Icelandic Archaeology* (Aldershot, 1994), pp.178, 187-188.
[153] Hambrecht, 'Zooarchaeology and the Archaeology' shows how later excavations are expanding our knowledge base.
[154] There are numerous publications covering these regions, here are just a few examples that illustrate the diversity of methods used: I. Simpson, G. Guðmundsson, A. Thomson and J. Cluett, 'Assessing the Role of Winter Grazing in Historic Land Degradation, Mývatnssveit, Northeast Iceland', *Geoarchaeology* 19(5) (2004), pp.471-502; T. Amorosi, 'Climate Impact and Human Response in Northeast Iceland: Archaeological Investigations at Svalbarð, 1986-1988', in C. Morris and D. Rackham (eds.) *Norse and Later Settlement and Subsistence in the North Atlantic* (Glasgow, 1992), pp.103-138; Harrison et al., 'Gásir in Eyjafjörður'; Dugmore et al., 'Abandoned Farms'.

or test trenching. In these investigations written evidence is being included along with other methodologies, such as environmental sciences and zooarchaeology.

Archaeological evidence is incorporated into this study, including grey literature made available by the North Atlantic Bio-cultural Organisation (NABO).[155] The evidence is invaluable, and ranges from zooarchaeology to structural remains. It is important that the whole landscape is considered because animals were not only kept on farmsteads. Some livestock were moved around the landscape to take advantage of particular pastures, therefore, where possible, evidence of structures, such as sheepfolds and shielings will be included. In order to chart changes over time it is essential to have sites with a long chronology or sites with dates that span the whole time period. Unfortunately, this is not yet the case with all excavations. Mirroring the general pattern of Icelandic archaeology, there is a temporal skew towards the tenth to fourteenth centuries with fewer zooarchaeological collections available for the following centuries. There is also a bias towards sites of higher status, though this is being corrected with regional projects, such as in Mývatn and around Gásir. A hindrance, but not the only reason, in obtaining a long chronology from a site is that since the eleventh century Icelandic farmstead locations have been fairly stable, so at some locations the archaeological evidence is currently inaccessibly because it is under modern farms.[156]

It is important to note that where farms' economies are discussed, whether milk, meat or wool, these inferences are based on zooarchaeological data, and it is necessary to mention that while there are several ways that archaeofauna is quantified, only two will be employed in this thesis. One method is to give the ratio between species, for example one bovine to two caprine. The other is the NISP (Number of Identified Species Present), which calculates the relative proportions of species from the identifiable bones recovered, one bone fragment is counted as one identified species. Evidence from numerous archaeological excavations is utilised in this study, so to aid understanding and limit repetition in the chapters, a short summary is provided of the relevant excavations in Appendix One.

[155] The reports can be accessed at: http://www.nabohome.org/cgi_bin/fsi_reports.pl
[156] A. Friðriksson and O. Vésteinsson, 'Creating a Past: A Historiography of the Settlement of Iceland', in J. Barrett (ed.) *Contact, Continuity, and Collapse: The Norse Colonization of the North Atlantic* (Turnhout, 2003), pp.139-162, p.156.

1.5 THESIS STRUCTURE

The following study will apply a thematic approach to livestock farming, examining the different aspects of farming as a whole system and not divided by livestock as some scholars have done.[157] The following overview will help clarify the structure that this thesis will follow.

Chapter One examines how land was managed for different livestock, and what livestock needed housing during the Icelandic winter. It is important to have an understanding of the how farming was conducted both off- and on-farm, including the use of structures and how these related to the different management strategies employed. There are several types of land, from cultivated land for hay-making to uplands for grazing, and, again, the function of the land was connected to the animals grazed on it.

Chapter Two considers the value of livestock, whether potential or realised, and examines how and why particular animals were assessed economically. The Icelandic legal texts paid particular attention to the value of livestock and listed the desired characteristics of these animals.

A critical evaluation of previous scholars' estimations of livestock population in Iceland is provided in Chapter Three, before moving on to addresses the size of herds and how the composition of these herds can aid our understanding of past economies. Iceland did not follow a uniform farming strategy and by examining these differences we gain a greater understanding of the complexity of farming practices.

The *máldagar* provide an opportunity to gain an insight into the livestock on church-farms over several centuries. This source type has been somewhat neglected until recently. Chapter Four collates all the livestock information from these documents to examine the changing nature of pastoral farming on these farms to demonstrate the complexity of farming strategies on a local, regional and countrywide scale. The discussion focuses on cattle and sheep because these are the animals consistently recorded in the *máldagar*.

[157] Þorvaldur Thoroddsen divided his work by livestock species, though, overlaps were made in some of his discussion. In a similar manner, Gunnar Karlsson's text-book *Lífsbjörg Íslendinga* adopted this approach for some sections, but used a thematic approach in other sections. Árni Daníel Júlíusson and Jónas Jónsson incorportate both approaches: thematic in volume I before focusing on each livestock species in volumes III and IV.

Icelandic livestock were utilised for their full range of products, both from the living creatures and their carcasses. While animals could be made into various products, from food stuffs to household items, Chapter Five shall focus on those items where there is evidence available, and how these products, both from the live and slaughtered animals, were consumed.

1.6 CONCLUSION

Farming practices in Iceland were distinguished from practices undertaken in north-western Europe because of Iceland's environment and location in the North Atlantic, which made it more dependent on pastoral farming. The challenges the Icelanders met in transplanting society from other regions demonstrates the adaptability of this population. Iceland differed from its fellow late settled neighbour Greenland as Iceland survived while Greenland failed as a permanent place of habitation. In short, the pastoral economy was one aspect of a particular population that was unlike other countries in north-west Europe, though they may have shared a common heritage.

CHAPTER ONE
FROM FARM TO PASTURE: THE USE OF LAND AND BUILDINGS

2.1 INTRODUCTION

The purpose of this chapter is to examine the foundation of Icelandic pastoral farming, that is to say land and vegetation. The management of the land had an effect on the rearing of livestock, and as will be shown the use and degradation of land in Iceland is a much discussed topic. As land was utilised in various ways at different times of the year, it is important to clarify how it was used and for what purpose. Hay and winter grazing were important for feeding livestock through the winter, as were shielings, upland and off-farm pastures for summer grazing, therefore, land resources used throughout the year will be included here. To focus on a season or one area of grazing fails to appreciate the continuous cycle of farming routines. Many scholarly words have been spent on cattle and sheep grazing habits, but this chapter will also examine the role of other domestic species, as these animals also made use of the land.

Farm buildings and pasture were as important to farming as livestock, yet they have received less attention than dwelling structures. The importance of fodder to medieval Icelandic society can be seen in the literary sources, for example the cultural association between grass and milk is illustrated in the statement from *Landnámabók* that 'every blade dripped with butter' and the value attached to grass when a character thought grass smelt as sweet as honey.[158] The beauty of a productive landscape is further echoed in *Brennu-Njáls saga*, when Gunnar defies his outlawry sentence partly because of the beauty of his farm.[159] Vegetation growth is fundamental to pastoral farming: the amount of fodder that can be gathered limits the number of livestock that can be fed, which limits the quantity of foods produced, and this in turn has an effect on the human population size. In simplified terms, a reduction in the amount of fodder would lead to a famine of varying degrees and a reduction in the number of people, unless other mechanisms were in place to buffer its effect, such as fishing.

[158] *Landnámabók*, ÍF I, chapters 5, p.38 and 135, p.176.
[159] *Brennu-Njáls saga*, ÍF XII, chapter 75, p.182.

More broadly, in order to establish and maintain power in medieval Iceland 'a sound economic base' was needed, and this base relied on the control of large, central farms.[160] The control allowed those vying for power to draw upon a variety of resources to fund their activities and maintain social connections, whether in goods or access to farms and resources. Householder status was essential in Iceland, not just for social standing but also for rudimentary matters such as marriage. Agricultural produce could be given as gifts, such as food or hay, or exchanged for elite items. In addition, chieftains would have needed land to support themselves as the *þingfarakaup*, assembly-tax, was their only regular income from followers.[161] Later, the sheriffs had other incomes from their duties, but would still have needed a reliable income to support themselves.[162] Land was, therefore, the foundation of power and of life in Iceland, yet the conversion of land to power is difficult to assess, and sometimes overlooked in favour of how the power was wielded.[163] In short, land produced fodder, which fed livestock, which produced goods that were used to establish and form social and economic relations, in Iceland and further afield. The more land under a person's or family's control, the more power they could exercise. Any textbook on Icelandic society will discuss how the ruling groups interacted, but few examine the ultimate basis of their power, the land and the pasture.[164] As the smallest unit of production was the farm, it is important to consider how farms managed the sources of fodder and utilised the whole landscape to take advantage of potential sources of vegetation growth.

Another farming issue that will be discussed below is the degradation of land in Iceland. Livestock grazing has been used as an explanation for land degradation, yet many decisions were involved in when and where livestock were grazed, and the differing magnitude of erosion shows that livestock grazing was not uniform across the country.[165] The challenge, therefore,

[160] Sigurðsson, *Chieftains and Power*, pp.111-112, 113.
[161] Gunnar Karlsson, *Goðamenning: Staða og áhrif goðorðsmanna í Þjóðveldi Íslendinga* (Reykjavík, 2004), pp.166-169.
[162] Of course, there were other ways that chieftains could generate an income from farmers, such as receiving or forcefully taking goods from farmers, or requiring farmers to look after their livestock without payment. Landlords would receive rents from their tenants, and the more powerful tended to have more property, thus, more rents.
[163] For example: Júlíusson, 'Signs of Power', p.3; McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.29; Sigurðsson, *Chieftains and Power*, pp.101-119. There were, also, other ways to establish power, though not to the same extent, such as, success in the legal courts, special knowledge or skills, both natural and supernatural, etc.
[164] For example, Karlsson, *Iceland's 1100 Years*; Byock, *Medieval Iceland*; Miller, *Bloodtaking and Peacemaking*; Hastrup, *Nature and Policy*.
[165] Gathorne-Hardy, 'Lake sediment evidence', p.421; McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.41; Simpson et al, 'Assessing the Role of Winter Grazing in Historic Land Degradation', pp.499-500;

is to discover what we can about practices from the available sources of evidence, as has been done by reconstructing past land productivity.[166] A problem with relying on the legal texts, *Grágás* and *Jónsbók*, which prescribe when communal land could be grazed, is that we do not know how closely these laws were followed. The reduction in the number of pigs and goats has been thought to be due to their detrimental effects on the fragile Icelandic soils. As shown elsewhere in this thesis, these species were also ill-suited to the Icelandic environment and were a less economical method of converting fodder into secondary products, which could have encouraged their reduction too.[167]

The use of shielings, off-farm bases, both alleviated the grazing pressure around the main farm and allowed distant seasonal resources to be exploited. Attention has usually been focused on shielings from the Settlement to the fourteenth century in Iceland, though they were in use into the twentieth century. Conclusions have been drawn about livestock populations based on the frequency of shielings that will be challenged below, as too, will certain criteria for identifying shielings. Off-farm grazing was managed in distinct ways due to the products sought from the livestock, with shielings being multi-functional sites for airy production of such goods as dairy products, wood collecting and hay. Farms utilised many fodder resources in the landscape and this could involve most or all of the household being spread across the landscape.

Shelter for animals was another requirement of Icelandic farming, especially during the winter, therefore any discussion of Icelandic farming must include an examination of animal structures, both on and off the farm. In this chapter the evidence for some livestock structures will be examined, for example those used to house cattle and sheep during the winter. It will be argued that greater awareness is needed of the relationship between livestock, structures and land use.

To understand the use of the landscape, we must first understand how a farm fitted into the landscape and the system the farm operated in. It has traditionally been argued that Iceland

J. Brown, I. Simpson, S. Morrison, W. Adderley, E. Tosdall and O. Vésteinsson, 'Shieling Areas: Historical Grazing Pressures and Landscape Responses in Northern Iceland' *Human Ecology* 40 (2012), pp.81-99, p.97.
[166] I. Simpson, A. Dugmore, A. Thomson and O. Vésteinsson, 'Crossing the thresholds: human ecology and historical patterns of landscape degradation' *Catena* 42 (2001), pp.175-192, pp.186-189.
[167] See Section 6.6.

consisted of 'isolated farmsteads',[168] but more recently this idea has been refuted.[169] While farmers may have aimed to be self-sufficient, they were involved in networks, whether as landlord and tenant, or parishioners. Indeed, in published scholarship the Icelandic rural population has been characterised by networks of communal support and inter-dependence, whether exchanging information, goods or labour.[170] For example, the commune (*hreppur*), the smallest administrative unit, which amounted to twenty or more farms, was responsible for system of compensation and the annual *smölun* (round-up).[171] A unique case in *Vopnfirðinga saga* attests to communal co-operation as the men of the district meet once a year to share out tasks.[172] The sagas give us a better sense of social interaction in Icelandic society than other textual evidence. The legal texts also aid our understanding of communal co-operation. Each farm was a separate entity with rights of ownership, but its occupants also had a responsibly to aid neighbours.

These social networks were grafted onto the landscape, linking a farm to the wider landscape and to neighbouring farms in a system of mutual support. It was in the best interests of all to ensure the continuation of farms and their households. If a household failed to survive, that household would then become a burden on the *hreppur*. The survival of the population relied on pastoral farming, and being on the ecological limit of agriculture, climate and environment played a governing role on livestock production. Farming was an introduced means of subsistence, not adapted to the Icelandic conditions, and so there was a constant risk of failure.[173] Pastoral farms were the basic unit of production with the utilisation of fishing and natural resources as alternative avenues of resources.

2.2 LAND DEGRADATION

As mentioned, an important topic in Icelandic historical scholarship is the degradation of the land over time. We must first be aware of the changing nature of Iceland's landscape before

[168] Byock, *Medieval Iceland*, p.10.
[169] Vésteinsson, 'Patterns of Settlement in Iceland', p.12.
[170] Vésteinsson, 'Patterns of Settlement in Iceland', p.12; Thráinn Eggertsson, 'Sources of Risk, Institutions for Survival, and a Game against Nature in Premodern Iceland', *Explorations in Economic History* 35 (1998), pp.1-30, p.8.
[171] *Grágás* (1852) K.234, p.171; Schulman, *Jónsbók*, pp.145-146; Jóhannesson, *A History of the Icelandic Commonwealth*, p.85.
[172] *Vopnfirðinga saga*, ÍF XI, chapter 14, pp.51-52.
[173] P. Oram, 'Sensitivity of Agricultural Production to Climate Change: The Inherent Vulnerability of Production Systems', *Climate Change* 7 (1985), pp.129-152, p.129. The risk of introduced farming can be seen in the case of the extinct Norse Settlement in Greenland, whilst the Inuit population survived.

we can understand how Icelanders managed the various types of land on which they depended. How Icelanders treated, or mistreated, the land had an effect on vegetation cover, deforestation and soil erosion. The traditional narrative of land in Iceland has been described as a loss in vegetation cover from the settlement due to the arrival of humans and the introduction of grazing livestock. *Íslendingabók*'s famous statement that when the settlers first arrived in Iceland trees stretched from the shore to the mountains has partially shaped views of pre-settlement vegetation in the twentieth century.[174] Þorvaldur Thoroddsen considered land types and stated that large areas were treeless so only about a thirtieth of Iceland was wooded. He gave an estimate for tree coverage between 3,500-5,000 km^2 during the Settlement Period, whereas at the beginning of the twentieth century there was only approximately 1,250km^2 of birch trees.[175] Sturla Friðriksson, in 1972, postulated that approximately 50% of vegetation cover was lost between the Settlement Period and the twentieth century based on comparisons between suitable areas for vegetation and present vegetation cover, and further only a quarter of the birch and shrub cover remains.[176]

More recently, environmental research has tended to focus on specific locales, discovering that the timing and extent of landscape change varies across Iceland and it did not start immediately after *landnám*. There is now a greater understanding that landscape change is varied and complex.[177] Not all factors relating to land use have the same influence and magnitude, and while humans and livestock are a key factor, they appear to exacerbate other factors such as climate and environment.[178] Regional studies have shown that woodlands were conserved up until the late seventeenth centuries when more reckless use of woodlands began, and that a simple model of immediate or continuous woodland reduction after the settlement is not appropriate.[179] It is imperative to understand that Iceland's landscape was not in a static state but was changing in response to people, livestock and climatic conditions. Woodland and vegetation cover was reduced, yet to various degrees in different areas.

[174] *Íslendingabók*, ÍF I, chapter 1, p.5.
[175] Thoroddsen, *Lýsing Íslands* II, p.437; Karlsson, *Lífsbjörg Íslendinga*, p.44.
[176] Friðriksson, 'Grass and Grass Utilization', p.786; H. Bjarnason, 'Erosion, tree growth and land regeneration in Iceland', in M. Holdgate and M. Woodman (eds.) *The Breakdown and Restoration of Ecosystems* (New York, 1978), pp.241-248, p.241.
[177] K. Vickers, E. Erlendsson, M. Church, K. Edwards and J. Bending, '1000 years of environmental change and human impact at Stóra-Mörk, southern Iceland: A multiproxy study of a dynamic and vulnerable landscape', *The Holocene* 21(6) (2011), pp.979-995, p.981.
[178] Dugmore et al, 'Abandoned Farms', p.8.
[179] Vésteinsson and Simpson, 'Fuel utilisation in pre-industrial Iceland', p.186.

Iceland was not a uniform country in environment or vegetation type, therefore farmers had to make the most of the vegetation they had access to.

Scholars' vegetation estimates tend to compare coverage at *landnám* with the modern landscape, giving the impression of a continuous reduction over the centuries. For example, various figures have been proposed, calculating that between *landnám* and 1990 the vegetation cover fell from 52% to 28%, or 65% to 25%, and trees from approximately 7% to less than 1%, or 25% to 1%.[180] Others estimate that the vegetation cover at the start of the twentieth century was half the ninth century level and annual vegetation production had been reduced by a third.[181] Vegetation growth models, however, for particular localities in Iceland show a gradual reduction in woodland cover. For example, the inland shieling areas of Sandfell and Arnarvatnssel (Mývatn) had tree coverage estimates of 32%, 20% and 10% respectively in the tenth, fourteenth and eighteenth centuries.[182]

This brief survey shows that there are several ways that vegetation changes have been calculated, but the important point here is the distinction between uplands and lowlands and how they were managed. Iceland is at the geographical limit of vegetation growth and altitude places an environmental limit on plant communities: the cooler the climate the lower the vegetation limit. From vegetation growth models, it has been argued that the loss of growth in the highland had a negligible impact because livestock depended more on the lowlands growth for winter fodder, meaning the extent of the upland vegetation loss would have had a smaller impact on the total amount of available fodder.[183] For fodder acquisition, therefore, the loss of vegetation growth and the proportion of fodder that came from the lowlands is of greater significance than total land productivity.[184]

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[180] Gathorne-Hardy et al., 'Lake sediment evidence', p.414; Smith, 'Landnám: the settlement of Iceland', p.322.
[181] Thráinn Eggertsson, 'Analyzing Institutional Successes and Failures', p.424.
[182] Brown et al, 'Shieling Areas: Historical Grazing Pressures and Landscape Responses', p.84.
[183] Hörður Haraldsson and Rannveig Ólafsdóttir, 'A novel modelling approach for evaluating the preindustrial natural carrying capacity of human population in Iceland', *Science of the Total Environment* 372 (2006), pp.109-119, p.118.
[184] Vegetation cover and the rate of land degradation varied between upland and lowland, across the island and through time, and these variations must be bore in mind for topics of grazing and pasture because they had a direct influence on farming practices. Friðriksson, 'Grass and Grass Utilization', p.795 states most growth is below 500m a.s.l., but that growth continues up to 700m a.s.l.. Haraldsson and Ólafsdóttir, 'A novel modelling approach', p.115 defines lowland as 300m a.s.l. and below and highland as 300m a.s.l. and above, which does not take into account upper limits. The 300m a.s.l. lowland-highland distinction appears to be a common rule of thumb, B. Berson, 'A Contribution to the Study of the Medieval Icelandic Farm: The Byres', *Archaeologica Islendica* (2) (2002), pp.37-64, p.42.

Land degradation is connected to livestock rearing as reductions in vegetation had a knock-on effect of less available grazing for livestock, so we must consider the relationship between the landscape and livestock before moving on to examining summer and winter feeding patterns. Traditionally, the catalyst for land degradation was viewed to be the farming practices of the settlers that proved to be unsuitable for the fragile Icelandic environment, causing the loss of vegetation cover and erosion. Hastrup, for one, has argued that Icelanders were unable to change their habits and so the cycle continued and resulted in the impoverishment of the land.[185] In recent years, the cause of land degradation in Iceland has been looked at afresh. McGovern et al. argue for an inability to predict weather that led to over-grazing and soil erosion.[186] Other factors such as the geographical location, exposure to the elements and the slope of the land, as well as the stability of the soil, are suggested by Simpson et al. Livestock alter the landscape, but land degradation is not an inevitable result of grazing and management strategies could actually have limited over-grazing.[187] Shielings were certainly one method of limiting over-grazing as we shall see.

It has been proposed that climate was the biggest factor governing vegetation growth in Iceland, and that mean air temperature with wind erosion played a large role in upland erosion.[188] In northern and southern Iceland, the timing of grazing has been shown to be a bigger factor on erosion than the total number of livestock.[189] The management of grazing is possible for upland grazing during the summer months. However, grazing on the lowland usually takes place during the winter when plant growth has ceased. In this case, there needs to be sufficient biomass on the lowlands to meet grazing needs and prevent a negative balance. While erosion is not examined in this thesis, it is necessary to be aware that there were variations in the extent and timing of factors that contributed to it.

With an understanding of the wider issues connected with land degradation, it is now possible to move our attention to how the Icelandic landscape was utilised for pastoral farming, addressing summer grazing before examining shielings.

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[185] K. Hastrup, *Culture and History in medieval Iceland: an anthropological analysis of structure and change* (Oxford, 1985), p.242.
[186] McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.45.
[187] A. Thomson and I. Simpson, 'Modelling Historic Rangeland Management and Grazing Pressures in Landscapes of Settlement', *Human Ecology* 35 (2007), pp.151-168, pp.151, 168.
[188] Haraldsson and Ólafsdóttir, 'A novel modelling approach', p.118.
[189] Brown et al., 'Shieling Areas', p.81; McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.41; Simpson et al., 'Crossing the thresholds', p.187.

2.3 SUMMER GRAZING

During the summer months, it appears that all livestock and some household members moved from the main farm sites to more remote localities. This was to take advantage of the vegetation at a distance from the farmstead, preserving the grass around the farmstead for hay-making or winter grazing. Non-milking livestock, both cattle and sheep, could be allowed to graze freely in these remoter areas. However, milking stock needed to be milked once if not twice daily, and so required a base.[190] These bases are known as shielings, *sel* (sg. *sel*). Both *Grágás* and *Jónsbók* make clear distinction between common pasture, *afréttur*, and the shielings by stating that shielings were not to be placed on common pastures, nor was hay-making allowed on common pasture.[191] There was flexibility in these clauses regarding the number of livestock that could be grazed, as quotas were meant to be agreed by all those who had grazing rights on that common pasture. Livestock numbers on common pasture were a balance between maximising potential grazing resources and preventing over-grazing, so that the animals 'will not get fatter even if there are fewer of them'.[192] Calculating the quality of pasture and whether it had potential to sustain more livestock is a subjective process, and thus would have varied across common pastures. The legal clause is only a general guide open to interpretation but shows that communities could challenge farmers who over-grazed, though we do not know how farmers interpreted the idea of over-grazing.[193]

The overuse of communal land has been shaped by the 'Tragedy of the Commons' debate, where Hardin explained that self-interest will drive an individual to maximise their own gains at the expense of others because the gains benefit the individual only, while the negatives are shared amongst those who share the common resource.[194] In the example given by Hardin about grazing domestic animals, the result of self-interest is over-grazing and land degradation. Hardin called for education and 'mutual coercion, mutually agreed upon by the majority of the people affected', and this can be partially seen in the clause in *Grágás* governing the quota of livestock on common land.[195] Nevertheless, it has been pointed out

[190] A. Dennis, P. Foote and R. Perkins, *Laws of Early Iceland: Grágás II* (Winnipeg, 2000), p.131. K.200. It is possible that ewes were only milked once a day, Thoroddsen, *Lýsing Íslands* IV, p.67.
[191] *Grágás* (1852) K.201; *Jónsbók* VII, 46 in Schulman, *Jónsbók*, pp.243-245.
[192] Dennis et al. *Laws of Early Iceland* II, p.133. *Grágás* (1852) K.201, p.114
[193] Karlsson, *Lífsbjörg Íslendinga*, p.114.
[194] G. Hardin, 'The Tragedy of the Commons' *Science* 162(3859) (1968), pp.1243-1248.
[195] Ibid., p.1247.

that the model is too simple for Iceland as there were more factors at work than the grazing of domestic livestock.[196]

The renting of property is also important for understanding land use. It is understood that over the centuries there was an increase in renting, though the exact levels are not known until the end of the seventeenth century. At this time the first comprehensive sources on land ownership revealed that 95% of farms were tenant farms.[197] There was the risk that tenants did not have sufficient knowledge of the potential grazing available and could unwittingly over-graze the pastures. Equally, with such little stability in tenure the tenant may not have cared if they did over-graze as there was little incentive to manage the resource.[198] Nevertheless, individual self-interest or ignorance would be balanced, up to a point, by the collective of farmers using a particular common pasture as they collectively decided round-up dates and quotas. In the legal texts, it appears that those involved in deciding the livestock quotas were equal parties, so as long as there were some members with knowledge or interest in the quality of the land, the individual would be kept at bay. A problem occurs when the balance shifts, as it might have done if there were more self-interested or ignorant farmers using the communal pasture.

Another difficulty with the 'Tragedy of the Commons' debate is the focus on communal pasture, which in Iceland was supposedly governed by the owners. As mentioned above, Icelandic pastoral farming depended more on the productivity of the lowlands than the uplands, and the productivity of the uplands was more dependent on when livestock round-ups were timed. Therefore, in order to test the supposed connection between land degradation and self-interest, it may be more advantageous to investigate lowland vegetation loss and soil erosion on privately owned farmland, as this was outside the balancing mechanism of the commune and more liable to suffer from individual self-interest.[199] These environmental investigations will be able to discover the frequency and severity of the degradation, yet this approach is hampered by our inability to access comprehensive livestock numbers earlier than the early eighteenth century *Jarðabók*. Livestock numbers in *Jarðabók* are used for

[196] Simpson et al., 'Crossing the thresholds', p.186.
[197] Lárusson, *Old Icelandic Land Registers,* p.29.
[198] Amorosi et al., 'They did not Live by Grass Alone', p.43.
[199] The lowlands are also where most of the fodder was gathered that kept livestock for the majority of the year. It is generally assumed that the growing season in Iceland lasts for five months (May-September), thus winter grazing is needed for seven months of the year.

modelling livestock numbers in the earlier centuries but, as we shall see, livestock numbers fluctuated over the centuries so an awareness of the changing livestock numbers is needed to gain an accurate picture of grazing pressures.[200] We need to examine decadal or centurial time scales where possible so to not simply compare between the ninth and twentieth centuries as others have done.[201]

From this section, it can be seen that off-farm grazing was susceptible to a range of factors depending on whether the land was communal or privately owned. For a couple of months each year, the communal pastures maintained the non-milking livestock, while the milking stock were moved to off-farm bases on private land, known as shielings.

2.4 SHIELINGS

Shielings were another form of summer off-farm grazing. While much academic discussion has been given to these sites, hardly any have been fully excavated and our knowledge depends on analogies with nineteenth and twentieth century evidence. This section re-evaluates shieling evidence, including their identification, the labour involved and their distribution. These are aspects that have been studied in a somewhat piecemeal fashion and would benefit from being drawn together. Shielings were bases that varied in size and function, as did the structures, which could include sleeping quarters, storage space and pens. Various activities took place at shielings up until the twentieth century, from dairy processing to craft working.[202] It has been argued that the quality of milk from stock at shielings was better than elsewhere, while the practice also spared the winter pastures.[203] Fresh grass would be richer in nutrients compared to stored hay, so it is more likely that compared to milk produced over winter, the summer milk was richer due to fresh grass. Whether the vegetation at shielings was richer than other locations is difficult to say. The main point is that shielings and other off-farm grazing let the winter grazing rest and grow for winter use.

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[200] For example Simpson et al., 'Crossing the thresholds', pp.175-192 and Thomson and Simpson, 'Modelling Historic Rangeland', both use *Jarðabók* livestock numbers for reconstructing grazing pressures several centuries before the compilation of *Jarðabók*. It is understood that these livestock numbers are the first almost countrywide, detailed record for livestock in Iceland, but an awareness that the numbers carry an in-built assumption is needed. For discussions about changing livestock numbers over the centuries see: Thoroddsen, *Lýsing Íslands* III, pp.213-237, 278-294; Karlsson, *Lífsbjörg Íslendinga*, pp.125-129, 134, and this thesis Chapter Three.

[201] See Chapter Three.

[202] Guðrún Sveinbjarnardóttir, 'Shielings in Iceland: An Archaeological and Historical Survey', *Acta Archaeologica* 61 (1991), pp.73-96, p.74 and 91.

[203] Eyþórsson, *Búskapur og rekstur staðar*, p.118.

The tradition of shielings existed in Scandinavia before Iceland was settled as attested to by the similarities between Icelandic and Norwegian legal texts. The legal texts, *Grágás* and *Jónsbók* both illustrate the Norwegian connection by using the Norwegian word *sætr* when referring to shielings, not the Icelandic *sel*. However, there is disagreement about the extent that Norwegian practices could have been followed in Iceland because of landscape differences.[204] *Jónsbók* was based on Norwegian laws and reflects Norwegian farming practices, where shielings were used between the middle of June and the middle of August, though possibly to the middle of September.[205] It has been suggested that *Jónsbók* stipulated too much time at the shielings as Iceland has a shorter summer, yet *Jónsbók* only includes the clause about when livestock should be moved to the shielings, not when they should be removed as in the Norwegian law, perhaps indicating flexibility in Iceland.[206] The corresponding clause in *Grágás* does not include an indication of when the shielings should be used, just that livestock are allowed to cross another's land twice in a summer, though it did make allowances for straying livestock.[207] Therefore, while the Icelandic laws were inspired by the Norwegian, they had undergone adaptation.

The examination of aspects of shielings, such as their location, the people at them and structural descriptions, has relied heavily on the sagas and legal texts, which were our main source of evidence for this site type before the commencement of landscape surveys. This section draws on both textual and physical evidence, to first consider their location before moving on to the labour force and the sites themselves. Þorvaldur Thoroddsen argued that in the first centuries of settlement shielings were located closer to inhabited land, most often on the best quality meadowland.[208] Similarly, Gunnar Karlsson uses the recording of *sel* or *selja* in about 200 place-names to assert that shielings were placed on the lowlands before Iceland was extensively settled.[209] This seems partially valid, but the fluidity of farm-names casts doubt on the assignment of the farms' original function. The idea that shielings were built to take advantage of resources before being converted into full-time farms seems plausible. The

[204] Sveinbjarnardóttir, 'Shielings in Iceland, p.92.
[205] L. M. Larson, *The Earliest Norwegian Laws: Being the Gulathing Law and the Frostathing Law* (New York, 1935), p.94.
[206] Sveinbjarnardóttir, 'Shielings in Iceland, p.74; Schulman, *Jónsbók*, p.237. VII, 42 only stipulated that shielings should be used 'when two months of summer have passed unless some other plan seems wiser to all' and gives no terminus date.
[207] Dennis et al. *Laws of Early Iceland* II, p.11-112. K.182.
[208]Thoroddsen, *Lýsing Íslands* III, p.209.
[209] Karlsson, *Lífsbjörg Íslendinga*, p.105.

settlers only had experience of farming in their homelands, and would have undergone a period of trial-and-error as they learnt about the new land. If an area was thought suitable for a shieling, it would allow the settlers time to decide whether to establish a farm. To settle a wooded area would have required a considerable investment from the settlers to clear the land for grazing, especially in terms of labour, at a time when meeting basic needs would have been more pressing.[210] I make no attempt to calculate how rapid or widespread the settlement was, but recent research has argued for somewhat rapid colonisation.[211] From this recent research, farms could have been established within twenty years but the adaptation process must have taken longer, if nothing else, for the settlers to experience long-term variation in climate and how the environment would react to such differences. With regard to shielings, if colonisation took place within decades then pressure for farmland could have encouraged shielings located in lowland areas to become full farms within years, or even months of being established. The speed of the transition from shieling to farm would challenge Gunnar's theory based on place-name evidence. Shielings could still have been used as stepping-stones, but whether the function of the site as a shieling was significant enough to warrant the remembrance in a place-name is doubtful. Indeed, the place-names may be later medieval creations from times when farms were abandoned, used as shielings and then re-settled.

During the eleventh century the location of farms appears to have stabilised, and as farms became established on the lowlands shielings were no doubt moved to more marginal areas.[212] Recent research by Albína Hulda Pálsdóttir has utilised landscape surveys of shieling ruins and concluded that most are situated about 200 m a.s.l. to take advantage of land at the limit of vegetation growth in Iceland. The change in location over time would explain why in some instances in the sagas, shielings were not always isolated as they provided convenient stopping points for travellers and the opportunity to spy on the households from other farms.[213] Therefore, there was no standard, universally agreed location

[210] This theory assumes that the settlers wanted to open up the landscape for grazing animals such as cattle, sheep and horses, and did not use browsing animals, for example goats and pigs, to take advantage of the wooded areas. Following the argument that pigs' furrowing habits damaged the fragile Icelandic woodland, this species would have been valuable for clearing woodland.
[211] Orri Vésteinsson and T. McGovern, 'The Peopling of Iceland', *Norwegian Archaeological Review* 45(2) (2012), pp.206-218. Also see comments and reply in same volume, pp.218-235.
[212] Lucas, 'Pálstóftir: A Viking Age Shieling', p.97.
[213] *Hallfreðar saga*, ÍF VIII, chapter 9, pp.177-185; *Grettis saga Ásmundarsonar*, ÍF VII, chapter 52, pp.166-172; *Reykdæla saga og Víga-Skútu*, ÍF X, chapter 26, pp.231-236; *Laxdæla saga*, ÍF V, chapter 35, p.97; Albína Hulda Pálsdóttir, *Segðu mér sögu af seli: Fornleifafræðileg úttekt á íslenskum seljum*. (Unpublished BA thesis, 2005), p.48, 52.

for shielings. The important points are that settlers would have chosen initial locations that did not require a large amount of investment while they secured themselves, and could then either use these sites as stepping stones to better locations, or abandon the structures. The later evidence for shielings show a diverse site type with no standard model due to the range of activities undertaken. The main issue when discussing the location of shielings is the identification of these sites, as will now be examined.

2.4.1 Identification

As already mentioned, shielings may have undergone modifications in purpose. Some sites were stepping stones towards permanent farmsteads, as is the case in lowlands of Eyjafjallasveit.[214] Shielings were also established earlier on in Austurdalur (Skagafjörður), before they became farmsteads, however, several of these sites reverted back to shielings in the nineteenth century. [215] Other sites, such as at Kot and Hamraendar (Borgarfjörður), located in the upland, were originally farmsteads from the ninth century that proved unsustainable are and were later used a shileings. [216] These sites were part of the 'over-optimistic pioneer fringe' of settlers who located their farmsteads in marginal areas and were later abandoned or re-located in the tenth century.[217] Identification of shielings has relied on place-name evidence and landscape surveys with little or no excavation, resulting in uncertain about their function and dating, therefore the identification of shielings may be possible but is not a straight-forward task.[218] As with structures on farmstead, there is great variation in layout and location of supposed shielings due to differences in their resources and topography. Compared with farmsteads, however, shielings tend to be smaller sites with fewer, smaller structures, located away from the main farmstead, near a source of water, without enclosures, and at higher altitude.[219]

Usually, the narrative sources make passing references to details of the structures, but occasionally we get more of a sense of their form. One indicator of size is given in *Grettis*

[214] Sveinbjarnardóttir, 'Shielings in Iceland, pp.79.
[215] Ibid., pp.85-86.
[216] G. Sveinbjarnardóttir, K. Dahle, E. Erlendsson, G. Gísladóttir and K. Vickers, 'The Reykholt Shieling Project: Some Preliminary Results', in Viking Settlement and Society (Reykjavík 2011), pp.162-175, p.172.
[217] McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.30; Dugmore et al., 'An Over-Optimistic Pioneer Fringe?', pp.340-341.
[218] K. Vickers and G. Sveinbjarnardóttir, 'Insect invaders, seasonality and transhumant pastoralism in the Icelandic shieling economy', *Journal of Environmental Archaeology* 18(2) (2013), pp.165-177, p.166; Sveinbjarnardóttir et al, 'The Reykholt Shieling Project, p.165.
[219] Sveinbjarnardóttir, 'Shielings in Iceland, pp.78, 92.

saga, when Grettir and a companion hide with two unconscious riding horses in a shieling on Reykir Heath to avoid detection.[220] It shows that this particular roofed structure was understood to be more than a small storage room, though Icelandic horses were not as big as their modern counterparts.[221] In another example, there was enough space for two people to dig a pit for themselves in a structure explicitly said to be roofed.[222] Regardless of these saga examples, some shielings had to be big enough to house several members of the household including a farmer and his wife.[223] The most detailed description of a shieling structure is found in *Laxdæla saga*, which says:

> *Selit var gǫrt um einn ás, ok lá hann á gaflhlǫðum, ok stóðu út af ásendarnir, ok var einart þak á húsinu ok ekki gróit.*
> 'The shieling was built with a single roof beam, which reached from one gable to the other and protruded at the ends, with a thatch of turf only a year old which had not yet fully taken root.'[224]

Precisely how big this structure is supposed to have been is not entirely clear. The saga mentions that five men and four women were working at the shieling, but not how many were staying there overnight, as this would indicate the bed space required. The shieling appears to be a short ride from the farm, so possibly some of the workers could return to the farm at night as stated in the later *Búalög* text.[225] Nevertheless, the number of people mentioned would imply that a large proportion of a household might be based at shielings during the summer months, though for what length of time is unclear.

Other structures at shielings could also include sheep pens to hold milking ewes overnight.[226] In Albína's study of Icelandic shielings an average of 2.3 structures were recorded at these sites, but the number of structures ranged from one to eight among a total of 209 sites, with most sites having between one and three structures.[227] The number of structures at Pálstóftir, the only fully excavated and securely dated proposed shieling - dated to the tenth and

[220] *Grettis saga Ásmundarsonar*, ÍF VII, chapter 63, p.206.
[221] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, p.136.
[222] *Þorsteins saga hvíta*, ÍF XI, chapter 7, pp.14-15.
[223] *Barðar saga Snæfellsáss*, ÍF XIII, chapter 12, p.141; *Vatnsdæla saga*, ÍF VIII, chapter 40, pp.103-107; *Grettis saga Ásmundarsonar*, ÍF VII, chapter 52, pp.166-172.
[224] *Laxdæla saga*, ÍF V, chapter 64, p.192; 'The Saga of the People of Laxardal' in Viðar Hreinsson (ed.) *The complete sagas of Icelanders including 49 tales* V (Reykjavík, 1997), pp.1-120, p.99.
[225] See Section 1.4.2.
[226] *Hrafnkels saga*, ÍF XI, chapter 3, p.101.
[227] Pálsdóttir, *Segðu mér sögu af seli*, p.44.

eleventh centuries - agrees with this average, as it initially had three structures (one dwelling, one for hay storage, one as an animal pen), before a later structure thought to be another dwelling structure was constructed.[228] The landscape survey data used in Albína Hulda Páldóttir's survey cautions that there is no clear definition of a shieling ruin, but that the subjective nature of individual entries balance themselves out. Furthermore, another difficulty with ruins is that it is unclear if the structures were all contemporaneous.[229] If we return to *Laxdæla saga*, there is a second shieling called *Bollatóftir* where there was a space for sleeping, *svefnsel*, and a pantry, *búr*.[230] The separation of sleeping and storage areas could be for two, though not mutually exclusive, reasons. The first was that the products needed to be kept cool and it would not be cool enough in the sleeping space with several people; at farmhouses there was usually a separate room for storing dairy products. The second reason was that there might have been a fire in the sleeping area for cooking and warmth. Two buildings with a space in between would protect the products from both of these risks.

The interpretation of some shielings have relied on the presence or absence of certain features to distinguish them from farmsteads. For example, Pálstóftir has been interpreted as a shieling because of its location, altitude and evidence for seasonal occupation, yet even the evidence for its presumed use for dairying is uncertain.[231] Doubts have also been raised about the evidence for seasonal use because of its limited entomological material.[232] In contrast, the sites of Kot and Hamraendar (Borgarfjörður) are thought to originally have been farmsteads because of the presence of numerous ruins, including two longhouses at each site and enclosure walls, yet it is possible that these two sites were later used as shielings. [233] The issue is then how to identify seasonal from continuous site use, and changes in site function confuses the matter further because then features of both farmsteads and shielings may be present.

The presence or absence of a hearth has been used by Gunnar Karlsson as one means of distinguishing shielings from farmsteads, but this seems a questionable method. For example,

[228] Lucas, 'Pálstóftir: A Viking Age Shieling', pp.89-91.
[229] Pálsdóttir, *Segðu mér sögu af seli*, p.44 gives the number of ruins at sites as between one and eight; Sveinbjarnardóttir, 'Shielings in Iceland, pp.91-92 gives the range of ruins as between one and ten, though ten structures was only at one site.
[230] *Laxdæla saga*, ÍF V, chapter 55, pp.165-166.
[231] Lucas, 'Pálstóftir: A Viking Age Shieling', p.92.
[232] Vickers and Sveinbjarnardóttir, 'Insect invaders', p.170.
[233] Sveinbjarnardóttir et al, 'The Reykholt Shileing Project: Some Preliminary Results', p.172.

he argues that evidence of fires and hay storage at Pálstóftir, the only fully excavated shieling, points to this site being a farmstead because those at the shieling would not have troubled themselves with making a fire in mid-summer nor that they would have stored hay.[234] Yet, if people were staying overnight at these sites they might have had fires for cooking and warmth, especially as people could have been there for up to two months during the summer and the site is situated at c.580, a.s.l., so the weather might not always have been that pleasant.[235] It should not be forgotten that the dairying activities would require the boiling of water too. At Þorljótsstaðasel and Tunga (Skagafjörður), and Faxadalur (Borgarfjörður), sites interpreted as shielings, test trenching has discovered pieces of charcoal suggesting hearths were in use at seasonal sites.[236] Shielings could also perform several functions, including being used as bases for hay-making. Indeed, the activities undertaken at shielings mentioned in sagas include hay-making, milking and grazing livestock; these need not have been exclusive.[237] With this in mind, any shielings where hay was cut could have stored hay, whether in hay-stacks or barns, and so disagrees with Gunnar's identification criteria. Evidence of hay storage does not only indicate farms but also shielings.[238] Indeed, the nineteenth- and twentieth-century shieling at Tinnársel (Skagafjörður) was used as a sheep-house during the winter, indicating the year-round use of the site and a need to store hay.[239] It seems safest to conclude that structures could be multi-functional depending on the needs of the farm.

In a step beyond Gunnar's present/absent argument, the duration of hay storage has also been used to differentiate continuous farming activities from seasonal shielings. In a similar line of argument as Gunnar, entomology has been used, working under the assumption that sites with evidence of year-round hay storage were farms.[240] There is a growing need to better understand insects' habitats and processes of colonisation, as some synanthropic species have been found to survive without the year-round presence of humans, which means the discovery of these insect species does not necessarily indicate permanent human

[234] Karlsson, *Lífsbjörg Íslendinga*, p.107. Only one other shieling has had more than preliminary investigations conducted, and that is the site of Kot (Rangárvallasýsla), but full publication is still awaiting.
[235] Lucas, 'Pálstóftir: A Viking Age Shieling', p.86.
[236] Sveinbjarnardóttir, 'Shielings in Iceland, p.81; Vickers and Sveinbjarnardóttir, 'Insect invaders', p.168.
[237] *Laxdæla saga*, ÍF V, chapters 35, pp.95-100 and 54, pp.163-165; *Egils saga*, ÍF II, chapter 85, p.297; *Gunnlaugs saga ormstungu*, ÍF III, chapter 5, p.65; *Heiðarvíga saga*, ÍF III, chapter 24, pp.283-284.
[238] See Section 2.7.
[239] Sveinbjarnardóttir, 'Shielings in Iceland, p.84; Jónas Jónasson, *Íslenzkir Þjóðhættir* (Reykjavík, 1961), p.63.
[240] Sveinbjarnardóttir, 'Shielings in Iceland, p.94.

habitation.[241] The changing nature of these sites would also mean evidence for both hearths and year-round hay storage. Indeed, Bruun argued that shielings were little farms except that shielings lacked hayfields, re-affirming the need to view sites as a whole, not just as structures.[242] In addition, precise dating for occupational layers can be difficult due to the broad date range given from dated material. In the same way that we can question the use of more modern place-names as evidence of the function of a site before 1100, the use of later historical evidence applied retrospectively is not always appropriate.[243] All in all, it is perhaps not so easy to differentiate seasonally used shielings from continuously occupied farmstead. Future excavations will hopefully provide answers on the relationship of structures and the dating of sites.

2.4.2 Who made use of shielings?

Búalög appears to suggest that shielings were women's spaces as it states that at a shieling three women could manage 12 cows and 80 ewes, and two of the women should return to the main farm each day. This prescriptive text makes the connection between shieling and female workers explicit, as well as an indication of the relative numbers of women to milking stock.[244] Recent research has also emphasised the argument that shielings were women's spheres, as women were frequently recorded at shielings.[245] The sagas, on the other hand, provide richer descriptions of the people present. Shielings tend to feature in sagas when males are seeking a place of refuge. Nevertheless, the saga corpus also mentions several occasions where male farmers, not just servants, were present at shielings undertaking various types of work.[246] Four instances show the plausible range of people that could been at these sites.[247] In *Hallfreðar saga*, there were several shielings in Laxárdalur run by at least twelve women in total. In *Laxdæla saga* women and shepherds were present at two shielings

[241] K. Vickers and G. Sveinbjarnardóttir, 'Insect invaders, seasonality and transhumant pastoralism in the Icelandic shieling economy', *Journal of Environmental Archaeology* 18(2) (2013), pp.165-177, p.175.
[242] D. Bruun, *Fortidsminder og Nutidshjem þaa Island* (Copenhagen, 1928) cited in Eyþórsson, *Búskapur og rekstur staðar*, p.123.
[243] Vickers and Sveinbjarnardóttir, 'Insect invaders', p.166.
[244] *Búalög um verðlag og allskonuar venjur í viðskiptum og búskap á Íslandi* (Reykjavík, 1915), pp.22, 34, 61, 74-75, 80, 96, 132, 154. There is some differences in the prescribed number of cows amongst the manuscripts as *Búalög* IIA, p.22 states that 13 cows are to be milked alongside 80 ewes. Four later manuscripts record more livestock to be milked, pp.162, 178, 191, 218.
[245] P. Kupiec and K. Milek, 'Roles and perceptions of shielings and the mediation of gender identities in Viking and medieval Iceland', in M. Eriksen, U. Pedersen, B. Rundbergt, I. Axelsen and H. Berg (eds.) *Viking Worlds: Things, Spaces and Movement* (Oxford, 2015), pp.102-123, p.115.
[246] *Reykdæla saga og Víga-Skútu*, ÍF X, chapter 5, p.165; *Laxdæla saga*, ÍF V, chapter 62, p.185.
[247] *Hallfreðar saga*, ÍF VIII, chapter 9, pp.177-185; *Laxdæla saga*, ÍF V, chapters 35, p.97 and 63, p.186; *Hrafnkels saga*, ÍF XI, chapter 3, p.103.

for milking ewes, reaffirming the connection between women and milking, but also including men. Again, in the same saga at another shieling, in a wood, a farmer and some of his farm-men, *húskarlar*, made hay demonstrating the multi-functionality of shieling.[248] The lack of women may suggest the absence of milking animals and that the shieling was instead used for gathering wood. Then in *Hrafnkels saga*, shielings, *sel*, were used both as a base for milking ewes *and* to gather wood, though only male shepherds are explicitly mentioned.[249] This confirms that shielings were seen as multi-functional sites to exploit whatever resources were located in the area, and so were bases for more than milking stock and women.

Looking closer at the saga examples indicates that it was not the space but that tasks that were divided by gender. For example, it seems that the actual milking was done only by women, therefore wherever milking stock went women followed, though men could have undertaken the role of herders.[250] As herders stayed with the livestock it is unclear if they stayed at shielings or returned only at milking time. Sighvatur Sturluson comments to Sturla Sighvatsson that sheepherders should be fond of women when describing tasks on a farm possibly indicated the constant interaction of herders and women at milking-time.[251] Nevertheless, the sagas usually inform us about shielings owned by higher status farms where resources permitted the workforce to have defined tasks and so were more likely to have a gendered division of labour. At smaller farms, where there were fewer people, however, it is likely that people were more flexible about tasks, so men and women would undertake roles as necessary.[252] These smaller, less wealthy farms may not have been able to afford a shepherd, for example, so instead a child from the household could fulfilled this role.[253] Therefore, while there may have been divisions within the work force, there was a stronger connection between the workforce and social status than between the work force and gender.[254]

Benedikt Eyþórsson reconciles what he perceives as inconsistencies in the representation of the people who went to shielings between earlier and later sources, by arguing for a dual

[248] *Laxdæla saga*, ÍF V, chapters 54, p.163 and 55, p.165.
[249] *Hrafnkels saga Freysgoða*, ÍF XI, chapter 3, p.101.
[250] *Búalög*, pp.22, 34, 61, 74-75, 80, 96, 132, 154, 162, 178, 191, 218 only nmentions women when it refers to milking stock at a shieling: The sagas also imply that women undertake the milking, such as *Bjarnar saga Hítdælakappa*, ÍF III, chapter 12, pp.139-140; *Fljótsdæla saga*, ÍF XI, chapter 1, p.215.
[251] *Íslendinga saga*, *Sturlunga Saga* I, chapter 125, pp.407-408.
[252] J. Jochens, *Women in Old Norse Society* (London, 1995), p.121.
[253] *Fljótsdæla saga*, ÍF XI, chapter 19, p.274.
[254] See Section 2.9.

system based on the required labour. Depending on the use of the shieling in the legal texts, a household, or most of it, would move during the summer, giving rise to the usage of the term *veturhús* (winter-house) for the main farmstead and *sumarhús* (summer-house) for the shieling.[255] If less labour was needed then fewer people would go to the shieling, as shown in the examples above. It is thought that shieling use became less popular in the later centuries, however, in the sixteenth century there were still cases where most or all of some households still moved to shielings.[256]

The amount of labour required and so who went to shielings depended on the tasks undertaken and was influenced by the status of the farm. A farmer of a large estate would not need to be present if there was sufficient labour available. The study of shieling ruins mentioned above indicates that shielings varied in size and so the number of people housed there most likely varied as well. It has been proposed that the size of the shieling was connected to the valuation of the main farm, the bigger the farm the bigger the shieling or greater number of shielings and so the more livestock that could be kept.[257] This proposition is supported by both the sagas and site surveys. As Pálstóftir is the only published, fully excavated shieling, the representativeness of the site is unclear, but the size of the structures gives an idea of the potential dimensions of shieling structures, and range from c.9m^2 for the dwelling structures to c.3m^2 for the hay storage structure.[258] It must be borne in mind that shielings came in various forms and so there is no one template that can be applied to all. Furthermore, shielings only took advantage of resources as long as it remained the most profitable method of exploitation, as will be discussed below.

2.4.3 The Number and Distribution of Shielings

Our first quantifiable indication of the extent of shieling use comes from *Jarðabók*, which recorded farms' rights to shielings at the start of the eighteenth century. From Hitzler's study based on *Jarðabók* with additional information from *Diplomatarium Islandicum*, we can see that there were regional variations in the rights to shielings.[259] Dalasýsla had the highest percentage of right to shielings in Iceland with 51% of the farms having rights,

[255] Eyþórsson, *Búskapur og rekstur staðar*, p.128; *Grágás* (1852) K.129, p.7.
[256] Þorvaldur Thoroddsen, *Lýsing Íslands* III, p.208.
[257] Pálsdóttir, *Segðu mér sögu af sel*, p.47.
[258] Lucas, 'Pálstóftir: A Viking Age Shieling', pp.89-91.
[259] E. Hitzler, Sel, Untersuchungen zur Geschichte des isländischen Sennwesens seit der Landnahmzeit (Oslo, 1979), p.168.

Rangárvallasýsla the lowest with 7%, compared to a country-wide average of 23%. Albína Hulda Pálsdóttir's study, based on farms registered by Johnsen (1847) and the modern register of shieling ruins, shows a variation in the proportion of farms with physical evidence of shielings, and gives an average of 34% of farms having shieling ruins in Iceland.[260] Some areas in Albína's survey, however, have relatively few shielings probably due to the on-going survey work in these districts. Dalasýsla is a clear example of the nature of the landscape surveys because none of the surveyed farms in the district had shielings, but then only 24 farms were surveyed, the smallest sample size out of all the investigated areas. The right of 50% of Dalasýsla farms to shielings shown by Hitzler emphasises the lower proportion is mostly likely due to sample bias, not reality.[261] Again, the contrast between sources can be seen in Þingeyjarsýsla, where Hitzler calculated c.34% of farms had shielings, whereas Albína's study shows that 53% of farms in the district had shielings. South Þingeyjarsýsla, in fact had the highest percentage of farms with shieling ruins out of all the districts at 55%.

These two studies give different perspectives on this topic: the landscape survey shows the actual use of land for shielings, whereas the *Jarðabók* data only recorded the rights to shielings. Nevertheless, these figures are based on different sources, spanning centuries and so one should not be used to discredit the other, but to add balance to discussions. The main points are that there is a difference between the rights to and the use of shielings, and most clearly, that their use varied across the country and over time.

While the anomaly of Dalasýsla may be due to discovery bias, it is possible to speculate on potential reasons for the difference in findings between the two studies above. One possible explanation may be the landscape, having relatively lower altitudes than the other areas surveys meant shielings were placed on lowlands and therefore susceptible to damage or destruction from land modification. The high percentage of farms with shielings in south Þingeyjarsýsla would support this explanation, as one of the five areas subject to closer examination by Albína, it has the longest average distance between farm and shieling, so less likely to suffer damage because they were more remote.[262] Another explanation may be the

[260] Pálsdóttir, *Segðu mér sögu af sel*, p.41; J. Johnsen, *Jarðatal á Íslandi, með brauðlýsingum, fólkstölu í hreppum og prestaköllum, ágripi úr búnaðartöflum 1835-1845, og skýrslum um sölu þjóðjarða í landinu* (Copenhagen, 1847).
[261] Pálsdóttir, *Segðu mér sögu af sel*, p.41.
[262] Pálsdóttir, *Segðu mér sögu af sel*, p.50. Unfortunately Dalasýsla is not one of the five study areas. See Section 2.5.

close proximity of Dalasýsla to Hvammsfjörður and Breiðafjörður, with its marine and island resources, which meant that people turned to the sea and not inland for summer resources, and this may hold for Snæfellnessýsla too.[263] Conversely, the high percentages for Húnavatnssýsla and south Þingeyjarsýsla could be due to these districts having no access to islands, but more inland area to graze. For an idea of the temporal distribution of shielings we have to rely on physical remains, though they await archaeological investigation to reveal their full potential and attempt to identity their purpose.

With regard to temporal distribution, Þorvaldur argued that shielings became less frequent over time because cattle farming diminished and there was less need for shielings.[264] This is a difficult hypothesis to test because until recently there has been little archaeological investigation into shielings and, so far, only Pálstóftir has been securely dated. It also assumed that milking cows were the only livestock brought to shielings, a questionable assumption when sagas show ewes were also used for milk.[265] Ewes were utilised for milk up to the twentieth century, so shielings could still have been used for ewes and not cows.[266] *Jarðabók* and later documents were also compiled after several waves of human and livestock losses in the fifteenth, late seventeenth and early eighteenth centuries, reducing the available workforce and possibly encouraging farming strategies less reliant on labour as happened in parts of Europe.[267] A reduction in the number of shielings would, in fact, demonstrate a decrease in milking stock, both cows and ewes, and a focus on less labour intensive products such as wool and meat. This assertion is part of Þorvaldur's wider perception of a downward trend in cattle farming throughout the medieval and early modern periods. In arguing this, his reliance on decreasing numbers of references to shielings in surviving documents and place-names is questionable. The sagas, however, suggest a decrease in shieling utilisation because there are more mentioned in *Íslendingasögur* than *Sturlunga saga*. Yet *Íslendingasögur* portray a society where even wealthy farmers were involved in farming and went to shielings, causing shielings to be included in the saga narrative. *Sturlunga saga*, on the other hand, was concerned with elites and politics, not farming, which was delegated to farm managers and only of interest to support the elite's

[263] See Section 2.5.1.
[264] Thoroddsen, *Lýsing Íslands* II, p.210.
[265] *Laxdæla saga*, ÍF V, chapter 35, p.97; *Hrafnkels saga Freysgoða*, ÍF XI, chapter 4, p.101.
[266] Sveinbjarnardóttir, 'Shielings in Iceland, p.74.
[267] M. L. Ryder, *Sheep and Man* (1983), p.457.

activities. The sagas provide us with details about the activities at shielings, but should not be used to quantify the number of shielings.

Another way to examine the use of shielings is the references to *selför*, the journey to shielings, as opposed to the mention of rights or place-names, in documents found in *Diplomatarium Islandicum*. As most of the documents are from the fourteenth century it is no surprise that this is the century for which we have most reference to *selför*, but the sixteenth and fifteenth centuries have the second and third most numerous recordings.[268] While not proof of the popularity of shielings, it allows us to discern if these journeys were still undertaken in later centuries. It is, therefore, not so much about comparing figures between source types, but that later sources were still recording shieling use even after reductions in both human and livestock populations, demonstrating at some farms these activities were still undertaken. More extensive archaeological research is needed on dating shielings before this hypothesis of diminishing use can be accurately tested.

At the moment, most of the physical evidence for shielings comes from ground surveys of ruins and some test-trenching, but the difficulties of interpretation using these methods means that open-air excavations are preferred.[269] Further, more extensive excavations would enable more data and sampling to be taken in the hope of differientating dates and duration of occupation. It is presumed that most surveyed shielings date to the late medieval or early modern period, so it would be beneficial if more reliable dates could be provided. [270] Once more accutrate dates are know for these sites, we can then assess whether shielings were more commonly used in the earlier centuries as argued by Þorvaldur, or if their use was more periodic. Also, of interest would be changes in land use and if shielings were converted into farms or vice versa, when this happened. The issue is then how to distinguish seasonal use from continuous site use.

2.5 OFF-FARM GRAZING STRATEGIES

There are two main types of off-farm grazing strategy discussed in the published literature: shielings and common pasture. Yet, there were more types of grazing available, such as the

[268] *Selför* references by century: twelfth (2), thirteenth (17), fourteenth (65), fifteenth (47), sixteenth (54), and seventeenth (1).
[269] Guðrún Sveinbjarnardóttir, 'Shielings in Iceland revisited: a new project' in C. Paulsen and H.D. Michelsen (eds.) *Símunarbók: Heiðursrit til Símun V. Arge á 60 ára degnum* (Tórshavn, 2008), pp.222-231, p.227.
[270] Ibid., p.92.

grazing of uninhabited islands, though our evidence is more limited. This section will contain a brief summary of the differences between shielings and common pasture, before moving on to island grazing, not examined by others, to give a greater appreciation of the diversity of pastures utilised.

The main difference between shielings and common pastures was their location. According to *Grágás*, shielings had to be placed on private land. Unpublished research by Albína Hulda Pálsdóttir has shown that shielings were on average located approximately 2km as the crow flies from their main farm, between one and four hours' walk depending on the landscape. The research investigated five regions across Iceland, and discovered there were regional variations even within the same quarters, with Eyjafjarðarsýsla having the shortest distance between farm and shieling whilst Suður-Þingeyjarsýsla, as mentioned above, had the longest.[271] The type of landscape is important when viewing these distances, as Eyjafjörður is a large valley system with tributary valleys, whereas Suður-Þingeyjarsýsla is a flatter area. On the other hand, common pasture could be further away from the farm as it extended far into the uplands because animals did not need continuous human supervision. The close proximity of the shieling to the farm facilitated the movement of livestock and transportation of products, such as butter, cheese, hay, firewood etc. The division of shieling and common pasture adds another layer of complexity to discussions of land use. Differing management strategies were needed for shieling and common pasture, as shielings required labour consistently whereas common pastures required labour for the round-up. Island grazing was different again as they were separated from farms by stretches of water and required another management strategy. Therefore the following section will examine the use of this resource to shed light on the diverse range of grazing used in Iceland.

2.5.1 Island Grazing

Porvaldur Thoroddsen, in his discussion on grazing land, commented that islands in Breiðafjörður were used to fatten thin ewes from autumn to Advent, or even longer, because of the islands' good grazing.[272] Most of the livestock were removed from the islands during the summer before the birds started to breed but the dry stock was left on the islands.[273] In

[271] Pálsdóttir, *Segðu mér sögu af sel*, pp.50-51. Calculations based on 173 cases in five regions, average distance range 1,497-4,531m.
[272] Thoroddsen, *Lýsing Íslands* III, p.178.
[273] Ibid., p.379.

addition, cows were sometimes grazed along shores around Eyrarsveit, and Breiðafjörður generally, and milked well because of this grazing, probably due to ingesting salt.[274] Islands outside Breiðafjörður were also utilised. For example, on Vestmannaeyjar at the start of the nineteenth century, Þorvaldur recorded that sheep left on the uninhabited islands without shelter over winter would be as good in spring as sheep on the mainland would be in autumn.[275] Árni Daníel Júlíusson and Jónas Jónsson briefly mention that islands, specifically in Breiðafjörður, were used in the mid-eighteenth century for grazing oxen.[276] The utilisation of uninhabited islands for grazing, therefore, illustrates the extensive procurement of all available sources of fodder, but has been mostly ignored in environmental studies that have focused on upland or farm grazing areas.

If Iceland was settled widely before c.900 as has been argued recently, then islands were potentially utilised from an early date as part of the settlers' inherited farming knowledge.[277] *Íslendingasögur* records the grazing of cattle and sheep on islands, whereas *Sturlunga saga* only mentions sheep once.[278] Interestingly, *Sturlunga saga*'s only other reference to island grazing was in the West, where horses were moved to an island without permission, indicating that livestock other than cattle and sheep were also moved to islands.[279] In the mid-eighteenth century horses are known to have been grazed over-winter on islands in Breiðafjörður, and there was such good grazing that horses would be fat in the spring.[280] It has been noted that cattle need sufficient fodder and shelter during the winter. Indeed, cattle need more fodder and space than other domestic meat-bearing species due to their size and they are more liable to be affected by adverse weather conditions.[281] The demand for shelter and good quality fodder would have put pressure on the farming system and consumed resources that arguably could have been put to better use elsewhere, such as feeding larger numbers of sheep. The *Íslendingasögur* testify that even in the twelfth and thirteenth centuries there was an awareness of the benefits of grazing islands, mostly in Breiðafjörður, and that livestock, including cattle, could graze for all or part of winter and potentially be

[274] Thoroddsen, *Lýsing Íslands* III, p.255.
[275] Ibid., p.379.
[276] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* III, p.129.
[277] Vésteinsson and McGovern, 'The Peopling of Iceland', pp.206-218.
[278] *Grettis saga Ásmundarsonar*, ÍF VII, chapters 69-71, pp.225-228, chapter 74, p.237; *The Saga of Hvamm-Sturla*, *Sturlunga saga* I, chapter 11, p.76.
[279] *Íslendinga saga*, *Sturlunga saga* I, chapter 103, p.379.
[280] Thoroddsen, *Lýsing Íslands* IV, p.34.
[281] N. Koepke and J. Baten, 'Agricultural specialization and height in ancient and medieval Europe', *Explorations in Economic History* 45 (2008), pp.127-146, p.129.

fatter in spring than they would have been if they were on the mainland. It is important to consider the inclusion of island grazing in discussion about pastures because islands were used, and particularly over winter, a time when valuable livestock would be fed fodder and pasture around farms would be used for feeding livestock kept outside.

Uninhabited islands appear to be a favoured pasture in *Íslendingasögur*, possibly because the lack of predators coupled with the slightly milder climate would make them ideal safe pasture for livestock. The practice of island grazing was not unheard of by some of the people who settled Iceland. Indeed, several sagas mention uninhabited islands as providing pasture for cattle in Scandinavia.[282] It is important to discover what cattle were put to graze on islands and what products were gained from them because these ideas could have been transported with the settlers. The use of uninhabited island grazing would have been for meat, or wool in the case of sheep, not milk because milking required daily contact with people and these islands appear uninhabited by people. Of course, milking could have taken place on inhabited islands, but we do not have the evidence to discuss this scenerio. The point about milking is supported by Þorvaldur, above, when he commented on early modern practices of leaving dry livestock on islands over summer and sheep over winter, when ewes would have stopped milking.

Sagas can indicate what islands were exploited. For example, *Grettis saga* records a farmer, Þorgils, owning islands called Óláfseyjar (Breiðafjörður) on which a good ox intended for Yule was kept.[283] There is no mention of other animals or people on the island, but it is unlikely that just one animal grazed the whole island. At Yule the ox is transported back to the farm, indicating that the ox was at some point taken to the island to fatten it for winter. It is transported back alive in a boat and restrained for the whole journey, even when it was on land.[284] The description of the animal as 'very fat', *allfeitr*, supports the use of island grazing for fattening up livestock to be slaughtered. As people do not appear to be living on the island it rules out milking.

[282] *Egils saga*, ÍF II, chapter 45, p.111; *Laxdæla saga*, ÍF V, chapter 32, p.85. Both examples are said to be from Norway.
[283] *Grettis saga Ásmundarsonar*, ÍF VII, chapter 50, pp.159-160.
[284] *Grettir leiddi uxann, ok var hann mjǫk stirðr í bǫndunum, en allfeitr; varð honum mjǫk mætt*', 'Grettir led the ox, and he was very stiff in the ties, and very fat; he became very weary', *Grettis saga Ásmundarsonar*, ÍF VII, chapter 50, p.161.

The connection between island pasture and fattening for Yule is explicit in *Reykdoela saga* where cattle and mares are taken to islands in north-east Iceland in preparation for Yule slaughter.[285] Here, only one character is told to take the livestock to the island, but this seems impractical due to the number of people required to row the boats and manage the livestock. In reality, the character instructed is probably an over-seer with others working under his management. There is no description of the type or quality of the grazing available on these islands or if it differs from the grazing found on the mainland. While we do not know whether these animals were adults or juveniles, it would seem easier to transport smaller, younger animals. These occurrences imply that the livestock were only on the islands for a couple of months to fatten them; they were not on the island all year round. Again, there is no mention of people remaining on the island.

From these two references it appears that the livestock were alive for the return journey. Whilst keeping the livestock alive would ensure the meat was fresh for Yule it would make it more difficult for transportation, especially in the winter months when the water would be rougher. It would have been easier slaughter the animals on the island and take back the carcasses. The difficulty of transporting livestock by boat is suggested by *Laxdæla saga* where a character has goods taken by boat but the livestock were driven over land.[286] The delay in slaughter suggests that the products were better utilised at the farm where products such as blood and skin could be immediately processed. It also appears in *Grettis saga* that those responsible for selecting the animals to slaughter were not part of the transportation party, but remained on the farm, and sent other members of the household to retrieve the ox.

Later in *Grettis saga*, islands are again used for pasture. The finale of the saga takes place on the island of Drangey (Skagafjörður), where rams and ewes were kept, *hrútar ok ær*.[287] The eighty sheep on Drangey were said to be owned by at least twenty farmers. The account is of interest because it implies that each owner had a small number of sheep on the island, with an average of just four sheep. Four sheep were not many but it did illustrate how all available pasture was utilized by the farmers, even when it was on an island and meant rowing out into the fjord during the winter to collect the sheep. In terms of management, the explicit reference to both rams and ewes indicates that the island was used as a breeding location. The

[285] *Reykdoela saga*, ÍF X, chapter 18, p.207, '*naut ok kapla*'. The islands are not named
[286] *Laxdoela saga*, ÍF V, chapter 35, p.99.
[287] *Grettis saga Ásmundarsonar*, ÍF VII, chapters 69, pp.225-226 and 70, p.228.

sheep collected during the winter could have been the rams removed when breeding was finished, leaving the ewes over winter on the milder climate of the island. The appearance of an ewe with lamb after the arrival of the outlaws supports the idea that Drangey was used as a breeding place. The island, the saga tells us, was accessed by a ladder making it difficult to transport the sheep to and from the island. If the sheep were lighter than modern sheep, it is possible that they could have been carried up the ladder by humans.[288] If the island was intended for breeding, then only the animals intended for slaughter would need to be removed, such as rams, lambs and old ewes. Lambs would be easier to handle, and if the rams or ewes became unmanageable they could be slaughtered on the island.

We also have other evidence for the utilisation of Drangey in documents contained in *Diplomatarium Islandicum*. These documents supposedly list Hólar's ownership of the island in 1374 and egg-collecting worth twelve *álnir* in 1388, however, documents dated to 1462 record twelve priests testifying to the length of Hólar's ownership of the island, indicating that there was some doubt about the ownership around this time.[289] There is no indication that Drangey was inhabited during the fourteenth to sixteenth centuries, though Hólar did make use of the island as it owned a boat that went to Drangey, rope for egg-collecting on Drangey and driftage rights there.[290] It is not until the sixteenth century that the use of Drangey for pasture was recorded, as in December 1550 Hólar had 37 sheep on the island.[291] In a record of livestock dated to January 1568 and early 1569, Hólar had 30 lambs and 25 sheep on the island respectively, and still owned ropes for egg-collecting.[292] These late sixteenth century documents show that Drangey was still being used for sheep and for a similar number of sheep as in *Grettir saga*, and were grazed there over winter. It was probably the case that Drangey was used for pasture from the early medieval period.

Islands were not always safe places, however, as shown in the sagas where in Norway and Frisia livestock were slaughtered before being transported. These examples were 'víking' raids and not part of routine farming practices.[293] A raid in Iceland shows not all islands had

[288] F. McCormick, 'Animal Husbandry' in P. Crabtree (ed.) *Medieval Archaeology: an encyclopedia* (London, 2001), pp.1-4, p.1. Here, the average live weight for a medieval sheep is given as 30 kg.
[289] DI 3, pp.278, 283, 418, DI 5, pp.365-368.
[290] DI 3, p.614, DI 9, 300, 303.
[291] DI 11, p.855.
[292] DI 15, pp.60, 218, 219.
[293] *Egils saga Skalla-Grímssonar*, ÍF II, chapter 57, pp.169-170, '*cattle livestock*' can refer to milch cattle; *Egils saga Skalla-Grímssonar*, ÍF II, chapter 69, p.218.

sufficient pasture.[294] The people living on Geirshólmur, a small island in Hvalfjörður, were forced to raid livestock, but do not have the fodder to maintain the livestock so their only choice was to slaughter them.

In general, livestock kept on islands were only reared for meat and wool, or were there to breed. The animals appear to have required little management once they were placed on an island. In fact, they seem to have been left completely unattended until they were transported back to the mainland for slaughter. There is a tradition in Iceland of utilising islands for pasture, but islands have not yet been investigated with the objective of detecting past grazing practices. Even Þorvaldur only made a passing comment on the use of islands, stating livestock was moved there in the autumn to fatten them until Christmas and that islands had several species of vegetation including excellent grasses.[295] As the products from the animals kept on islands appear to have been consumed elsewhere it is probably that the practice of island grazing leaves little in the way of archaeological remains, unless structures were built to house people or livestock. Environmental studies may be able to indicate the longevity of island grazing and if islands were as prone to land degradation as pasture on the mainland.

As has been shown, much published literature has been concerned with shielings and the communal resource of common pasture, however, investigations have neglected other areas of pasture. While there is need for further research on upland grazing, the role of islands has been under appreciated and would prove an interesting contrast to mainland grazing. Of course, not all areas would have had access to island grazing limiting the inclusion in grazing strategies. Nevertheless, where island grazing was available it was most likely used, for example in Breiðafjörður. This adds another dimension to discussions of regional differences by the inclusion of off-farm grazing strategies.

2.5.2 Separate grazing for lambs?

It is usually assumed that lambs grazed alongside their mothers during the summer months, as lambs needed additional care until they were able to fend for themselves. A search of the *Íslendingasögur* and *Sturlunga saga* corpuses reveals few references to lambs themselves, but when lambs are mentioned they mostly appear separate from adult sheep. It is unclear

[294] *Harðar saga*, ÍF XIII, chapter 26, p.68.
[295] Thoroddsen, *Lýsing Íslands* III, p.178.

whether lambs were separated from the ewes and grazed on different pastures. It seems possible that this was the case, as in *Jónsbók*, it states that only every tenth ewe was permitted to take her lambs (pl. *dilkar*) with her to graze, and a fine of one *eyrir* for each ewe over this quota was payable to the king.[296] Only ewes that had lambed for the first time were exempt from this regulation. In the King Eiríkr amendments to *Jónsbók* dated to 1294, it is stated that the complete ban on suckling lambs should be removed.[297] There is no evidence for a complete ban in *Grágás*, *Járnsíða* or *Jónsbók*, suggesting that this clause was a misunderstanding of the extent of the restriction in *Jónsbók*. Furthermore, it is unclear where the clause originated from as it is not found in *Grágás*, or the Norwegian *Gulathing* and *Frostathing* laws. It is possible that the clause was introduced due to a perceived shortage of milk by the legal compilers, if not by society in general. Yet within thirteen years of *Jónsbók* being introduced the clause was repealed, signalling it was not needed in the first instance or was no longer needed, the former being more likely.

From a farming perspective, the 1294 amendment of removing lambs from the ewes would not affect milk production, as it has been shown that ewes do not need lambs to let down their milk as was the case with cows. Though the presence of lambs can be beneficial to ewes' long-term milk production.[298] If the clause was in effect, milk from 90% of ewes was intended for human consumption, while 10% would feed their lambs. The continued feeding of the suckling lambs would result in bigger and stronger lambs compared with their grass-fed counterparts. Suckling lambs would have been better animals to keep for livestock replacement and the grass-fed lambs could be slaughtered for meat. If farmers had adhered to this clause, its removal in the 1294 amendment meant that farmers could judge for themselves the proportion of suckling lambs to maintain and so were flexible in response to changing conditions. By recording lambs separately, sagas seem to suggest that at least some lambs were kept separate from the ewes, though no ages are given. Other methods of restricting suckling, such as gags, were also known in Iceland as testified to in *Eyrbyggja saga*.[299] Quite rightly, Þorvaldur commented that this brief case indicates that lambs were

[296] Ólafur Halldórsson, *Jónsbók Kong Magnus Hakonssons Lovbog For Island*, (Odense, 1970), VIII, 15, p.225. The clause is omitted from Schulman's translation, p.317, footnote 199.
[297] Halldórsson, *Jónsbók*, 1294 amendments, 13, p.283; Schulman, *Jónsbók*, p.401.
[298] M. Balasse, 'Keeping the young alive to stimulate milk production? Differences between cattle and small stock', *Anthropozoologica* 37 (2003), pp.3-10, pp.5, 8. Neither Þorvaldur nor Gunnar comment on this clause further than pointing it out as an oddity. Karlsson, *Lífsbjörg Íslendinga*, p.140; Thoroddsen, *Lýsing Íslands* III, pp.326-327.
[299] *Eyrbyggja saga*, ÍF IV, chapter 45, p.130.

gagged while with the ewes and so reduced the need for different enclosures or pastures. Unfortunately, we have no evidence for the adherence to the clause in *Jónsbók*. It must have been unpopular, or irrelevant, for it to have been removed from the law books thirteen years after *Jónsbók* was accepted by the Icelanders. The references to lambs without ewes in the sagas leaves it unclear as to how common a practice it was, but it was a known practice.

The social unrest portrayed in *Sturlunga saga* and the prevalence of raiding gives insights into the management of lambs for the twelfth and thirteenth centuries. Lambs are vulnerable to the elements and so need some form of shelter, such as a lamb-fold (sg. *stekkr*), built in spring when the lambs grazed away from the farm.[300] A lamb-fold was usually a place where lambs could be gathered together at milking time to prevent them wandering. However, it was also as a place of safety from raiders. There is a single example of lambs being taken to the uplands in winter in an attempt to avoid raiders. [301] In this case the evasive action ultimately failed as the raiders found the lambs. This shows the desperation of the people of Bjarnarhöfn (Kerlingarskarð) as the uplands would not have been beneficial for lambs in bad weather (*foraðsveður*). The desperate need for food by another group of raiders can be seen in their taking of lambs along with older livestock, and the leader's insistence that the raiders 'shall have each lamb, while able to walk' even though the younger animals slowed the raiders' progress.[302] This is one of only two references to lambs being herded together with older sheep.

The sagas give us a limited insight into the management of lambs and most references relate to off-farm activities. As already mentioned, lambs needed shelter and supervision by people to prevent them from wandering, to protect them from other animals, and to offer shelter if the weather turned. One example where an enclosure was needed was at a lamb-pasture (*lambhagi*) down the valley near the river Laxá (Laxárdalur).[303] The enclosure offered refuge for the lambs while they took advantage of the grazing. In another saga, lambs were kept on the farm and driven down to the beach indicating that it was usual for older lambs to be allowed out to graze during the winter; otherwise this movement of lambs would have aroused the suspicion of pursuers.[304] Here, the lambs served to trample the ground to remove

[300] *Þorgils saga ok Hafliða*, *Sturlunga Saga* I, chapter 14, p.31.
[301] *Íslendinga saga*, *Sturlunga Saga* I, chapter 103, p.378.
[302] *Sturlu saga*, Sturlunga Saga I, chapter 21, p.92, '*hafa skal hvert lamb, meðan ganga má*'.
[303] *Laxdoela saga*, ÍF V, chapter 20, p.51.
[304] *Gunnars þáttr Þiðrandabana*, ÍF XI, chapter 4, p.204.

any signs of the footprints of a fugitive. In general, little information was recorded about lambs before they were allowed off the farm to graze, probably because the activity was restricted to the farm and farm workers, and did not advance saga narrative.

2.6 WINTER LIVESTOCK HOUSING

It sometimes appears to be the case that winter grazing was conducted the same way throughout Iceland. However, it is clear that precipitation and temperature vary across the country resulting in different conditions, both in severity of temperature and snow coverage. In addition, the location of farms would influence farming requirements, as those farms located at higher altitudes would need to be prepared for heavier snow, such as at Þórarinsstaðir (Hrunamannaafréttur), an eleventh century farmstead where the sheep houses were built relatively close to the farmhouse compared with other farm sites.[305] The purpose of this section is to examine the archaeological evidence for livestock housing and discover what we can add from the sagas.

The first point of consideration is what livestock were housed and what livestock were grazed outside, which is not always a clear distinction. Housing would dictate which livestock needed continuous feeding and which livestock could survive with minimal supplementary fodder. From the literary sources, it appears that milking cows, not ewes, were housed over winter. Ewes produce milk after lambing in the spring and by the eighteenth century milking had been extended to the end of autumn in some places, so ewes did not need housing to ensure continuous milking, as was the case with cows.[306] The timing of calving, on the other hand, could be controlled and be all year round, including when they were housed inside, as demonstrated by a new-born calf in the *fjós* in *Bjarnar saga Hítdælakappa*.[307] It has been argued that cattle, including milking cows, were allowed to graze outside in some places all year round during the Commonwealth Period.[308] While the outside grazing of cattle is plausible, the outside grazing of milk cows throughout the winter appears unlikely unless the

[305] Berson, 'A Contribution to the Study of the Medieval Icelandic Farm', p.42.
[306] Thoroddsen, *Lýsing Ísland* III, p.334. Interestingly, milking goats could be milked up until Christmas. Thoroddsen, *Lýsing Ísland* IV, p.67. Ewes did, however, need more fooder than other sheep to increase their fertility and the chances of a successful lambing.
[307] *Bjarnar saga Hítdælakappa*, ÍF III, chapter 16, pp.152-153. There are several instances in the sagas of cows being housed indoors, but this is the only one where a new-born calf is mentioned.
[308] Jóhannesson, *A history of the Old Icelandic Commonwealth,* p.290. 'Önnur jarteinir úr Þorlaks biskups' in J. Sigurðsson and G. Vigfússon (eds.) *Biskupa sögur* I (1858, Copenhagen), pp.357-374, p.368; Amorosi et al., 'They did not Live by Grass Alone,', p.41.

cows were in an area with very mild weather and no snow cover. Milk production can be reduced or even stop if cows become cold, whilst snow cover hinders grazing and limits fodder intake, thus jeopardising milk production. Of course, the extent and duration of snow coverage varies across Iceland, but it is here suggested that milking cows would need housing for some part of the winter at least.

In light of the differing needs of housing, structures provided for livestock will now be discussed, concentrating on the *fjós*, byre, where milking cows and other animals were housed, and then the less discussed sheep structures, *fjárhús*, sheep-house, and *fjárborg*, sheep-shelter.

2.6.1 *Fjós*

Milking cows needed housing, but there is scarcely any evidence for the housing of non-milking cattle in the medieval period so it is unclear whether they were housed or grazed outside during the winter. Indeed, the housing of oxen and bulls in a *fjós* is only mentioned for three farms in *Íslendingasögur*, at Þórhallsstaðir (Forsæludalur), Möðruvellir and Jarlsstaðir (Eyjafjörður), and no references are found in *Sturlunga saga*.[309] It is unclear if the practice of housing non-milking cattle in the *fjós* was widespread or reflected the farm's status. If a farm's wealth influenced the livestock in a *fjós*, then it is presumed that poorer farms housed their livestock together because they could not afford to build and maintain separate buildings. The sagas do not always give an indication of status, though some farms are clearly superior to others. It is, therefore, necessary to rely on later sources for information on farm values, such as *Jarðabók*, which recorded the land values for farms at the start of the eighteenth century. It is thought that these land values were somewhat stable from the medieval period and so can be used retrospectively.[310] Of the three farms above, only the well-known farm of Möðruvellir was recorded in detail. In *Jarðabók*, we find that Þórhallsstaðir was abandoned by the sixteenth century with no valuation given, and there is no record for Jarlsstaðir. Relying on these later farm values, it appears that farms of varying fortune housed milking and non-milking cattle together in their *fjós*, and there was no difference in practices based on the wealth of the farms.

[309] *Grettis saga Ásmundarsonar*, ÍF VII, chapter 33, p.115 (Þórhallsstaðir, Forsæludalur); *Ófeigs Þáttr (Ljósvetninga saga)*, ÍF X, chapter 2, p.119 (Möðruvellir, Eyjafjörður); *Reykdæla saga og Víga-Skútu*, ÍF IX, chapter 11, p.179 (Jarlsstaðir, Eyjafjörður).
[310] McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.29.

On the other hand, other livestock could be housed in the *fjós* at the same time as milking cows.[311] The size and purpose of a *fjós* would therefore depend on the individual farm's requirements, resulting in a diverse range of sizes and number of stalls. This diversity can be seen in the archaeological material, where a total of thirteen medieval sites are known to have structural evidence for *fjós*, but only nine have been fully investigated, and the distribution is limited to the south of Iceland from Borgarfjörður to Papey.[312] Recent excavations have started to rectify this issue, with *fjós* found at Sveigakot (Mývatn) and Keldudalur (Skagafjörður).[313] Interestingly, the distribution of those recorded in *Íslendingasögur* are restricted to the north where the winter may be assumed to have been harsher and last longer.

There are some common characteristics that are generally accepted as identifying a *fjós*, such as a central aisle, being nearly always paved with stalls on either side.[314] The structure thought to be *fjós* at Sveigakot also followed this design by having a central paved aisle and a sloped floor, though there was no evidence of stalls.[315] The climatic differences and winter conditions are likely to have influenced such aspects as distance from farmstead and proximity of the location of hay storage. There are likely to have been variations amongst *fjós*, such as the material used to divide the stalls, whether the floors were sloped, and whether there was a barn attached to the structure.

While it is assumed that every farm would have had a *fjós*, only thirteen have been archaeologically investigated. On the limited evidence available, it appears that the *fjós* can be situated up to 80m away from the farmhouse.[316] From the somewhat problematic evidence we have for *fjós*, it has been speculated that when *fjós* were re-built they were re-built in a different location.[317] The periodic re-location of the *fjós* would help distribute manure around

[311] *Fljótsdæla saga*, ÍF XI, chapter 19, p.276; *Hænsa-Þóris saga*, ÍF III, chapter 9, p.26.
[312] Berson, 'A Contribution to the Study of the Medieval Icelandic Farm', p.38.
[313] Orri Vésteinsson, 'Archaeological investigations at Sveigakot 2004', Fornleifastofnun Íslands Report FS265-00215 (2005), p.4, http://www.nabohome.org/uploads/fsi/FS265-00215_Sveigakot_2004.pdf; Guðný Zoëga, 'Keldudalur í Hegranesi: Fornleifarannsóknir 2002-2003', Rannsóknaskýrslur (2013), pp.1-83, p.2. http://www.glaumbaer.is/static/files/pdf/Rannsoknarskyrslur/bsk-2013-135-keldudalur-i-hegranesi-2002-2003.pdf
[314] Berson, 'A Contribution to the Study of the Medieval Icelandic Farm', pp.59-60.
[315] Vésteinsson, 'Archaeological investigations at Sveigakot 2004', p.17.
[316] Berson, 'A Contribution to the Study of the Medieval Icelandic Farm', p.60.
[317] Ibid., p.62. As Berson explains, in the past *fjós* excavations have not been undertaken to the same level of detail as dwelling structures, and with some excavations only uncovering the last phase of use. Again, more excavations are needed.

the land, especially if the farm did not have the workforce to spread manure.[318] As a result, there might be remains of more than one *fjós* for farms with long histories. The difficulties with archaeological investigations of *fjós* are the placement of *fjós* relative to the dwelling structures, the ability to actually excavate the structure and the survival of remains. *Fjós* remains may be situated outside the limit of excavation. If this is the case, it could be costly and time-consuming to search for these livestock structures, but not unrewarding. Alternatively, potential remains may be under later or modern buildings. In these circumstances, the remains may have been damaged or even destroyed, as well as building material having been re-used. All of these are possible explanations for so few *fjós* being discovered.

The sagas are of little help for indicating the distance between the farmhouse and the *fjós* in the saga evidence.They only state whether the farmhouse and *fjós* are conjoined or separate buildings. At times the *fjós* was attached to the main farmhouse building, yet at other times it was a short distance away, as assumed in one case where women milking walked between the farmhouse and *fjós*.[319] In *Fljótsdæla saga*, the distance between the dwelling and *fjós* saved a mother, daughter and herdsman, who survived a landslide that buried the farmstead because they had gone to the *fjós*, indicating a lengthy distance.[320] The *fjós* could also be situated closer to grazing than to the farm. In *Laxdæla saga* during the settlement, a *fjós* was built in a wooded area at a distance from the farm to utilise the grazing there, implying it was easier for people to go to the cows than for the cows to come to the main farm.[321] Thus there was no set model to follow and the placement of a *fjós* reflected the needs and resources of the farm.

2.6.2 *Fjárhús* and *fjárborg*

One difficulty with examining winter housing is whether or not early modern practices existed earlier. For example, Thoroddsen states that the sagas do not mention *fjárborgir* (sheep-shelters), a type of shelter for livestock kept outside during winter.[322] These structures are only mentioned in written sources from the eighteenth century onwards and it is unclear

[318] D. Bolender, 'The Creation of a Propertied Landscape: Land Tenure and Agricultural Investment in Medieval Iceland', (Unpublished PhD thesis, Northwestern University Illnois, 2006), p.224.
[319] *Valla-Ljóts saga*, ÍF IX, chapter 6, p.250; *Bjarnar saga Hítdælakappa*, ÍF III, chapter 16, pp.152-153.
[320] *Fljótsdæla saga*, ÍF XI, chapter 1, p.215.
[321] *Laxdæla saga*, ÍF V, chapter 24, p.68.
[322] Thoroddsen, *Lýsing Íslands* III, p.179.

when they came into use.[323] The sagas do, however, make several references to *fjárhús* (sheep-house) during wintery or bad weather. In *Hávarðar saga Ísfirðings*, there are two separate references to *fjárhús* when characters go to check on sheep in bad weather.[324] It therefore, seems that *fjárborgir* were either uninteresting to saga narrative or were a later introduction to sheep farming in Iceland. Both *fjárborgir* and *fjárhús*, though, appear to have served a similar purpose of offering protection during wintery weather. There were differences between the actual structures that necessitate closer examination.

Fjárborgir appear to have been low structures, usually door-less and without a yardwall, leaving the animals free to come and go. There are no references to mangers, internal divisions or stalls, and there was a tendency for fodder not to be given at the *fjárborgir*, though when fodder was given it was put on the frozen ground.[325] It is not clear whether fodder was stored at the *fjárborgir* or was brought to them from another place. Þorvaldur makes no comment on where fodder was kept at these shelters. In contrast to the unrestricted access of *fjárborgir*, a physical description of a *fjárhús* stated that it had a low, narrow doorway and was roofed with turf.[326] In the structures thought to be *fjárhús* at Þórarinsstaðir flat slabs were placed around the walls to create mangers. Another example from *Íslendingasögur* shows the multi-functional use of structures on a small farm when sheep were locked in a *naustahús* (boat-house) in an emergency.[327] A structure partially excavated at Steinbogi (Mývatnssveit) might also have had multiple uses during its existence: it has been interpreted as a *fjárhús* before it was re-used and then finally abandoned around the turn of the fourteenth century, showing a fluidity in buildings' use over time.[328]

The locations of *fjárborgir* and fjárhús were different too. *Fjárborgir* seem to have been placed in remote areas, for example near beaches, and in some areas caves were used for shelters. Whereas a fight recorded in *Íslendinga saga* describes a *fjárhús* in an enclosed low-lying field, *garðr*, indicating that sheep could be closed in when necessary and were not

[323] Birna Lárusdóttir, *Hiti er á við hálfa gjöf: Fjárhús, beitarhús og fjárborgir á Íslandi* (Unpublished MA thesis, University of Iceland, 2005), p.147.
[324] *Hávarðar saga Ísfirðings*, ÍF VI, chapters 3, p.300 and 14, pp.337-338.
[325] Thoroddsen, *Lýsing Íslands* III, p.179.
[326] *Fóstbræðra saga*, ÍF VI, chapter 12, p.179.
[327] *Fljótsdæla saga*, ÍF XI, chapter 19, p.278.
[328] Orri Vésteinsson, 'Archaeological investigations at Steinbogi' in Orri Vésteinsson (ed.) 'Landscapes of settlement 2002 Reports on investigations at five medieval sites in Mývatnssveit', Fornleifastofnun Íslands Report FS218-02261 (2004), pp.7-15, p.12.
http://www.nabohome.org/uploads/fsi/FS218-261_Five_medieval_sites_in_Myvatnssveit.pdf

always placed on marginal ground.[329] In *Landnámabók*, the *fjárhús* at Reykholt was placed near the baths, a short distance from the farm house.[330] These two saga examples show that sheep were not always kept at a distance from the farm. There were also several names for these houses depending on the animals housed, for example, the sagas record sheep-house, *sauðahús*, and lamb-houses, *lambahús*, situated on their own hayfields.[331] Both sagas record the structures but not the animals, though as the events occur during the summer the sheep were probably grazing off-farm. During the winter, the sheep would use the structures as they grazed the hayfields and their manure would fertilise the ground for the next year's hay.

The size of *fjárhús* must be related to the maximum potential number of sheep kept in them. Attempts have been made to calculate the size of sheep herds based on the size of *fjárhús*, yet these calculations can only ever be estimates because it is unclear how much space was given for each animal and whether these structures were always filled to capacity.[332] The internal space was not divided into stalls, as in the case of *fjós*, and farmers may have had different ideas about the necessary space needed for an animal.[333] In addition, it is not clear whether a farm would have just one *fjárhús* or several, and again that would depend on the management strategies. The fifteenth century *Búalög* gives us some idea of what was thought to be sufficient space for sheep as it recommended manger breadth for one adult sheep to be one sixth of a *faðmur* or c.29cm.[334] Little is known about *fjárhús* because they have only been excavated at two sites. Þórarinsstaðir appears as a unique site with three medieval sheep houses discovered less than 100m away from the farmhouse.[335] The three *fjárhús* seem to have been in contemporary use due to the short life of the site, suggesting a farm may have several *fjárhús*, though Þórarinsstaðir is situated in an area known for its deep snow coverage, which possibly necessitated multiple houses to accommodate all the sheep owned by the

[329] *Íslendinga saga*, *Sturlunga saga* I, chapter 138, p.430.
[330] *Landnámabók*, ÍF I, chapter 152, p.192, 'fór Oddr frá húsi til laugar í Reykholt; þar váru sauðhús hans'. It is unclear in the example whether there was one or several *fjárhús* at Reykholt because *fjárhús* is the same in the singular and plural form. It is assumed that there was one in this example. The recent excavations at Reykholt have been limited in their interpretation of structures due to modern developments and damage, Guðrún Sveinbjarnardóttir, *Reykholt: Archaeological Investigations at a High Status Farm in Western. Iceland*, (Reykjavík, 2012), p.96.
[331] *Þorgils saga skarða*, *Sturlunga saga* II, chapter 47, p.182. *Sauðahús* has the same form for the nominative and accusative in both singular and plural, thus in this instances it is not clear if there were one or more sheep-houses, or adjoining sheep-houses, on the hayfield. *Fóstbræðra saga*, ÍF VI, chapter 12, pp.178-179.
[332] Karlsson, *Lífsbjörg Íslendinga*, p.134.
[333] The issue of livestock population is dealt with in chapter 4.
[334] *Búalög*, p.213; Björn M. Ólsen, 'Um hina fornu íslensku alín', *Árbók Hins íslenzka fornleifafélags* 1910 (1911), pp.1-27, p.9.
[335] Kristján Eldjárn, 'Eyðibyggð á Hrunamannaafrétti', *Árbók hins íslenzka fornleifafélags 1943-48* (1949), pp.1-143, pp.33-38.

farm.[336] The *fjárhús* at Sveinbogi was partially excavated as the structure was truncated by a modern road.[337] The longevity of these structures is unclear. The farm of Steinbogi is thought to have been occupied for two and a half centuries until it was abandoned before 1300, and the *fjárhús* had two building phases before being re-used later, though no dates are given for its use.[338] Þórarinsstaðir was abandoned due to volcanic activity, yet the *fjárhús* potentially could have been used for longer if the eruption had not ceased activities at the farmstead.

Structures used to house animals on a farm have some common characteristics, though the limited amount of excavation restricts the information available about them. These structures were essential, especially for cows, if livestock were to survive the winter. Livestock also needed fodder to ensure their survival through winter. The giving of fodder varied in extent and leads to questions about the location of hay storage, which will be discussed in the next section.

2.7 HAY STORAGE

The cutting and storing of hay was crucial in a pastoral economy such as Iceland's where the winters could be long and harsh. Fodder was collected from different places, but hay cut on the *heimaland* and further afield was the most prized and ferociously protected, as shown in the legal and literary sources. Once hay was cut it needed to be dried as much as possible by turning it where it was cut, this was to stop it from rotting, and then the hay was stored to protect it from the weather. As with some other aspects of farming routine, the sagas are mainly uninformative about hay-making or how hay was stored. The most illuminating account is an exceptional case in *Eyrbyggja saga* where a shower of blood fell during hay-drying.[339] Nevertheless, if the hay-making was successful and the hay was dried, it needed to be stored or transported to where it would be used.

It appears that two structures were used for hay storage in Iceland. The first in the hay-yard (sg. *heygarður*) and the second the barn (sg. *hlaða*). Hay-yards have been referred to by several names over the centuries, including *heygarður*, *stakkgarður* and *töðugarður*.[340]

[336] Eldjárn, 'Eyðibyggð á Hrunamannaafrétti', p.41.
[337] Vésteinsson, 'Archaeological investigations at Steinbogi', p.12.
[338] Ibid., pp.12, 14.
[339] *Eyrbyggja saga*, ÍF IV, chapter 51, p.140.
[340] Thoroddsen, *Lýsing Íslands* III, p.134-135.

Heygarður refers to the use of the yard for hay, *töðugarður* from *taða* refers to the use of manure as fertiliser for the hay, and *stakkgarður* to the method of storing the hay in stacks.

It it is unclear what storage practices existed in the medieval period. Descriptions from sagas shed a little light on hay storage, but are vague on specific details. One form of storage was to build the hay into stacks in the hayfield where a wall would protect the hay from animals. The stacks were built in such a way as to hinder moisture working its way into them and covered in a layer of turf, and as shown in *Þorgils saga skarða*, it was this outer layer is what was needed to be broken in order to get to the useable hay.[341] In later times it is known that hay was covered in turf to protect it from the elements.[342] Hay was not necessarily transported to the farm once it was dried, but could be built into stacks on the hay-making land.[343] The sagas reveal a fear of haystacks being destroyed by stray livestock, a legitimate worry in a country reliant on hay for their survival through winter.[344] The haystacks were temporary storage solutions before the hay was moved from the hayfield to where they were needed at a later time, and this was done by horses or oxen.[345] We are reliant on vague saga details because archaeologically, the haystacks would leave little trace except for the hayfield walls if present, but these would enclose the whole field not just the stacks. Environmental evidence in the form of synanthropic insect evidence might not be present at the hay-yards due to the distance from the farms and the little shelter offered against the climate.[346] Therefore, we are limited in our understanding of this type of hay storage for the centuries considered by this thesis.

The other type of storage was barns, where a roof would protect the hay against the weather. These structures would leave more physical evidence in the form of walls and would be situated closer to animal houses, if not connected directly end to end.[347] There are a few examples of possible barns in the literary sources. For example, in *Fljótsdæla saga*, hay was carried into a building through a window, *vindauga*, big enough for forkfuls of hay to pass

[341] *Þorgils saga skarða*, *Sturlunga saga* II, chapter 61, p.204. It is uncertain what this outer layer consisted of, but it appears to be spoilt hay or turf.
[342] Jónasson, *Íslenzkir Þjóðhættir*, p.85.
[343] *Íslendinga saga*, ÍF I, chapter 84, pp.349-350.
[344] *Víga-Glums saga*, ÍF IX, chapter 7, p.24; *Eyrbyggja saga*, ÍF IV, chapter 63, p.174.
[345] *Heiðarvíga saga*, ÍF III, chapter 19, p.271; *Fljótsdæla saga*, ÍF XI, chapter 12, p.246; *Eyrbyggja saga*, ÍF IV, chapter 30, p.82.
[346] Vickers and Sveinbjarnardóttir, 'Insect invaders', p.166,175, comments that synanthropic beetles may survive winter inside abandoned buildings, but hay-yards were open to the elements.
[347] Berson, 'A Contribution to the Study of the Medieval Icelandic Farm', p.60.

through, and though the structure was not named it is most likely a barn. [348] Later in the same saga, at another farm, the windows of a barn attached to a *fjós* were sealed up after the hay had been brought in. The use of windows directly into the barn would have eased moving the hay and meant it did not have to be brought through the *fjós*.[349] Unfortunately, recovering evidence of windows to aid identification of these spaces is not possible. We can conclude that the barns were dark and ill-ventilated places once the windows were sealed as ventilation otherwise came through the *fjós*. Again, the evidence for hay storage is sparse and the archaeological evidence for these structures is ambiguous as there would be few indicators to distinguish the structure, or space, from other functions, except for the possible presence of fodder remains or associated insects.

There were, then, at least two different ways that hay was stored. Each of these would have had an effect on the nutritional value of the hay and the surviving physical evidence of the storage of hay. It is usually assumed that hay was cut on the *heimaland*, but there is evidence that hay was cut further afield, such as at shielings, thereby expanding the catchment zone of farms' resources.[350] The winter storage of hay would also indicate the presence of animals and inform us about the location of livestock over winter. The challenge then, is to locate and identify such structures, though they may have had several functions over their lifespan.

2.8 THE GRAZING OF OTHER LIVESTOCK

Cattle and sheep were the most numerous milk and meat-bearing domestic livestock in Iceland, but they were not the only livestock. Pigs and goats were also introduced at colonisation, and their grazing habits have long been thought to have contributed to deforestation and land degradation. The legal texts acknowledged that pigs were different from other livestock, in their habits and requirements, whereas goats were treated in a similar manner to sheep. Still, both species became scarce. Unfortunately, archaeological investigations have so far had limited scope examining pig husbandry in Iceland. In addition, goat bones are hard to distinguish from those of sheep and usually placed in the combined

[348] *Fljótsdæla saga*, ÍF XI, chapter 12, p.247. In *Íslendinga saga*, *Sturlunga saga* I, chapter 150, p.452, the window of a barn was big enough for a man to jump through and escape. Escaping through windows is a method of escape in *Guðmundar saga dýra*, chapter 3, I, p.165, though the structure is only referred to as a *hús*, and not clear if it was an animal house or other outbuilding.
[349] *Fljótsdæla saga*, ÍF XI, chapter 19, p.276.
[350] See Section 2.4.

category of 'caprine' in zooarchaeological reports. The evidence for grazing of specifically pigs and goats will be evaluated to discover what evidence there is for these species.

2.8.1 Pigs

Due to the scarcity of pigs in the sagas and archaeology, we are mostly reliant on the legal texts to inform us of pig grazing in Iceland. Even then, there are few references to pigs in *Grágás* which must indicate the limited role that pig husbandry played relative to sheep and cattle husbandry.[351] *Grágás* states that there is 'No quota of pigs is to be calculated for any land or pastureland' and later 'Pigs are not to be kept in communal pasture. They had no immunity from injury on any man's land except their owner's unless it is a homefield boar with a ring or toggle or withy in its snout' to prevent it from rooting.[352] There was no mention of pigs wearing collars or boars causing injuries as there was in the Norwegian *Frostathing*, probably due to pigs being restricted to the owner's land, so collars were not needed.[353] The differing focus on pigs between the Icelandic and Norwegian laws suggests that Icelandic society was more concerned about damage to land than injury to people.

The grazing for pigs was inextricably linked to whether they were enclosed. If they were housed, then the range of fodder could be controlled. *Grágás* implies that pigs without nose-rings were enclosed or under close supervision to ensure that they could not trespass, as only pigs with nose-rings were allowed off the owner's land. Despite the religious tone, an incident in *Prestssaga Guðmundar góða* indicates the housing, at least, of sows in the mid-twelfth century when at Hegranes a sow escapes her house, *hús*, and bit a small child to death.[354] Apart from being noted as an odd event, it shows an incentive to enclose pigs because they were known to be dangerous. Nevertheless, pigs would need fodder, and it is unclear from *Grágás* where grazing was obtained. The banning of pigs from common land implies they were kept on the farm, where they were housed or at least herded to protect

[351] *Grágás* was actually more concerned with pigs, unlike the Norwegian law texts, *Gulathing* and *Frostathing* that are thought to have been the inspiration for *Grágás*. Dennis et al., *Laws of Early Iceland* I, p.1.
[352] *Grágás* K.180, K207; Dennis et al., *Laws of Early Iceland* I, pp.109, 139.
[353] Larson, *The earliest Norwegian laws,* p.288, 387. *Frostathing* refers to injuries to a person caused by a boar, as well as other male animals, and stipulates a fence is 'competent' when a pig wearing a collar 'two thumb ells long' could not get through the fence. Nowhere are the Norwegian legal texts concerned with the foraging behaviour of pigs, though the mention of a collar does suggest that pigs were restrained. *Gulathing* does not refer to pigs at all.
[354] *Prestssaga Guðmundar góða*, *Sturlunga saga* I, chapter 4, p.123, '*at þar hljóp gyltr ein ór húsi sínu um nótt ok braut upp hurðir ok hljóp at hvílu einni, er koma hvíldi í með barni. Ok greip gyltrin barnit ok beit til bana ok hljóp út síðan. En barnit lá eftir dautt, en gyltrin hljóp í hús sitt*.'

pasture and hayfields. The time and labour involved would mean pigs, where they were kept, were kept in small numbers and likely fed on leftover or waste food as discussed below.

A second issue is whether people kept fewer pigs as a result of the decreasing amount of woodland.[355] The foraging behaviour of pigs would have destroyed young trees, while their rooting would have destabilised the fragile Icelandic soils.[356] By preventing the regeneration of vegetation cover and loosening the soil, pigs would have visibly increased soil erosion. Reducing the number of pigs would have eased the pressure on the woodlands and aided their preservation. The Icelandic birch woodland also lacked oak and beech and was not a natural source of forage for pigs making them reliant on roots, grasses and other vegetation. In mainland Europe, pigs fed on acorns and beechmast, therefore Iceland was ill-suited to feeding pigs and alternative sources of fodder would have been needed. Analysis of stable carbon and nitrogen isotopes has revealed that some of the pigs at Hofstaðir were fed on the waste of fish processing and the eggs of waterfowl.[357] It is sometimes forgotten that pigs are omnivores and can survive on animal remains, as well as waste food.

Grágás shows a society concerned with controlling the foraging behaviour of pigs by the twelfth century. As shown, it is clear that pigs were ill-suited to Iceland and were costly to rear. *Grágás* demonstrates that wandering pigs were treated differently from wandering cattle and sheep, and pigs were valued for their meat.[358] The text stipulates that cattle and sheep were not to be harmed in any way, indeed if they are harmed, and the damage to the animals was worth over five *aurar*, the drivers could have been fined or sentenced to lesser outlawry. Pigs found wandering, however, could be killed once they were discovered roaming. There is no stipulation about driving wandering pigs as there was with cattle and sheep. There was thus a significant difference between cattle and sheep on the one hand and pigs without nose-rings on the other. Therefore, to protect such an expensive investment, it would have been better to keep pigs enclosed on the farm. It is not known if pigs were housed separately, or housed in the *fjós* as was the case with other livestock.

[355] As stated in see Section 2.2, it is thought that Iceland had extensive woodlands when first settled, yet within a few centuries measures were being taken to conserve this resource, as illustrated in *Grágás*.
[356] F. Vera, *Grazing Ecology and Forest History* (Wallingford, 2000), p.185; McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.30.
[357] T. McGovern, 'The Archaeofauna', in G. Lucas (ed.) *Hofstaðir: Excavations of a Viking Age Feasting Hall in North-eastern Iceland* (Reykjavík, 2009), pp.168-252, p.219.
[358] *Grágás* (1852) K.200-203.

2.8.2 Goats

There are few references to goats in the written sources, potentially indicating their rarity amongst Icelandic livestock from an early date. It is unlikely they were restricted to the farmstead in the way pigs were restricted. In fact, *Grágás* and *Jónsbók* suggest that goats were allowed on pastureland, *hagi*, unlike pigs.[359] Goats can survive on hay and grass plants, but they prefer woody shrubs. It is usually assumed that sheep and goats have 'complementary' grazing habits as they exploit different species and can benefit land productivity if the correct balance is struck.[360] In Iceland, however, there was not the diversity of vegetation to allow sheep and goats to have different grazing habits, therefore unless there was shrubbery available, such as there was thought to be during the ninth and tenth centuries, sheep and goats are likely to have competed for the same fodder. If sheep were the more profitable species to feed, as they gave a wider range of products, then it would have been more economical to rear sheep than goats.

There are a couple of references in the *Íslendingasögur* to goats, yet there is little detail about how they were managed. In *Njáls saga*, a billy-goat was allowed to walk around the hayfield at Hlíðarendi (Fljótshlíð), suggesting that the billy-goat was a special animal to be permitted to graze on valuable hay-land, *tún*, in a similar way to a bull allowed to graze the *tún* in *Eyrbggja saga*.[361] At the farm of Bakki (Borgarfjörður), the keeping of goats in stalls in the *fjós* was mentioned in passing when the *fjós* was searched.[362] By the nineteenth century, goats needed to be tied in stalls because they were inclined to fight and injure each other, according to Björn Jónasson.[363] It is possible that in the preceding centuries, they were also tied when stalled. Young goats, kids, are also mentioned in *Íslendingasögur*. In *Hrafnkels saga*, Hrafnkel loses everything and is forced to move to a poor farm, where he supposedly survived the first winter by raising calves and kids.[364] The reliance on young livestock emphasises the impression that Hrafnkel has fallen a long way from his previous social

[359] *Grágás* (1852), K.180, p.89; Schulman, *Jónsbók,* p.161. VI, 4.
[360] S. Payne, 'Kill-off Patterns in Sheep and Goats: The Mandibles from Aşvan Kale', *Anatolian Studies* 23 (1973), pp.281-303, p.299; G. Goetsch, 'Co-grazing of sheep and goats: Benefits and constraints', *Small Ruminant Research* 77 (2008), pp.127-145.
[361] *Brennu-Njáls saga*, ÍF XII, chapter 41, p.106; *Eyrbyggja saga*, ÍF IV, chapter 63, p.172.
[362] *Fljótsdæla saga*, ÍF XI, chapter 19, p.276.
[363] Thoroddsen, *Lýsing Íslands* IV, p.67. Sheep, on the other hand, could be housed together in sheep-houses and did not need to be separated indoors.
[364] *Hrafnkels saga Freysgoða*, ÍF XI, chapter 5, p.122. It is not clear why the young livestock are restricted to goats and calves. Possibly it is due to cows being breed all year round, but it would be assumed that goats were breed in the autumn, to coincide the birth with the start of spring.

position: young livestock would not provide milk, a major component of the medieval Icelandic diet. However, the young are calves and kids, not lambs, thereby illustrating that he still has some standing as calves and kids would mature into milking stock, and so he is perhaps not as poor as he could be.[365] In *Þorskfirðinga saga*, two grey ewe-lambs and two grey kids are stolen each spring by a troll and a shape-shifter indicating that these young animals were kept in pens close to the farm.[366] Kids could also be used for small payments, such as when a boy herding livestock on Hrísey was given a female-kid as payment for spying.[367]

While *Íslendingasögur* and *Sturlunga* saga were compiled contemporaneously, they portray different times in Icelandic society. The inclusion of goats in the *Íslendingasögur* adds a sense of the unusual to the stories and sets the period of these stories apart from the time of the audience. When they are mentioned, they do not appear to have had distinct grazing practices, they were just another livestock animal and treated as such. There is no mention of goats in *Sturlunga saga,* supporting the idea that goats had become scarce by the thirteenth century when these sagas were compiled.

2.9 FARM LABOUR

This chapter has so far focused on livestock and the utilisation of the landscape that ensured sufficient fodder through the winter, yet, it has neglected another essential component of farming: humans. Before mechanisation farming relied on people to provide labour and sagas allow us a glimpse into the tasks assigned to an array of men, women and children participating in farming. These were the people who herded the animals, milked the milking stock and maintained the buildings. The sagas suggest that the two main factors governing task assignment on farms were gender and age, and these shall be discussed in this section. Some have suggested that there was a gender division in labour seen at shielings, but currently there is no clear evidence for gendered spaces at shieling sites.[368] That is not to say, though, that gender ideals were absent from medieval Icelandic society, as shown in *Laxdæla saga* where a man could be divorced for wearing feminine clothing and a woman for wearing

[365] Goats do not appear to have been used for wool in Iceland and instead were known for their milking abilities. See Section 6.5.
[366] *Þorskfirðinga saga*, ÍF XIII, chapter 14, p.205.
[367] *Reykdæla saga og Víga-Skútu*, ÍF X, chatper 13, p.189.
[368] See Section 2.4.2.

masculine clothing.[369] Indeed, women appear to be practitioners in milking and *vaðmál* production, as seems to be the case with men exclusively undertaking fishing, but as will be shown all members of the household could, and would, be called upon to provide labour for different farming activities. Medieval farming can be seen as a male dominated world, but women were just as necessary and deserve to have their input recognised. Likewise, children are found undertaking various tasks in the sagas, however, their role in farming is under-appreciated. Outside of the literary material there is little evidence of children in farming, yet they are known to have played a part in early modern Icelandic farming and worked to support the household.[370] Children and young adults functioned as unpaid labour, as well as potential future householders.[371] While the evidence for them is scarce, children and young people should be acknowledged as part of the production process.

The routine of farming is important because it gives an insight into how a farm was organised, socially who was responsible for tasks and economically how animals were turned into products. The management of cattle therefore permits a brief examination of who did what on a farm based on saga evidence. The role of gender in Icelandic society has been a topic of saga research, but has not been explored much in regard to farming activities, as the following evaluation will show.

As mentioned above, there is very little evidence for on-farm activities, such as breeding and calving, but there is evidence for milking and housing. The recording of milking and housing reflect the nature of the sources, where these activities provide the backdrop for the saga events. The management of cattle show that these animals were spheres of overlapping responsibility for both men and women, as in *Harðar saga* where each group blamed the other for perceived mistakes.[372] The division of labour reflects what must have been known tensions between the milkers and herders. In this case, an ox was taken from a *fjós*, though no specifics are given about what cattle were housed in the *fjós*. Later in *Harðar saga*, a character from another farm unties the cattle in the *fjós*. In the *fjós* with the cattle are two

[369] *Laxdæla saga*, ÍF V, chapters 34-35, pp.94, 96.
[370] Childhood exhibition, Borgarfjörður local museum, September 2014.
[371] Children and young people' labour within a household appears to be unpaid, or when they come to the household they are given board and lodging, not a wage. For example, a father is paid for herding but the son is only given board and lodgings in *Íslendinga saga*, *Sturlunga Saga* I, chapter 141, pp.440-441 and *Hrafnkels saga Freysgoða*, ÍF XI, chapter 4, p.101 records a young adult obtaining work as a shepherd, the last position on the farm to be filled. Of course, it may be that children and young people were given the least desirable job, but this was not always the case, *Grettis saga Ásmundarsonar*, ÍF VII, chapter 69, p.225.
[372] *Harðar saga*, ÍF XIII, chapter 22, p.60.

men, later called cattle-men, *nautamenn*, who assume the loose cattle were the fault of the women, *konur*. When the women enter the *fjós*, they assume that the cattle are loose because the cattle-men have fallen asleep. Both groups had access to the cattle so could be blamed. It says that women came to the *fjós*, but does not state their purpose. The arrival of the women in the morning suggests it is for milking, but this would mean that it was a mixed herd kept in the *fjós*.

The driving of livestock was a crucial part of utilising off-farm pasture. The duties show roles being differentiated based on gender, though it was not rigidly followed. Men usually undertook herding activities, such as shepherding, as illustrated again in *Harðar saga* when a man and a boy drove cattle to pasture in the spring.[373] Yet women could also be involved, as shown by a shepherd and housemaid driving livestock.[374] Herding was age- and livestock-related too, as in *Íslendinga saga* where a father was paid for herding cattle but his son, age unknown, was not paid for herding sheep.[375] Neither the father or the son were householders indicating there was no difference in social status, therefore it appears that this distinction in pay was due to cattle being more valuable than sheep, requiring more care and experience. As shepherding was less well paid it was taken up by younger people, who maybe had just entered the job market. Herding duties were not rigidly assigned and when the need arose any member of the household could be called on to help. Again in *Íslendinga saga*, a farmer calls to his house-man, *húskarl*, to help him drive cattle, *naut*, out of the homefield, *tún*.[376] It was possible for one person to herd, as in *Guðmundar saga dýra* where a maid, *meystelpa*, was able to drive cattle to grazing on grass being prepared for hay.[377] The cattle are driven off, but it is unclear if they were driven by the farmer who spoke to the maid, or by the people who would have been hay-making, which could have been both men and women as testified to in *Eyrbyggja saga*.[378] As a charge of being driven by force is levelled at those drying hay in *Guðmundar saga*, it is likely that more than one person was involved.

The activities and roles were not always clearly defined in medieval Icelandic farming, except when it came to milking and weaving related duties which was the sole domain of

[373] *Harðar saga*, ÍF XIII, chapter 29, p.74.
[374] *Brennu-Njáls saga*, ÍF XII, chapter 78, p.192.
[375] *Íslendinga saga*, *Sturlunga Saga* I, chapter 141, pp.440-441.
[376] *Íslendinga saga*, *Sturlunga Saga* I, chapter 67, p.322.
[377] *Guðmundar saga dýra*, *Sturlunga Saga* II, chapter 11, p.182.
[378] *Eyrbyggja saga*, ÍF IV, chapter 51, p.140.

women. Men appear to have done most of the herding, though there was some flexibility as to who drove livestock. In reality, duties were probably more flexible on smaller farms where fewer people and smaller herds resulted in individuals taking on a number of roles. At bigger farms with more animals and available labour, individuals would have had specific tasks.

2.10 CONCLUSION

This chapter has reappraised the evidence concerning various forms of pasture and some of the livestock buildings found on or around a farm. It brings to light some of the gaps in our knowledge of the practical side of pastoral farming. The discussion of pasture and shielings is not intended to be exhaustive, but more an attempt to connect the discussions of land use with livestock practices, such as the use of off-farm grazing and how livestock, other than cows, were housed and fed during the winter. From this chapter, we can see that a farm generally consisted of a farmhouse and buildings for livestock, hay storage and other activities. The livestock buildings reflect the farm's economy and livestock reared, as well as the wealth of the farm. The placement of these buildings would depend, again, on the farm but also the local conditions, such as the depth and duration of snow cover, and where suitable grazing was located. Off-farm grazing would be utilised during the summer, but whether as communal pasture, shieling or private pasture depended on the farm and its resources. The decision to utilise various types of grazing would depend on the economy of the farm; shielings being exploited by milking stock whereas non-milking stock were allowed more freedom.

Shielings have also been shown to be diverse places, both in function and workforce. Dairy processing, hay-making, firewood collecting are some, but not all, of the tasks conducted at these sites, that differ from the use of communal pasture. Some have argued that shielings were female spaces, but this was only the case when dairy processing was taking place, and even then herders who were males were needed to herd the livestock. It may be the case that wealthier farms could afford to designate specific tasks to household members, whereas members of poorer households were required to undertake several roles at shielings, as well as at the main farm. It can also reasonably be assumed that apart from regional variations there were reductions in shieling use after disease outbreaks, though these may have been short-term rather than evidence of long-term abandonment of farming practices.

It has usually been assumed that only milking cows were housed during winter, however, this chapter has shown that this was not the case. There are several saga examples that indicate that non-milking cattle and even sheep were housed during winter. Therefore, when comparing practices in the sagas caution is needed as the frequency of details does not indicate the popularity of a practice, just that it was notable in the context of the narrative. This last point explains the scarcity of information on hay-making in the sagas.

In addition, Icelandic livestock were not just cattle and sheep, but included rarer species such as pigs and goats. These two species were ill-suited to the Icelandic environment, being more woodland dependent and our knowledge of their grazing habits rely on the *Íslendingasögur* where they appear as a novelty. From these examples, it has been shown that pigs had to survive on a diet different from that of pigs in the rest of Europe. Goats appear to have been grazed in a similar way as sheep and cattle, permitted to graze off the farm in the summer and possibly housed, or at least offered shelter during the winter. Pigs, on the other hand, were kept on the farm, though it is unclear if they were kept alongside other housed livestock or in a separate structure.

While this chapter has not been exhaustive on the issues connected with grazing and housing, it has drawn attention to, and challenged, some of the ideas surrounding these topics. We need to understand pastoral farming practices in order to appreciate the use of land and the structures labelled as livestock houses. With this awareness of the relationship between the land, the farm and the livestock, we can now move on to examine the value of these livestock in medieval Icelandic society.

CHAPTER TWO
THE VALUE OF LIVESTOCK

3.1 INTRODUCTION

The aim of this chapter is to examine the legal texts and other documents that contain livestock valuations to discover how these animals were viewed economically by medieval Icelandic society and assess what these valuations indicate about the products sought from these animals, including the lesser discussed livestock of horses, pigs and goats. In Iceland, the idea of a standard unit of value, the *kúgildi*, was brought with the settlers. A *kúgildi* was a unit of currency that was equivalent to the value of a milking cow, or sometimes referred to simply as a cow-value. Part of a wider Icelandic system of giving values in numbers of livestock and their products, a milking cow was the largest denomination of value. Unlike other extant legal texts from Scandinavia and the British Isles, the Icelandic legal texts record equivalent values for other livestock in units of *kúgildi*. Nevertheless, most discussions of *kúgildi* are concerned with the changing *kúgildi* value over time or fluctuating land values.[379] This chapter shall evaluate our evidence for the value of a *kúgildi* before discussing how it relates to the value of other livestock within the context of Icelandic farming.

The unit of the *kúgildi* was used widely throughout the Icelandic economy, and has been used by scholars to address various aspects of the economy. Þorvaldur Thorodssen discussed at length the use of *kúgildi* for land rent values and the equivalent values in goods. He did acknowledge that the price of a cow differed between regions in nineteenth century Iceland. The lowest prices being found in the south, with prices higher in the north and highest in Múlasýsla.[380] He stated quite reasonably that a cow's value would increase after disasters, though he related this to the *móðuharðindi*, the Mist Famine, of 1783-1785.[381] The fluctuating nature of a *kúgildi* is significant when discussing livestock because other animals were valued relative to the unit, as will be shown below. Árni Daníel Julíusson also incorporates the *kúgildi* into his examination of land rents, the changing proportions of livestock, and for estimating livestock numbers.[382] He does not, however, go further to

[379] Thoroddsen, *Lýsing Íslands* III, pp.44-45; Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, pp.148-149, 176-177.
[380] Thoroddsen, *Lýsing Íslands* III, p.274.
[381] Ibid., p.274; Karlsson, *Iceland's 1100 Years*, pp.178-180.
[382] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, pp.148-149, 183-184, 239-240, 242-244.

discuss details about other livestock or their economic potential in Iceland. Helgi Þorláksson charts the changing nature of prices over the centuries, demonstrating the varying values given to certain goods, including *vaðmál* and fish.[383] However, he is concerned with *vaðmál* and prices in general, not specifically with livestock values and what these values indicate about farming in Iceland. These studies concentrated on valuations at regional and international levels, at a distance from farm production. The significance that was attached to the animals is not considered. The equivalent value of one milking cow to six ewes is commonly quoted as a standard value in published research, but few appreciate the wealth of information contained in the Icelandic legal texts about the value of other livestock.[384] Other north-west European legal texts do not permit such a detailed discussion of relative values because they lack the appropriate information. Some medieval Welsh and Irish laws do record livestock values, but they are valued against units of monetary currency, showing the importance of coinage in their economy, and not milking cows as in Iceland.[385]

In this chapter, the focus will be on the value of livestock and the qualities needed to achieve the values from the full spectrum of Icelandic domestic livestock. A glance at the valuations from the twelfth and thirteenth centuries would suggest consistency in the values relative to the *kúgildi* and as will be shown, the consistency continued at least into the sixteenth century, albeit based on limited sources. However, as stated by Kelly for medieval Ireland, 'No economic system can guarantee absolute stability in cattle-prices' and a hard winter, disease, war or a poor crop harvest may increase cattle prices because of the demand for cattle and their products, whereas human depopulation would lead to a drop in value.[386] The real value, or the amount of goods that could be exchanged for these livestock, may have varied across time and regions depending on social, political and climatic conditions, but the valuation of livestock relative to each other remained stable (Table 1). Helgi Þorláksson's study has addressed the changing nature of the *kúgildi* unit to show the variation in comparative goods

[383] Helgi Þorláksson, *Vaðmál og verðlag: Vaðmál í utanlandsviðskiptum og búskap Íslendinga á 13. og 14. öld* (Reykjavík, 1991), pp.132-143.
[384] Environmental research used the one cow to six sheep ratio for examining fodder requirements, amongst other things. For examples, see: Brown et al., 'Shieling Areas', p.88; Thomson and Simpson, 'Modelling Historic Rangeland', p.159; Simpson et al., 'Crossing the thresholds', p.184.
[385] M. Owen, 'Medieval Welsh cows, calves, bulls and oxen', *The Dublin Institute for Advanced Studies Medieval Law Conference 2014* https://www.youtube.com/watch?v=RWGCt412O94 ; M. Richards, *The Laws of Hywel Dda (The Book of Blegywryd)*, (Birkenhead, 1954), pp.87-89; F. Kelly, *Early Irish Farming* (Dundalk, 1998), p.58-66. The Irish laws sets the value of a milking cow at 24 scruples, equal to an ounce of silver, but this is not the same as the Icelandic laws, where all livestock are valued against *kúgildi*.
[386] Kelly, *Early Irish Farming*, p.57.

to give a wider perspective on the discussion, but the relevance of other livestock, apart from sheep remains unexamined. Below is an examination of how the valuation of other domestic animals, not just sheep, relate to the unit of a *kúgildi* and how these values differ by age and sex. The main sources for examining the value of livestock are the legal texts *Grágás* and *Jónsbók*, two *Alþing* price lists dated to c.1100 and c.1280, a district *þing* price list from Árnes dated c.1200, *máldagar* and, occasionally sagas. *Járnsíða*, another legal text, will not be included because it does not contain the clause on standard valuation of livestock, which the other two legal texts do.

Table 1: Comparison in domestic livestock values for *Grágás*, *Jónsbók*, and the *Alþing* and Árnes price-lists.[387]

	***Grágás* (twelfth century)**	***Alþing* c.1100**	**Árnes þing (c.1200)**	***Jónsbók* (thirteenth century)**	***Alþing* c.1280**
Kúgildi	Presumed 20 *aurar*	-	33 *aurar*	Presumed 20 *aurar*	-
Neat two-winters	1/2	1	1/2	-	1/2
Neat three-winters	3/4	1	1	2/3	1
Ox four-winters	1	1	1	1	1
Ox five-winters	1 1/3	1 1/3	c.1 1/6	1 1/3	1 1/3
Ox six-winters	1 2/3	1 2/3	c.1 1/3	1 2/3	1 2/3
Ox seven-winters and older	2	2	-	2	2
Dry cow and ox three-winters	3/4	3/4	c.3/4	2/3	2/3
Dry cow and two-winters heifer	1 subtract 10%		c.7/8	1 substract two *aurar*	
Dry cow three-winters and older	3/4	-	3/4	2/3	
Plough ox	subject to individual assessment		-	subject to individual assessment	
Ewe with fleece and lamb	c.1/6	c.1/6	c.1/6	c.1/6	c.1/6
Dry ewe and ewe-lamb	1/8	1/8	c.1/8	c.2/7	c.1/8
Wether winter-old	1/12	1/12	c.1/13	c.1/12	1/12
Wether two-winters	1/8	1/8	c.1/6	1/8	c.1/8
Wether three-winters	1/6	1/6	-	1/6	1/6
Ram two-winters		c.1/6	-		c.1/6
Male horse four to ten-winters	1	1	-	1	1
Gelding over twelve	-	-	c.7/10	-	-
Mare three-winters	3/4	2/3	c.3/5	3/4	-
Mare four to ten-winters	1	3/4	-	1	3/4
Horse one-winter	c.1/3	c.1/3		c.1/3	1/3
Horse two-winters	c.1/2	c.1/2	1/2	c.1/2	c.1/2
Horse three-winters	3/4	3/4	-	3/4	2/3
Horse four-winters	-	-	1	-	2/3
Sow two-winters+nine piglets	1	1	-	1	1
Goats	Similar values as for sheep		-	Similar values as for sheep	

Though the earliest Icelandic legal text, *Grágás*, is thought to have been modelled on Norwegian texts the level of detail *Grágás* contains on livestock activities and livestock values are not found in any of the other Scandinavian texts. Indeed, the laws of *Gulathing*, *Frostathing* and *Borgarthing*, which survive in thirteenth century manuscripts, contain hardly

[387] *Grágás*: (1852) K.246, pp.193-194; *Alþing*: DI 1, p.166; Árnes þing: DI 1, pp.316-317; *Jónsbók*: Schulman, *Jónsbók*, p.303; *Alþing*: DI 2, p.170.

any details of livestock.[388] There is the occasional mention of *kugildi* usually without specifying the actual value. The value of a horse is referred to in one clause in the *Frostathing* Laws concerning compensation payments for injuries done to horses, but the value is unclear.[389] The most detailed description of livestock is found in the *Gulathing* Laws concerning valid forms of wergild payments, but yet again, there is no specification of the value of these animals, only that cows, bulls, oxen, stallion and sheep are valid, but mares, geldings and goats are not.[390]

Grágás and *Jónsbók*, in contrast, list specific values for livestock by age and sex, demonstrating their relative economic importance and the products that the legal specialists, at least, thought were important. Not all livestock known to have been reared on Icelandic farms were recorded in the legal texts.[391] The legal texts, unsurprisingly, were mostly concerned with the grazing livestock. Other animals, such as dogs are only included in the texts where they posed a danger, a dog biting a human for example.[392] Thus these non-grazing animals are excluded from the following analysis.

The two *Alþing* price lists dated to c.1100 and c.1280 give us another source as they include, amongst other things, livestock prices.[393] Helgi Þorláksson argues that the *Alþing* price lists were an attempt by prominent Icelanders to control prices against increases by foreign merchants and even other Icelanders, especially after famine.[394] When the livestock valuations in the *Alþing* price lists and legal texts, however, are viewed they give mostly the same relative values, so little sign of these attempts to control prices can be seen. Perhaps as expected, the c.1100 price-list bears a close resemblance to *Grágás* whereas the c.1280 price-list is closer to *Jónsbók*, (Table 1). In addition, there is one surviving spring price-list from Árnes þing dated to c.1200 in *Diplomatarium Islandicum*.[395] The monetary value of the

[388] H. Vogt, *Medieval Law and Its Practice: The Function of Kinship in Medieval Nordic Legislation*, (Leiden, 2010), pp.73-74. Another Norwegian legal text is known, Eidsivathing Law, however, it only survives in fragments and does not contain information about livestock.
[389] Larson, *The Earliest Norwegian Laws*, pp.359-361.
[390] Ibid., p.151.
[391] Some examples of animals not listed in standard values: *Grettis saga Ásmundarsonar*, ÍF VII, chapter 14, p.37; *Svínfellinga saga*, *Sturlunga saga* II, chapter 8, p.95; *Bjarnar saga Hítdoelakappa*, ÍF III, chapter 10, p.136; *Brennu-Njáls saga*, ÍF XII, chapter 48, p.123.
[392] *Grágás* (1852) K.241, p.187.
[393] DI 1, p.166; DI 2, p.170.
[394] Þorláksson, *Vaðmál og verðlag*, p.102.
[395] DI 1, pp.316-317; Dennis et al. *Laws of Early Iceland* II, pp.358-359; Helgi Þorláksson proposes that the document dates to c.1190, Þorláksson, *Vaðmál og verðlag*, p.101.

kúgildi is thought to have been set at the regional spring þing, assembly, as is set out in the Skálholt version of *Grágás*.[396] Therefore, the *Alþing* set the comparative values between livestock, but it was the spring-þing that set the value of a *kúgildi*. The biggest difference between the price-lists is that the Árnes document records a *kúgildi* as valued at 33 *aurar* (sg. *eyrir*), not 20 *aurar* as was widely held. The significance of this difference in the *kúgildi* value is that the animals that are valued relative to a *kúgildi* would have their value increased by over 50%. Overall, while the legal texts and *Alþing* price lists mostly agree, the Árnes þing price list shows a regional assembly potentially responding to local needs and may indicate that there is some stress in this area to increase the value of *kúgildi*, such as famine or livestock disease.

The *kúgildi* valuations relative to non-livestock goods recorded in the laws are rigid prescriptions of value and may not reflect the likelihood of flexibility in reality or match the prices paid for actual livestock at the time. From a comparison of the sources in Table 1, we can see a remarkable consistency in the valuation of livestock relative to each other over two centuries. While there are changes in the values over time, which will be discussed below, it is important here to draw attention to the stability in related values. While the consistency could be due to the disconnection between farm activities and *Alþing*, these sources more likely suggest stability in practices and perceived value of livestock between the twelfth and thirteenth centuries. If there was a greater demand for livestock then this would have driven up prices, and possibly the demand would have resulted in the *Alþing* or local *þing* changing the legal valuation. It is unlikely that international trade would have affected the valuation of livestock in this period as live animals would have been difficult to export, and the goods sought by merchants were processed goods such as *vaðmál*. Therefore, if these valuations do reflect the value of livestock at this time the explanation must lie within Iceland.

Máldagar infrequently refer to the value of individual animals, and when they do the values mainly refer to horses. However, as the *máldagar* and sagas are location specific, it is possible to discover incidental references to farms known for valuable horses. The scarcity of such examples does make it difficult to propose wider conclusions about horse values in Iceland. The laws presumably give us standard valuations of typical animals, but reveal the

[396] Þorláksson, *Vaðmál og verðlag*, p.99; Jóhannesson, *A History of the Old Icelandic Commonwealth*, p.333; *Grágás* (1879) S.53, p.61.

variety of desired livestock characteristics and indicate the sought after products. Thus, by utilising legal texts and *máldagar* we can gain a fuller understanding of the link between animals and their economic value, whether realised or potential.

For evidence of how the abstract concept of the *kúgildi* was used in medieval Icelandic society we can turn to the sagas. Rarely is the value of an exchange explicitly given as one cow value, *kúgildi,* but there is one example where a cow, *kú,* is exchanged for a catch of fish, *fang*.[397] Sometimes in the sagas, the value of property might be given in *kúgildi*, as in *Sturlunga saga*, when it records that an individual had investments worth a hundred *kúgildi* in addition to ten estates.[398] This does not mean that the character had under his control 100 cows, but that it was the value assigned to his rents, which made him a wealthy individual. Elsewhere *Sturlunga saga* records that a farm was established with five *kúgildi* and additional *kúgildi* from the local farmers.[399] These values relate to the units of value, not physical animals, and indicate, respectively, the wealth of the farm and the support given by the local community.

It has been assumed in this chapter that one *kúgildi* was equal to 120 *álnir* (20 *aurar*) because a *kúgildi* became fixed at this value in the first half of the fourteenth century. Before this time, a *kúgildi* could fluctuate in value between 72 *álnir* (12 *aurar*) and 120 *álnir* (20 *aurar*), based on *máldagar* evidence. As mentioned earlier the Árnes price-list shows that a *kúgildi* could have been valued as high as 33 *aurar*.[400] Due to this variation, the following discussion will mostly give the relative value of livestock in *kúgildi*.

3.2 *KÚGILDI*

The legal texts give the relative value of the different livestock that could have been present on an Icelandic farm, as set out in Table 1. As the *kúgildi* was an abstract unit of currency, it was useful for giving the relative assessment of other livestock. Milking cows were prized in Icelandic society, though a milking cow was not the most expensive animal to be found on an Icelandic farm. *Grágás*, dated to the twelfth century, describes the standard value of a milking cow, *kúgildi*, as:

[397] *Reykdoela saga*, ÍF X, chapter 7, p.170. Unfortunately, we do not know the weight of the catch fish.
[398] *The Saga of Hvamm-Sturla*, *Sturlunga Saga* I, chapter 30, p.105 'Hann átti hundrað kúgilda á leigustöðum ok tíu lendur'.
[399] *The Saga of Þorgils skarði*, *Sturlunga Saga* II, chapter 24, pp.148-149.
[400] Þorláksson, *Vaðmál og verðlag*, p.134; Jóhannesson, *A History of the Old Icelandic Commonwealth*, p.333.

'Þetta er en fjárlag. At kýr þrevetr eða ellre .x. vetra eða yngri kalbær oc miólk, hyrnd og lasta laus, eigi verre en meðal naut, herað ræk at fardögom oc mólke kálfs mála, sú er giald geng.'[401]

'Also of standard value is a cow three years old or older, ten years old or younger, capable of bearing calves, in milk, horned and free of defects, no worse than an average beast, fit enough to be driven from one district to another at the moving days and giving enough for a calf at a milking. She is a valid form of payment.' [402]

The description indicates that a cow was considered most productive between the ages of three and ten, and expected to produce milk and bear calves. Ten years would have been considered old for a cow in other northern European regions, with the Norwegian *Gulathing* law, for instance, giving a maximum age of eight years for a cow given as payment.[403] Irish laws record that a milking cow was expected to calve in her fourth year, reaching her maximum value at six years and Welsh laws show that a cow first calved in their fourth year and at that point obtained her maximum value.[404] Unfortunately, the Irish and Welsh texts do not indicate when a cow stopped milking. It is possible that due to the reliance on pastoral farming in Iceland cows were kept milking for as long as they produced milk, and thus an older age is given than for Norway. The reference to the mobility of the animal at the moving days, *fardagar*, is an obvious way to define the good health of cattle at a set point in the farming calendar.[405] The inability to walk would be a clear sign of ill health for a potential buyer.

The thirteenth century legal text of *Jónsbók* has a slightly different stipulation:

'*Þetta er enn fjárlag sva sem lagt er dýrt á vár j þvi heraði. Kýr viii vetra ok ægi yngri en at ǫðrum kálfi, heil ok heilspenat ok hafi kelft um vetrinn eptir Pals messo, ægi verri en meðalkýr herad ræk at fardögum.*'[406]

'It is also standard value that a valid form of payment in the district is a cow. Such is a cow eight-winters old but not younger than two-winters old, healthy

[401] *Grágás* (1852) K.246, p.193.
[402] Dennis et al. *Laws of Early Iceland* II, p.208.
[403] Larson, *The Earliest Norwegian Laws*, p.151.
[404] Kelly, *Early Irish Farming*, pp.58-66; Richards, *The Laws of Hywel Dda*, pp.87-89.
[405] Larson, *The Earliest Norwegian Laws*, p.251. Four days at the end of May when a person could change their legal residence.
[406] *Jónsbók* VIII, 6. Schulman, *Jónsbók*, p.302.

> and in milk, which has calved during the winter after the feast of the Conversion of St Paul (25th January) no worse than an average cow, fit enough to be driven from one district to another at the moving days.'[407]

Again, a cow must be healthy enough to be driven between districts during the moving days to be a valid form of payment. The maximum age of eight years follows the Norwegian *Gulathing* Law more closely, and the minimum age is expressed in a similar manner to the Norwegian *Borgarthing* Law, both suggesting a closer relationship to the Norwegian laws than to *Grágás*.[408] In *Grágás*, the cow is required to be three-winters old, but in *Jónsbók*, the cow should not be under two winters and should have calved. Depending on when the cow was born and when she was put in calf, she would be in or past her third winter when she calved. *Jónsbók* is more prescriptive in the dates but less so about the cow's qualities. The cow must have calved after a certain date and be producing milk, but the stipulation about the amount of milk for a calf and having horns are no longer included. The requirement for producing milk assumes that a cow would naturally produce enough milk for a calf, though, cows do vary in their milk production. *Jónsbók*, therefore, is giving a subjective, minimum milk requirement. The omitting of the horns, mentioned in *Grágás*, suggests a change in preference from horned to polled cattle which are less dangerous, especially in the confines of a *fjós*, byre. In *Jónsbók* the cow must have proved it was capable of having calves by calving after late January. If cows calved for the first time by late January then the calves would spend their first couple of months in the *fjós*, if they were not slaughtered, resulting in the calves being old enough to fend for themselves once they were let out for the spring. The cows would then be free to be taken to the shielings without the trouble of having to care for a calf. It is unclear why these stipulations changed in the thirteenth century, but there appears to be a new impatience for cows to bear calves as soon as the cows reach breeding age, suggesting pressure to get return on the resource invested as soon as possible. This could suggest that the clauses concerning livestock were following Norwegian laws more closely, or potentially, that *Jónsbók* was responding to Icelandic conditions. It is unlikely that Icelandic cattle had developed to be able to bear calve at a younger age.

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[407] Schulman, *Jónsbók*, p.303. While Schulman translates *heilspenuð* as 'in milk', I would argue that 'healthy uddered' would be more appropriate because 'in milk' refers to producing milk, yet the inclusion of udder indicates that the udders are to be free of defects or damage and without disease, which is somewhat more than producing milk.

[408] Larson, *The Earliest Norwegian Laws*, p.151; G. Flom, *The Borgarthing Law of the Codex Tunsbergensis* (Urbana, 1925), p.174.

3.3 CATTLE

The evidence of cattle in *Grágás* and *Jónsbók* indicates the importance of particular types of cattle. The standard valuation sections reveal how cattle were compared and the distinctions made based on age and sex. The comparisons indicate the relative worth assigned to each category based on a *kúgildi*. Prized characteristics would presumably be reflected in a higher valuation.

If we compare *Grágás* and *Jónsbók* then we find that the valuation for oxen remains mostly consistent, except for a contradiction in the value of a three-year–old ox, as shown in Table 1. *Grágás* states that a barren cow and three-year-old neat are each worth three quarters of a cow '*öxi þrevetr iii lutir kúgoldis*'.[409] *Jónsbók*, however, gives the value as two thirds of the value of a cow '*tveir hlutir kúgildis*'.[410] This reduction in value could be an indicator of the increasing economic importance of cattle's secondary products, in this case milk and traction, between the early twelfth and late thirteenth centuries. The ability of a cow to produce milk or an oxen as a beast of burden appears to be a third of the total value of the animal by the late thirteenth century.[411] The animals were expected to have fulfilled the criteria by the age of four as that is when the animals obtained their maximum valuation of one *kúgildi*.

When all the sources for livestock valuation are compared, we find that oxen had the potential to become the most valuable animal on a farm, as a seven-years or older ox was assessed at two *kúgildi* (Table 1). This is significant because oxen's main purpose was as a beast of burden, and yet from the age of five an ox was worth more than a milking cow illustrating the ability to produce milk was not always the most highly valued livestock characteristic. From these valuations, it appears that few oxen reached the age of five and so with every additional year their value increased, potentially reflecting the animal's ability to endure the hard work they undertook. The distinction of seven-years is similar to the eight-year one for the maximum legal age of a milking cow to be a *kúgildi*, suggesting that cows began to decline in productivity after this age but oxen were exceptional animals and so held their value. We can only postulate that a good ox had the potential to live beyond seven years

[409] *Grágás* (1852) K.246, p.193.
[410] *Jónsbók* VIII, 6. Schulman, *Jónsbók*, pp.302, 303.
[411] It appears that a neat's value was divided into three parts: their meat, their skin and then either their milk for cows or their draught for oxen.

as long as it could still work, but whether they did survive to this age is open for speculation as they could have become worn out.

The fact that the value of bulls is not mentioned at all in *Grágás* and *Jónsbók* implies that there was no need to include them, and although bulls were an essential part of maintaining a cattle population, they were insignificant to the compilers. The lack of valuation can be explained when we look at similar contexts. For example, in medieval Greenland, it has been proposed that smaller cattle herds were maintained by borrowing bulls from larger herds.[412] In early modern Iceland, bulls were reared just to maturity, used extensively to sire calves, and then slaughtered because of the costs involved in keeping them.[413] Þorvaldur recorded quantities of meat, suet and skin gained from slaughtering a neat between four and eight years, and cited Ólafur Stephensen's view from the eighteenth century that it was common for males to be slaughtered when four years or younger in his time.[414] If bulls destined for breeding were kept just to maturity and borrowed for breeding, then a standard value for a bull would not be needed because the exchange would be a loan and not a permanent change of ownership. A loan might have incurred a service fee but not the sale of an animal. Of course, not all males would be used for breeding, and it is assumed that unwanted males were slaughtered before they reached sexual maturity or even as calves. Again, human agency was involved in the selection, so on some farms, promising males may have been reared to give them time to show their potential.

The laws' sections on compensation support the idea that bulls in medieval Iceland were slaughtered soon after they had reached maturity. *Grágás* once mentions bulls in relation to injuries done by a bull of three-years and older.[415] The stated age suggests that the bull had to be three-years or older to be considered an adult. People were expected to be cautious around a bull 'against swing of horn and hoof', but once a bull injures a person or another animal, then the bull's owner loses their immunity from punishment but only if it is three-years or

[412] T. McGovern, 'Cows, Harp Seals, and Churchbells: Adaptation and Extinction in Norse Greenland', *Human Ecology* 8(3) (1980), pp.245-275, p.263.
[413] McGovern, 'The Archaeofauna', pp.168-252, p.240. Bulls would not only need to be fed good quality fodder, but also kept separate from other livestock to prevent injury. The separate housing/enclosure must have increased the expense of keeping a bull. A bull would not have been housed with cows during the year because of the danger to new born calves, resulting in a separate building and costs for building the separate housing.
[414] Ólafur Stephensen, *Gömul Félagsrit* VI., pp.88-89 as cited in Thoroddsen, *Lýsing Íslands* III, p.245.
[415] *Grágás* (1852) K.242, p.188, '*griðung þrevetran eða ellra*'.

older.[416] *Jónsbók* also legislated on injuries caused by a bull, and again made the distinction between those older or younger than three.[417] *Jónsbók*'s section on compensation distinguished whether the animal was a gelded ox or bull younger than three years.[418] The compensation sections make clear that a bull reached maturity after its third winter. The absence of older bulls in the laws emphasises that there was no need to legislate for them as they were not kept alive for long after three-years. Of course there may have been exceptional circumstances, but the practice of rearing bulls just to maturity, using them widely for breeding before slaughtering them would explain the lack of valuations in the legal texts.

For cattle, their valuation was directly linked to their age and function as both female and male cattle became more valuable with age. Indeed, oxen could become twice as valuable as a milking cow, showing the medieval Icelandic society appreciated other, non-dairy products from cattle.

3.4 SHEEP

Sheep were the other important livestock in Icelandic farming and as such have detailed valuations recorded in the legal texts. *Grágás* and *Jónsbók* represent a system of valuation that makes clear distinction between the values of different sheep categories and demonstrates a more complicated system than the idea of one cow equating to six sheep. *Grágás* (1852) states:

> *'vi ær við kú, ii tvévetrar oc iiii gamlar, oc ale lömb sin oc orotnar loðnar oc lembðar. Ær viii alsgelldar iii vetrar oc ellre við kú. viii gelldingar við kú ii vetrir, viii lambgimbrar, oc ale lömb sin. vi geldingar iii vetrir við kú. iiii vetra geldingr oc anar ii vetr fyrir ær ii. Rutr ii vetr a gildr. xii vetr gamlir sauðir við kú. Allt þetta fé gillt oc í ullo. Rutr iii vetr oc ellri oc forosto geldingr, þat er met fe.'*[419]
>
> 'Six ewes, two of two winters and four older, able to feed their lambs, not losing their wool and with fleece and lambs, equal one cow. Eight ewes

[416] *Grágás* (1852) K.242 '*Griðungr er o heilagr við averkom þegar hann viðr a monnum… Hver maður abyrgiz sic við horns gange oc hófs.*'; Dennis et al. *Laws of Early Iceland* II, p.203.
[417] *Jónsbók* IV, 23, p.63, '*Nú er graðungr í yxna tali þar til er hann er þrevetr*', 'Now a bull is counted among the oxen until he is three years'.
[418] *Jónsbók* VII, 40, p.171, '*Qll þau naut er yngri eru en þrévétr utan graðung, þá er algildi á þeim ok ǫllum kollótum nautum*', 'All these cattle that are younger than three years except a bull, then is full value to them and all cattle without horns'.
[419] *Grágás* (1852) K.246, p.193.

> completely barren, of three winters or older, equal one cow. Eight two-winter-old wethers equal a cow and so do eight yearling ewes able to feed their lambs. Six three-winter wethers equal a cow. A four-winter wether and another of two winters equal two ewes. A two-winter ram is worth one ewe. Twelve winter-old sheep equal one cow. All these animals are to be sound and with fleeces. A ram of three winters and older and a leader-wether, their value is subject to assessment.'[420]

An awareness of how sheep were valued is important, because their products were central to the upkeep of a farm and *vaðmál* was a major export good. The presence of sheep on a farm did not indicate status in the same way as cattle, as sheep were assessed a lower value, but sheep and their products did underpin the economy on the farm and further afield. These texts provide information on the value of sheep, the functions of sheep and the issues that prompted the laws to be created. One of the most insightful aspects of sheep husbandry recorded in the legal texts is the valuation of sheep depending on age and sex, as shall be examined now.

The age and sex of a sheep, as with any animal, determines the products they generate. For example, ewes had to reach maturity before they could bear lambs and produce milk whereas wethers could only produce wool no matter their age. The characteristics of the animals recorded in the laws were those traits the animals were prized for. The focus on a ewe's capability to feed her lambs, maintain a fleece and not be losing wool were issues that related to their productivity and health and so were part of the criteria for judging a ewe's value. A ewe that could feed lambs was a productive ewe, but also had the potential to be milked. Interestingly, the legal references to fleeces are not accompanied by any comment on the quality of the fleece, only its presence, and nor is there any reference to meat as a product of sheep.[421] This would suggest that to the compilers, the quality of fleece was similar across Icelandic sheep, or it was not the quality but the quantity of wool that was esteemed.

As we might expect, the distinction in values shows that a ewe's value was based on her reproductive potential. A barren ewe would only be used for their meat and wool, not for

[420] *Grágás* (1852) K.246; Dennis et al. *Laws of Early Iceland* II, p.208.
[421] *Grágás* (1852) K.246, p.193.

milk or lambs. The value of one cow for eight one-year-old ewes that can feed their lambs and have their fleeces implies that age was taken into account. A ewe's value increased once she had lived through two years, in which time it would have increased in body weight, providing more meat and be more likely to reproduce. The age related values for ewes demonstrate a preference for ewes two-years and older. Older ewes may have been hardier, carried more meat, been more experienced and so better able to survive, while the year-old animals were presumably regarded as being untested.

Wethers, castrated males, were valued on their fleece yields and by the nineteenth century wethers were thought to produce better fleeces than ewes or rams.[422] Where evidence for fleece weight becomes available in the nineteenth century, it appears that wethers produced heavier fleeces than ewes in Iceland.[423] The main function of a wether was to provide wool and the valuations imply that a three-year-old wether would provide more wool than a two-year-old. The difference in wool growth must have been considerable for separate values to be given to two- and three-year-old wethers. The stipulation that these animals must have their fleece when valued emphasises a wether's wool-producing function. *Grágás* continues, after providing all the standard values, to state that if a payment was made in shorn ewes then a load, *vætt*, of wool should be included for every twenty ewes given in payment, indicating that a sheep, even a ewe, was not complete without wool.[424]

Evidence about the maturity of sheep is found in the twelfth and thirteenth century legal texts and the *Alþing* price lists, which show that sheep were considered to have reached maturity from the age of three, however, wethers may have been nearer to four years because *Grágás* includes an additional age distinction of four-year-olds for wethers. It states that two wethers, one four-years and the other two-years, were equivalent to two ewes. Both the legal texts and the *Alþing* price lists make a point of recording the difference in age for the wethers whereas the age of the ewes are not stated. The emphasis on the difference between two- and four-year-old wethers must relate to the amount of wool produced by each animal. Þorvaldur Thoroddsen, citing Magnús Stephensen in the early nineteenth century, stated that a fleece

[422] Jon Haukur Ingimundarson, *Of sagas and sheep: Towards a historical anthropology of social change and production for market, subsistence and tribute in early Iceland (10th to the 13th century)*, (Unpublished PhD thesis, University of Arizona, 1995), pp.64-65.
[423] Thoroddsen, *Lýsing Íslands* III, pp.329-330.
[424] *Grágás* K.246; Dennis et al. *Laws of Early Iceland* II, pp.210, 385. A *vætt* was a unit of weight roughly equal to 80lbs or 35kg.

from a four- to five-winters sheep could weigh between c.1.8-2.3kg, whereas a fleece from a two-winter sheep could weigh c1.1kg.[425] There is only one medieval document, dated to 1398, where the weight of fleeces are actually given, unfortunately it is not possible to determine the weights of different sheep's fleeces from this example as it states 25 ewes and 10 wethers gave c.35kg of wool, or an average of c.1.4kg of wool per sheep.[426]

In stark contrast to the attention paid to ewes and wethers in the legal texts, fewer details are recorded about rams, which were divided into two categories: a ram of two-years and a ram of three-years and older. A ram of two years was valued as equivalent to one ewe. When wethers and rams are compared, it seems a ram of two-years had more value than a two-year-old wether but less than a four-year-old wether. The clarification of the value of a two-years ram differs from that of a three-year ram, because *Grágás* stated that the worth of the latter must be judged on an individual basis. This implies that a two-years ram had not yet reached its breeding age and so the value was based on breeding potential. The legal clauses indicate that rams were bought and sold, not borrowed as bulls were. *Fljótsdæla saga* records rams being housed together, so it is possible that farms reared several rams, where their resources allowed, and then unneeded rams were bought and sold between farms.[427] The standard value of rams under three-years suggest that they were valuable animals but unproven, whereas by three-years a better judgement could be made about the animal. These valuations also reflect the different breeding practices between cattle and sheep.

Grágás and *Jónsbók* also assert that leader-wethers must be evaluated on an individual basis, and unsurprisingly, implies that a leader-wether has qualities lacking in an average wether. Leader-wethers, *forustugeldingar*, are known to possess an ability to lead the flock to safety in bad weather, a valuable characteristic in the unpredictable conditions of Iceland's uplands. The legal texts suggest that these animals were exceptional and defied standard values. The deviation from standard values for leader-wethers and rams would allow any appraisal to be placed on them, signifying the difference between these animals and the amount of personal judgement involved before these animals were bought or sold.

[425] Thoroddsen, *Lýsing Íslands* III, p.329.
[426] DI III, p.630. Dated to 1398.
[427] *Fljótsdæla saga*, ÍF XI, chapter 3, p.219.

The consistency in sheep valuations between *Grágás* and *Jónsbók* implies a degree of continuity in the sheep economy during the intervening 150 years between the texts' composition, and of the relative value of sheep depending on age and sex. The similarities suggest that there was little change in society's perception of the value of sheep, even when they became the main species on Icelandic farms. Once again, this assertion is based on the idealised society represented in the legal texts. The Árnes þing price-list, on the other hand, demonstrates the flexibility of local assemblies as it displays a greater difference between wethers of one- and two-years. It values two-years and older wethers the same as milking ewes demonstrating the economic importance of these animals and wool production a year younger than the other texts.

Grágás and *Jónsbók* differ only concerning the animals subject to individual assessment.[428] *Grágás* says that rams over three-years-old and leader-wethers should be valued individually, *Jónsbók* only mentions leader-wethers of three-years or older.[429] Apart from a two-year-old ram being equal to a ewe, there are no other provisions in *Jónsbók* about the value of rams, which is a curious omission considering a ram's reproductive role. The reason for this omission could be due to scribal error or people not needing legislation on rams. Alternatively, the omission could indicate a change in farming with rams over three-years-old not being reared as often and so did not need their value stipulated. Rams may have begun to be loaned out for breeding, or as with bulls in early modern Iceland, reared to maturity, bred widely and then slaughtered because they were more expensive to maintain than other sheep. It is more likely that in an economy where milk and wool played a significant role, importance was attached to the values of ewes and wethers and the omission of rams gave the freedom to value rams as long as the animal was over two-years.

Overall, the legal texts show an almost identical standardised representation of sheep in the medieval Icelandic economy. The significance of these sheep valuations is that they show a consistency of values compared to *kúgildi*, even though changes were underway in the proportion of cattle and sheep being reared in Iceland.

[428] There appears to be a discrepancy between the original text and the translation of *Jónsbók*. The original text states eight dry ewes of three years and older are equivalent to one *kúgildi*, whereas Schulman's translation states that seven dry ewes are equivalent to one *kúgildi*. *Jónsbók* VIII, 6; Schulman, *Jónsbók*, pp.302-303.
[429] *Grágás* (1852) K.246; *Jónsbók* VIII, 6.

As we might expect, ewes were the most valuable of all sheep, with an ability to produce the full range of ovine products: milk, lambs, wool and eventually meat. Wethers only obtained the same value when they reached full productivity at the age of three. Barren ewes and younger wethers were less valuable, being only able to produce meat and less wool. There was also a difference in age distinction, with wethers reaching maturity at the age of three, whereas milking ewes were not distinguished by age but assigned full value after their first lambing. Other scholars have concentrated on the legal valuations of sheep for flock size estimates or the value of farms, but here it has been shown that the same value was attached to wool as to the ability to produce milk and lambs. To the compilers' these two capabilities were equally important. Furthermore, the talents of *forustugeldingar* were recognised and highly esteemed in a country where the weather can be volatile. The findings from this section show that sheep values were more complicated than just six sheep to a *kúgildi*. A sheep's value was connected to its sex and precise age, and even from the twelfth century onwards the economic importance of wool was recognised.

3.5 HORSES

Horses were ever-present animals on farms and an essential mode of transportation for both people and goods. As will be shown, there are similarities between the legal values and the values recorded in some *máldagar* though these texts were compiled centuries apart. Unlike for other species, the *máldagar* provide evidence for vastly differing horse prices, reflecting the range of qualities that must have been sought in horses.

The legal texts show average horses to be mostly worth less than a cow. In both *Grágás* and *Jónsbók*, the same valuations are given for horses:

> *'Hross ero oc laugð. Hestr iiii vetra gamall eða ellre, oc x vetra oc yngri, heill og lasta laus, við kú. Mer iiii vetra ellre oc x vetra oc yngri gelld, heil oc lasta laus, fjorðungi verri en kýr. Hestr iii vetr jafn við mere. Mer iii vetr ii lutir kugilldis. Tuav hross tvé vetr, hestr og mer, við kú. Þrju vetr gomol hross við kú, oc er eitt hestr. Ef maðr gelldr mer hross vetr gamalt fyrir þriðjung kú gildis, þa scal fylgja eyrir. Þetta scolo vera meðal hross oc eigi verre. Stoð hestr, oc se verðe betri fyrir sacir vigs, oc gelldr hestr oc se verðe betri fyrir reiðar sacir oc fyl mer í stóðe, það er metfé.'*[430]

[430] *Grágás* (1852) K.246, p.194.

> ‘Horses also have a standard value. A male of four years or older, ten years or younger, healthy and free of defects, equals a cow. A mare of four years or older and ten years or younger, barren, healthy and free of defects, equals the price of a cow less one quarter. A three-year male is equal to a mare. A three-year mare two-thirds the price of a cow. Two two-year horses, a male and a mare, equal one cow. Three year-old horses, one of them a male, equal a cow. If a man pays a year-old mare for one-third the price of a cow, one ounce-unit is to be added. These are to be average horses and not worse than so. A stud-stallion which is worth more for its qualities as a fighter, and a gelding which is worth more for its qualities as a mount, and a brood mare with foal: their value is subject to assessment.’[431]

The price-list for the Árnes spring-*þing* suggests that there were broadly similar values for horses as it gives only slightly different valuations to *Grágás* and *Jónsbók*, showing flexibility but an overall general adherence. The Árnes price-list, for example, records that a male horse between four and ten-years, whether gelded or not, was worth a *kúgildi*, illustrating that a gelding and a stallion were viewed equally even though they had different functions.[432] It also states that a gelding older than twelve-years should be priced at three marks (1.2 *kúgildi*), which is not included in the other texts; ten-winters is the oldest horse mentioned. Compared to the law texts, the valuation points to geldings increasing in value once older than twelve years, probably as they became more useful as riding animals. Gelsinger has commented that price lists for individual districts must have been similar to the neighbouring districts, otherwise buyers would go to the other districts in search of cheaper goods.[433] Thus, other districts may have had similar values as the Árnes price list, but the other documents do not survive for comparison. What this texts show is that spring assembly price-lists were reacting to local factors and so more flexible. Also, while the spring assemblies were permitted to decide the value of a *kúgildi*, in Árnes they were also deciding some of the comparative values too. Therefore, if we believe that people adhered to these values, the spring assemblies wielded more control than had been legislated for.[434]

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[431] Dennis et al. *Laws of Early Iceland* II, p.209 it states ‘A three-year male is equal to a cow’, this is incorrect as the vernacular states ‘Hestr iii vetr jafn við mere’. The passage above has been corrected.
[432] DI 1, p.317.
[433] B. Gelsinger, *Icelandic Enterprise: Commerce and Economy in the Middle Ages* (Columbia, 1981), p.169.
[434] Þorláksson, *Vaðmál og verðlag*, p.99. Jóhannesson, *A History of the Old Icelandic Commonwealth*, p.333; *Grágás* (1879) S.53, p.61.

Grágás and *Jónsbók* leave open the valuations for horses with specific functions, such as fighting stallions, riding geldings and breeding mares, demonstrating that these individual traits were sought after. Additional evidence for the value of horses can be found in the *máldagar*. Of the 263 *máldagar* that included horse valuations, most values assigned are given in the briefest of terms, such as a *kúgildi* or a *hundrað* worth of horses, for example, *kúgildis hestar iii*, 'three *kúgildi* of horses'.[435] While this allows us to estimate the number of animals that belonged to the church-farm, it gives little in the way of individual assessment of the animals. Where horses are referred to in terms of *kúgildi* or *hundruð* it must then be assumed that these animals were of average worth. In most cases where the number of horses and a value were recorded there is no description of the horses' characteristics, such as 'three horses worth two marks each' and 'there belong three horses none less than 14 *aurar*'.[436]

Occasionally, valuations can be given in the form of a comparison, such as 'half another *hundrað* of *vaðmál* or two horses'.[437] Unlike the legal valuations that are given in *hundruð*, the *máldagar* also record assessments in *aurar* and *mörk*. These valuations do not make clear the reason for the valuation, but do allow an insight into the range of values assigned to these animals, a step beyond the idealised values given in the law texts. The following examples illustrate the variable quality of animals kept on church-farms.[438]

Most of the *máldagar* that contain horse valuations are dated to the fifteenth and sixteenth centuries. Though the *máldagar* record a range of values, the values tend to follow the legal values suggesting that there was some consistency in horse values from the eleventh to thirteenth centuries, when the legal texts were compiled, through to the sixteenth century, the dates of these *máldagar*. This consistency in values suggests stability of practices, and little change in the demand for and the quality of horses. As with the legal texts and price lists, however, we are relying on the assumptions that the *máldagar* were recording live horses

[435] DI 1, p.402.
[436] DI 1, p.423 'hestar iii ii marka hestr hvar' and 280 'þar fylgja hestar þrir engi verre en xiiii aurar'.
[437] DI 1, p.423 and p.278. 'hálft annað hundrað vaðmál eða hesta ii'.
[438] Refstaðir (Vopnafjörður) stands out as a cautionary case. Its *máldagi* for 1367 records a stallion worth three marks, a little over the standard value for a male horse, yet so do two subsequent *máldagar* dated to 1397 and the end of the sixteenth century (DI 3, p.236; DI 4, p.218; DI 15, p.678). It is unlikely that the same stallion was recorded in the fourteenth century *máldagar*, so unless the church-farm maintained good breeding stallions, the phrase is a remnant of the earlier charter that continued to be copied. Fossilised phrasing is a feature of the *máldagar* that presents difficulties because it is not clear if the information still applies to the later documents, or if the phrases were being copied. See Section 1.4.3 and 5.2.

owned by the churches at the time, not fossiled wording, the record is accurate and the value assigned to the horse reflects its actual worth. The increase in specification in the fifteenth and sixteenth century *máldagar* supports these assumptions, as too does the widespread knowledge of farming amongst the population, even members of the clergy, suggesting that those compiling the *máldagar* would be aware of the worth of the animals. Where doubts arises it will be discussed.

The values recrded for horses in the *máldagar* range from over two *hundruð* at Kálfafell (Fljótshverfi) to two fifths of a *kúgildi* at Hof (Eystrahreppur). The most expensive horses recorded in any *máldagi* were at Kálfafell, dated to 1397, where three horses had a combined worth of 207 *aurar* (69 *aurar* or over two *hundruð* each) in addition to another horse worth two *kúgildi*.[439] A unique valuation at Staðarfell (Fellsströnd), repeated in 1492, 1496 and 1570 or later, described a 15 *aurar* horse as 'with fodder', *með ábœti*, and worth one *hundrað*.[440] Valuations for individual horses were also below the legal valuations. For example, at Hof in 1553-1554 two two-year-old horses were valued at one *mark* each, or two fifths of a *kúgildi*.[441] The valuation is slightly below the half a *kúgildi* assigned in the legal texts for these animals. Two sixteenth century examples from Hraungerði (Flói) and Húsafell (Borgarfjörður) show one horse and a one-year-old valued at one *kúgildi* in total when the combined legal value for these two animals should have amounted to one and a half *kúgildi*.[442] Another example from 1553 shows a greater difference in value. A three-year-old horse was valued at 12 *aurar* at Skógar (Eyjafjallasveit).[443] According to the legal texts, a three-year-old horse was given the same value a mare, three quarters or two thirds of a *kúgildi* depending on the age of the mare. Twelve *aurar* is only three fifths of a *kúgildi* showing that for unrecorded reasons this three-year-old was worth less than, but still close to, the legal value of the earlier centuries. In sum, these *máldagar* do not provide sufficient information to analyse the reasons for these valuations, but do demonstrate the variability of horses on church-farms by the sixteenth century.

The legal texts differentiate horses on the basis of their age, sex and some of their uses, such as breeding, fighting and riding, but this was not all that horses were used for. The *máldagar*,

[439] DI 4, p.235.
[440] DI 7, p.134, p.135 and p.301, DI 15, p.595. Total value given in two of the four *máldagar*.
[441] DI 12, p.659.
[442] DI 15, p.654 and DI 7, p.737.
[443] DI 12, p.646.

and sagas, demonstrate that horses were used as pack-horses (sg. *kapall*) too. To understand the monetary value of these animals we must rely on the *máldagar* where there are several examples. Úlfljótsvatn (Þingvallarsveit) at the turn of the sixteenth century had two *hundruð* in pack-horses, of which one was worth 15 *aurar*, or three quarters of a *kúgildi*.[444] Another pack-horse was valued at 15 *aurar* at Kross (Landeyjar) at the end of the sixteenth century.[445] Values varied during this time as shown at Skeggjastaðir (Langanesströnd) and Ásar ytri (Skaftártunga) where pack-horses were assessed at 10 *aurar*.[446] A range of 10-15 *aurar* is typical, though the highest value found was in the mid-sixteenth century where a pack-horse was worth two *mörk* at Svalbarð (Þistilsfjörður), 16 *aurar* or four-fifths of a *kúgildi*, whereas the lowest value was at Kálfafell (Fljótshverfi) where one pack-horse was only worth 6 *aurar* in the late sixteenth century.[447] Again, these examples show there were variations, whether due to individual horses or geographical reasons we cannot be certain, but most pack-horses had similar values comparable to the average legal norms, even centuries after the legal texts were compiled.

Another category of horse found in the *máldagar* is *hestamóðir,* or broodmare. Though the term appears in several *máldagar* there are only two *máldagar* where values are recorded, both dated to the end of the sixteenth century. The first is for Gilsbakki (Hvítársíða) where one *hestamóðir* and foal were valued at one *hundrað*.[448] The second case was at Melar (Melasveit) where one *hestamóðir* was worth 15 *aurar* (three quarters of a *kúgildi*) and a second worth 80 *álnir* (or c.two-thirds of a *kúgildi*).[449] These two valuations are the same as the valuations given in *Grágás* and *Jónsbók* for mares. The precise specification was part of a general trend in *máldagar* composition in the fifteenth and sixteenth centuries, which is advantageous when looking at the different functions of horses. Therefore, though we know more about the use of horses, they still maintained approximately the same values but overall broodmares were more valuable than pack-horses.

The sagas provide an insight into the social status that horses convey on their owners, rather than their economic value. The social value is discussed here because stallions had a

[444] DI 7, p.48. Another *máldagi* records three *hundruð* of pack-horses, but no individual price, DI 7, p.47.
[445] DI 15, p.666.
[446] DI 15, p.675, 705.
[447] DI 12, p.640 and DI15, p.703.
[448] DI 15, p.554.
[449] DI 15, p.554, 628.

sentimental value rarely seen for other livestock, and this emotional connection is signified by the naming of horses. One of the most famous horses is Freyfaxi supposedly dedicated to Frey in *Hrafnkels saga*.[450] The owner, Hrafnkell, swore that he would kill anyone who rode his stallion without permission, and of course events arose whereby the farm's shepherd rode Freyfaxi.[451] Another stallion named Freyfaxi was described as being good for fighting and used for draught-work.[452] *Bjarnar saga Hítdælakappa* assigns value to a stallion named Hvítingur, which was given as a gift from father to son along with two foals.[453] These two foals are mentioned later in the saga as fine stallions each with their own stud of mares showing the merit attached to the lineage.[454] Horses were valuable commodities in the sagas with their main use being as fighting and riding horses, and also to pull sledges and carry goods. The naming of a horse is infrequent in the sagas, and so emphasises the importance of these animals to the audience. These examples illustrate what is missing from the quantitative evidence, the social significance of the living creatures.

The significance of the horse valuations is that they show variations. While most horses were recorded as average, some were exceptional. The higher value attached to some of these horses illustrates their importance and yet horses are not discussed much in modern scholarship beyond the issue of the consumption of horse-meat.[455] The valuations also give us the best indicator of the economic worth of these animals and their diversity of functions when they are scarce in other sources. Þorvaldur Thoroddsen, when discussing the uses of horses, limited himself to riding and pack-horses and so failed to recognise the range of tasks that horses were used for. In the legal texts, horses with specific uses had their value left open to assessment, but by the sixteenth century there was a move towards specifying functions.

Occasionally, horses were given values that allow an insight into the value of these functions. Broodmares needed inherited qualities and so a good broodmare was more expensive than average horses, and more valuable than pack-horses in the sixteenth century, if not earlier. It appears that the lower values for horses are mostly dated to the sixteenth century. The appearance of lower values may be due to the increased detail about the animals recorded in

[450] *Hrafnkels saga Freysgoða*, ÍF XI, chapter 3, pp.101-102.
[451] *Hrafnkels saga Freysgoða*, ÍF XI, chapter 3, pp.103-105.
[452] *Vatnsdæla saga*, ÍF VIII, chapter 34, p.90.
[453] *Bjarnar saga Hítdælakappa*, ÍF III, chapter 10, p.136.
[454] *Bjarnar saga Hítdælakappa*, ÍF III, chapter 27, pp.186-187.
[455] See Section 6.4.

these centuries. Alternatively, horses could have been more abundant in the sixteenth century and so the price decreased. The prices could also reflect the quality of these animals available at the time, so a lower price indicates a lower quality of horse. We do not have evidence to speculate further on the reasons for these values, but it is more likely that the *máldagar* show greater variation across the country as they were written to record the property of a particular church, not set trading values for a region or Iceland.

3.6 PIGS

Pigs were not as numerous as cattle and sheep even by the tenth century, yet they were, at least until the thirteenth century, significant enough to be included in the legal texts. These texts demonstrate that, though rare, pigs were used as an indicator of wealth based on their valuation. *Grágás* and *Jónsbók* both contain the same, single sentence related to the value of pigs: '*Sýr ii vetr eþa ellre oc ix grisir með við kú*'.[456] 'A sow of two-years with nine piglets is worth one cow' suggests that female pigs reached maturity by two-years and a typical litter size was nine piglets.[457] The briefness of the clause indicates that pigs were not commonly exchanged, or else more details would be included. These animals were judged for their reproductive values and females were the animals exchanged, not males. The valuation is high compared with other farm animals and must reveal that sows with good sized litters were valuable animals.

From the fourteenth century, the evidence indicates that pigs were kept on wealthy farms, possibly because these farms had the space and resources to maintain the animals, whereas poorer farms would have concentrated on livestock that gave better returns for their investment. Only in *Svínfellinga saga* is there any mention of pigs in *Sturlunga saga*, and pigs are listed with other livestock being confiscated, including numerous valuable animals.[458] The inclusion of pigs emphasises the wealth of the farm at a time when the ownership of pigs would have been limited to those that could afford to rear them. The fourteenth century *máldagar* testify to wealthier farms, such as church-farms, keeping pigs. Bishop Guðmundur Arason had a total of thirty pigs on farms under his control in 1446.[459] Yet, in the *biskupasögur*, there is no mention of pigs reflecting the scarcity of pigs by this

[456] *Grágás* (1852) K.246, p.194.
[457] *Grágás* (1852) K.246; Dennis et al. *Laws of Early Iceland* II, p.207.
[458] *Svínfellinga saga*, *Sturlunga saga* II, chapter 8, p.95.
[459] DI 4, p.684, 687, 869.

time, and also due to the fact that these sagas are essentially hagiographies and rarely concern themselves with the details of rural life, even when the subjects perform miracles in farming contexts.[460] The archaeological evidence supports the connection between pig ownership and wealth as will be discussed in the following chapter.[461] For now it is sufficient to state that the legal evidence for pigs is rare on Icelandic farms from the fourteenth century, and only found at high status farms but gives us no information on boars.

3.7 GOATS

Goats are another species that were scarce in Iceland from the tenth century, with increasingly limited distribution as discussed elsewhere in this thesis, but unlike pigs, there is evidence for their continued existence in Iceland.[462] The standard valuation for goats closely resembles the valuation of sheep, and is given as:

> *'Geitr vi með kiðom oc sva faret sem ám, enn viii gelldar, við kú, þrævetrar eða ellre. viii hauðnor við kú, oc ale kið sin. Viii ii vetrir hafrar við ku, oc iiii kjarn hafrar, oc iiii algeldir, en vi þrevetrir, við kú, halfir hvárs alsgelldir og kirningar. iiii vetra gamall hafr oc anar ii vetr fyrir geitr ii. Tvevetr hafr við geit. Ef hafrar ero ellre en nu ero talþir, oc er þat met fé. ii vetrgamlir geitsauðir við geit, hálfir höðnor eða alsgelldingar en hálfir kjarn hafrar eða graþ hafrar.'*[463]
>
> 'Six goats with kids and in the same condition as prescribed for ewes equal a cow, as do eight barren goats of three years or older. Eight yearling goats able to feed their kids equal a cow. Eight two-year billy-goats equal a cow, four of them uncastrated and four fully castrated, and six three-year billy-goats equal a cow, half of them fully castrated and half of them uncastrated. A billy-goat of four years and another of two years are worth two nanny-goats, a two year billy-goat one (nanny-goat). If billy-goats are older than those so far listed,

[460] Miracles in the Bishops' sagas seem to ease burdens on the population, for example providing food during famines, improving weather and protecting livestock, such as *Þorláks saga*, ÍF XVI, chapters 20-22, pp.85-86 and 54-64, pp.92-93. Translated in K. Wolf, 'Pride and Politics in Late-Twelfth-Century Iceland: The Sanctity of Bishop Þorlákr Þórhallsson', in T. DuBois (ed.) *Sanctity in the North: Saints, Lives, and Cults in Medieval Scandinavia* (London, 2008), pp.241-270, pp.255, 259-260; *Joans saga*, chapter 13. Tranlated in G. Vigfusson and F. Powell, *Origines Islandicae: a collection of the more important sagas and other native writings relating to the settlement and early history of Iceland* 1 (Oxford, 1905).

[461] See Section 4.5.

[462] As with pigs, the zooarchaeology will not be discussed in this section because in zooarchaeofauna reports sheep and goat bones are usually placed together in a 'caprine' group. Evidence for the presence of goats will instead be examined in Section 4.6.

[463] *Grágás* (1852) K.246, pp.193-194.

> then their value is subject to assessment. Two year-old goats equal one nanny-goat, one a young female or a fully castrated male, the other an uncastrated male or billy-goat for stud.'[464]

There is no variation between *Grágás* and *Jónsbók* concerning the valuation of goats. It is likely that the conservation of the values was due to there being fewer goats, not an ongoing need to set their value. As goats became scarce their value became superfluous and so their valuations would either be omitted or become fossilised, as further suggested by their absence from the Árnes þing price-list. A valuation was no longer required on animals not being exchanged. Where we have evidence for the rearing of goats after 1300, goats appear to be mainly kept in Þingeyjarsýsla. Unfortunately, we do not have price-lists for these areas, or values recorded in *máldagar* to examine changing values.

There are stark similarities between the valuations for sheep and for goats. Unlike sheep, however, goats do not appear to have been used for wool production in Iceland, as *Þórarins þáttr Nefjólfssonar* refers to seeking wool in a goat shed as a foolish undertaking.[465] As goats were not reared for wool, then their other products appear to be more valuable than the same products from sheep.[466] As discussed in Chapter Five, it is thought that goats were milked for a longer time each year making them, in general, more productive for milk than sheep. Perhaps the capability to produce milk later in the year compensated for goats not producing wool in the legal valuations.

The similar valuations also suggest that at least at the time of the legal texts compilation, goats were perceived as being similar animals to sheep. As with rams, the stipulation that the value of a billy-goat older than four-years was open to assessment suggests that they were rare after this age, possibly they were more problematic to handle and so were slaughtered or the animals no longer changed ownership but were leased out, as with bulls. The 1294 amendments to *Jónsbók* re-enforce this similarity by adding the clause: 'If a ram comes among sheep or a buck among goats, then its owner is to pay all the damages if he had

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[464] *Grágás* (1852) K.246. Dennis et al. *Laws of Early Iceland* II, p.208. *Jónsbók* VIII, 6. Schulman, *Jónsbók*, p.303. The English translation of *Grágás* is quoted here.
[465] *Þórarins þáttr Nefjólfssonar*, ÍF XIII, chapter 1, p.331; '*Margir mæltu, at hann færi í geitarhús ullar at biðja um vistartekjuna*', 'Many people said that lodging there would be like going to a goat-shed to ask for wool', 'Thorarin Nefjolfsson's Tale', *The complete sagas of Icelanders* I, p.387.
[466] See Section 6.5.

previously brought it in'.[467] Though sheep are thought to have been more numerous, the inclusion of the reference to bucks suggest an on-going concern about goats' unwanted breeding, just as there was with sheep.

The Árnes þing price-list does not give valuations for goats, implying that goats were either no longer reared or so scarce in the district that they could be ignored.[468] The inclusion of goats in the *Alþing* price-lists, however, suggests they were still being kept elsewhere in Iceland, and possibly that regional preferences for goats had started to emerge by the start of the thirteenth century. Still, where goats were kept they appear to have been valued in a similar way to sheep but for milk rather than wool.

3.8 CONCLUSION

As has been shown, most scholars discuss livestock valuations in terms of the *kúgildi* and its use in the wider Icelandic economy or to track changes in land rents over time. Few have examined how the *kúgildi* relates to other domestic animals, or the implications of differences between the available sources. This is unfortunate because only through these sources can we discover the economic importance of wool in Árnes in the twelfth century, or that broodmares were more valuable than pack-horses in the sixteenth century, and possibly earlier. The monetary value of a *kúgildi* varied over the centuries, but the relative value of livestock to a *kúgildi* did not. The consistency demonstrates that even though there were changes in Iceland, in relation to livestock there apparently was very little change over time.

The basis of the value system was the abstract unit of currency, the *kúgildi*, but the texts show that a milking cow was not the most valuable animal a farm could own. Some cattle and horses were equal to, if not, more valuable than a *kúgildi*. The Icelandic legal texts show little change in animals' value over time, implying that there was stability in the economic significance of the livestock. Instead, it is more likely that the conservation of the values was due to the continued relative value of the animals against the *kúgildi* and therefore each other. The relative value of other animals appears to have been fixed and so give the impression of consistency over the centuries. Although this was not always the case, as shown with the Árnes þing price-list. Other non-legal evidence permit us to track changes in values over time

[467] DI 2, p.285; Schulman, *Jónsbók*, pp.402, 403, clause 21.
[468] DI 1, pp.315-317.

values. From the legal texts of the twelfth and thirteenth centuries to the *máldagar* of the late sixteenth century, there is a range of evidence for the value of livestock. The actual economic value, and in some cases the potential economic value, has mostly remained unexamined. The domination of the economic analysis by cattle and sheep is due to the lack of evidence relegating horses, pigs and goats to a lesser economic importance. This absence is unfortunate as horses formed an integral part of farming practices, notably transporting fodder from field to farm, and goats appear to have been highly valued though their products were not as diverse or economical important as wool.

The findings above demonstrate that the economic values of animals in Iceland were relatively complex. Each animal had a use and their value mirrored that use. Whether the *máldagar* valuations reflected the valuations of livestock on small, less wealthy farms is not known. What is known is that Iceland underwent changes (in society, economy, politics and farming), yet still held onto the standard values for centuries suggesting little change in livestock farming, or at least the demand for the animals. The consistency may suggest that Icelandic farming did not undergo any significant changes to cause the written sources to alter their livestock valuation. These sources do not, however, show the valuation of cattle and sheep in the fifteenth and sixteenth centuries, during which time Iceland was undergoing further social, economical and political changes. It may be the case that cattle and sheep valuations changed, but we do not have the sources to examine and horses kept a consistent value because they were not as economically significant as cattle and sheep.

When compared to Norwegian laws, thought to have been the inspiration for the Icelandic laws, we see little similarity between them, even though they all used the *kúgildi* unit of value. The Icelandic laws are more detailed, assigning values based on both age and sex for all livestock present on farms. Indeed, the Icelandic laws have closer parallels in style to the Welsh and Irish laws, potentially reflecting the importance of livestock to these societies, though, Iceland was different as it assigned values based on the *kúgildi* and not on coinage. From the Welsh and Irish laws we also see similarities in the ages that animals reached sexual maturity and maximum valuations that suggest a commonality in the rate of livestock development across these regions, and most likely north-western Europe.

The laws provide guidance on livestock prices, and when compared to other sources, variations are revealed in the valuations of these animals. A number of *máldagar* record the

values for individual horses, and from these, we can see that though there were differences the values were roughly the legal standard value for the animals. While the *máldagar* do not explain why the values were given, they show continuity with the relative values formulated centuries earlier. The continuity indicates that though the relative proportions of livestock species changed, for example there had been a move towards sheep farming by the sixteenth century, society or at least the compilers of these texts did not change its understanding of the animals' value. The legal texts illustrate the diversity of livestock and the products sought from these animals, providing an understanding of all the potential livestock in the twelfth and thirteenth centuries. Lesser-discussed livestock, such as horses, goats and pigs, were recorded displaying the authors' awareness of these animals existence even when they were scarce in Iceland. These species were known to Icelanders and had some input into the pastoral economy no matter how small, as will be discussed later.[469]

[469] See Section 6.4, 6.5 and 6.6.

CHAPTER THREE
POPULATION, HERD SIZES AND COMPOSITION

4.1 Introduction

When settlers came to Iceland, they introduced the same range of livestock that were used to colonise land across the North Atlantic.[470] The livestock consisted of cattle, sheep, horses, pigs and goats. Based on the zooarchaeological evidence, during the ninth and tenth centuries, the first centuries of settlement, Icelanders relied on a combination of domestic and wild resources, taking advantage of the available fish and birds whilst establishing their livestock herds. The eleventh and twelfth centuries saw an increasing reliance on domestic livestock, with sheep increasing relative to cattle. By the fourteenth century, the increase in sheep relative to cattle continued, but fish were the most abundant in the record, and pigs and goats became scarce.[471] As mentioned in elsewhere in this thesis, many scholars argue that there was a peak in aggregate livestock numbers in the first few centuries after settlement, but from the fourteenth, if not the thirteenth, there was a downward trend in livestock numbers.[472]

Þorvaldur Thoroddsen, relying on the written evidence, argued that cattle were most numerous in Iceland pre-1000, there were fewer in the thirteenth and fourteenth centuries and still fewer in the fifteenth century.[473] There were fewer sheep in the Saga Age than in his time, but he avoids giving an estimate for the size of the sheep population.[474] Indeed, he argued that there were not many sheep in comparison to cattle even in the fifteenth century but that sheep flocks were larger in the thirteenth century than later.[475] It was not until the seventeenth century that sheep outnumbered cattle as hard times became more frequent.[476] He explained that livestock numbers would follow farming conditions, good years would see a rise in numbers and bad years a fall in numbers.[477]

[470] T. Amorosi, P. Buckland, A. Dugmore, J. Ingimundarson and T. McGovern, 'Raiding the landscape: Human Impact in the Scandinavian North Atlantic', *Human Ecology* 25(3), pp.491-518, p.501.
[471] McGovern et al., 'Coastal connections, local fishing', p.191.
[472] See Section 1.3.1.
[473] Thoroddsen, *Lýsing Íslands* III, p.255.
[474] Ibid., pp.280-281.
[475] Ibid., p.284.
[476] Ibid., pp.285-286.
[477] Ibid., p.287.

Jón Jóhannesson echoed Þorvaldur by cautioning against the assumption that the same number of livestock were found on every farm or that livestock populations were the same over the centuries.[478] He stated that cows were more numerous between the eleventh and thirteenth centuries than later, even to the twentieth century.[479] He proposed that sheep were fewer relative to cattle, with few ewes but more wethers.[480]

Gunnar Karlsson more recently, has argued based on *kúgildi* valuations of livestock, that there was a 60% reduction in the value of cattle and a 50% reduction in the value of sheep between c.1100 and the early eighteenth century when *Jarðabók* was compiled.[481] He does recognise that there were differences in farming between these two points, stating that cows were less productive in the Middle Ages because they were fed less, but we are unsure about the quantities of milk that they produced. Interestingly, Gunnar overlooks the dramatic reduction in non-milking cattle compared to milking cattle in his calculation of a 60% reduction in cattle value. He distinguished between cows, *kýr*, and cattle (presumably non-milking cattle), *naut*, and when these are calculated separately there was in fact a reduction in cows of only 43%, less than the total for sheep, but a reduction of 90% for other cattle, yet Gunnar does not draw attention to this point. This difference in reductions within the cattle population would actually mean that the greatest change was of non-milking cattle and so a significant reduction in beef production between these two points in time. He does not, unfortunately, comment when these changes might have occurred.

Benedikt Eyþórsson, in his study of farming at Reykholt, points to the sixteenth and seventeenth centuries as a time of change in Icelandic farming, as sheep farming steadily overtook cattle farming.[482] He states that during the medieval period, there was proportionally more cattle than sheep and farming was mainly based on milk production with considerable beef and wool production, and some grains grown in the south and west. With regard to Reykholt itself, cows and ewes accounted for most of the livestock and milk production was the primary part of the farm's economy with some grain growing.[483] By the fourteenth century, grain growing had ceased and there was a shift from cattle to sheep farming with less

[478] Jóhannesson, *A History of the Old Icelandic Commonwealth*, p.289.
[479] Ibid., p.289.
[480] Ibid., p.290.
[481] Karlsson, *Lífsbjörg Íslendinga*, p.153.
[482] Benedikt Eyþórsson, *Búskapur og rekstur staðar*, p.152.
[483] Ibid., p.152.

emphasis on meat production. Benedikt avoids calculating livestock populations, instead he pays more attention to changing farming practices. Instead of seeing a downturn in farming, there is more a change in emphasis, with unsuitable practices such as grain growing ceasing, demonstrating that Reykholt and Iceland in general were modifying farming to get the best return. Even at the wealthy farm of Reykholt there was a move away from beef production, so this change in farm economy was not limited to poorer farm but probably happened across all farms.

Árni Daníel Júlíusson and Jónas Jónsson argue that up to 1400 the number of sheep were increasing but cattle numbers remained constant. It was not until after 1400 that the number of cattle started to decrease.[484] They further argue that plague in the fifteenth century reduced the available labour and large numbers of livestock were slaughtered resulting in smaller homefields being needed to produce fodder.[485] Thus over the centuries, all agree that the number of cattle decreased and there was a move to sheep farming, the differences being when and to what extent these changes occurred.

This chapter draws on the documentary as well as archaeological evidence to examine herd sizes and the composition of herds to break down the general statements about domestic livestock. Within a herd, there are different categories of animals: female and male, young and old, milking and non-milking. Some of the sources record such information and so, issues such as animals' sex, age and purpose will be investigated to discover the farming strategies employed on Icelandic farms. In contrast to previous published research, horses, pigs and goats will also be discussed. Though less frequently mentioned, horses did have a role in the Icelandic economy, and small numbers of goats and pigs were also reared. Pigs are special as the species is thought to have become extinct in Iceland because there is no documentary or archaeological evidence for pig rearing for part of the seventeenth and eighteenth centuries.[486] The limited but significant evidence of pigs will be investigated later in the chapter.

4.2 Cattle

[484] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, p.178.
[485] Ibid., p.177.
[486] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* IV, p.134.

One question that has interested scholars of Icelandic agricultural history was the potential carrying capacity of the island. The discussion of livestock population has been central to ideas about Iceland's ability to support humans, the extent of land degradation and ultimately the issue of declining farming from the fourteenth century onwards.[487] Regarding cattle, it has been argued that various factors combined to make sheep farming more profitable for the resources invested, which resulted in fewer cattle being kept as time went on. The attention paid to milking cattle has neglected other cattle categories. As shall be argued, discussions of a reduction in cattle numbers have actually masked a reduction in non-milking cattle. When milking and non-milking cattle are differentiated the number of milking cattle generally remains constant. Furthermore, the evidence on which population estimates are based rely on the number of cows, but there are flaws in the calculations as the evidence is not sufficient to allow estimates based on more than scattered saga examples and a few *fjós*, byre excavations.[488]

Aggregate cattle population estimations vary. For example, Gunnar Karlsson estimates that between the eleventh and fourteenth centuries there were 50,000 cows and 30,000 oxen with a fluctuating number of calves.[489] From this estimate, each farm had an average of ten cows and six oxen, based on his assumption that there were 5,000 farms in existence during this time.[490] By contrast, Þorvaldur Thoroddsen gave a combined total of 100,000 cattle in Iceland during the Saga Age.[491] Árni Daníel Júlíusson and Jónas Jónsson argue that it is difficult to know anything about population figures before the compilation of *Jarðabók* and instead use examples from *Íslendingasögur* and *Sturlunga saga* to show exceptionally large numbers of livestock on welathy farms.[492] In the same manner as Þorvaldur, they are aware that these figures are not helpful for discussing livestock numbers on all farms. A much earlier scholar, Þorkell Bjarnason estimated an even higher number for the Icelandic cattle population during this period, with 80,000 cows and 55,000 oxen, and so there were five to six times more cattle in Iceland during the Saga Age than in the nineteenth century.[493] These calculations

[487] See Section 1.3.
[488] See Section 2.6.1.
[489] Karlsson, *Lífsbjörg Íslendinga*, p.133.
[490] 5,000 farms is an estimate. The late seventeenth land registers record the number of farms as fluctuating around 4,000 and are as follows: 1686 (3,852 farms), 1695 (3,282 farms), 1696A (3,957 farms), 1696B (4,029 farms), 1696C (4,018 farms), and 1698 (4,018 farms). Lárusson, *The Old Icelandic Land Registers,* p.25.
[491] Thoroddsen, *Lýsing Íslands* III, p.220.
[492] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* III, pp.14, 124.
[493] Þorkell Bjarnason, 'Um nokkra búnaðarhætti Íslendinga í fornöld', *Tímarit hins Íslenzka Bókmentafélags* VI (1885-86), pp.1-56, pp.6-8.

were based on recorded numbers of cattle in sagas which he used to estimate human to cattle ratios for earlier centuries compared to the total cattle population in Iceland at the end of the nineteenth century. As the sagas record a higher ratio than the nineteenth century material, Þorkell Bjarnason concluded there were more cattle during the Saga Period. Jón Jóhannesson followed this argument by asserting there were more livestock in the thirteenth century than in later centuries, but did not discuss livestock proportions.[494] These scholars perceived a decrease in the number of cattle that Iceland could support over the centuries. Due to the general scarcity of evidence available, they were forced to work on mean figures based on numbers recorded for exceptional farms in sagas.

The problem with using the sagas for estimate livestock populations are that the sagas are works of fiction that give useful details but should not be depended upon for the specifics of herd sizes. The saga examples are open to exaggeration and livestock numbers were included in the texts to illustrate the wealth of certain individuals. They do not reflect smaller farms or the smaller herd sizes that must have existed on smaller, less wealthy farms. If sagas are used, then the estimations will potentially be too high because they do not give any indication about the herd sizes on smaller farms. We do not gain an insight into the herd sizes on these smaller farms until *Jarðabók*, but by using the *máldagar*, as done in this study and by Árni Daníel and Jónas, we can increase the number of farms on which we make our conclusions, from a couple of cases in the sagas to hundreds of cases in the *máldagar*.

Based on the *máldagar* and the physical remains of *fjós* from the period before 1100 it does appear that there was a decrease in the number of cattle in Iceland over the centuries, but there were variations that go against the generalisations raised by the scholars above. The *máldagar* are for church-farms so do not resolve the issue of herd sizes on secular farms. The *máldagar*, however, do record the chronological distribution and the wealth variation of church-farms providing a broader spectrum on which we can examine changes over time in cattle herd sizes and further the composition of the herds.[495] The size of herds on individual farms, as opposed to total population estimates, shows the variation in the cattle being reared on church-farms across Iceland. Thus we should not think in terms of total carrying capacity of the land, but the differences in herd sizes because herd sizes can be explained by other,

[494] Jóhannesson, *A History of the Old Icelandic Commonwealth*, p.293.
[495] See Chapter 6 for discussion of *máldagar* material.

non-environmental factors such as wealth and access to sufficient fodder resources. These specifics about herd size demonstrate the quantity of resources directed into cattle farming by church-farms at certain times, and the extent of their resources can be inferred from their ability to maintain large herds. Those church-farms with larger herds did tend to be wealthier. The archaeological investigations of *fjós* have given insights into cattle herd sizes, as will be discussed below.

4.2.1 Herd Sizes

Milking cows required good quality hay and winter housing to be kept milking that resulted in cows being an expensive and time-consuming investment. The first recording of cattle herds after the sagas are found in the *máldagar*, which reveal where large herds of cows were kept and which church-farms had the resources and labour to maintain these milk-producing herds. The largest cow herd recorded in the *máldagar* was 60 cows at Grenjaðarstaðir (Reykjadalur) in the late fifteenth century.[496] The second and third largest are found at the monasteries of Þykkvibær, 1340, with 53 cows, and Viðey, 1367, with 50.[497] Smaller again, was at Stafholt (Borgarfjörður) which owned 35 cows in the late sixteenth century.[498] As can be seen, the largest cow herds are owned by monasteries, but church-farms also owned similar numbers. These herds are exceptionally large when compared to the numbers owned by other church-farms. Surprisingly, the two church-farms with the largest cow herds owned them in the late fifteenth and sixteenth centuries when cattle numbers were thought to be smaller and Iceland was entering a period of stagnation. These figures show that keeping large cow herds was possible in the fifteenth century, though the majority of our evidence for herds comes from the fourteenth century.[499] Not all church-farms were wealthy establishments, however, as out of 945 *máldagar* that record cattle, 921 record cows, of these *máldagar* only 61 record one cow and five *máldagar* do not specify any milking stock. [500] These figures indicate that some church-farms either did not have the resources, decided not to rear milking cows, or cows were under the ownership of the secular part of the farm.

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[496] DI 5, p.280. The *máldagar* for 1394 recorded 40 cows, DI 3, p.578.
[497] Þykkvibær: DI 2, p.737. The *máldagar* for c.1218 listed 40 cows, DI 1, p.395. Viðey: DI 3, p.212.
[498] DI 15, p.620.
[499] Total 923 *máldagar*: 12th century (26), 13th (33), 14th (538), 15th (150) and 16th (176).
[500] Total 61 *máldagar* record one cow: 12th century (4), 13th (7), 14th (40), 15th (7) and 16th (3).
Total 5 *máldagar* record no milking stock: 14th century (3) and 15th (2). The *máldagar* that refer to *kúgildi* of milking stock, or livestock, without specifying whether they are cow, ewe or non-milking stock have been discounted.

While superficially, one gets the impression that there were larger cow herds in the centuries prior to the fifteenth century, this is an illusion created by the majority of thesurviving *máldagar* being from the fourteenth century. Therefore, traditional narratives of a decline in the number of cows, at least on church-farms, can be questioned. Regardless of the temporal bias of the documents, they show the potential range of herd sizes on church-farms, illustrating the concentration of resources. Instead of a decline in cow numbers, it may be that there was a consolidation of resources on certain farms in later centuries resulting in the ability to maintain large herds of cows.

As stated above, the attention paid to milking cows has in fact masked a reduction in the rearing of non-milking cattle, which creates the impression that cattle numbers were decreasing. Cattle population estimates by other scholars are based on the number of cows and then a proportion of that number is added to represent the non-milking cattle in a herd, the result being that non-milking cattle rise and fall in sync with the number of cows. The *máldagar*, on the other hand, allow non-milking cattle to be evaluated independently. There are 210 *máldagar* where non-milking cattle are recorded, of which 118 had more than one non-milking neat, but the most common number of non-milking neats owned by a church-farm was one and, therefore they were a small part of the farm's economy. Most of the larger non-milking herds are recorded for the fourteenth century. Helgafell had the biggest herd with 125 animals in 1397, followed by Kirkjubær nunnery with 75 cattle in 1343, while other churchs owned 50 animals or fewer.[501] Indeed most of the largest herds were found at monasteries or church-farms that owned all the *heimaland*. This is an unsurprising finding as only wealthier institutions could afford the investment needed to maintain this number of animals. Also, at these places the cattle herd composition shows a clear preference for non-milking cattle. Where church-farms had 18 or more non-milking cattle, those animals account for more than half of the total cattle kept. On the church-farms with less than 18 non-milking cattle, most had more milking cattle than non-milking cattle.

The largest non-milking cattle herds are found in the fourteenth and thirteenth centuries with smaller non-milking herds for the fifteenth and sixteenth, which suggests that there was a move away from beef production after c.1400. In addition, the reduction in the recording of older oxen in the fifteenth and sixteenth centuries indicates less demand for these animals as

[501] DI 4, p.165 and DI 2, p.780.

beasts of burden. Older oxen would have functioned as plough-oxen, whereas the inclusion of one- and two-year-old cattle in the *máldagar* could be intended for beef production, as older oxen were past their 'prime meat' stage of life. There are six *máldagar* that specifically mention plough-oxen: two are dated to the thirteenth century, three to the fourteenth century and one to the fifteenth century.[502] The fifteenth century document records forty plough-oxen, the largest herd of plough oxen out of the six *máldagar*. While this is not very robust evidence due to the small number of cases, it does seem to mirror the reduction in arable farming that was thought to have mostly ceased in Iceland by 1500.[503]

The aggregating of cattle numbers masks cattle farming strategies and the overall move towards a more milk dominated cattle economy on church-farms. In addition, the inclusion of the largest non-milking herds informs us of exceptional cases, but were not common practices. As stated above, the most common number of non-milking neats on church-farms was just one animal. The recording of these animals show a more even distribution across the fourteenth to sixteenth centuries actually indicating a fairly constant number of church-farms continuing to rear a single non-milking neat.

Due to the nature of the *máldagar*, non-milking stock were not always recorded, making it difficult to say with certainty what the total cattle populations were on all church-farms with surviving *máldagar*. In light of this, total herd sizes should only be examined where there is evidence for both milking and non-milking cattle. Again, the largest herds were owned by monasteries mostly made up of large non-milking herds. For example, 145 cattle at Helgafell in 1397, 112 at Þykkvibær in 1340, and 105 in 1343 at Kirkjubær.[504] All other church-farms owned cattle herds of fewer than 89 animals. The majority of the largest cattle herds are recorded for the fourteenth century arguing, unlike for cow herds, for a reduction in the overall number of non-milking cattle after the fourteenth century. Where we have information for milking and non-milking cattle, we can see a move toward milk production, and away from beef production, from the fifteenth century as milking cows made up the majority of cattle herds.

[502] DI 1, p.461 (1224), DI 2, p.117 (c.1274), DI 4, p.123 (1397), DI 4, p.107 (1397), DI 3, p.259 (1371), DI 5, p.291 (1461).
[503] Simpson et al., 'Soil limitations', p.440.
[504] DI 4, p.165, DI 2, p.737 and p.780.

If we turn now from documents to archaeology, we have another means of estimating a farm's herd size: *fjós* excavations. Depending on the conditions of the ruins, it has sometimes been possible to estimate the numbers of stalls or at least the overall dimensions of the structure. Unlike the evidence presented in the *máldagar*, the archaeological evidence is not limited to church-farms and is increasing with every excavation, even if this evidence is occasionally problematic.

It is worth taking a brief look at some of the limitations of the archaeological evidence. Foremost, it is not always possible to make out individual stalls or the dimensions of the structure. For example, the numerous postholes and lack of stall divisions in the *fjós* at ninth to tenth century Sveigakot (Mývatn) have been interpreted as movable tethering stakes, with the potential to house 16 cattle.[505] This suggests the animals could be moved around the *fjós* without the constraints of stalls. In other words, there might not be evidence of stall divisions to be found during excavation.[506] Where evidence of stalls is not recovered, the herd estimate is based on how much space is given to animals from *fjós* with stall divisions, and this might have varied.

In addition, the herd size calculations usually assume that the *fjós* was fully stocked with cattle, but as shown elsewhere, other animals could be kept in this structure and not all stalls were of a sufficient size to contain an adult neat.[507] It is also possible that not all the cattle in the *fjós* were milking cows. If all cattle in a *fjós* were milking cows, it raises the question of where the non-milking cattle were housed. And if they were in another structure, then another structure must have been situated on the farm. Non-milking cattle could be housed further away from the farmhouse because milk did not have to be carried between the two structures, and so could be at a distance from the dwelling, as was the case for to sheep structures.[508]

The first *fjós* to be discussed here is Þórarinsstaðir (Hrunamannaafréttur). The excavation is a special case because the eleventh century farmstead is the only one where sheep-houses have been excavated. It is also exceptional because of the level of detail that the *fjós* excavation

[505] Vésteinsson and McGovern, 'The Peopling of Iceland', p.212.
[506] Orri Vésteinsson, 'Areas S7 and SP', in Guðrún Alda Gísladóttir and Orri Vésteinsson (eds.) 'Archaeological investigations at Sveigakot 2006', Fornleifastofnun Íslands Report FS376-00217 (2008), pp.8-17, p.14. https://www.instarch.is/pdf/uppgraftarskyrslur/FS376-00217%20Sveigakot%202006.pdf
[507] See Section 2.6.1.
[508] See Section 2.6.2.

recovered, which allows us an insight into the composition of the cattle housed in it. An observation of how animal waste was directed to the central channel allowed the excavator to distinguish the stalls of male and female cattle and deduce that there were eight females, five males and two calves housed in the structure, which assumes that the size and composition of the herd at Þórarinsstaðir was always the same.[509] These numbers reveal that if the *fjós* was fully stocked and the females were all milking cows, then the farming strategy was directed towards milk production as milking cows formed 62% of the adult herd. The somewhat low proportion of milking to non-milking, or rather female to male cattle when compared to other evidence for herd composition, suggests a great variance on cattle herd composition in medieval Iceland. The evidence for calculating herd composition from the archaeological remains at Þórarinsstaðir makes the site unique as no other excavation has come across this feature. Most *fjós* excavations can only indicate herd sizes, as will now be discussed.

It is common practice for excavations to calculate the holding capacity of *fjós* from the internal dimensions of the structure and then divide by the number of stalls discovered. These estimates, where possible, show the variation in what was thought to be sufficient space for each animal. A review of these estimates will now be provided to illustrate how these estimates are calculated. Three excavations provide evidence of stall divisions. At Lambhöfði (Þjórsárdalur) it was thought that the 40m^2 *fjós* could house 18 cattle, the *fjós* at Laugar (Hrunamannaafréttur) was estimated as having twenty stalls in 50 m^2 and at Áslákstunga (Þjórsárdalur) 30 cattle could be housed in the 56 m^2 *fjós*.[510] The estimation of 30 cattle for Áslákstunga is, however, thought to be a little excessive. The more recent excavation at Bergþórshvoll has revealed evidence of wooden stall divisions that could house 30 cattle in the 60 m^2 *fjós*.[511] At Sámsstaðir (Þjórsárdalur) one side of the *fjós* suffered from erosion damage, yet the walls were discernible, measuring a little over 32m^2 and possibly housed twenty cattle in total.[512] These sites suggest an average stall space of approximately 1.6 m^2 and 2.5 m^2, but do not consider the space taken by the central aisle, the dimensions (width and breadth) of the stalls or whether the stalls were of uniform size. These are important factors to consider as stalls are useless unless animals can fit into them.

[509] Eldjárn, 'Eyðibyggð á Hrunamannaafrétti', pp.28-30.
[510] Berson, 'A Contribution to the Study of the Medieval Icelandic Farm', p.57. Lambhöfði and Áslákstunga are considered, based on typological comparisons to have been abandoned in the eleventh or thirteenth centuries. Laugar is considered medieval and no later than 1104, as is Sámsstaðir.
[511] Ibid., p.46. Bergþórshvoll has not been dated on archaeological evidence.
[512] Ibid., p.52. Not considered later than 1104.

It also cannot be assumed that all *fjós* were symmetrical, something which has implications for estimations of the number of animals housed, where excavations uncover partially damaged structures. Again, Þórarinsstaðir provides an exception as the *fjós* had nine stalls on one side but only five stalls on the other. At Þórarinsstaðir, the average stall space was 1.61 m^2 based on a floor space of 22.8m^2.[513] At Herjólfsdalur (Westmannaeyjar) there were two *fjós* excavated. House VIII is thought to predate house IV, showing a difference in structure sizes over time at the site. The overall dimensions of House VIII is not clear, but the *fjós* measured approximately 18 m^2 and had up to fifteen stalls varying between 0.6-1.6m in width, giving an average of 1.2m^2 per stall.[514] House IV was 32m^2 and had evidence of sixteen stalls, giving an average stall space of 2m^2, though the stalls measured 0.6-1.7 m in width.[515] Even though the *fjós* had a similar number of stalls, the remains illustrate there was more space on average given per animal in the later phase. Many explanations are possible for the increased size, including bigger animals, more resources being available to build a bigger *fjós*, and a conscious decision to give the animals more room.

In both structures at Herjólfsdalur stall divisions were indicated by depressions in the ground. These depressions show that the stalls were not uniform in width, but varied between 0.6 m and 1.7m.[516] A width of 0.6 m is too narrow to house an adult neat suggesting that the narrow stalls may have housed a young animal such as a calf, been used for storage or to house a different livestock animal.[517] Only in building IV was an *in situ* stall division discovered, and it is possible that the height of the stall divisions differed. It may be the case that the narrower stalls were meant for calves and had lower divisions, to limit feeding but maintain sensory connections to encourage the letting down of milk.

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[513] Eldjárn, 'Eyðibyggð á Hrunamannaafrétti', p.28. The length of the *fjós* was 7.6 m and the width varied betwwen 2.2 m and 3.5, thus a middle point of 3 m is used, giving a total floor space of 22.8 m^2 and an average space per animal of 1.61 m^2. Thought to have been abandoned sometime before 1104, though there is some issue about the length of time, see Berson, 'A Contribution to the Study of the Medieval Icelandic Farm', pp.49-50.

[514] Margrét Hermanns-Auðardóttir, 'The beginning of settlement in Iceland from an archaeological point of view', *Acta Borealia* 9(2) (1992), pp.85-135, p.100; Margrét Hermanns-Auðardóttir, *Islands tidiga Bosättning* (1989, Umeå), pp.15-16. Gunnar Karlsson is rather generous in according a total floor space of 20m^2 to House VIII, which gives an average of 1.33m^2 for each animal, Karlsson, *Lífsbjörg Íslendinga*, p.128.

[515] Hermanns-Auðardóttir, *Islands tidiga Bosättning*, p.12.

[516] Hermanns-Auðardóttir, 'The beginning of settlement in Iceland, p.91; Berson, 'A Contribution to the Study of the Medieval Icelandic Farm', p.54-55.

[517] It is thought that the typical adult beast was below 1.25 m at the shoulder in the medieval North Atlantic. McGovern, 'The Archaeofauna', p.239.

As we have seen, there was much variation between and within *fjós*, from overall structural dimensions to the dimensions of stalls. The average stall space ranges from 1.2m^2 to 2.5m^2. If these averages are then applied to sites where there is little or no evidence of stall divisions, it is possible to estimate the housing potential of these undivided *fjós*. From the summary of *fjós* dimensions given by Gunnar Karlsson, the largest *fjós* at Áslákstunga innri (Þjórsárdalur) would have housed 28 cattle if the average of 2m^2 is used, compared to the smallest *fjós* at Goðatættur I (Papey) with an approximate floor area of 24m^2 giving space for 12 cattle.[518] These herd size estimates, while based on various assumptions, show that herd sizes were comparable to herd sizes recorded in the *máldagar*, even those in the fifteenth and sixteenth centuries. Saga evidence about *fjós* is limited. For example, there are only two references where the numbers of cows in a *fjós* are recorded. In an *Íslendingasögur*, there is recorded 30 cows in a *fjós*, a large, but not implausible number.[519] In *Sturlunga saga*, we find eight cows taken from a *fjós*, presumably the total number of animals in that building.[520] These numbers show how many cows could be housed, but does not give us any information about the *fjós* itself.

4.2.2 Potential cattle populations

We can turn now to how the evidence from *fjós* has been used by others to estimate the total cattle population of Iceland. Þorvaldur Thoroddsen, in the early twentieth century, stated there were at least 100,000 cattle in Iceland during the twelfth to mid-thirteenth centuries.[521] He explained that beef was eaten on a daily basis and the large groups of men recorded in *Sturlunga saga* would have required the slaughter of many cattle to feed them. There would, therefore, be a perceived decline in cattle numbers between the twelfth and thirteenth centuries and Þorvaldur's time. However, these figures were only recorded because they were notable in some way and did not reflect the number of livestock owned on the majority of farms.

Since Þorvaldur's time, there have been several *fjós* excavations and this information has been incorporated into discussions of population. Recently, Gunnar Karlsson has considered the *fjós* archaeological evidence for his estimations of total cattle populations. He states that

[518] Karlsson, *Lífsbjörg Íslendinga*, pp.128-129. I chose to use 2 m^2 because most of the excavations give an average around this figure, whereas 2.5 m^2 and 1.2 m^2 are the upper and lower extremes.
[519] *Gísla saga Súrssonar*, ÍF VI, chapter 16, p.53.
[520] *Guðmundur saga dýra*, *Sturlunga saga* I, chapter 23, p.208.
[521] Thoroddsen, *Lýsing Íslands* III, p.220.

the average number of cattle housed in a *fjós* from the archaeological evidence is twenty animals.[522] According to him, the number of cattle was higher around 1100 than later and *fjós* may not have been fully stocked, so he reduces the proportion of livestock calculated at the proposed eleventh century site of Þórarinsstaðir (12 females, seven males and two calves), to ten cows including heifers, and six cattle, excluding calves.[523] He also calculates that there were 5,000 farms in Iceland during the early medieval period.[524] So by multiplying the average number of cattle on a farm by the number of farms in Iceland, Gunnar Karlsson calculates that there were 50,000 cows and 30,000 cattle around 1100. He adds that the number of cows accords well with documentary evidence, citing *Búalög* on the number of milking stock three women were expected to milk at a shieling and a document dated to c.1250 for Helgafell which stated that people on a nearby farm should not own more than 12 cows.[525] Later, when discussing production during the Middle Ages, he adds an additional 3,200 cows to account for cow herds at forty big farms to the total number of cows he estimated earlier (50,000 cows).[526] When divided by the number of farms, which he gives as 5,040, the average number of cows on a farm during the Middle Ages is 10.5, or 10 cows.[527] He then goes on to use these figures to give a total livestock value that he compares with recorded livestock value at the start of the eighteenth century, to argue that there was a reduction in the number of cattle and sheep kept in Iceland.

As can be seen, these cattle estimates rely on the number of stalls uncovered in excavations, and the proportion of females to males is somewhat dependent on the excavation of Þórarinsstaðir. However, as Þórarinsstaðir is over 300m asl., it is thought the farm was forced to provide housing for all its livestock, whereas on lower altitude farms non-milking cattle might have grazed outside with no housing during the first centuries of settlement.[528] Thus, the Þórarinsstaðir herd estimates can only really apply to that farm or farms at a similar altitude, which throws doubt on the cattle figures. It is also likely that *fjós* were not always fully stocked, built slightly larger than were needed, and that animal numbers on a farm changed over the lifetime of these structures, so stalls could have stood empty. The numbers

[522] Karlsson, *Lífsbjörg Íslendinga*, p.133.
[523] Ibid., pp.132-133.
[524] Ibid., p.87. See Section 4.2.
[525] *Búalög* IIA, p.22; DI 1, p.577. See Section 2.4.2 for discussion of *Búalög* clauses about the number of woen at shielings.
[526] Karlsson, *Lífsbjörg Íslendinga*, p.152.
[527] Ibid., p.152.
[528] Berson, 'A Contribution to the Study of the Medieval Icelandic Farm', p.42.

used in these calculations, therefore, cannot be known with certainty and are open to interpretation. While this thesis does not attempt to estimate livestock population figures because of the inherent errors in the calculations, it does caution against using saga information on livestock numbers because livestock numbers imply the status of some characters or the devastating effect of raiding on others. It is more productive to examine livestock populations on farms at a local level to discern changes in populations, where evidence is available, as done elsewhere in this thesis.[529]

Based on the archaeological and *máldagar* evidence, which give a more robust means of testing herd sizes from the twelfth to sixteenth centuries, it does not appear that the reduction in cattle was so pronounced. These methods are still problematic, for example, the *máldagar* post-date the Saga Age discussed by Þorvaldur and Gunnar, and though they give livestock numbers there are differences in how much of a farm's *heimaland* was under the control of the church, and these documents only exist for church-farms, not secular farms. Archaeology also suffers from not being representative of all farms, and being based on a limited sample size. Nonetheless, they do provide indications of herd sizes across several centuries. It is not possible to calculate a total cattle population for Iceland until the compiling of *Jarðabók* at the start of the eighteenth century, where the total cattle population is given as 35,860.[530]

It would be helpful if *fjós* excavations investigated sites of small, less wealthy farms. To date, most excavations of *fjós* have been skewed to pre-1400 farms that are known to have been wealthy or places of important individuals.[531] It is likely that these farms would have been able to support larger herds than smaller farms, so the *fjós* would be expected to house more livestock. Further, those *fjós* that have been excavated are mostly restricted to pre-1600.[532] The available evidence seems to skew the picture towards suggesting that herds of cattle were larger in the earliest centuries of Iceland's settlement, but more research into later sites is needed to test whether this assumption holds more generally. The assumption does not take into consideration adaptive techniques employed by Icelanders over the centuries in response to the recognition of changes in vegetation and climate, such as a move towards sheep

[529] Section 5.3, 5.6 and 5.7
[530] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* III, p.126. 24,467 cows, 3,876 heifers, 4,540 calves and 2,977 bulls and oxen.
[531] The excavations of the three farms in Þjórsárdalur and Þórarinsstaðir stand in contrast to the usual excavation of *fjós*.
[532] Berson, 'A Contribution to the Study of the Medieval Icelandic Farm', p.37.

farming. Sheep are better suited to the cold climate because of their fleeces, lower fodder intake and the ability to graze areas inaccessible to cattle. Sheep can be left outside during the winter to find their own grazing or fed poorer quality hay if necessary, whereas feeding milking cows on poor quality hay would result in less, or no, milk.[533]

It is possible to examine the number of cattle owned by farms, and that grouping all cattle together, or concentrating on milking cows, gives an incomplete picture of medieval Icelandic cattle farming. Previous estimates for cattle pre-1300 is based on evidence for their presence, with the assumption that an absence of evidence is evidence of a reduction. This is rather a methodological problem, not conclusive proof. Cattle numbers in sagas are sometimes exceptional and cannot be representative of all farms in Iceland at the time. Unfortunately, occasional saga references are the only evidence we have available for pre-1300. It is not until the recording of *máldagar* from the twelfth century, their abundance in the fourteenth century and continued compilation until the sixteenth century, that we get a wider perspective on livestock herds.

The *máldagar* show that the largest non-milking cattle herds do date from the fourteenth century, such as Helgafell (Helgafellsveit) owning 125 non-milking cattle in 1397, Viðey (Kollafjörður) owning 110 in 1367 and Kirkjubær (Síða) owning 75 in 1340.[534] Comparable cattle herds were kept in the fourteenth century as in the sixteenth century, but these tend to be herds of less than ten non-milking cattle. From these documents, it appears that there was a clearer reduction in non-milking cattle and a move towards a dairy cattle economy on church-farms. The reduction in non-milking cattle could also be linked to the cessation of arable farming as plough-oxen were no longer needed and horses provided a quicker mode of transport. A reduction in the number of non-milking cattle would be a case of adaptation in order to obtain the most products from resources, and not decline in farming conditions. Adaptation is more likely as farms continued to survive over the centuries, even when faced with changing environmental and social factors. Herd composition, numbers and product management were not the same for the eighteenth and nineteenth centuries as it was for the twelfth and thirteenth centuries, but then neither were the farming conditions.

[533] Koepke and Baten, 'Agricultural specialization and height', p.129; O. Vésteinsson, T, McGovern, C. and Keller, 'Enduring Impacts: Social and Environmental Aspects of Viking Age Settlement in Iceland and Greenland' *Archaeologica Islandica* 2 (2002), pp.98-136, pp.118-119.
[534] DI 4, 165; DI 3, 212; DI 2, 780.

4.2.3 Herd Composition

In order to investigate what products were being sought from Icelandic livestock we must turn to evidence about herd composition. The proportion of females, males, old and young within a herd can indicate the products desired on a farm. For many medieval Icelandic farms, it is assumed that a milk economy was undertaken with meat being obtained from unwanted very young animals, less than three months, culled to preserve fodder supplies or older animals that had reached the end of their productive lives. Being able to produce meat from animals in their prime, between 18 and 36 months, was a reflection of higher social standing and limited to farms that could afford the resources required to rear these animals. Zooarchaeology has opened up this topic by providing age-at-death for some animals where the evidence is available; the slaughter of many young and old animals suggests a dairy economy.[535] Unfortunately, sagas do not record the composition of herds, as they do not give numbers for the animals they mention. Thus, for discussions of herd composition we have to look to the *máldagar* as they contain information on the number of cows and oxen on church-farms. As previously mentioned there are several issues with interpreting *máldagar*, one of which is the absence of data for some livestock categories resulting in some church-farms only having information about the number of milking stock. A result of this bias is the appearance that church-farms were operating a predominantly milk economy, therefore, only church-farms with evidence of milking and non-milking cattle will be included here. A small number of farms record only non-milking cattle and so they will be discussed because, if the church owned the entire *heimaland*, then it suggests that they owned no cows and so had no cows' milk.

The correlation of a farm's size or wealth with the choice to farm for beef can be seen in herd composition. An arbitrary benchmark of over 50% of non-milking cattle is taken to distinguish a church-farm's economy between milk and meat. There were 185 church-farms that matched the criteria of recording both milking and non-milking cattle in their *máldagar*. Of this figure, only 21 have more than 50% of their cattle recorded as non-milking, including oxen and non-specified cattle (Table 2). In other words, about one in ten church-farms had 50% or more of their cattle for meat production.[536] These results reveal that, though evidence

[535] See 5.2.1.
[536] 21 *Máldagar*: 12th-13th centuries (3), 14th century (14), and 15th-16th centuries (4).

is equally scarce for the twelfth and thirteenth centuries as it is for the fifteenth and sixteenth centuries, the later church-farms generally had a larger proportion of non-milking cattle than the church-farms in earlier centuries, 76.7% (4) compared with 58.4% (3). The church-farms listed included well-known *staðir*, such as Reykholt, Þykkvibær, Kirkjubær, Gaulverjabær and Helgafell. These cattle herds show that church-farms across the country were farming cattle for meat, and therefore had surplus resources that they could direct to this superfluous form of farming because dairy farming was the most effecient return on resources. It is not surprising that these church-farms had such resources available to them as they were the larger, more powerful church-farms, probably with dependent farms and other rights. It is worth nothing, however, that some of these church-farms owned substantially more non-milking than milking cattle. It cannot be the case that the *máldagar* left cows unrecorded because milking cows were a clear indicator of social status, as well as being valuable amimals. It appears likely that some church-farms were wealthy, but were also displaying this wealth through their diet, as argued to be the case at Skálholt in the seventeenth and eighteenth centuries.[537] Furthermore, these church-farms can be found around Iceland, demonstrating that beef-farming was not geographically restricted, though the density of church-farms in southern Iceland does mean there are more church-farms are found in southern localities.

[537] G. Hambrecht, 'The Bishop's Beef. Improved Cattle at Early Modern Skálholt, Iceland', *Archaeologica Islandica* 5 (2006), pp.82-94.

Table 2: Church-farms with over 50% non-milking cattle recorded in extant *máldagar*.[538]

Year	Church-farm	Milking cattle	Non-milking cattle	Total cattle	Percentage (non-milking/total)
1185	Reykholt	20	30	50	60
c.1218	Þykkvibær	40	49	89	55.1
1224	Reykholt	20	30	50	60
1318	Háls	13	25	38	65.8
1340	Þykkvibær, Ver	53	59	112	52.7
1343	Kirkjubær	30	75	105	71.4
1343	Kirkjubær	30	35	65	53.8
1354	Hítardalur	6	23	29	79.3
1354	Staðarfell	10	20	30	66.7
1356	Gaulverjabær	9	43	52	82.7
1367	Viðey	50	110	160	68.8
1377-78	Helgafell	30	53	83	63.9
1394	Saurbær	20	40	60	66.7
1394	Goðdalur	11	18	29	62.1
1397	Helgafell	20	125	145	86.2
1397	Hítardalur	7	34	41	82.9
1397	Hlíð (Úthlíð)	14	21	35	60
1461-1485	Kvíabekkur	4	7	11	63.6
1471	Vallanes, Þingmúli	4	13	17	76.5
1491-1518	Hof	1	18	19	94.7
1509	Vatnsfjörður	2	20	22	90.9
1570 and later	Breiðabólsstaðir	14	19	33	57.6

[538] Reykholt, Borgarfjörður (1185): DI 1, 279, (1224): DI 1, 466;
Þykkvibær, Álptaveri (c.1218): DI 1, 395, (1340): DI 2, 737;
Háls, Fnjóskadalur: DI 2, 439;
Kirkjubær, Síða (1343): DI 2, 780, DI 8, 4. Both *máldagar* have been dated to 1343 but record slightly different numbers for non-milking cattle.
Hítardalur, Mýrasýsla (1354): DI 3, 84, (1397): DI 4, 184;
Staðarfell, Snæfellsnes: DI 3, 80;
Gaulverjabær, Flói: DI 3, 114;
Viðey, Kollafjörður: DI 3, 212;
Helgafell, Helgafellssveit (1377-78): DI 3, 325, (1397): DI 4, 165;
Saurbær, Eyjafjörður: DI 3, 524;
Goðdalur, Skagafjörður: DI 3, 563;
Hlíð (Úthlíð), Biskupstunga: DI 4, 38;
Kvíabekkur, Ólafsfjörður: DI 5, 256;
Vallanes, Þingmúli: DI 5, 629;
Hof, Öræfi: DI 7, 37;
Vatnsfjörður, Ísafjörður: DI 8, 286;
Breiðabólsstaðir, Fljótshlíð: DI 15, 667.

Another source for examining herd composition is the confiscation record for Guðmundur Arason, dated to 1446. Guðmundur was a wealthy individual owning six farms at the time of the confiscation, and demonstrated that certain farms were wealthy enough to be able to farm for beef in the fifteenth century. Overall, there was an equity between non-milking and milking cattle, 52% to 48% respectively.[539] Individually, his properties of Reykhólar and Saurbær appear to have been following a more beef economy with 62.8% and 55.9% non-milking livestock respectively. Kaldaðarnes, 21.9%, and Fell, 36.8%, had a clear preference for milking cows in the herd compositions, whereas Núpur, 48.1%, and Brjánslækur, 48.9% had a mixed cattle economy. These figures illustrate that while the six properties were owned by the same person they undertook different cattle farming strategies.

As mentioned above, the *máldagar* do contain cases where only non-milking cattle were recorded. These are very unusual as milking cows were so prevalent. Nonetheless, these cases can indicate potential arable farming where large numbers of oxen were recorded. In 24 *máldagar* there are unspecific cattle and/or oxen recorded with no mention of cows. On two church-farms, Borg (undir Eyjafjöllum) and Möðruvellir (Eyjafjörður) there were 20 and 40 oxen recorded, demonstrating that large herds of oxen were kept in Iceland with dates assigned as 1371 and 1461 respectively.[540] In the case of Borg the oxen were referred to as *arðuruxi*, plough-ox, suggesting that Borg, located in the south of Iceland, was still undertaking arable farming. At Möðruvellir, the *máldagi* specifies that the animals were three-years and older yet gives no function. The large number of animals implies that they were kept for a particular reason, but the late date and the northern location does not suggest that they were used for arable farming, though draught work is possible. The recording of non-milking cattle does indicate the importance of these animals. Indeed, beef maintained its prestige as a high status food in Iceland as well as in the wider North Atlantic region throughout the centuries.[541]

It is usually assumed that cattle farming in medieval Iceland operated a dairy economy with most of the cattle being milking stock. The confiscated livestock of Guðmundur Arason

[539] DI 4, pp.683-694.
[540] DI 3, p.259 and DI 5, p.291.
[541] Hambrecht, 'The Bishop's Beef. Improved Cattle at Early Modern Skálholt', p.89.

demonstrates the individual nature of farm economies, as each of his properties undertook cattle farming for different products, but still had milking and non-milking cattle present. The *máldagar* evidence suggests a general dairy cattle economy as most of the church-farms had over 50% of their cattle as milking stock. However, there are always exceptions, as listed in Table 2, that show throughout the twelfth to sixteenth centuries some church-farms were operating a largely beef economy, especially as the marginality of arable farming ruled out the use of these animals as plough-oxen.

4.3 Sheep

Medieval Iceland operated a dual sheep economy of wool and milk with meat being obtained when animals reached the end of their productive life or when lambs were culled after coming off the uplands in the autumn. During the nineteenth and early twentieth century sheep were utilised for their milk and meat, but it is less clear how far this occurred in earlier centuries.[542] Little work has been done on the management of flocks that produced the raw material for one of Iceland's most important exports, *vaðmál*.[543] In this section, the management of sheep flocks will be examined, mainly concentrating on ewes and wethers due to their more frequent appearance in the sources, while not forgetting the management of lambs and rams.

The main topics discussed for sheep farming have been management and the generation of products, such as the number and composition of the flock and the economic implications of that composition. On a country-wide scale, it has been estimated that the number of sheep fell in Iceland between the Middle Ages and the recording of *Jarðabók*, from c.550,000 to 278,994.[544] While acknowledging that livestock figures from the Middle Ages can only ever be estimates, the comparison of this figure with a figure based on more substantial evidence several centuries later fails to comprehend the changing fortunes of farming.

Þorvaldur documented examples of large sheep flocks from the sagas, which inflate livestock numbers to show status in a similar manner to the recording of large cattle herds, so it is not until the *máldagar*, for church-farms, and then the early eighteenth century that we get more

[542] I. Mainland and P. Halstead,'The Economics of Sheep and Goat Husbandry in Norse Greenland' *Arctic Anthropology* 42(1) (2005), p.103-120, p.110.
[543] Thoroddsen, *Lýsing Íslands* III, p.278; Ryder, *Sheep and Man*, p.547.
[544] Karlsson, *Lífsbjörg Íslendinga*, p.153.

reliable figures for sheep flocks. From these figures we are then able to evaluate the differing numbers of sheep on farms in Iceland.[545] However, it is unclear what the average number of sheep were on each farm, or if the change in overall numbers masks a change in composition. Small flocks are thought to suggest a subsistence economy on a farm while larger flocks would suggest the farm was producing a surplus. This division assumes that larger farms had the ability to participate more in the wider economy while smaller farms did not play a role in the economy beyond their district. All farms produced some surplus, as they were expected to pay rent and tithes, yet, the amount of surplus would depend on flock size and the farms' needs. The evidence of flock sizes is limited before the fourteenth century and then exists only for church-farms. It is possible to calculate the composition of some flocks from the fourteenth century and examine the sheep economy for these farms, thereby moving beyond the generalised changes in sheep population to see what can be said about farming strategies.

4.3.1 Flock Size

Before examining the composition of sheep flocks, it is necessary to consider the evidence of sheep populations. As already stated above concerning cattle, no estimation will be given here for the total sheep population because the scarcity of evidence in the sagas and the unrepresentative nature of the evidence, or church-farms in the case of the *máldagar* evidence. The following section will first assess the evidence available in the saga material to discover what can be known about the size of sheep flocks in earlier centuries, demonstrating the infrequency of information, before moving on to the evidence recorded in the *máldagar*.

Most of our *Íslendingasögur* evidence for sheep numbers comes from descriptions of lost or stolen sheep, mainly wethers as they were allowed to graze the uplands during the summer, which made them vulnerable to appropriation by others. While such incidents are the stuff of saga disputes, the numbers recorded can indicate potential flock sizes grazed on the upands. The number and descriptions of missing stock, unsurprisingly, varies amongst the *Íslendingasögur*. In *Bandamanna saga*, forty or sixty wethers described as being of the best stock are suspected of being stolen, indicating that the herd was larger as the missing wethers were only a part of the flock.[546] In *Flóamanna saga*, a flock of sixty wethers went missing

[545] Thoroddsen, *Lýsing Íslands* III, pp.278-287.
[546] *Bandamanna saga*, ÍF VII, chapter 4, p.310.

from their pasture.[547] These examples show that a farm could send dozens of wethers to the uplands.

Considering that milking ewes required regular milking, it is surprising that a flock of fifty milking ewes went missing.[548] Another fifty milking ewes are mentioned in *Hrafnkels saga Freysgoða*, this time as needing to be managed by a shepherd, which suggests that these ewes were the entire milking flock, and possibly that fifty ewes was a round number used for convenience.[549] *Sturlunga saga* contains only two references to sheep numbers and both are to 120 ewes, so larger milking flocks than the *Íslendingasögur* examples.[550] The *Svínfellinga saga* example lists 120 ewes, 50 wethers and 70 year-old sheep, giving us the only saga information on flock composition, and indicates c.70% of the flock were for milk production as it is not clear if the year-old sheep were for wool or milk production. The largest flock recorded in the sagas, however, is in *Landnámabók*, when Hrólfr rauðskeggr is said to have counted 2,400 of his sheep before they jumped out of the sheep-fold.[551] This is an exceptionally large number, especially for the supposed time and suggests an exaggeration of numbers.

In contrast to the attention paid to the number of wethers and ewes, there is little attention given to rams in the sagas, possibly reflecting the small proportion of rams to the overall sheep population and that rams were managed differently, being kept on the farm.[552] There are only three instances in the *Íslendingasögur* where we have information on rams being present, one of which is rams being kept alongside other sheep on Drangey.[553] The second example implies that more than one ram was kept on a wealthy farm. The third concerns an unmarked ram kept on a farm that was used to spark a legal dispute.[554]

Looking more closely at the second example, found in *Fljótsdæla saga*, a ram breaks the thigh bone of Þiðrandi from Njarðvík (Borgarfjörður eystri), which ultimately leads to his

[547] *Flóamanna saga*, ÍF XIII, chapter 6, p.242-243.
[548] *Droplaugarsona saga*, ÍF XI, chapter 5, p.150.
[549] *Hrafnkels saga Freysgoða*, ÍF XI, chapter 4, p.101.
[550] *Svínfellinga saga*, *Sturlunga saga* II, chapter 8, p.95; *Þorgils saga skarða*, *Sturlunga saga* II, chapter 24, p.149.
[551] *Landnámabók*, ÍF I, chapter 355, p.358.
[552] See Section 3.4 for a discussion of the scarcity of rams in the legal evidence.
[553] *Grettis saga Ásmundarsonar*, ÍF VII, chapters 69-71, pp.225-228, See Section 2.5.1.
[554] *Heiðarvíga saga*, ÍF III, chapter 7, p.227.

death.[555] Þiðrandi was described as having 'one hundrað and seventy (190) independent farmers' living on his property, indicating that he was a large landowner and could afford to keep several rams.[556] He kept more than one ram as the saga mentions a ram hitting the farmer's leg.[557] It is likely that rams were kept together for ease of feeding, though it would not have been possible when the rams were running with ewes. If rams were relatively more expensive, then owners may have limited the number of rams they maintained, possibly with dependent farmers using their landlord's rams. Alternatively, Þiðrandi may have been wealthy enough to keep a group of rams, selecting which rams he wanted for each flock on a annual basis, while poorer farmers kept one ram and exchanged or borrowed them each year to hinder inbreeding. This example shows us that multiple rams could have been kept on a farm, but does not indicate the number that were kept.

The third example is found in *Heiðarvíga saga*, where a ram was kept on the farm almost like a pet.[558] There was no danger from this ram, indeed, conflict arose when the cooked ram's head was presented at a meal and an aggressive character discovers the ram had no ear-markings.[559] According to this saga, ear-marking was introduced because fewer sheep were rounded up than there should have been in the autumn. While the incident stands as a warning farmers to mark their livestock, it also shows that even less-wealthy farms kept at least one ram. Yet, the saga is uninformative about the total number of rams on a farm, or their relative frequency to other sheep. A closer watch was kept on rams to prevent unwanted breeding and so rams were less likely to become involved in saga narrative.

To return briefly to ear-marking, the detailed legal clauses of the twelfth and thirteenth centuries regarding ear-marking testify to the concern over identifying ownership.[560] According to *Grágás* and *Jónsbók*, the marking of all livestock was a legal requirement to be completed in the first weeks of June. The number of regulations designed to ensure that each farmer had their own livestock markings indicates that disagreements must have arisen for the law to be introduced. Ear-marking ensured that owners could identify their sheep, though

[555] *Fljótsdæla saga*, ÍF XI, chapter 3, p.219.
[556] 'The Saga of the People of Fljotsdal', *The Complete Sagas of Icelanders* IV, p.381.
[557] *Fljótsdæla saga*, ÍF XI, chapter 3, p.219: '*hrút einn hafa lostit sundr í sér lærlegginn*'; 'The Saga of the People of Fljotsdal', *The Complete Sagas of Icelanders* IV, p.382: 'a ram had broken his thigh-bone'.
[558] *Heiðarvíga saga*, ÍF III, chapter 7, pp.226-227.
[559] *Heiðarvíga saga*, ÍF III, chapter 7, p.227, '*slátrit af hrútnum borit fram, ok fylgði þar höfuðit með… ekkert er auðkenni á eyrum'.*
[560] *Grágás* (1852) K.225, pp.154-155; *Jónsbók* VII, 47, p.244-245.

it was not unheard of for some farmers to change ear-markings to disguise unlawful exchange.[561]

The sagas offer a wealth of information about sheep farming practices and how sheep were perceived by society. The sagas do not, however, inform us of absolute numbers of sheep owned by farms or farms' economies. For further information on flock numbers and composition we must turn to the *máldagar*.

4.3.2 Flock Composition

The composition of a sheep flock, whether milking or non-milking, young or old, indicates the products being sought after. The first quantifiable data available for examining the composition of sheep flocks is found in the *máldagar*. From the information contained in these documents it is possible to develop an understanding of the church-farms' economies. This data is significant because it is not until the early eighteenth century that information on livestock is recorded in a systematic fashion in *Jarðabók*. The *máldagar* are the first opportunity we have to examine the living animals on church-farms from the twelfth century up until the sixteenth centuries.[562] For those church-farms that recorded more than the milking ewes, it is possible to build a picture of the composition of the flocks owned by those institutions. This section will assess the *máldagar* evidence for flock composition and what it indicates about the economy of church-farms in Iceland.

There are 277 *máldagar* that record the number of milking and non-milking sheep in some respect. Of these 208 *máldagar* record both milking ewes and non-milking sheep. Though the *máldagar* range in date from the twelfth to sixteenth century, there is a predominance of *máldagar* for the fourteenth and sixteenth centuries.[563] Only two *máldagar* recorded equal numbers of milking ewes and non-milking sheep and both of the church-farms owned all of their *heimaland*. Of the remaining 206 *máldagar*, it is clear that most owned all of the *heimaland* they were situated on, and so there is no distinction between *heimaland* ownership and sheep economy (92% of 143 *máldagar* and 94% of 63 *máldagar* respectively).[564] The church-farm with the largest difference was Háls (Hamarsfjörður), a *staðr*, dated to 1397,

[561] *Ljósventninga saga*, ÍF X, chapter 14, p.26.
[562] A fuller discussion of *máldagar* can be found in Chapter 6.
[563] The chronological distribution of surviving *máldagar* based on dating provided by *DI*: twelfth (7), thirteenth (3), fourteenth (103), fifteenth (41) and sixteenth (54).
[564] See Appendix Three for further information.

which illustrates the under-representation of wethers as it owned 72 ewes but only one non-milking one year-old sheep.[565] It is unlikely that farms would have such large milking flocks and yet only one non-milking sheep, emphasising that not all non-milking sheep were recorded even when some others were listed. The under-representation of listed categories of sheep is a problem with the *máldagar* and skews the milking to non-milking sheep comparison even when the categories were included in the charters. The habit of recording milking-ewes over other sheep categories signifies the importance of milking stock to the Icelandic economy. This aspect of the *máldagar* adds another layer of difficulty when distinguishing farming economies. It is possible that the church-farms did only keep flocks of milking ewes, relying on gifts and tithe payments for their supply of wool and meat, if it was not satisfied by the wool and meat provided by the milking ewes. The dichotomy of ewes for milk and wethers for wool is in this respect false. Only where there were flocks of non-milking sheep recorded is it possible to argue for an exclusive wool, and possibly meat, economy, whereas ewes can be exploited for the full range of products. Therefore, we must examine church-farms with no ewes to assess the nature of a wool economy.

There are 57 *máldagar* that record non-milking sheep with no ewes, most of which record flocks of several hundred animals. Three church-farms stand out as they had flocks of over a thousand animals: Heydalir (Breiðdalur), Tjaldanes (Dalir) and Eyri (Álptafjörður).[566] Tjaldanes and Eyri, dated to 1224 had the largest flocks with 1,200 sheep each, and shows that large wool-producing flocks were known by the thirteenth centuries. Heydalir, meanwhile, had a flock of 1,020 sheep dated to the turn of the sixteenth century showing there were somewhat comparable flock sizes in later centuries.[567] The temporal distribution of these non-milking flocks does appear to be weighted more to the fifteenth and sixteenth centuries, with 47 *máldagar* compared to ten for the pre-fifteenth century. Putting the issues of source survival aside, it appears that on a limited number of church-farms there was a move towards an exclusive wool economy, which is somewhat surprising considering that stockfish overtook *vaðmál* as the main export item from the fourteenth century onwards.[568]

[565] DI 4, p.230.
[566] DI 7, p.31; DI 1, p.465, 466.
[567] Tjaldanes: 'x hundruð fjár' = 10 X 120 = 1,200 sheep; Eyri: 'tíu hundruð friðs fjár' = 10 X 120 = 1,200 sheep; Heydalir: 'vi^{c} í gelldum sauðum, v^{c} í sauðum og gelldum nautum' = 6 X 120 + (half of 5 X 120) = 1,020 sheep. The *hundrað* and c are interpreted as the long hundred or 120, not a *kúgildi*, as *kúgildi* is used elsewhere in these documents. My interpretation is that if the compilers wanted to specify six sheep they would have used *kúgildi*, not *hundrað*.
[568] M. Gardiner and N. Mehler, 'English and Hanseatic Trading and Fishing Sites in Medieval Iceland: Report on Initial Fieldwork', *Germania* 85 (2007), pp.385-427, p.397.

Yet, where we have evidence for the seventeenth and eighteenth centuries the export of knitted goods did increase generally.[569] It is possible that while the demand for *vaðmál* decreased relative to stockfish, there was still a demand for woollen goods that encouraged the keeping of sheep solely for wool. The only church-farm to rear more non-milking sheep than Heydalir was Stafholt (Borgarfjörður) in the late sixteenth century, with 1,440 two-years and older dry sheep.[570] The church-farm was run mainly for wool as it only had 96 ewes, a significant difference between the number of milking and non-milking sheep.

From the discussion based on the *máldagar* evidence, it is clear that any examination of flock sizes would mask the differences in flock composition and thus farms' economies. As has been shown with the available evidence, some large flocks of sheep were reared in Iceland throughout the Middle Ages. The locations of the largest ewe and wether flocks do not point to any geographical preference for particular types of production. From flock composition, it can be inferred that milking ewes were more widely kept, however, there was a move towards wool production in later centuries, and there was also cases where church-farms owned flocks for the sole production of wool demonstrating that it must have been viable to rear sheep for wool, and for the by-product of meat.

4.4 Horses

Horses were an important livestock species and presumed to have been present on every farm as a beast of burden and were essential for farming, not least during hay-making. The question of the total number of horses in Iceland shall not be discussed here, as the exceptional numbers of horses mentioned in the sagas and the inconsistent recording of horses in the *máldagar* make calculating the Icelandic horse population futile. Horse herd composition did not matter as much as other livestock, because all horses could have been used for transportation as human consumption of horse-meat was forbidden. However, we do not know for certain whether the practice ceased completely.[571] Horses' carcasses of course were utilised for skin, hair and bone after death.[572] Where the composition information has been recorded, the implications have been evaluated. As horses did not have an immediate

[569] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* III, p.59.
[570] DI 15, p.621. 'xvi ásauðar kúgildi… xii^{c} in gelldum sauðum tvævetrum og elldre' = 16 X 6 ewes and 12 X 120 = 1,440 sheep.
[571] See Section 6.4.
[572] Horse skin was used for saddles, horse hair for ropes and reins and the bones were made into various implements. Such items can be viewed at the local museums of Laugar, Sælingsdalur and Skógar, Hvolsvöllur.

product input into the economy after the eating of horse-meat was banned, their keeping could indicate the draught needs of a farm, but as not all horses were draught animals this is rather dubious association to make. No doubt, where herds were present certain horses were kept for specific purposes, whether indicating stauts, breeding, riding or draught. We must, therefore, be cautious in relating herd size to draught work. Instead, it would be safer to reflect on resources to maintain these herds and consider changes in resource allocation over time. The sagas record the use of horses, but give no clue about the size of herds. When there are groups of riders, the horses are supplied by the rider or borrowed so we are not given any evidence for the size of horse herds owned by specific farms.

From the sagas, it appears that every farm had at least one horse for riding and bringing home hay. Some *máldagar* give quantitative data about horse numbers from which we find that on church-farms the average number of horses was 4.5, and out of 702 *máldagar* that record horses, 505 *máldagar*, or 71.9%, had four horses or fewer.[573] When the averages are viewed by century, the largest herds are from the thirteenth century and the smallest from the twelfth (Table 3).[574] Information on the proportion of *heimaland* ownership and horses are available for 418 *máldagar*, and as can be seen, church-farms that owned the entire *heimaland*, on average, tended to own one more horse than church-farms with partial *heimaland* ownership. The difference is more pronounced for the thirteenth century by an average of nearly two horses, but caution is needed here because of the extremely small sample size of the pre-fifteenth century *máldagar*.

Table 3 The average number of horses recorded for church-farms in *máldagar* in the twelfth to sixteenth centuries.

Century	Number of *máldagar* (*heimaland* info given)	Average number of horses	Average where *heimaland* info given (entire *heimaland*)
Twelfth	11 (9)	3.3	3 (3)
Thirteenth	17 (9)	6.9	3.4 (5.1)
Fourteenth	347 (4)	4.6	5.0 (5.2)
Fifteenth	131 (210)	4.9	5.3 (6.0)
Sixteenth	196 (108)	3.7	4.3 (5.0)
Total	702 (418)	4.5	4.8 (5.6)

[573] Where the valuation of horses was given, the standard valuation of one horse is equivalent to 0.75 *kúgildi* or 0.75 *hundrað* was used. 683 or 97.3% had 20 horses or fewer, and 689 or 98.2% had 30 horses or fewer.
[574] The twelfth century was a time when churches were establishing themselves, whereas the thirteenth was a time of securing their rights. When the number of surviving *máldagar* are considered, the fifteenth century has the most extant *máldagar* recording horses.

Generally, as with cattle and sheep, the number of horses on church-farms fluctuated across time and large herds can be found in all centuries. The larger horse herds can be seen in Table 4 below.

Table 4: Horse herds of more than thirty horses recorded in *Diplomatarium Islandicum*.[575]

Church-farm	Year	Number of horses
Kirkjubær monastery	1218	30
	1343	37/42[576]
Þykkvibær monastery	c.1218	39
	1340	53
Kálfafell, Hornafjörður	1343	33
	1367	36
	1397	c.5[577]
	c.1500	36[578]
	1570 or later	4
Viðey monastery	1367	32
Helgafell, Helgafellssveit	c.1186	8
	1377-78	30
	1397	42
	1570 or later	None recorded
Möðruvellir, Eyjafjörður	1394	31[579]
	1429	33
	1461	41
Reynistaðir, Skagafjörður	1446	47[580]
Silfrastaðir, Skagafjörður	1394	30
Skálholt bishopric	1544	95
	1547-1548	217

[575] Kirkjubær: DI 2, p.737, DI 2, p.780, DI 8, p.4;
Þykkvibær: DI 2, p.437, DI 2, p.771;
Kálfafell: DI 2, p.771, DI 3, p.423, DI 4, p.200, DI 7, p.451,DI 15, p.700;
Viðey: DI 3, p.212;
Helgafell: DI 1, p.280, DI 3, p.325, DI 4, p.165, DI 15, pp.602-603;
Möðruvellir: DI 3, p.516, DI 4, p.373, DI 5, p.291;
Reynistaðir: DI 4, p.702;
Silfrastaðir: DI 3, p.519;
Skálholt: DI 11, p.315; DI 11, pp.584-585.
[576] The numbers recorded in the Kirkjubær *máldagar* for 1343 might be due to the scribes confusing the numbers of each group. The total difference was five animals, and if more than a scribal error, could be due to the charters being compiled at different times of the year, for example before and after the autumn slaughter.
[577] The *máldagi* records four *hundruð* in *hross*, based on the valuation of one *hross* is valued at three quarters of a *kúgildi*, this equated to just over 5 animals. See section 3.5.
[578] The *máldagi* records 30 horses plus 4.5 *hundruð* of *hross*, based on the valuation of one *hross* is valued at three quarters of a *kúgildi*, this equated to six animals.
[579] The *máldagi* records seven horses plus 18 *hundruð* in *hross*, based on the valuation of one *hross* is valued at three quarters of a *kúgildi*, this equated to just 24 animals. See 3.5 on horse valuations.
[580] Thoroddsen, *Lýsing Íslands* IV, p.13 states there were 51 horses lists at Reynistaðr, however, I can only see 47 horses (DI 4, 702).

Not all *máldagar* list different age and sex categories so we are limited in our discussion of herd composition. Evidence for monasteries and bishoprics has been included as a point of comparison to illustrate the potential size of horse herds. In 1367, the monastery at Viðey owned 18 full-grown horses, 2 two-year-olds and 12 full-grown mares, giving a total of 32 animals. The specific reference to mares may suggest that there would have been foals or some form of breeding stud.[581] The distinction between two-year-olds and fully grown horses implies that horses were not classed as adult, or possibly fully trained, until they were more than two-years-old. Modern horses are not put into training until they are at least three-years-old. The Kálfafell *máldagi* for 1397 has been included here to show the apparent, short-term drastic reduction in the church's herd, which usually exceeded 30 horses. Unfortunately, without more information about this low number we are left to speculate that disease, scribal error, a change in management or a lack of resources has caused this decrease. Kálfafell's sixteenth century *máldagi* might be explained by the Reformation reducing the available resources for the farm. The *máldagar* for Helgafell indicate that the church was expanding their horse herd, but the absence of horses in the late sixteenth century *máldagi* is more likely to point to an omission of horses than to no horses being kept.[582] The temporal distance between the two later Helgafell *máldagar* makes it unclear whether the absence of horses were a scribal error, a consequence of the Reformation or earlier events. As horses were essential to farming activities, it is more likely that horses were present but unrecorded.

Geographically, all these church-farms are located across Iceland except for the Westfjords, yet from these documents, it seems that there was no geographical preference for church-farms to rear horses before the sixteenth century. This is not to say that there was no regional preferences as there was later in 1703, when the first comprehensive livestock survey was conducted. There were then preferences in the regions of the south, c.9,400 horses, the west, c.5,200, and Skagafjörður and Húnavatnssýsla, c.4,700, whilst Westfjords, the rest of the north and the east of Iceland had a combined total of only c.6,700.[583] It is possible that the preference for horse-breeding was a secular activity.

[581] DI 3, p.212.
[582] Þorvaldur is unfortunately silent on Kálfafell's and Helgafell's horse herds, skipping the sixteenth century in his discussion, preferring to concentrate on the fourteenth and seventeenth centuries in his comparison of horse and cattle numbers, as part of his argument for more cattle than horses in earlier centuries. Thoroddsen, *Lýsing Íslands* IV, pp.12-13.
[583] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, p.142.

There appears to have been larger horse herds in the thirteenth to fifteenth centuries than in the other centuries, but exceptionally large herds only existed on wealthy church-farms and monasteries. The lack of detailed information leads to difficulties in distinguishing the purpose of having such large herds. The larger herds may reflect the rearing of horses for riding and communication, but the horses could have also been used as pack-horses too. The charters for these larger herds do not distinguish between horses used for riding, breeding, or as pack-horses. Some *máldagar* do record the ownership of pack-horses indicating an agricultural function. This is not to say that pack-horses could not also have been used as riding horses, just that their main purpose was as pack-animals. Generally, there was a shift in how horses were listed. In earlier centuries, they were usually listed as numbers of horses (*hross* or *hestur*), however, from the fourteenth century onwards there was a move towards giving the valuation of horses and then increased detail about the animals listed in the sixteenth century. So as time goes on we know more about the range of horses kept on church-farms and the value attached to them, but not the actual number of animals kept unless we work backwards from the standard valuations, and as shown earlier the valuation for horses did vary somewhat.[584]

The evidence for horse populations is scarce compared to the frequency of evidence for the presence of cattle and sheep, and so too is the evidence for horse herd composition. Nevertheless, where evidence is available we see that the number of horses owned by church-farms varied. Over time, it is likely that church-farms acquired the resources to maintain and then expand their herds. Thus, the lowest average is for the twelfth century, yet, by the thirteenth century the average number of horses had doubled on church-farms. The more modest averages for the fourteenth to sixteenth centuries reflect the increased accuracy due to the larger *máldagar* sample size. The increase in horses in the fifteenth century, at a time when the livestock population would have been reduced due to the effects of plague on the human population, points to churches acquiring horses and other livestock, left to them by plague victims. Large herds existed throughout the centuries, though, Skálholt kept the largest herd in the mid-sixteenth century. Apart from the Westfjords, no geographical preference is apparent for horse breeding, however, this may be due to *máldagar* recording churches' property, not existent for non-church-farms and the under-representation of non-milking livestock. It is possible that secular farms pursued horse breeding, not church-farms.

[584] See Section 3.5.

4.5 Pigs

Pigs were brought to Iceland during the Settlement, however, in comparison to the livestock species discussed above, very little is known about pig husbandry in Iceland. The question of population is connected to the suitability of the Icelandic environment for pigs' foraging behaviour, which lead to a reduction of the species in Iceland. The following section will examine the available evidence for pigs' presence in Iceland, both the written and the growing body of archaeological data. The evidence for pigs is so scant that there is some debate as to whether pigs became extinct in Iceland.

Archaeology testifies that pigs were brought to Iceland during the settlement, as demonstrated at Hofstaðir, but pig bones became scarce towards the end of the eleventh century when the site was abandoned, and so does not give a continuous record beyond.[585] Indeed, the date of c.950 AD has been given for the disappearance of pigs from 'normal Icelandic' farms,[586] with pig bones being scarce on all sites after the fourteenth century.[587] On lower status farms dated between the thirteenth and eighteenth centuries pigs are completely absent. Pig bones were, however, recovered on post-1300 high status sites of various functions: Bessastaðir, Viðey, Stóraborg and Skálholt. Yet, high status was not the sole prerequisite for pig farming as shown by the absence of pigs at the wealthy, but unusual farm of Svalbarð (Þingeyjarsýsla). In contrast to later farm sites, seventeenth and eighteenth century urban midden deposits in Reykjavík do contain pig bones.[588] It is unclear, however, if the pork was from Icelandic pigs or was preserved pork brought in from abroad, as it was thought to be at Gásir in the fourteenth century.[589] At the early modern site of Tjarnargata 3C (Reykjavík), more certain evidence for the importation of pork joints has been recovered.[590] Whereas at the monastery of Viðey, the recovery of adult and neo-natal pig bones from medieval contexts are thought to indicate Icelandic reared pigs.[591]

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[585] McGovern, 'The Archaeofauna', p.216.
[586] McGovern et al., 'Economy of Landnám', p.157.
[587] Harrison et al., 'Gásir in Eyjafjörður', pp.109-110.
[588] Hambrecht, 'Zooarchaeology and the Archaeology'; Reykjavík excavations Tjarnagata 3c, Aðalstrarti 10 and Aðalstraeti 14-16, reports can be found on the North Atlantic Bio-cultural Organisation website (www.nabohome.org).
[589] Harrison et al., 'Gásir in Eyjafjörður', p.109-110.
[590] S. Perdikaris, C. Amundsen and T. McGovern, 'Report of Animal Bones from Tjarnargata 3C, Reykjavík, Iceland', NORSEC Zooarchaeology Laboratory Report No.1 (2002), p.17. http://www.nabohome.org/publications/labreports/Norsec1Tjarnargata3c.pdf
[591] T. Amorosi, 'Icelandic Zooarchaeology: new data applied to issues of historical ecology, palaeoeconomy and global change', (Unpublished PhD thesis, City University of New York, 1996), p.411.

Other documents testify to the continued presence of pigs in Iceland. For example, the confiscation record of Guðmundur Arason's property dated to 1446, the record of possessions at Reykhólar dated to 1483, and the property record for Staðarfell (Fellsströnd) dated to 1493, which will be discussed below.[592] A payment made by Bishop Ögmund at Skálholt, dated to 1537, demonstrated the exchange of pigs as it included five pigs with other livestock and goods.[593] The last document to mention pigs is dated to 1553 at Viðey, where four pigs are listed.[594] Therefore, if pigs did become extinct in Iceland it was after the mid-sixteenth century.

Máldagar offer us a wider geographical perspective on farming. Furthermore, for the centuries between the compilation of the sagas and *Jarðabók*, the *máldagar* record occurrences of grazing rights for pigs. Hrafnseyri, (Arnarfjorður) in 1363 had the right to pasture in Sviðningsdalur (Dynjandaland) for calves and pigs along with the upkeep of the pasture. Over thirty years later, in 1397, it maintains the same right and continued to have the right in the late sixteenth century. [595] In a similar manner, Hóll (Bolungarvík) had the right to pasture for stud horses or pigs in Hraunsdalur in 1327 and in the late sixteenth century the church still held the right to graze stud horses or pigs in Hraunsdalur.[596] However, none of these documents record whether the farms were actually utilising these rights to graze pigs in these areas; pigs were not recorded for these farms in any of the records mentioned above. Both farms are located in the West Fjords, a region with a limited amount of pastureland. Indeed, the *Jarðabók* entry for Hrafnseyri in September 1710 recorded the grazing rights for calves and pigs in Sviðningsdalur, though the grazing right was useless for animals as it was recorded as now being grassless and barren.[597] Pigs, however, were not listed. It is probably that pigs were once kept on these farms and that the grazing rights to the land continued to be recorded, even when pigs were no longer reared, because grazing land was especially valuable in this region.

[592] DI 4, pp.684, 687 and 869; DI 6, p.472; DI 7, p.184. These documents are discussed below in more detail as they contain herd composition information.
[593] DI 10, p.339. The information is found in another document: DI 12, p.87.
[594] DI 12, p.596.
[595] DI 3, p.198; DI 4, p.145; DI 15, p.579. The first two references to this farm have recorded it as Eyri (Hrafnseyri), Arnarfjörður. By the late sixteenth century, the farm was called Hraffnseyri. The standardised name has been given from the start to reduce confusion and to show the same farm is being discussed.
[596] DI 2, p.617; DI 15, p.571
[597] *Jarðabók* VII, pp.15-16.

In a similar manner, certain rights but no pigs were recorded at Upsir (Upsaströnd) in 1394, as all the livestock, *except pigs*, could be driven out as far as Torfá (Svarfaðardalur).[598] This is repeated nearly seventy years later in 1461. It is unclear whether this phrasing was an existing verbal agreement or part of a standard formula from a document pre-dating 1394, because pigs were not recorded amongst the church-farm's livestock in either the 1394 or 1461 *máldagar*. Thus, at some stage before the late fourteenth century it is likely that pigs formed a part of the farm's livestock, but were no longer kept when these *máldagar* were compiled. While *máldagar* are generally not relics, they do occasionally preserve earlier ideas, and as land was a valuable resource any mention of rights to pasture were preserved even though the livestock might have changed.

At the end of the sixteenth century, Bishop Oddur Einarsson of Skálholt (d. 1630) wrote that pigs were still found in a few places, but he does not give specific locations or livestock numbers.[599] He goes on to say that Iceland lacked the woodland vegetation that best suits pig husbandry, though they were most often found in deep valleys and marshland, and when there was frost they are kept inside and fed hay and leftovers. The mention of vegetation by Oddur Einarsson indicates that these farms must have had rights to such types of land. *Jarðabók* (1702-1712) does not record any pigs on Icelandic farms demonstrating that pigs were extinct at this time. In further support of extinction the *Ferðabók* of Eggert Ólafsson and Bjarni Pálsson (1752-1757) state that there was no Icelandic rearing of pigs, but that merchants did bring pork and possibly live pigs to Iceland.[600] These pigs were slaughtered to provide fresh meat. The rearing of pigs was not undertaken again on Icelandic farms until the mid-nineteenth century.[601]

As we have discussed the presence and potential herd sizes for pigs, we now turn to the topic of herd composition. We find stories in the sagas of lost pigs being found and having rapidly multiplied in the meantime. For example, in *Landnámabók*, three pigs became 30 in Svínadalur (Dalir) and in Vatnsdalur (Húnaþing) ten pigs became 120.[602] *Vatnsdæla saga* uses the same motif as *Landnámabók*, as 10 pigs were lost in Vatnsdalur and 120 were found

[598] DI 3, p.515; DI 5, p.251.
[599] Oddur Einarsson, *Íslandslýsing. Qualiscunque description Islandiae (1589)*, translated by Sveinn Pálsson (Reykjavík, 1971), pp.101-102.
[600] Eggert Ólafsson and Bjarni Pálsson, *Travels in Iceland by Eggert Ólafsson and Bjarni Pálsson (1752-1757)* (translated), (London, 1805), p.29.
[601] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* IV, pp.134-135.
[602] *Landnámabók*, ÍF I, chapter 116, p.158 and 179, p.220.

the following summer.[603] While, these stories can be viewed as convenient explanations for place-names centuries after the events were supposed to have happened, they suggest the presence of sows, boars and piglets, but not the relative proportions. Another indication of the number of pigs owned by a farm is found in *Sturlunga saga*, when 25 pigs were listed amongst confiscated livestock owned by Kirkjubær, supposedly in 1250.[604] Kirkjubær was an unusually wealthy farm and so it is unsurprising that it could own 25 pigs along with 50 head of cattle, over two hundred sheep and 20 horses. The saga incident stands contrary to the zooarchaeological material, where pigs were rare on farms after the eleventh century.[605] Nevertheless, pig farming is portrayed as a small part of the economy at Kirkjubær, and it must have been reasonable for the audience to believe a farm of this size could maintain pigs.

It is not until the fifteenth century, however, that we get our most detailed information on herd composition. At the six farms of Guðmundur Arason in 1446, Reykhólar had eight old pigs and piglets, Saurbær had nine old pigs and two sows with piglets, and Núpur had ten old pigs and two sows with seven piglets each.[606] It is unclear what is meant by old, *gömul*, as pigs can breed from two-years and live until about eight-years. It is also unclear whether boars are included, and whether the old pigs were for breeding. It is clear, however, at Saurbær and Núpur that breeding sows were a small part of the overall herd. When the overall farming economy of these farms are examined, we can see that Reykhólar and Saurbær were following a more meat, than milk, bovine economy, and possibly points to these farms being more meat producing farms. Núpur had more balance between milk and meat production. While prime beef was considered a high status food the rarity of pork would also make it an expensive commodity in Iceland and may have encouraged pig rearing as a display of wealth on some farms, though, the practice did not last as a 1483 property record shows a significant decrease of pigs at Reykhólar to two old pigs and six piglets are recorded.[607] As a litter at Núpur had seven piglets, it could be inferred that one of the Reykhólar pigs was a breeding sow. A slightly larger litter is recorded for Staðarfell (Fellsstrandarhreppur) as three pigs, one sow and nine piglets are listed.[608] While ambiguous

[603] *Vatnsdæla saga*, ÍF VIII, chapter 15, p.43.
[604] See 1.4.1 for more information on *Sturlunga saga*.
[605] McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.40; McGovern, 'The Archaeofauna', p.216.
[606] DI 4, pp.684, 687 and 869.
[607] DI 6, p.472.
[608] DI 7, p.184.

as to the sex of the pigs, these records show piglets were present and so too must have been sows and boars, though, in what proportions we cannot be certain.

In agreement with others, pigs were reared in several regions of Iceland into the sixteenth century but they became extinct after the mid-, if not late, sixteenth century and certainly by the early-eighteenth century.[609] This late date challenges Þorvaldur Thoroddsen's assertion that pigs once were common on farms, before becoming fewer in the fourteenth century, and contrary to his citation of the payment made by Bishop Ögmund in 1537, he stated pigs had completely disappear by the end of the fifteenth century.[610] The keeping of pigs on prominent farms promotes the connection between pigs and wealth that was portrayed in the sagas. Pigs appear as a by-word for high-status and well-resourced farms, potentially with access to woodlands and marshes. The question of the timing of extinction can be pushed back to the mid-sixteenth century at the earliest, leaving a shorter span of time when pigs were not reared in Iceland. Unfortunately, archaeology does not yet aid our understanding of whether pigs at urban sites were reared or imported from abroad. It is possible that as Icelandic farming, in general, shifted to sheep, and pigs' preferred vegetation of woodlands were reduced, alongside the changing social, economic and climatic conditions, pig rearing became a superfluous luxury that could no longer be maintained.

4.6 Goats

Goats were another livestock species that became rare on farms from the tenth century, but they continued to be reared in Iceland. As already mentioned, the examination of goats in the economy is complicated by the difficulty of distinguishing goat remains from sheep remains archaeologically. In addition, the zooarchaeology attests to the consumption of these animals, but does not represent the livestock population. Therefore, the following section will examine the documentary evidence for the presence of goats and potential explanations for the continued rearing of these animals. Where possible, the size of goat herds will be discussed.

[609] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* IV, p.134; G. Sveinbjarnardóttir, E. Erlendsson, K. Vickers, T. McGovern, K. Milek, K. Edwards, I. Simpson, and G. Cook, 'The palaeoecology of a high status Icelandic farm', *Environmental Archaeology*, 12(2) (2007), pp.187-206, p.201. McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.40 does not propose a date of extinction.
[610] Thoroddsen, *Lýsing Íslands* IV, pp.69, 71-72. Þorvaldur may not have been aware of Oddur Einarsson's writing as they were published after *Lýsing Íslands*.

A few documents in *Diplomatarium Islandicum* contain information on the location of goat herds. In the 1318 *máldagar* collection, the *staðr* of Háls (Fnjóskadalur) has listed '80 ewes with female goats', while seven *kúgildi* of livestock with a *kúgildi* of female goats were listed for the *bændakirkjur* of Gnúpufell (Eyjafjörður).[611] A letter of sale dated to 1454 for Reykir (Ólafsfjörður) lists a goat-house as a land-marker, suggesting that goats were still kept in this area or at least the building was still standing.[612] In 1485, a letter of sale for Vatnsleysa (Fnjóskadalur) records that cattle, sheep and goats were included in the sale.[613] At Munkaþverá (Eyjafjörður) in 1486, three goats were recorded in a gift made between the abbot at Munkaþverá and one of his relative.[614] In 1525, a list of properties owned by the monastery at Munkaþverá recorded that Illugastaðir (Fnjóskadalur) owned eight kid female goats, two year-old female goats and three male goats.[615] In 1550, at the bishopric of Hólar, twenty female and male goats, and two with four kids were listed. Such records for these farms demonstrate that there were still viable breeding populations in existence in the north of Iceland.[616] A 1318 *máldagi* for Laufás (Eyjafjörður) recorded the right to keep four cows and 'so many ewes and female-goats as the person who lives there wants on the farm for six weeks'.[617] The next three *máldagar* (1394, 1461 and 1525) have the same phrasing for ewes and female-goats, but has an additional phrase about grazing for four cows or two horses.[618] It is possible that the inclusion of goats is a fossilised phrase in the *máldagar* and does not indicate the presence of goats after the first document, although, the addition of two horses shows that the *máldagi* might have undergone revisions.

With regard to feeding, goats prefer wood and shrubs, implying that in the areas where goats were recorded there must have been some woodland. Goats can live on grasses, but that does not appear to have been in the case in Iceland. A grazing stipulation about goats, dated to 1558, illustrates that goats were seen to feed on woody shrubs and trees, and they could be kept on such land as long as they did not pose a threat to others' land.[619] Oddur Einarsson wrote that goats were useful for the amount of milk they gave and the quality of their skin but

[611] DI 2, p.439; DI 2, p.450.
[612] DI 5, p.120.
[613] DI 6, p.552.
[614] DI 6, p.581.
[615] DI 9, p.309.
[616] DI 11, p.855.
[617] DI 2, p.447, '*svo margar ær og geitur sem sá vill er á stað byr um vi vikur*'.
[618] DI 3, p.566, DI 5, p.266 and DI 9, p.329.
[619] DI 13, p.357.

were restricted to rare areas of woodland.[620] And in 1638 his son, Bishop Gísli Oddsson, listed goats amongst the known Icelandic livestock indicating there was still an awareness of the usefulness of goats in the seventeenth century, even though they were few in number.[621]

From this evidence, it can cautiously be argued that goats continued to be reared in the region around Eyjafjörður, in the north of Iceland, because of the availability of woodland whilst goats fell out of favour in other regions. The repeated recording of goats in Fnjóskadalur is significant because this valley had substantial woodland up to the beginning of the eighteenth century; the fodder resources were still available for goats in this area even after woodlands had been reduced in other areas of Iceland. [622] Goats would not have competed with sheep for grasses but been able to browse woods and shrubs. The number of goats recorded in Fnjóskadalur and Eyjafjörður suggests a viable breeding population, especially because nanny goats, male goats and kids were recorded. The occasional reference to goats outside of this region suggests that there may have been local breeding groups. It is more likely that the goats were being obtained from within Iceland or abroad, and brought to these areas, possibly as a novelty or status symbol because of the rarity of their preferred fodder. It has been argued that goats 'disappeared from the normal Icelandic farmyard' in the mid-tenth century based on the zooarchaeology.[623] The scarcity of goats in the archaeological record does suggest that goats were not a common species in Iceland, however, they continued to be kept in Iceland throughout its history and there is not the same debate about their existence, as there is with pigs.

The continued utilisation of goats can be seen in the 1703 entries *Jarðabók*, where according to Þorvaldur Thoroddsen count there were 818 goats in Þingeyjarsýsla.[624] In *Jarðabók*, there is a concentration of goats in Þingeyjarsýsla, mostly in Ljósavatnshreppur and Reyjadalshreppur, with some in Fnjóskadalur, Mývatn, Tjörnes and Öxurfjörður.[625] The demography of goat herds varied from farm to farm, suggesting that farms exchanged billy-goats for breeding and kids were not always kept, as may have been the case in previous centuries. Ytstafell (Ljósavatnshreppur) had the largest recorded goat herd with 21 nanny-

[620] Einarsson, *Íslandslýsing. Qualiscunque description Islandiae (1589)*, p.101.
[621] Gísli Oddsson, 'Undur Íslands (De Mirabilibus Islandiae 1638'),in Jónas Rafnar (ed.) *Íslenzk annálabrot og Undur Íslands* (Akureyri, 1942), p.96.
[622] Thoroddsen, *Lýsing Íslands* II, p.434.
[623] McGovern et al., 'Economy of Landnám', p.157.
[624] Thoroddsen, *Lýsing Íslands* IV, p.64.
[625] *Jarðabók* XI, *passim*.

goats, six two-years and older billy-goats, seven one-year-old billy-goats, but no kids, giving a herd size of 34 animals.[626] Goats could also be found outside Þingeyjarsýsla, for example four kids were kept at Staðarfell (Fellsstrandarhreppur).[627] The church-farm at Staðarfell, however, never owned goats according to its *máldagar*.[628] These four kids appear as an isolated population as no other goats are recorded in the area, and so it is unclear how these animals came to be there. Most farms have only a couple of goats, others had just one nanny-goat or kid recorded.

In *Jarðabók*, the livestock owned by Önundur Gunnarsson at Hrafnstaðir (Ljósavatnshreppur) stands in contrast to the general Iceland farm economy as the livestock imply a milk economy as twenty ewes, two nanny-goats, one young female goat but no non-milking sheep were listed.[629] Livestock was also owned by Jón Hallsson on the same farm, including eight ewes, one one-year-old sheep and a nanny-goat. Care should, therefore, be taken when making generalisations about the utilisation of sheep over other livestock species. The use of *Jarðabók* data for goats has been included to demonstrate that goats were present on secular farms at the start of the eighteenth century and may have been so in the previous centuries. Hrafnstaðir had rights to wood suitable for rafters, coal and firewood, and possibly sufficient for grazing goats. We cannot say for certain if these animals were bred in Iceland but the presence of males, females and kids makes it almost certain.

Archaeology shows that goats were present in various locations around Iceland from the Settlement, however, skeletal similarities with sheep makes an accurate representation of the proportion of goats difficult. Their continued existence is demonstrated through the written sources where we see that goats were mostly recorded in locations in the north. Goat populations were present around Eyjafjörður, probably due to the existence of woodlands that were unsuitable for sheep. Recording of goat numbers show they were never kept in great numbers, especially when compared to the number of sheep present on farms. Further, goats did not contribute to wool production and so the manufacture of *vaðmál*, but they did have advantages over sheep such as prolonged milking.

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[626] *Jarðabók* XI, p.123.
[627] Jarðabók VI, p.105. Staðarfell stands out as the church owned a herd of four pigs and piglets in 1493, see Section 4.5.
[628] DI 2, p.636; DI 7, p.134, p.135 and p.201; DI 15, p.595.
[629] *Jarðabók* XI, p.121.

4.7 Conclusion

There is much discussion of changes in livestock populations over the centuries but few consider the wider context. Most scholars compare saga evidence from the twelfth and thirteenth centuries with figures provided by *Jarðabók*, in the early eighteenth century, to conclude that there was an overall reduction in livestock populations. Though some acknowledge that Icelandic farming was not static over the centuries, none seem to link the wider events to the livestock figures. For example, the human population was hit repeatedly by disease, especially in the fifteenth and seventeenth centuries. There was even an outbreak of smallpox during the compilation of *Jarðabók*. We must bear in mind the context in which the written sources were created and that there are reasons for the changes seen that are not part of a long-term, downward trend in farming conditions. These disease outbreaks may explain Gunnar Karlsson's estimate of a 55% reduction in cattle and sheep from c.1100 to *Jarðabók*. We are unable to calculate with any certainty the country-wide population, so we are left with discussing livestock on a farm-by-farm basis. And within these changes there are signs of adjustments in livestock herds suggesting that on some farms adaptation was taking place.

There were changes in livestock numbers between the Settlement and c.1600, but population estimates for the earliest centuries are based on unsound calculations that could exaggerate earlier livestock numbers and so give the false impression of a reduction. As has been shown with Gunnar's *fjós* estimations and country-wide population figures, the calculations rely on a small sample of archaeological evidence and contestable information in the sagas. It would be better to steer away from these country-wide estimates and attempt to examine livestock on a smaller scale. Our evidence does not allow us to answer the question of total livestock population until the compilation of *Jarðabók*, which is outside the timeframe of this thesis. Nevertheless, the herd sizes on ecclesiastical farms suggest that changes in livestock numbers were more complex than less cattle and more sheep.

In contrast to Þorvaldur Thoroddsen and Gunnar Karlsson's arguments for an overall decrease in cattle numbers, it appears that a reduction took place of non-milking cattle, possibly in connection with the marginalisation of arable farming. Of course, there were always exceptions, with some church-farms geared towards a beef economy. The overall move to a milk economy is suggestive of adaptation, not worsening conditions, as a milk

economy would give better returns for resources invested. A move to a more sheep-dominated economy would also have given better returns because sheep could utilise grazing unsuitable for cattle and required less labour to manage. As we have seen, this change was underway by the fourteenth century, though it may have become more pronounced in the seventeenth century, and led Þorvaldur to argue for this century as the tipping point between cattle and sheep farming.

Herds of cattle, sheep and horses did not change much in size on church-farms over the centuries examined in this thesis, demonstrating that resources were available to support these herd sizes. It is unclear how widespread large herds were on secular farms. It may have been the case that over the centuries, some church-farms consolidated their resources to allow them to maintain large herds. However, Icelandic society and farming conditions were not constant, so it should not be assumed that there would be consistency in livestock populations or herd sizes. Between the fourteenth century and the compilation of *Jarðabók* in the early eighteenth century, Iceland experienced hard years and disease outbreaks, amongst other things. These factors impacted on the numbers of animals kept.

In general, there was a reliance on cattle for milk, followed by meat, and a move towards wool production for sheep from the fourteenth century onwards as the number of wethers rose in relative proportion to ewes. There were differences within and between livestock species, such as cattle and sheep, resulting in the generation of varying proportions of products. As always, there were exceptional cases. The *máldagar* are a useful source of information on the full range of livestock species, permitting us to get a closer glimpse at the pastoral economy starting from the twelfth century until the sixteenth century. The lowest number of horses on church-farms were in the twelfth and sixteenth centuries, probably due to initial donations to establish churches and the reduced income after the Reformation. Unsurprisingly, the presence of goats, and especially pigs, appears to be connected respectively with access to grazing resources and wealth. With regard to the question of extinction, we have evidence of pigs until the mid-sixteenth century and references to the late sixteenth century but no record of pigs in *Jarðabók*, indicating that pigs did become extinct somewhere between these dates, which are later than generally proposed based on the archaeological evidence. Goats, on the other hand, were farmed throughout Icelandic history, yet the lack of evidence results in them being mainly ignored. The *máldagar* are only for

church-farms but may reflect a wider trend for wealthier farms in Iceland to keep livestock that required more resources to define their status.

CHAPTER FOUR
THE LIVESTOCK ECONOMY OF ICELANDIC CHURCHES FROM THE TWELFTH TO SIXTEENTH CENTURIES

5.1 THE MEDIEVAL ICELANDIC CHURCH

Before discussing the livestock economy of the Icelandic Church, it is essential to give a short history of the medieval Icelandic Church. It was not a static institution, but developed through the centuries, and an understanding of domestic and international events is needed to provide the wider context for changes that can be seen in its livestock economy. According to the sagas, Christianity was adopted in Iceland in the year 999 or 1000.[630] Iceland's bishoprics were established at Skálholt in southern Iceland in 1056, and at Hólar in northern Iceland in 1106. Skálholt's jurisdiction covered the Western, Southern and Eastern Quarters, whilst Hólar covered the Northern Quarter.[631] The tithe law was introduced in 1097 and included in *Grágás* in the early twelfth century. Part of the Christian Law section stipulated that endowments to a church should be recorded and read out annually, resulting in the production of *máldagar*.[632] At the same time as Iceland's monasteries were being founded in the twelfth century, the first church-farms were being established.[633] These church-farms were divided into *staðir*, churches that owned more than 50% of the *heimaland*, and *bændakirkjur* (farmers' churches) where the church owned less than 50% of the *heimaland*.[634] The distinction followed a long disagreement between the Church and church-owners. In 1178, Bishop Þorlákr Þórhallsson of Skálholt demanded that churches, including *staðir*, become church property. The result was only a partial success because, while church-owners in the Eastern Quarter agreed to transfer ownership, those in the Southern Quarter refused to do so and the transfer of ownership went no further. Bishop Árni Þorlákssson raised the issue again in 1269, and it was finally settled in 1297 with the Treaty of Avaldsnes. The result was that the *staðir* became the property of the Church while the *bændakirkjur* stayed under the control

[630] Karlsson, *Iceland's 1100 Years*, p.33.
[631] Cormack, *The Saints of Iceland*, p.8.
[632] See Section 1.4.3; Wolf, 'Pride and Politics in Late-Twelfth-Century Iceland', p.242; Dennis et al., *Laws of Early Iceland* I, p.32-33.
[633] Cormack, *The Saints of Iceland*, p.9. Commonly accepted foundation dates for monastic houses: Þingeyrar (1133), Munkaþverá (1155), Þykkvibær (1168), Flatey (1172, relocated to Helgafell in 1184), Viðey (1225 or 1226), Hítardalur (latter half of twelfth century), Saurbær (c.1200) and Kirkjubær (1186).
[634] Jón Viðar Sigurðsson, 'The organisation of Hólar bishopric according to Auðunarmáldagar', in S. Imsen (ed.) *'Ecclesia Nidrosiensis' and 'Noregs veldi': The role of the Church in the making of Norwegian domination in the Norse World* (Trondheim, 2012), pp.243-260, p.245. In this chapter, the term church-farm will be used to refer to both *staðir* and *bændakirkjur* because the term *staðr* was somewhat fluid before the late thirteenth century, and to avoid confusion as some *bændakirkjur* later became *staðir*.

of their secular owners.[635] As such, *máldagar* for *staðir* record the total livestock maintained on the farms, whereas *máldagar* for *bændakirkjur* only record a proportion of the farms' livestock.

The debates over the control of church property continued during the fourteenth century. Rulings on the matter by the Norwegian rulers differed depending on their attitude towards the Church. Those on friendly terms with the Church gave favourable rulings, while those who were more averse to the Church did the opposite.[636] Nevertheless, by approximately 1400, the Church had extended its control of *bændakirkjur* so that the lay owners could neither choose priests freely nor use the income from the church (for example, from tithes and gifts) as they wished.[637] The next major change for the Icelandic Church came in the mid-sixteenth century with the Reformation. Bishops' tithes were allocated to the Crown in 1556, although they were partially restored to the Church shortly afterwards. The income from the bishoprics was appropriated by the Crown with the bishoprics keeping control of their lands. The Reformation altered how church-farms were managed because it reduced their income, which meant that they had to rely more on their own property. The bishoprics were not dissolved, however, as they were in other countries, until a couple of centuries later.[638]

What these events demonstrate is that churches in medieval Iceland were not static institutions, but underwent several changes in ownership over the centuries that affected the management of church-farms and also their livestock. It is assumed in this chapter that *bændakirkjur* were managed by householders for the subsistence of their households and any clerics, as the householder owned more of the *heimaland* and so had more control of the running of the farm. *Staðir*, on the other hand, were managed to support the church establishment, clerics and their dependents. In *bændakirkjur*, it is also assumed that livestock owned by the church were kept together with livestock owned by the secular part of the farm. As we do not know how far these assumptions hold, and as some of the earliest *staðir* were

[635] Sigurðsson, 'The organisation of Hólar bishopric', p.247-248.
[636] Helgi Þorláksson, 'Succumbing secular chiefs. On secular chiefs in Iceland, their loss of ground to the Church, c.1270 to 1355 and its impact' in S. Imsen (ed.) *'Ecclesia Nidrosiensis' and 'Noregs veldi': The role of the Church in the making of Norwegian domination in the Norse World* (Trondheim, 2012), pp.261-282, p.262.
[637] Ibid., p.262.
[638] Karlsson, *Iceland's 1100 Years*, p.134.

controlled by household leaders who were also church clerics, both *staðir* and *bændakirkjur* will be grouped together unless otherwise stated.

From the outset, the establishment of churches in Iceland usually involved the donation of all or part of the land on which a farm was built, the *heimaland*, and possibly other gifts such as religious items, livestock and property rights. These donations were for the maintenance of the church building and the support of the clerics who oversaw the religious needs of the local populace. For example, the earliest surviving *máldagi* dated to 1120 recorded that Tanni and Hallfríður gifted Undir Hraun (Mýrasýsla) with half the *heimaland* and all the lands along with livestock to support two clerics and a dependent person (*ómagi*).[639] It is likely that various motivations lie behind the transfer of land and property to the Church, some religious and some practical. Some have suggested that churches were founded in an attempt by landowners to avoid paying tithes on their own land.[640] The household would benefit doubly from the control of a church-farm by being able to utilise not just the resources of the farm, but also the wealth brought to the farm by the tithes from others. Helgi Þorláksson argues that the earlier *staðir* were established to control information, provide sanctuary and enhance their owners' reputations.[641] There are also suggestions that giving a church full ownership of a farm would ensure that it remained undivided by subsequent generations, and additional income would be secured if the householder was the cleric because they would receive the quarter of the tithe allocated for the priest.[642] Helgi Þorláksson identifies a further benefit to secular leaders in receiving an income from their church: they could maintain their social position through activities that were in some way funded by the church.[643] Orri Vésteinsson highlights the role of bishops in persuading land-owners to donate land to the church to safeguard its survival in the long-term, meaning establishment was not always driven by the laity.[644] Bishops, he argues, were more concerned with ensuring that churches were provided for in the future and that those responsible for them took their duties as guardians seriously,

[639] DI 1, 178; Vésteinsson, *The Christianization of Iceland*, p.102.
[640] Benedikt Eyþórsson, 'History of the Icelandic Church 1000-1300. Status of Research' in H. Þorláksson (ed.) *Church Centres in Iceland from the 11th to the 13th Century and their Parallels in other Countries* (Reykholt, 2005), pp.19-70, pp.40-49 provides a good overview of the scholarship on the topic.
[641] Helgi Þorláksson, 'Why were the 12th Century Staðir Established? in Helgi Þorláksson (ed.) *Church Centres in Iceland from the 11th to the 13th Century and Their Parallels in Other Countries* (Reykholt, 2006), pp.127-155. Staðir is a vague term, however, after the Treaty of Avaldsnes it was understood as a church that owned more than half of the heimaland.
[642] Þorláksson, 'Why were the 12th Century Staðir Established?', p.129.
[643] Þorláksson, 'Succumbing secular chiefs', p.265.
[644] Vésteinsson, *The Christianization of Iceland*, p.114.

and not as some authors of the bishops' sagas suggest, that they wanted more direct control over the churches.[645]

Whatever the reasons for their establishment, the church-farms and their dependents needed to be supported, and this was partially done through the rearing of livestock. The *máldagar* record donations to churches and the property they owned, and so provide us with an insight into their livestock economy. Previous discussion about the ownership of church-farms has usually centred on *staðir*, however there is evidence for *bændakirkjur* that also allows an insight into their resources. The significance of church ownership is that there were various motivations for the farming strategies undertaken on church-farms. Livestock were part of a church's resources and how they were managed reflected the requirements of those who controlled the churches and the resources of the church-farms.

The distinction between clerical and secular was not clear at church-farms, especially in earlier centuries as some leading families were based at *staðir*. The ownership of a *staðir* was not a pre-requisite for power, though, as some chieftaincies were based at *bændakirkjur*, such as Grund (Eyjafjörður), Staðarhóll (Dalasýsla) and Vatnsfjörður (Westfjords).[646] Up until the submission to the Norwegian Crown in the 1260s, b*ændakirkjur* could act as power bases for leading secular families, some of whom held on to power for considerable periods of time.[647] In addition, donations to churches consisted of varying amounts of land and rights, although most common was the donation of half or all of the *heimaland*. Some smaller church-farms, including those that owned the entire *heimaland*, provided for their parish and remained at a distance from social and political events. Nonetheless, the function of, and access to, resources suggest there would be variations in the farming strategies employed. No analysis has been undertaken to discover if differences in ownership resulted in variations in livestock management strategies. Livestock generated goods and these goods in part supported both the Church and the Icelandic elite, although we only have documents detailing the livestock owned by the Church. The following sections will, therefore, address the *máldagar* in more detail and use them to examine the farming strategies that were undertaken on those parts of the farms that were owned by the Church.

[645] Vésteinsson, *The Christianization of Iceland*, p.123.
[646] Ibid., p.189.
[647] Ibid., pp.129-130; Karlsson, *Iceland's 1100 Years*, p.92. After the 1260s, the political system in Iceland was re-organised but the elite demanded they should hold the newly created positions of power within Iceland.

Consideration should also be given as to how the land and resources under church ownership were managed. While it is conceivable that priests had an understanding of farming as it was integral to all medieval Icelandic households, the extent of their role in farm management is unclear. Before the Treaty of Avaldsnes in 1297, it is thought that the laity had more control of the church-farms, whereas following the treaty, the Church took control of *staðir* and the laity maintained control of *bændakirkjur*. A donor who gave over the whole of his *heimaland* could continue as the farmer on the church-farm, suggesting that the management strategy might initially have been the same.[648] At *staðir*, where clerics had complete control, presumably they could undertake the management themselves or appoint a manager. Based on the late thirteenth century *máldagar*, Vésteinsson points out the possibility that at some *bændakirkjur* where the priest was not the householder, he received a kind of rent for the church's part of the land, paid by the householder in goods when they became available or were needed,[649] Thus Vésteinsson argues that the priests at some *bændakirkjur* had no role in farm management. It is unclear to what extent *staðir* and *bændakirkjur* were employing the same farming strategies. The two models of the ownership of church-farms, then, raises a question about livestock management and whether there were notable differences depending on the ownership of the church. This chapter aims to address this question by analysing the entire corpus of *máldagar* up to the end of the sixteenth century as contained in the printed *Diplomatarium Islandicum/Íslenzkt fornbréfasafn*. Prior to this, however, the *máldagar*, and the difficulties surrounding the dating and chronological distribution of them will be discussed.

5.2 THE CONTENT OF *MÁLDAGAR*[650]

Máldagar (sg. *máldagi*) are the key source for looking at the number of livestock on church-farms. Churches were required once a year to have an inventory drawn up of their property, and as a result a large body of information exists on church property, including church furnishings, livestock and land, whether whole farms or rights over the use of resources such as pastures belonging to other farms.[651] There are, however, only sporadic surviving charters

[648] Bolender et al., 'Unsettled Landscapes', p.235.
[649] Vésteinsson, *The Christianization of Iceland*, p.124. Vésteinsson refers to these churches as having 'owned less than a unit of independently farmable land', which I interpret as *bændakirkja*.
[650] The *máldagar* used in this chapter are the medieval *máldagar* published in *Diplomatarium Islandicum*, hereafter referred to as DI.
[651] Dennis et al., *Laws of Early Iceland* I, pp.32-33.

with most church-farms having just a single *máldagi*. Occasionally, there will be a charter that details the donations and then maybe one or two others, possibly dating to centuries later. The majority of these *máldagar* only survive because they were compiled into bishops' collections in the fourteenth century.[652] There was no set format or standard list of possessions for inclusion in these documents, and, although the later ones appear to be more uniform, variations between them are still apparent. The inclusion of property and rights signified what the churches and the scribes felt were important assets. Livestock were a vital part of farming in Iceland, although they are not recorded in *máldagar* for every church. Furthermore, young livestock, an essential part of a livestock population, might have been omitted as they are rarely mentioned.

There is also some difficulty in interpreting the livestock information contained in the *máldagar*. To illustrate the variations in interpretation, Table 5 shows my reading of the livestock figures recorded for Guðmundur Arason's six farms in 1446 alongside those calculated by Þorvaldur Thoroddsen and Helgi Þorláksson, which have been carried through into more modern scholarship.[653] As can be seen some of the numbers differ. Another concern is the vagueness of the information provided about livestock. Occasionally, a *máldagi* may simply refer to the value of livestock, such as *iii kúgildi búfjár*, 'three *kúgildi* of farm-livestock', without specifying the animals or their numbers.[654] Caution is needed when relying on the *máldagar* for livestock numbers because sometimes the figures recorded may not relate to the livestock numbers owned by church-farms. For some *máldagar* the details remain exactly the same even though the *máldagar* are dated centuries apart, demonstrating that the documents can contain fossilised information and the livestock numbers from the earlier *máldagi* have been carried over to the later ones. It will be noted when this appears to be the case.

[652] See 1.4.3.
[653] Thoroddsen, *Lýsing Íslands* III, p.285; Þorláksson, *Vaðmál og verðlag*, pp.274-275; Karlsson, *Iceland's 1100 Years*, p.127; Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* III, p.15.
[654] DI 1, p.410. Oddgeirshólar (Flóa).

Table 5: Various livestock figures calculated by the author, with figure calculated by Helgi Þorláksson (H) and Þorvaldur Thoroddsen (Þ), for the confiscation of Guðmundur Arason's six farms in 1446, DI IV, pp.684-690.

Farm	Cows	Ewes	Cattle	Sheep	Calves	Lambs	Total cattle	Total ewes
Reykhólar	45	180	90 H:76	339 H:379	26	180	161 Þ:154	699 Þ:739
Kaldaðarnes	25	120	9 H:7	68 H:43	-	100	34	288 Þ:288
Núpur	42	152	47 H:39	165 H:157	12	100	101	417 Þ:422
Brjánslækur	23	110	26 H:22	177 H:172	8	70	57	357 Þ:347
Saurbær	45	160	57	250 H:210	25	140	127	550 Þ:550
Fell	12	80	7	66 H:63	2	70	21	216 Þ:216
Total	192	802 Þ:807	236 H:208	1,065 H:1,024	73 Þ:74	660	501 Þ:481	2,527 Þ:2,562

Máldagar often stipulate who should be supported at a farm, listing the priests, deacons and sometimes the poor (pl. *ómagar*), but a farm required more people than just the clerics to undertake the farming work, especially if there were large livestock herds.[655] Sverrir Jakobsson states that priests were in reality farmers, though the extent of their involvement probably depended on the wealth of their church as well as their other administrative and pastoral roles.[656] By contrast, it does not appear that members of monastic communities were involved in farm work. An entry in *New Annal* for the early fifteenth century suggests that it was uncommon for members of monastic communities to participate in farm work; there is a story in which the nuns at Kirkjubæjarklaustur were supposedly reduced to having to milk their cows themselves because their servants had died during the plague epidemic in 1403.[657] The scarcity of lay people recorded in the *máldagar* suggests that only ecclesiastical persons were recorded, and that the laity were listed only where the church was required to support them.

An important issue with *máldagar* is their dating. The dates given in *Diplomatarium Islandicum* have been contested, especially those dated to the twelfth and thirteenth centuries. The main methods of dating *máldagar* are through the identification of named individuals

[655] See Section 2.9 for women's role in milking.
[656] Sverrir Jakobsson, 'From Reciprocity to Manorialism', *Scandinavian Journal of History*, 38(3) (2013), pp.273-295, p.279; Vésteinsson. *The Christianization of Iceland*, pp.204, 208, discusses St Þorlákr as a manager of Skálholt's finances and Ljúfini, a household priest who was involved in hands-on activities implying that some priests were actively participating in farming.
[657] Karlsson, 'Plague without rats', p.268.

that are found in other sources and references to events of known date. A problem emerges for the earlier *máldagar* because there are so few named individuals who can be identified elsewhere and uncertainty exists with the dating of some events.[658] Cormack goes so far as to state that the dating assigned by the nineteenth-century editors of *Diplomatarium Islandicum* should be disregarded because the documents are mostly seventeenth century copies.[659] Even the dating of the *máldagabækur*, the bishops' collections of *máldagar*, has been questioned.[660] Sigurdson concludes that any individual *máldagi* within a collection could have been written as much as fifty years or more either side of the date assigned in *Diplomatarium Islandicum*.[661] The implication for the present chapter is that the dates given in *Diplomatarium Islandicum* are approximate and are not meant to be accurate to the year but have a possible date span of several decades. The pre- or post-dating of *máldagabækur* by 50 years would still result in most of the *máldagar* in the collections dating from the late thirteenth to early fifteenth centuries. The analysis below proceeds on the basis that the ascribed dates of the *máldagar* are correct and that, as yet, no better way of dating them has been proposed. Despite all this, many of the conclusions of this analysis would not be invalidated by adjustments to the dates of the documents concerned because our understanding of when some process occurred can only be refined to decades, and the difference in time between the documents does not allow a more accurate temporal resolution. Another issue is that numbers of animals are usually recorded in Roman numerals which, in some cases have demonstrably been mis-transcribed; there may well be undetectable further instances of this.[662]

The chronological distribution of the extant *máldagar* is also an issue that needs to be considered. The fourteenth century has more *máldagar* available, with large numbers surviving for certain years, most of them in the four *máldagabækur*. Two complete collections are available for Hólar, the northern bishopric: the 1318 collection, *Auðunarmáldagar*, and that of 1394, *Pétrsmáldagar*. An incomplete collection is also available for Hólar dated to 1360, mainly recording farms in the western part of the see. The southern bishopric of Skálholt has one complete collection, *Vilchinsbók*, dateable to 1397.

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[658] Vésteinsson, *The Christianization of Iceland*, p.102-103.
[659] Cormack, *The Saints in Iceland* (Brussels, 1994), p.26.
[660] See 1.4.3.
[661] Sigurdson, '*Máldagabækur* and Administrative Literacy', pp.31-32. There is no reason given for the date range of 50 years.
[662] Karlsson, 'Plague without rats', p.269.

This depth of synchronic data allows an assessment of the Church's properties at a single point in time to be made, enabling consideration of how and why farming practices might have varied across a diocese. Unfortunately, from the fifteenth century onwards the number of *máldagar* useful for this study decreases as livestock were less frequently recorded in detail. Instead of a church's livestock being itemised as cattle, sheep and horses with further division based on age, the later *máldagar* generally note the valuation given in *kúgildi* with no livestock distinctions being made. The reduction in detail may reflect a change in the attitude of church-farms towards their livestock, implying that they were less interested in the individual animals and more in their combined value.

This chapter has examined the entire *máldagar* corpus, of which 1,163 *máldagar* contained livestock information.[663] The evidence from all church-farms has been considered, from the wealthiest *staðir* to the poorer *bændakirkjur*. Other data that is useful for this study are the proportion of the *heimaland* owned by churches and number of religious individuals supported at each church, as these give a sense of the size and importance of the church. For some of the church-farms there are few or no alternative records relating to the wealth or status of the medieval farm, so information contained in the *máldagar* is the only evidence available for their livestock. Donations and rights to grazing are not discussed below because they do not say anything about numbers of livestock, or even that churches were expected to use the land. For example, grazing rights for pigs and stud-horses are documented for several farms where these animals were not listed as livestock owned by a particular church.[664] The amount of grazing land is not recorded in the *máldagar* so it will also not be discussed here.

5.3 PREVIOUS ANALYSES OF MÁLDAGAR AS RECORDS OF LIVESTOCK HERDS

Several studies of the medieval Icelandic Church have used the *máldagar* to discuss livestock. For example, Þorvaldur Thoroddsen used *máldagar* to discuss livestock population figures for larger farms and monasteries.[665] Due to the large number of documents, he limited himself to illustrative cases of bishoprics, monasteries and the larger church-farms, restricting his discussion to certain areas. From this, Þorvaldur concluded that the ratio of sheep in relation to cattle increased from the tenth and eleventh centuries onwards, and that the

[663] See Appendix Three for the *máldagar* database.
[664] See Section 4.5.
[665] Thoroddsen, *Lýsing Íslands* III, pp.215, 284.

number of sheep in Iceland had increased relative to cattle from the thirteenth to fifteenth centuries, with a further significant change occurring in the seventeenth century.[666] Gunnar Karlsson draws on saga evidence and *máldagar* too, and uses the *máldagar* to discuss well-known church-farms and to illustrate the range of livestock that could be present on an Icelandic church-farm. He concentrates on records of exceptional livestock numbers at large farms and wealthier ecclesiastical sites, which limits his discussion geographically and neglects the smaller church-farms.[667]

Árni Daníel Júlíusson and Jónas Jónsson have gone further than other scholars as they have collated the livestock information in the *máldagar* to generate cattle to sheep ratios for different regions in Iceland in the late fourteenth century (based on the *máldagabækur*) and then for the fifteenth and sixteenth centuries together.[668] From these ratios it can be seen that the region with the least change in the relative proportions of cattle to sheep, and thus the greatest stability in livestock, was the East while the greatest change was evident in the West. From this, we can see that changes in livestock farming varied across Iceland and on a regional basis. We cannot assume that trends in one area were replicated in another area. One shortcoming of these authors, however, is that all the cattle and allthe sheep are grouped together without taking into account the full potential of the information contained in the *máldagar*, such as the proportions of milking and non-milking stock. The differing proportions give us an insight into the economies of these church-farms. It is usually assumed that farms in Iceland were following a milk economy, and the *máldagar* give us an opportunity to test whether this assumption holds true at least on church-farms.[669] We can then discover if church-farms were engaged in farming for the same products as secular farms, and if so, which church-farms were following the general pattern. Furthermore, the role of factors such as *heimaland*, whether *staðr* (owned by a church) or *bændakirkja* (owned by a secular householder), and other church-farm characteristics have not been taken into account. Generally speaking, s*taðir* tended to be wealthier church-farms than *bændakirkjur* that owned part, but not all, of their *heimaland*, and church-farms that supported additional clerics would have required more resources. These aspects and the differences in church-farms' status may be seen in their livestock ownership. As will be shown, the *máldagar*

[666] Thoroddsen, *Lýsing Íslands* III, pp.285-286. Þorvaldur Thoroddsen refers to the tenth and eleventh century as the 'Saga Age'.
[667] Karlsson, *Lífsbjörg Íslendinga*, pp.126-127.
[668] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, pp.121-124, 181.
[669] See Section 5.5.

contain a wealth of data on livestock production owned by church-farms that has until now been under-appreciated.

None of the scholars, though, differentiate between *staðir* and *bændakirkjur*. Indeed, in previously published research there is little distinction between the livestock requirements of fully owned and partially owned church-farms. In terms of farming strategies, Þorvaldur Thoroddssen argued that there were more cattle in the Saga Age, and, while cattle did decrease and sheep did increase in numbers, that there was no substantial change in farming until the seventeenth century.[670] He also used the confiscation catalogue for Guðmundur Arason to set a benchmark of 1:5 for the cattle:sheep ratio for the mid-thirteenth century.[671] Recently Benedikt Eyþórsson has argued that there were in relative terms more cattle farming than sheep farming in Iceland up until the sixteenth and even seventeenth centuries, though a change was underway as sheep numbers increased before these centuries.[672] Árni Daníel Júlíusson and Jónas Jónsson argue that changes were underway in farming as early as the twelfth century and there were regional variations, but generally between 1100 and 1400 there was stability in cattle numbers, though sheep numbers were increasing.[673] After 1400, however, the number of cattle reduced and sheep continued to increase in number; the greatest change in the cattle:sheep ratio was in the West and the least change in the East.[674]

Apart from by these prominent scholars, farming practices have not been discussed in as much detail or instead other sources of evidence have been utilised.[675] The *máldagar* record the number of living animals kept on church-farms or the production pattern, whilst the zooarchaeological bovine:caprine ratio shows possible consumption patterns. As I have mentioned earlier, these two patterns cannot be readily compared as they are two ends of the same process.[676]

5.4 METHODS OF ANALYSING THE *MÁLDAGAR*

[670] Thoroddsen, *Lýsing Íslands* III, pp.214, 225.
[671] DI 4, 684-690.
[672] Eyþórsson, *Búskapur og rekstur staðar*, p.152. It appears that he works on the basis of one cattle= six sheep, p.81.
[673] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, p.83.
[674] Ibid., pp.178, 184.
[675] See Section 1.3.
[676] See Section 1.3.2.

Two methods will be employed to analyse livestock numbers in the vast *máldagar* corpus. The first method is a survey of church-farms on a local and then regional level. The regional surveys do not rely on the evidence of just one farm, but allow a wider view to be taken of the area. They can also include smaller church-farms that may otherwise be overlooked and church-farms with just one surviving *máldagi*. The second is a case study approach which will be used to track change over time in the livestock population managed by, or allocated to, particular churches and which can be constructed if a succession of charters survive for a particular farm.[677] Large, well-known church-farms are favoured in the historical record as they tend to have more surviving *máldagar* but, as will be shown, some less well-known church-farms also have multiple charters. As the focus of the case studies will be on single church-farms, only those farms with more than one charter are discussed. Farms with single charters are not included in the case studies because a lone *máldagi* does not allow an understanding of change over time. Single charters do not inform us whether livestock numbers increased, decreased or remained constant. Regional surveys based on the *máldagabækur* answer this short-coming of the case studies approach by giving roughly contemporary information about neighbouring farms, so that local farming strategies can be compared within a few decades.

As most *máldagar* contain some information on cattle and sheep categories the ratio is the most widely considered measure of farming strategies.[678] Another means by which to assess farms' strategies, however, is to examine the proportion of cows to non-milking cattle, and ewes to non-milking sheep, where possible. As a result, the discussion is based on cattle and sheep in this chapter because the data is consistently documented in the *máldagar*.

5.5 CHURCH-FARMS AND FARMING STRATEGIES ACROSS ICELAND IN THE FOURTEENTH CENTURY

As already mentioned, the fourteenth century has the most surviving *máldagar* of any century thanks to the compilation of the *máldagabækur*. As is evident in this chapter, the breadth and

[677] With reference to the discussion of farm ownership above, it is assumed that churches that owned more than half of the *heimaland* would manage their own livestock, while churches with a smaller proportion of the *heimaland* would receive a kind of rent from the farmer of the farm.
[678] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, pp.124, 181. Archaeological investigations employ the cattle: sheep ratio because the zooarchaeological evidence does not usually allow sex to be distinguished. When the *máldagar* are used, the ewe to cow ratio is used because cows and ewes are nearly always mentioned while other categories of livestock are neglected, for example Eyþórsson, *Búskapur og rekstur staðar*, p.81. See 1.3.2 for the issues of the cattle: sheep ratio.

frequency of the *máldagar* from the fourteenth century permits a detailed comparison of the changing nature of livestock farming, including the average number of milking and non-milking cattle and sheep. Table 6 shows the total and average cattle and sheep numbers, the herd compositions and cattle:sheep ratio on church-farms from the fourteenth century *máldagabœkur*. The number of church-farms is included to show the sample size for these findings, as generally the larger the sample is, the more representative the findings will be, as the outlier values have less effect on the calculations. These findings are significant because previous research that has utilised the *máldagar* has relied on the ratios without providing the wider context permitted by the other information contained within the *máldagar*.

Table 6: Average and total numbers of cattle and sheep in *máldagabœkur* (rounded to whole numbers).

Year	No. of farms surveyed	Mean no. of cows	Total no. of cows	Mean no. of cattle	Total cattle	% of milking to non-milking	Mean no. of ewes	Total no. of ewes	Mean no. of sheep	Total sheep	% of milking to non-milking	Cattle: Sheep ratio
1318 Hólar	72	7	419	8	483	87.5	15	1078	25	1304	60	1:2.6
1360 Hólar	33	8	258	8	270	100	25	815	32	939	75	1:3.7
1394 Hólar	69	10	592	11	705	90.9	33	2254	43	2423	76.7	1:3.6
1397 Skálholt	106	8	1022	10	1395	80	26	3931	44	4862	59.1	1:3.7

From this evidence, it is possible to show that the average numbers of cows and cattle on church-owned property remained the same in the diocese of Hólar for 1318 and 1360. The proportions of milking to non-milking animals and cattle:sheep are unaffected by the increase in overall livestock numbers over the fourteenth century, indicating that farming strategies were unchanged. There was, however, an increase in the total number of animals reared, because church-farms were raising more animals, and possibly from additional donations. The ratios would suggest that, generally, conditions during the fourteenth century allowed the expansion of livestock herds owned by church-farms and more so towards the end of the century. The Skálholt diocese, unfortunately, has only one *máldagabók* dated to 1397, which does not permit an examination of change over time. A comparison, though, between the two dioceses at the close of the fourteenth century shows that farming strategies were similar, but that church-farms in the Hólar diocese kept, on average, more animals. Unsurprisingly, the

percentages show that cows formed the majority of the cattle herds throughout the fourteenth century. In Skálholt there were generally fewer ewes to non-milking sheep than in Hólar and the proportion of sheep did increase during the fourteenth century because of an increase in non-milking sheep.

The figures in Table 6 are somewhat distorted because they do not take into account the proportion of *heimaland* ownership, and following Vésteinsson's argument that *bændakirkjur* possibly kept their livestock alongside the secular owned livestock, we are not getting the full picture of how many animals were reared on these farms.[679] Some church-farms also obtained full *heimaland* ownership during the fourteenth century, so an attempt has been made here to compare like with like. By estimating the total livestock for farms on which *bændakirkjur* were situated, the potential herd sizes for the entire farm can be deduced and then included with the livestock owned by *staðir*. From this, a better analysis can be made of the total livestock kept on the entire *heimaland*. When allowance is made for the percentage of *heimaland* owned by the church-farms, the livestock figures reveal a different image of farming in the fourteenth century, though the cattle:sheep ratio remains the same because the livestock numbers are being multipled and no additional livestock added. The number of church-farms is reduced because some of these charters do not record *heimaland* ownership and so were omitted from the calculations.

Table 7 represents whole herds kept on farms, not just the livestock owned by churches. For this calculation, the livestock numbers on *bændakirkjur* have been multiplied to equal 100% *heimaland* ownership, so for example a *bændakirkja* that owned half the *heimaland* (50%) has had the livestock numbers multiplied by two and this gives an idea of the total number of livestock reared on the farm. The livestock numbers on *staðir* have also been included, but remain unaltered. From these calculations, a better insight into total herd populations of cattle and sheep on farms becomes evident. Not all *máldagar* record the proportion of *heimaland* owned by the church so those that do not have been excluded. As always, these figures should be viewed with caution as they are based on an even smaller sample size than is contained within Table 6. The smaller number of cases also makes the results less representative of church-farms in general.

[679] Vésteinsson, *The Christianization of Iceland*, p.124. Also see section 5.1.

Table 7: Average and total numbers of cattle and sheep in *máldagabækur* (rounded to whole numbers) adjusted for ownership of entire *heimaland* where *heimaland* ownership is known.[680]

Year	No. of farms surveyed	Mean no. of cows	Total no. of cows	Mean no. of cattle	Total cattle	% of milking to non-milking	Mean no. of ewes	Total no. of ewes	Mean no. of sheep	Total sheep	% of milking to non-milking	Cattle: Sheep ratio
1318 Hólar	35	10	415	12	481	83.3	26	1076	38	1323	68.4	1:2.6
1360 Hólar	22	11	237	11	248	100	36	797	46	939	78.2	1:3.7
1394 Hólar	44	13	569	15	681	86.7	53	2326	56	2477	94.6	1:3.6
1397 Skálholt	102	15	1489	19	1919	78.9	51	5480	71	6460	71.8	1:3.7

With the adjusted *heimaland* ownership in the Hólar diocese, there was inconsistent growth in livestock numbers throughout the century, as there was a decrease in the total mean number of cattle in 1360. The proportion of milking to non-milking cattle suggest changes in cattle farming during the fourteenth century, with the figures for 1360 suggesting a move towards an exclusively dairy economy model for cattle, whereas those for the other years suggest a predominantly dairy economy. These aggregate figures suggest the economic model for sheep farming was gradually moving towards dairy products, with ewes making up an increasingly larger proportion of the sheep flocks in the Hólar diocese through the fourteenth century. In contrast, Skálholt had a lower proportion of ewes making up their sheep flocks, showing they were mainly farming for milk, but also for wool and/or meat at the end of the fourteenth century. As the Skálholt data is drawn from a far larger geographical area and a larger sample size, both before and after adjustment, the figures provide an almost countrywide picture rather than a regional one. A greater diversity of environmental and climatic conditions may explain the different sheep economies between the two dioceses at the end of the fourteenth century, as farms in the Skálholt diocese were placing more emphasis on wool than farms in the Hólar diocese.[681] Skálholt farms were doing this by having on average fifteen more non-milking sheep per farm, and not by having less milking

[680] The cattle:sheep ratio is the same for Table 6 and 7 because no additional livestock have been added. Livestock numbers for *bændakirkjur* have only been multipled. Church-farms with unknown *heimaland* ownership have been excluded from the survey in this table.
[681] For example, the landscapes of southern Iceland are relatively flat compared to the steep fjords of the Westfjords.

ewes. This aspect of farms' economies would be lost if only the cattle:sheep ratio had been considered.

5.5.1 The Diocese of Hólar

The aim of this section and the following section, is to assess whether there were similiarities in the number and proportion of livestock owned by church-farms across Iceland. It will explore the relationship between the status of church-farms and the size of their livestock herds in order to assess whether there was a minimum livestock requirement or livestock value for the support of a church. This is an issue that scholars have not addressed before, but is necessary in order to determine whether all church-farms were expected to function as independent farms, or whether, following Orri Vésteinsson's argument, some churches 'owned less than a unit of independently farmable land', and so relied upon the secular-owned part of the farm for survival.[682] Thus the following two sections will assess whether any differences can be discerned in the livestock owned by church-farms with various levels of *heimaland* ownership, as well as other characteristics such as number of clerics. The *máldagabækur* for both bishoprics shall be used to enable a comparison of the dioceses.

As noted above, the oldest *máldagabók* for Hólar is conventionally dated to 1318.[683] It shows that there was no consistent pattern of endowment for the church-farms based on their *heimaland* ownership. It is presumed that any endowment would include milking animals as they are the animals most consistently recorded in the *máldagar*, yet, there is no pattern between *heimaland* ownership and the number of cows owned. Of the 64 church-farms where the numbers of cattle are recorded, all but Melstaður (Miðfjörður) owned at least one cow, indicating it was common for a church-farm to be endowed with cows, but the number could vary. A pattern does emerge for the maximum number of ewes when the *heimaland* ownership is considered. Among the church-farms that owned a third of the *heimaland* the most ewes were eighteen, those owning half the *heimaland* had a maximum of 56 ewes and the *staðir* had up to 110 ewes. It shows that there was a common understanding about the number of ewes required to support churches with different levels of *heimaland* ownership. The more of the *heimaland* owned, the more ewes were kept to maintain the church and clerics. Ewes would provide a diverse range of products to cater for the needs of clerics and

[682] Vésteinsson, *The Christianization of Iceland*, p.124.
[683] DI 2, pp.423-489.

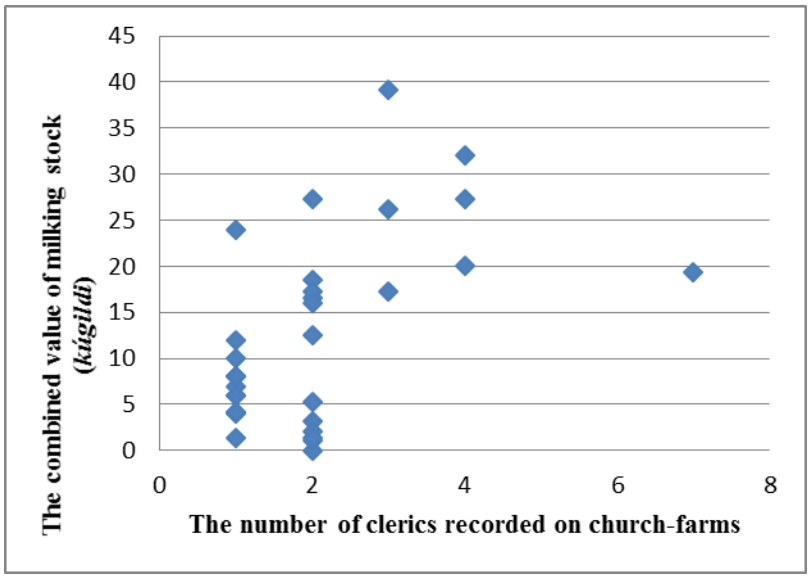
dependents, and which could be traded for other goods, both in the local and wider economies.[684]

It can be presumed that a church with more clerics would need more resources to support them, both with clothes and food. The association of the number of clerics and milking livestock, therefore, is considered to ascertain whether the number of clerics a church had was reflected in the wealth of their milking stock. There appears to be no correlation between the number of milking livestock owned and the number of clerics supported on each church-farm. A church-farm with one or two clerics could have no cows at all, or, exceptionally, as many as 24.[685] There were only six church-farms with three or four clerics, but these church-farms had a smaller difference in cow numbers with a minimum of eight cows and a maximum of 22 cows, and between 36 and 110 ewes. The 1318 *máldagabók* illustrates that at this date, out of 36 church-farms with a single cleric, only two had more than ten cows.[686] This suggests that there was a common, and possibly earlier, idea of the maximum number of cows needed to support a church with one cleric, even if there were exceptions. The need to support clerics, though, did not necessarily result in a church-farm being provisioned with more cows.

When the combined value of cows and ewes is examined, however, the pattern for churches with three or more clerics becomes clearer: three quarters of these church-farms owned fifteen or more *kúgildi* in cows and ewes (Figure 1). Some church-farms with fewer clerics did own comparable milking stock, though most tended to own fifteen of less *kúgildi*, suggesting a possible breakpoint in milking stock between churches with one or two clerics and those with three or more clerics. Therefore, it was not the *heimaland* ownership but the number of clerics that distinguished the value of milking stock.

[684] See Section 6.3.
[685] At Fell, Sléttuhlíð one cleric was to be supported and the herd was recorded as 24 cows but no other livestock.
[686] Tjörn (Svarfaðardalur) had twelve cows and Fell (Sléttuhlíð) had 24 cows.

Figure 1: Graph showing the combined value of milking stock (cows and ewes) in *kúgildi* against the number of clerics recorded for Hólar in 1318. Each diamond represents one *máldagar* where data is available. Six ewes are valued as one *kígildi*.



Looking specifically at the 1360 Hólar *máldagabók*, which contains fewer charters (33 *máldagar*, 25 of these being present in the 1318 collection), there are only 22 charters with information about *heimaland* ownership and livestock.[687] Of these, a dominant pattern emerges: the six church-farms with two clerics have 10-24 cows, while the sixteen church-farms with only one cleric had 10 or fewer cows.[688] The significance of the maximum of ten cows for one cleric echoes the findings from the 1318 *máldagabækur*, implying a common idea of the upper limit of support for one cleric in the Hólar diocese. When the combined values of milking livestock are examined, church-farms with two clerics have 15 or more *kúgildi* of milking stock. No church-farm with one cleric, regardless of *heimaland* ownership, owned 15 or more *kúgildi* in milking stock. The most milking stock owned by a one cleric church-farm was 13 *kúgildi* at Hvammur (Skagafjörður). There seems to have been a common understanding that more clerics required more provisions, and this is seen in the number of cows owned by the churches with the pattern appearing even clearer for the combined value of milking stock, and a continuity from the 1318 data.

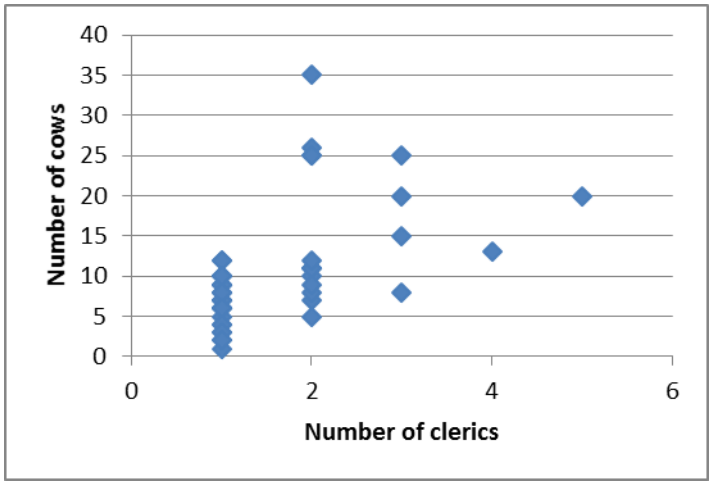
[687] DI 3, pp.155-178.
[688] All the six church-farms with two clerics are *staðir*, owning the entire *heimaland*, but this does not seem to be a factor as seven of the church-farms with one cleric were also *staðir*.

Apart from these general patterns there is no direct correlation between *heimaland* ownership, the number of clerics and livestock. The number of clerics is more closely related to the relative wealth of the church. It is likely that the number of clerics reflected the needs of the church for pastoral and administrative duties. The number of livestock did not depend on the proportion of *heimaland* possibly due to the differing estate sizes of the church-farms.

The 1394 Hólar *máldagabók* provides information about the number of clerics and the milking livestock population for 39 church-farms.[689] The relationship between the number of clerics and number of cows was clearer for the church-farms (both *staðir* and *bændakirkjur*) with only one cleric, as none of these farms had more than 13 cows. The data for church-farms with several clerics shows a weaker correlation than for church-farms with one cleric (Figure 2). The difference may be due to the churches with more than one cleric having more duties and thus other sources of income, making their reliance on livestock of less importance. There is also a tendency for church-farms that owned the entire *heimaland* and had more than one cleric to have a large combined value of milking stock, though the correlation is weak. The presence of several clerics did not guarantee that a church-farm owned the entire *heimaland* either. Möðruvellir (Eyjafjörður), for example, supported three clerics and owned a third of the *heimaland* and eight cows. Hrafnagil also was not a *staðr* but had four clerics, owned half the *heimaland* and thirteen cows with a total milking stock worth 27 *kúgildi*. In terms of farming strategies, the number of clerics and proportion of *heimaland* owned does not appear to have any influence on the cattle:sheep ratio in the 1394 *máldagabók*. The cattle:sheep ratio does not differ according to the number of clerics; it ranges from c.1:1-1:7 for two or more clerics and c.1:3-1:9 for one cleric.

[689] DI 3, pp.511-595.

Figure 2: Graph showing the number of clerics against the number of cows for Hólar in 1394. Each diamond represents one *máldagar* where data is available.

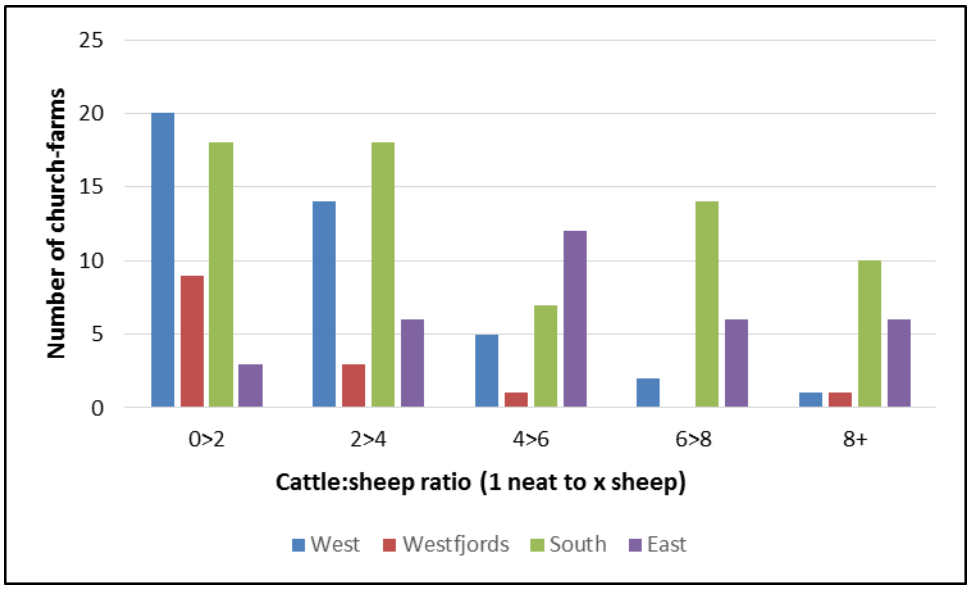


5.5.2 The Diocese of Skálholt

The bishopric of Skálholt administered three quarters of Iceland, so it is not surprising that the 1397 *máldagabók* for Skálholt is the largest surviving collection.[690] It includes 240 *máldagar* with information on livestock, of which 62 record the proportion of the *heimaland* owned and the number of clerics maintained by the church. We can see that the cattle:sheep ratio reflects the varying landscapes across the regions administered by Skálholt (Figure 3), with a diocese average of c.1 neat to 4.7 sheep. Thus in the late fourteenth century, the Westfjords had the lowest cattle:sheep ratio with an average of 1 neat to 1.2 sheep. Thus the Westfjords were relying, in general, much more on cattle than any other region in Iceland at the end of the fourteenth century. Indeed, if we look closer at the Westfjords we see that only three church-farms (all *staðir*) out of 27 church-farms had a ratio over 1:2: Sandar (Dýrafjörður), Eyri (Skutilsfjörður) and Holt (Önundarfjörður). The generally low values appear to reflect the Westfjords' reliance on fishing and the limited amount of pastureland. The steep valleys with little agricultural land and farms located close to the coast appear to have encouraged cattle farming over sheep farming. The East had the highest average ratio (1:6.5) followed by the South (1:4) with the West having the lowest (1:3). The data seems to confirm that Eastern Iceland was far more inclined to sheep farming as it had some of the highest ratio values.

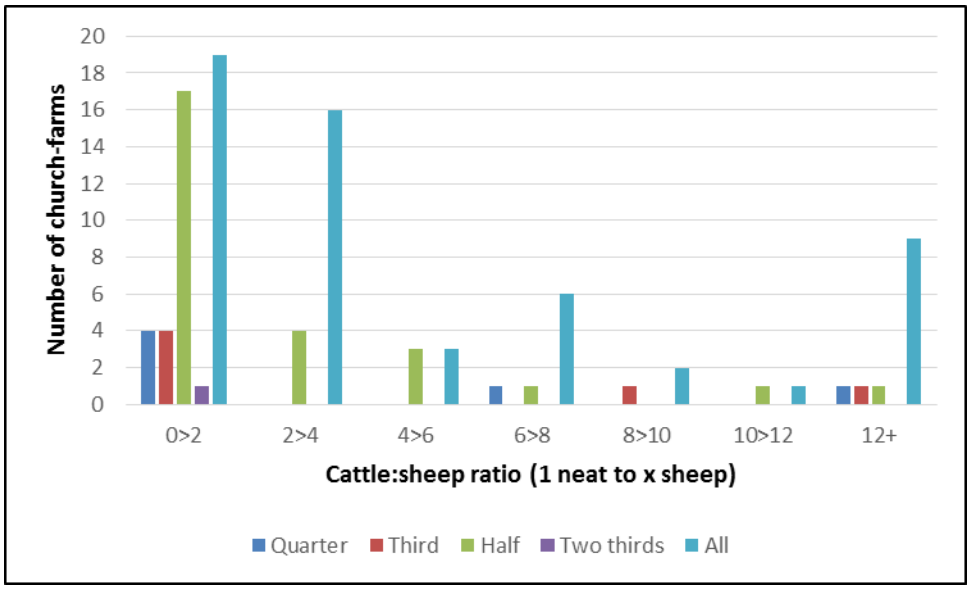
[690] DI 4, pp.27-240.

Figure 3: Graph showing the regional variation of cattle:sheep ratio where data is available for Skálholt in 1397. See database in Appendix Three for individual values. Total of 156 church-farms.



Of the 96 church-farms that record *heimaland* ownership, all except five church-farms had ratios of less than 1 neat to 12 sheep, though the cattle:sheep ratio ranged from below 1:1 to 1:18.3. The higher ratios, however, are found in the East, which contains the three highest ratios, while there are also two in the South. Overall, there were relatively more church-farms with higher ratios in the East. Most church-farms had a ratio of 1:6 or less indicating that while there were differences in *heimaland* ownership, church-farms undertook relatively similar farming strategies (Figure 4). If we bear in mind the legal valuations for cattle and sheep, then the majority of church-farms owned a greater value of cattle than sheep, and so potentially generated a greater amount of products from their cattle than their sheep at the end of the fourteenth century. While the full *staðir* did tend to have the highest ratios, the *bændakirkjur*, whether owning a quarter, third or half of the *heimaland*, had comparable values to the majority of the *staðir*. Therefore, there is no discernible difference in farming strategies between *staðir* and *bændakirkjur*.

Figure 4: Graph showing the cattle:sheep ratio against the proportion of *heimaland* owned for Skálholt diocese in 1397. See database in Appendix Three for individual values. Total of 96 church-farms.



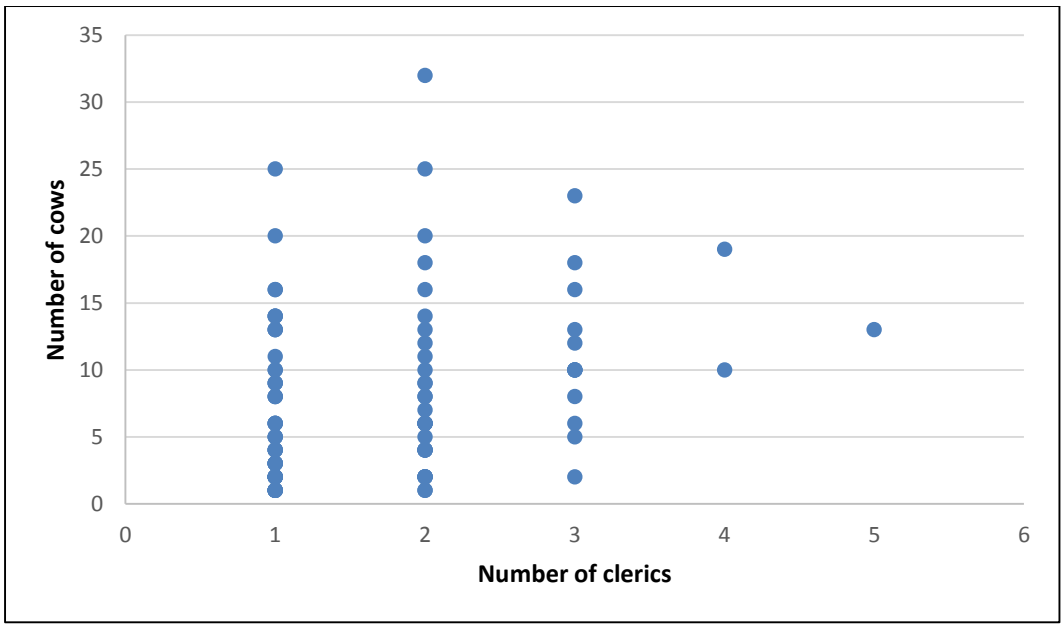
The cattle:sheep ratios above show the general trend in farming strategies on church-farms, with church-farms in the Westfjords having roughly equal numbers of cattle and sheep and the East having the greatest disparity. However, by only considering the averages we lose some of the detail provided by the *máldagar*. There is only one church-farm, Borg (Mýri) in Western Iceland, whose ratio of c.1:77 far exceeds the mean ratio. Borg's ratio clearly stands out when compared against those of neighbouring farms and suggests that it was intentionally directing its resources towards sheep farming. We do know that Borg had two clerics and owned two *hundruð* of the *heimaland*, but we do not know the proportion of the *heimaland* this represented. Borg had such a high ratio because it owned a large sheep flock, not because it had less cows compared to other church-farms.[691] It is not clear why Borg had such a high cattle:sheep ratio as it was in the West, which had the second lowest overall ratio for the country at this time. The *máldagi* unfortunately does not allude to possible explanations, being comparatively brief.

With regard to the number of clerics, there is a positive but weak, correlation between the number of clerics and the number of cows, although there is no correlation between the number of clerics and total value of milking stock (Figure 5). This would suggest a

[691] Borg owned 13 cows and 1,006 ewes.

connection between the number of clerics and cows in the Skálholt diocese. The association may be due to the greater number of church-farms in the South and West out-weighing the other regions, and possibly due to the more open landscape of the Southern region encouraging cattle farming. A similiarity can, therefore, be seen in the correlation between clerics and ewes in Hólar in 1318 being encouraged by the availability of upland grazing in the north. The lower overall cow and combined milking stock values for church-farms with four or more clerics was probably due to the small sample size rather than showing a meaningful pattern.

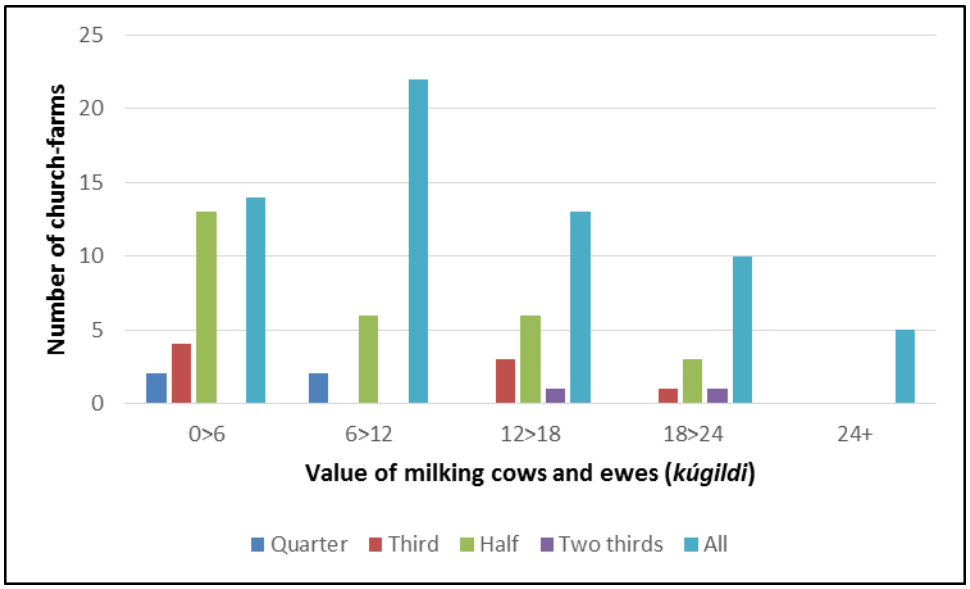
Figure 5: Graph showing the numbers of cows in relation to the number of clerics on church-farms for Skálholt in 1397. Each dot represents one *máldagar* where data is available.



In contrast to the correlation between the number of cows and the number of clerics for Skálholt, for the *heimaland* there were no such clear patterns for the number of cows or the combined value of milking stock. Church-farms that owned less than 50% of their *heimaland* did not own more than twenty *kúgildi* of milking stock, whereas church-farms with full *heimaland* ownership did own more, but most of the *staðir* owned comparable amounts as the *bændakirkjur* (Figure 6). Again, document survival plays a part as we have 64 *máldagar* from *staðir* but only 42 *máldagar* from *bændakirkjur* in the 1397 collection, and thus *staðir* appear as a larger category on the graph. As can be seen, the value of milking stock varied regardless

of the percentage of *heimaland* owned by the church at the end of the fourteenth century, revealing milking stock were not related to the *heimaland* ownership.

Figure 6: Graph showing the total value of milking stock (*kúgildi*) depending on proportion of *heimaland* ownership for Skálholt in 1397. Six ewes are valued as one *kúgildi*. Total of 106 church-farms.



By examining the *máldagabók* for Skálholt, we can see that while the preference for cattle or sheep farming did vary across the diocese, the variation was not that great, being usually 1:6 or below, with an average of c.1:4.7. In contrast to the Hólar diocese, where there was a correlation between the number of clerics and ewes, in the Skálholt diocese there was a correlation between the number of clerics and cows. It is possible that the inclusion of church-farms in the densely settled South and West, where open meadowland is more readily available would have encouraged the rearing of cows, meant that Skálholt church-farms had a greater association with cows than with ewes. The comparable cattle:sheep ratios for both *staðir* and *bændakirkjur* in the Skálholt diocese show that there was not a great difference in the balance of farming between cattle and sheep. Furthermore, while the greatest value of milking stock (cows and ewes) tend to be found at *staðir* and the least at *bændakirkjur*, these values overlap to a great extent, implying that there was no clear-cut distinction between the livestock provisioning of *staðir* and *bændakirkjur*. On the whole, the milking livestock numbers recorded in the *máldagar* suggest that *bændakirkjur* were mostly intended to be independent farms in a similar way to *staðir*. Those church-farms that owned less than half their *heimaland* did generally have the lowest combined value of milking stock. This may be

explained by the farm householder paying the church a rent, as argued by Vésteinsson, as the church and clerics would receive goods from the household, meaning that they would not need their own milking livestock to survive.[692]

It is possible that the difference in the cattle:sheep ratios found across the diocese were also found on secular farms, as they too would have had to adapt to the surrounding landscape. Access to resources was a major factor in farming, and therefore the farming strategies employed would reflect farms' rights to resources. Farms with access to meadowland where the better quality hay was made would be able to rear cattle, as cattle require good quality hay to maintain condition and for cows to continue to produce milk. Farms with less access to meadowland, or that only had access to poorer land, would be forced to undertake more sheep farming to make the best use of the land as sheep can survive on rougher fodder. The more rights and access farms had then the more options they had about the balance to they struck between cattle and sheep. Farms, though, that attempted to rear cattle on poor quality land would run the risk of losing their cattle and so receiving nothing in return for their resources. Wealthier farms may have had the resources to undertake similar farming strategies as the church-farms, whilst poorer farms with less resources may have been more inclined to conduct subsistence farming and so favour sheep over cattle farming.

5.5.3 Discussion of Church-farms and Farming Strategies in the Fourteenth Century *Máldagabækur*

A church needed to be able to maintain its property and support a cleric to conduct religious duties. As churches were given property and rights, it could be assumed that there was a link between the number of clerics and livestock owned by the churches. The *máldagabækur* of the fourteenth century allow us to examine this relationship, taking into account factors such as milking stock, other livestock holdings and the percentage of the *heimaland* owned by the Church. Summarising this analysis, it can be seen that in the 1318 *máldagabók* for Hólar, there is a weak correlation between the number of clerics and the combined value of milking stock, with three quarters of *staðir* with three clerics or more owning over 15 *kúgildi* in milking livestock. The same is true for the 1360 *máldagabók* where a clearer pattern emerges for *staðir* with two clerics owning more than ten *kúgildi* in milking livestock. For Hólar's 1394 *máldagabók*, all church-farms with just one cleric had no more than 13 cows, but for

[692] Vésteinsson, *The Christianization of Iceland*, p.124.

those with two or more clerics there is no relationship between the number of clerics and cows. Furthermore, *staðir* tended to have a higher number of cows in general. Where there were higher numbers of cows this might have been due to *staðir* having more grazing rights or better quality grazing.[693] The significance of there being more cows at *staðir* would confirm the idea that the *staðir* were able to distinguish themselves by keeping more cows, the most demanding milking stock. The intentions of donors also played a role, as they donated property, rights or livestock, possibly reflecting what the donors thought the churches needed. The ability to donate valuable livestock such as milking cows or meadow land to maintain cows would have been a display of status as well as a generous gift.

It must be noted, however, that these patterns are based on varying numbers of *máldagar* and should therefore be viewed with caution. Predictably there is no hard and fast rule about the relationship between the livestock population of church-farms with either the proportion of the *heimaland* or the number of clerics that they were supposed to support. There does appear to have been a tendency for the combined value of milking livestock to indicate a maximum value for church-farms that only supported one cleric.[694] This may have been due to a common idea of the maximum subsistence needs of one cleric, which increased by three *kúgildi* over the century. The combined values of milking stock (cows and ewes) are a clearer representation of this common idea because the relative proportions of milking stock differed across Iceland.

5.6 CHANGES IN THE FARMING ECONOMY OVER TIME

As has been mentioned above, the main debate that concerns livestock farming in Iceland pertains to the relative numbers of cattle to sheep over time.[695] The *máldagar* are the only source type that allows an insight into livestock numbers on farms across Iceland over the centuries. There are limitations with this source however, as discussed above.[696] A caveat that applies to the increase/decrease of livestock numbers analysis, below, is that it is based on an absolute change which may distort the proportionate amount of that change. An increase or decrease is registered the same whether it is a change in one animal or hundreds.

[693] Vésteinsson, 'Patterns of Settlement in Iceland', p.8.
[694] In 1318 this was fewer than twelve *kúgildi*, in 1360 generally fewer than thirteen *kúgildi* and for the 1394 *máldagabók* generally fewer than 15 *kúgildi*. The mean averages (number of churches calculation is based on) of the value of milking stock owned by churches with one clerics are 5.3 *kúgildi* (36) in 1318, 11.4 *kúgildi* (16) in 1360 and 9.5 *kúgildi* (34) in 1397
[695] See 1.3.
[696] See 1.4.3 and above.

Nevertheless, the various forms of analysis present in this section complement each other to give a more robust understanding of livestock changes. The *máldagar* also use a variety of language to record livestock owned by churches, usually documenting the milking stock, but with other livestock optional. In order to maintain consistency, the discussion will be limited to adult cattle and sheep stock.

A regional, century-by-century approach will be used here to consider whether local practices or farming trends are evident. The church-farms, both *staðir* and *bændakirkjur*, will be considered by Quarter but the Westfjords will be separated from the rest of the Western Quarter because of its distinctive landscape: it contains steep-sided narrow valleys with limited agricultural land in contrast to the rest of the Western Quarter.[697]

The changing proportion of sheep to cattle can be used to identify preferred farming strategies, but does not necessarily indicate changes within livestock populations. A growing disparity in the ratio could be due to increasing numbers of sheep more generally, and not necessarily a reduction in the cattle population. To discover whether there was a decrease in livestock populations in Iceland, it is necessary to look at stock numbers on church-farms in the long term.

5.6.1 The question of declining livestock numbers in the late middle ages

The eleventh to fourteenth centuries was a period in which the Church in Iceland was evolving as an institution. This was the main period of donations where land, goods and rights were received to support churches, and, while donations still continued after the fourteenth century, they were not given in such great quantities. It is logical to assume that the number of livestock on these church-farms would have been relatively small until the fourteenth century whilst the church-farms were establishing themselves, and then herds developed as the churches expanded to utilise their full potential. There were, however, hard years recorded throughout Icelandic history due to famine, volcanic eruptions and human and livestock diseases. We must, therefore, bear in mind these events when considering explanations for change over time.[698] The traditional narrative, though, usually contrasts

[697] The Westfjords is defined as a region here by its traditional administrative boundaries. The boundaries are in Gilsfjörður and Bitrufjörður.

[698] Thoroddsen, *Lýsing Íslands* III, p.225; Þorláksson, *Vaðmál og verðlag*, p.142; Guðrún Sveinbjarnardóttir, *Farm Abandonment in Medieval and Post-Medieval Iceland: an Interdisciplinary Study* (Oxford, 1992), p.164. Large number of sheep deaths due to insufficient hay: *Laurentius saga*, ÍF XVII, chapter 57, pp.432-433; J.

earlier, independent centuries (eleventh to thirteenth) with later centuries (fourteenth to sixteenth). The *máldagar* allow examination of such long-term change. Of course, the centuries before 1318 have fewer surviving *máldagar* than post-1318 so the sample size is smaller and has resulted in no appropriate information for either the Eastern or Northern quarters. Table 8 shows the numbers of church-farms where there had been changes, and those where there were very few, in their cattle and sheep numbers pre-1318 (i.e. during Iceland's 'Golden Age' and the decades immediately following Iceland's submission to Norway), and the sixteenth century, when Iceland is thought to have begun to stagnate, both economically and socially.[699]

Table 8: The number of church-farms with extant *máldagar* listing cattle and sheep for both pre-1318 and the sixteenth century.[700]

	Westfjords		**West (ex. Westfjords)**		**South**		
	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Total
Increase	4	1	5	3	7	4	24
Decrease	1	1	7	8	0	2	19
Same	0	0	2	0	1	1	4
Total	5	2	14	11	8	7	47

The data shows that in the Westfjords and the South, church-farms mostly increased their cattle and sheep populations, but as it is based on so few cases, this begs the question of its typicality for these regions. The West stands out because from the eleventh and thirteenth centuries to the sixteenth century there were decreases in both cattle and sheep numbers on more church-farms than there were increases. The difference for the West is clearer for sheep than for cattle, although two church-farms maintained the same number of cattle between these centuries. The West has the largest number of church-farms with available *máldagar*, as it includes about a quarter of all the church-farms in the region. These church-farms cover a variety of landscapes and are therefore more likely to be representative of church-farms in the region as a whole compared with other regions, and the West is therefore of more use when looking at this longer term picture. It is also more likely that any increases reflect genuine

Sandnes, 'Conclusion', in S. Gissel, E. Jutikkala, E. Österberg, J. Sandnes and B. Teitsson (eds.), *Desertion and land colonization in the Nordic Countries c.1300-1600: comparative report from the Scandinavian Research Project on Deserted Farms and Villages* (Stockholm, 1981), pp.230-343, p.239.

[699] Simpson et al., 'Crossing the thresholds', p.187; Eggertsson, 'Sources of Risk', p.3.

[700] See Appendix Three for church-farm data used in these calculations.

changes in livestock numbers and were not as a result of additional donations, since the practice was far less common by the sixteenth century.

It is clear that the West and the Westfjords, unlike other regions, underwent drastic changes between the early fourteenth century and sixteenth centuries in farming practices. Table 9 shows the changes in average ratios pre-1318 and for the sixteenth century by region, including the range of ratios and the difference in the ratio range to give an idea of the variety of farming strategies undertaken within that region. The final column shows the change in average ratio between the two time periods. The number of *máldagar* that these figures are drawn from is included so the size of the sample can be understood. The ordering of the ratio difference between regions is in overall agreement with Árni Daníel Júlíusson's recent analysis of cattle:sheep ratio changes between the fourteenth and fifteenth-sixteenth centuries.[701] The least change occurs in the East, and the most in the West. However, Árni Daníel Júlíusson argues for a greater change in ratio in the North (1:4-1:7) than the South (1:4-1:5), whereas this study found little change in the North as it was based on a single pre-1318 *máldagi*, and a decrease in the cattle:sheep ratio in the South. The findings for the South are more robust, having the largest sample size of all regions, and points to this region as having a preference for cattle farming when all other regions were undertaking more sheep farming. There is agreement with Árni Daníel about the West, including the Westfjords, undergoing the biggest change, whilst the East remained more stable. Based on the range and the difference in ratios, there was a greater diversity of farming strategies in the sixteenth century than pre-1318, except for the South. Greater variation could demonstrate a diversity of methods employed to cope during the increased variable climate and the political, social and economic conditions.

[701] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, pp.124, 181.

Table 9: Cattle:sheep ratio on church-farms by region where data on both sheep and cattle numbers available, for pre 1318 and the sixteenth century.

Region	Pre 1318			Sixteenth century			Change in ratios pre-1318 and 16th century
	Máldagar	Ratio	Range	*Máldagar*	Ratio	Range	
Westfjords	6	1:4.5	0.5-16	21	1:10.9	0.04-37.5	1:6.4 (increase)
West	17	1:5.6	1.3-10.9	55	1:21	1.2-240	1:15.4 (increase)
South	17	1:12.2	3-65	60	1:7.1	2-64	1:5.1 (decrease)
East	3	1:8.7	6.2-10	30	1:8.2	2.2-30	1:0.5 (increase)
North	1	1:6	6-6	6	1:6.8	1-12.5	1:0.8 (increase)
Iceland	44	1:8.2	0.5-65	173	1:12.1	0.04-240	1:3.9 (increase)

5.6.2 Change from the Fourteenth Century to the Sixteenth Century

The abundance of *máldagar* for the fourteenth century and to a lesser extent the sixteenth century, creates greater potential for possible trends in livestock holdings to be tracked than from pre-1318. Therefore the following section will analyse changes over time between these two centuries to identify regional trends in this larger dataset. Table 10, like Table 8, shows the number of church-farms where there had been changes, or stability, in their cattle and sheep numbers. It compares *máldagar* from the fourteenth century, sometimes seen as a peak time for both human and livestock populations, and the sixteenth century, when Iceland is thought to have begun to enter a period of economic and social stagnation.[702]

Table 10: The number of church-farms with *máldagar* listing cattle and sheep for both the fourteenth and sixteenth centuries.

	Westfjords		West (ex. Westfjords)		South		East		North		Iceland
	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Total
Increase	11	15	13	13	26	18	10	14	3	1	124
Decrease	11	1	17	9	22	22	11	7	9	10	119
Same	5	3	8	4	6	6	3	2	2	1	40
Total	27	19	38	26	54	46	24	23	14	12	283

Table 11 has a smaller sample size than in Table 10, due to the ambiguity in later *máldagar* over the recording of a combined value for the milking stock without distinguishing whether

[702] See Section 1.3.

it refers to cows or ewes. Table 10 shows the number of church-farms that had changes, while Table 11 shows the extent of changes in cattle and sheep numbers by region and countrywide. Table 10 and 11 mitigate the limitations of each other and so the discussion of the combined results are presented here.

Table 11: The change in cattle and sheep numbers on selected church-farms and mean numbers on church-farms from the fourteenth to the sixteenth century.[703]

	Westfjords		**West (ex. Westfjords)**		**South**		**East**		**North**		**Iceland**	
	Total	Mean	Total	Mean	Total	Mean	Total	Mean	Total	Mean	Total	Mean
Cattle	+44.5 (22)	+2	-7 (22)	-0.3	+20.5 (36)	+0.6	-62 (18)	-3.4	-7 (5)	-1.4	-11 (103)	-0.1
Sheep	+2,422 (14)	+173	+2,053 (19)	+108.1	+678 (30)	+22.6	+59 (16)	+3.7	-6 (3)	-2	+5,206 (82)	+63.5

Across Iceland, there are hundreds of church-farms with extant *máldagar* for both the fourteenth and sixteenth centuries. As is shown in Table 10, 14% of the church-farms show no change in their allocated livestock, whilst approximately equal numbers of church-farms increased their livestock as decreased them between the two centuries. Sheep numbers show more change than cattle numbers. The changes in cattle and sheep numbers, as found in Table 11, show that there was a small reduction in cattle, but a much greater increase in sheep.

When the church-farms are considered on a regional basis, differences in farming strategies can be seen. For the East the figures demonstrate that while the cattle:sheep ratio remained the same, there were more farms that increased their sheep flocks than decreased them. Furthermore, the East had the greatest reduction, per church-farm, of cattle indicating a clear move towards a sheep-dominated farm economy. On a regional level, the clear move to sheep dominated farming in the East would reflect the landscape, with less meadowland than the South, for example, but more access to uplands and rough grazing, coupled with a cooler climate. While other factors may have been at play, it appears that in the East landscape and climate played a role in farm decision-making.

[703] See Appendix Three for church-farm information. Figures in parenthesis refer to the number of *máldagar* results are based on.

In the Westfjords there was a much clearer move towards sheep farming (with 15 church-farms increasing their sheep numbers and only one showing a decrease), but the same number of church-farms increased their cattle herd as decreased them. Overall, the number of cattle appears to have increased, but the increase in sheep is the greatest in Iceland and suggests a move towards sheep farming while maintaining their cattle numbers. It appears that the church-farms were managing to increase their stock more so than any other region. As mentioned above, the giving of donations to churches had become less common by the sixteenth century implying that these figures reflect genuine increases in livestock numbers. It is possible that sheep farming was more compatible with fishing, a major industry in the Westfjords, and sheep made better use of the grazing resources.

The West also shows a growing preference for sheep rearing as there were more increases than decreases in sheep alongside a decrease in cattle. The change in the number of animals also supports this point, as there is a slight reduction in the number of cattle but a clear increase in the total number of sheep. As with the Westfjords, the West could have moved towards sheep farming, although, as the number of cattle also reduced, these changes could be due to the long-term effects of the plagues (such as labour shortages) that are thought to have originated and spread rather quickly through the region.[704]

The South has the large regional sample of church-farms and appears to move towards cattle farming as cattle increased on the same number of church-farms as sheep decreased. Nevertheless, there was still an increase in both cattle and sheep numbers. In the mid- to late-sixteenth century there were a number of recorded cattle disease outbreaks leading to a number of cattle deaths in the South, yet there appears to be no long-term sign of this as 26 church-farms increased their cattle herds in contrast to 22 that decreased them.[705] The South with its boreal climate and more open landscape may have been considered better suited to cattle farming, and so continued with cattle farming when other regions shifted to sheep farming.

The North, however, reveals a pattern of reduction for both cattle and sheep, though only by a small amount. This reduction in both types of livestock could have been influenced by the

[704] Karlsson, *Iceland's 1100 Years*, p.113.
[705] Thoroddsen, *Lýsing Íslands* III, pp.227, 276.

lack of available labour in the northern diocese, as argued by Árni Daníel Júlíusson.[706] The changes made to farming then were maintained during the following centuries. In addition, there is thought to have been an increase in the frequency of sea ice in the mid- and late-sixteenth century, limiting the growing season in the North and possibly resulting in more church-farms reducing the numbers of livestock rather than increasing them.[707]

Across the country, there was a clear indication of church-farms increasing their herds between the fourteenth and sixteenth centuries, yet the small sample size limits the extent to which we can generalise. It is not possible to comment on church-farms in the North and East from before the fourteenth century, but we can say that the *máldagar* for the fourteenth and sixteenth centuries show scarcely any change in farming strategies for the North and little change in the East. These findings support the idea that Iceland underwent changes on a regional but not on a countrywide basis.

While the long chronology shows long-term changes, it is difficult to pinpoint the causes for these differences. It is possible that the preference for sheep farming in the East by the fourteenth century meant that any reduction in labour, due to the plagues of the fifteenth century, was not felt as severely as in other regions of Iceland, because the East had already followed a farming strategy that required the least labour. Unfortunately, there is hardly any evidence about the death rate due to the plague in the East, or indeed Iceland in general, and therefore we can only make inferences about the severity of labour loss across Iceland.[708] Árni Daníel Júlíusson argues that differences in the development of church-farms in the North and South was probably due to the long-term effect of available labour, which led to a reduction of church-farms in the North.[709] This loss of labour would contribute to the decreases in cattle and sheep on church-farms, though the reduction was not great. It appears that the North was the only region between the fourteenth and sixteenth centuries to see a reduction in both cattle and sheep numbers. A lack of labour would also have negatively affected the West, and to a lesser extent the Westfjords, as these regions were relatively more dependent on cattle farming than other regions.

[706] Júlínusson, 'Signs of Power', p.17.
[707] Ogilvie, 'Local knowledge and travellers' tales', p.283.
[708] Karlsson, 'Plague without rats', p 271.
[709] Júlíusson, 'Signs of Power', p.17.

Looking further afield for explanations, we could postulate that the population decline and later demand for cheap woollen cloth in places such as England, who channelled their native wool into the production of high-quality cloth, meant that Icelandic farms were turning to wool production.[710] The demand for commodities that could not be grown in Iceland may also have encouraged sheep farming in order to produce desirable goods to trade, or alternatively sheep farming may have been more compatible with the labour demands of fishing, an important export commodity. We should be aware that overseas events and processes could have influenced the goods sought by merchants coming to Iceland, which in turn affected Icelandic farming decisions.[711] Increased climatic variability would also have encouraged the move towards sheep farming as they are hardier animals, as too would the demand for meat and wool for export as was the case in the seventeenth century.[712] The South stands in contrast to the West and Westfjords, as the ratio decreased in the intervening centuries, possibly due to its more extensive grasslands.

5.7 CASE STUDIES

The general, aggregate picture of herd sizes recorded in *máldagar* has been set out above. However, it is also illuminating to look at smaller regional case studies. The following section will evaluate five localities across Iceland to discover if neighbouring church-farms responded in the same way to external factors or operated under their own agency. For each region a table has been compiled to shown the percentage of *heimaland* the church owned and the changing number of cattle and sheep, or mostly cows and ewes, divided into approximate time periods.[713]

[710] Gelsinger, *Icelandic Enterprise*, pp.128-129, 172. Gelsinger states that until the thirteenth century English weavers concentrated on high quality cloth production because it had the greatest profit margin, so cheaper cloth was supplied by Iceland *vaðmál*. In the thirteenth century, however, technological advancements meant English weavers could produce cheaper cloth and also that the demand for Icelandic raw wool dropped too. In somewhat of a contradiction, Gelsinger does refer to restrictions imposed on the export of English wool in the thirteenth entury because of the domestic demand for wool, which would suggest a potential market for Icelandic wool in England or in areas where English wool or lower quality cloth had previously been traded, p.253, footnote 24 and 25.

[711] This topic is outside the scope of this thesis but does raise questions about the role of Iceland in the wider medieval European trade network.

[712] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* III, p.59.

[713] The location of these church-farms can be found in Appendix Four: Maps.

5.7.1 EYJAFJÖRÐUR[714]

Eyjafjörður is a large valley system in the north of Iceland, extending over 75 km inland from the coast. The church-farms have been examined in geographical order from those nearest the coast to those furthest inland.

Table 12: Eyjafjörður Case Studies

Church-farm	*Heimaland*	1318	1394	Late 15th	16th
Tjörn, Svarfaðardalur	50%	12 cows	7 cows 42 ewes	-	-
Vellir, Svarfaðardalur	100%	21 cows, 6 cattle 110 ewes, 72 sheep	25 cows 120 ewes	22 cows, 7 cattle 66 ewes	-
Árskógar, Eyjafj.	100%	2 cows 3 ewes	3 cows, 2.5 cattle 10 ewes, 10 sheep	5 cows 18 ewes	-
Höfði, Eyjafj.	100%	5 cows 18 ewes	9 cows, 1 neat 20 ewes, 10 sheep	-	-
Draflastaðir, Fnjóskadalur	-	1 neat	6 cows 42 ewes	1 cow 36 ewes	-
Háls, Fnjóskadalur	100%	13 cows, 25 cattle 80 ewes, 10 sheep	15 cows, 3 cattle 90 ewes, 30 sheep	-	-
Bægisá, Hörgárdalur.	100%	-	7 cows 19 ewes, 20 sheep	12 cows, 3 cattle 18 ewes	-
Hólar, Eyjafj.	100%	3/1 cattle	-	-	-
Hrafnagil, Eyjafj.	50%	14 cows 36 ewes	13 cows 84 ewes	6 cows, 2 cattle 36 ewes	10 cows, 1 neat 5 ewes, 5 sheep
Saurbær, Eyjafj.	100% (50%)	8 cows, 6 cattle 56 ewes, 20 sheep	20 cows, 40 cattle 96 ewes, 1 sheep	18 cows 120 ewes	_

Even though the church-farms of Tjörn and Vellir were located across the valley from one another they had differing fortune in the fourteenth century, indicating farm-specific causes for these changes. Assuming that one cow was equivalent to six ewes, Tjörn slightly increased their value of milking stock from 12 cows to 14 *kúgildi* due to the inclusion of ewes in 1394. Vellir, whereas, maintained roughly the same number of cattle but reduced its number of sheep. Vellir had further reduced its sheep flock, this time the number of milking

[714] DI 2, 457, DI 3, 513 and DI 5, 258; DI 2, 456, DI 3, 512 and DI 5, 260; DI 2, 455, DI 3, 515 and DI 5, 262; DI 2, 447, DI 3, 568 and DI 5, 263; DI 2, 440-441, DI 3, 571 and DI 5, 269; DI 2, 439, DI 3, 572 and DI 5, 298; DI 3, 518, DI 5, 294 and DI 12, 638; DI 2, 453, DI 3, 560, DI 5, 315 and DI 11, 356; DI 2, 452, DI 3, 524 and DI 5, 310. Hólar has not been included in the table because it only contained livestock information in one year (1318): DI 2, 426, 451.

ewes, by the late fifteenth century. Árskógar, out on the fjord, shows an overall increase in livestock, and demonstrates that it was able to maintain a small but consistent number of livestock for over a hundred years.

In Fnjóskadalur, a smaller valley immediately to the east of Eyjafjörður, Draflastaðir and Háls suggest that there was some common factor at play as the numbers of sheep increased but the numbers of cattle decreased. This preference for sheep on both church-farms may suggest a local explanation, such as the availability of upland grazing better-suited to sheep than cattle farming. Bægisá, in the valley to the west of Eyjafjörður, was different, both in location and farming strategy as it reared more cattle and fewer sheep by the late fifteenth century. Unfortunately, there are no other comparable church-farms in the valley to determine whether the changes were typical.

At Hrafnagil, there was a clear reduction in both cattle and sheep from the fourteenth to sixteenth century. Whereas at Saurbær, cattle numbers were reduced but those of sheep increased, yet the combined value of sheep and cattle was halved. Both Hrafnagil and Saurbær show that there was a reduction of herd sizes at church-farms in the inner reaches of Eyjafjörður.

Overall, there was a common trend from the fourteenth to sixteenth centuries in the reduction of recorded livestock at the church-farms in Eyjafjörður, though some did increase their herds, such as in cattle at Vellir and in sheep at Saurbær. The case of Hrafnagil suggests that these decreases in livestock could also have continued into the sixteenth century. Within this region, there was no universal pattern of change and the church-farms survived even through difficult times.

5.7.2 HORNAFJÖRÐUR AND SUÐUR MÚLASÝSLA[715]

The south-east of Iceland is characterised by widely dispersed church-farms all of which were situated near to the coast. Starting in Hornafjörður, Kálfafell had a consistent number of cows and ewes, except in the late sixteenth century. Nearby Borgarhöfn similarly shows a

[715] DI 2, 771, DI 3, 243, DI 4, 200-201, DI 7, 451 and DI 15, 700; DI 2, 770, DI 4, 234 and DI 8, 4; DI 4, 233, DI 6, 334, DI 13, 164 and DI 15, 699; DI 3, 242, DI 4, 233 and DI 15, 698; DI 2, 768, DI 4, 232, DI 7, 34 and DI 15, 695; DI 4, 203, DI 7, 35 and DI 15, 694 and 697; DI 4, 230, DI 7, 34 and DI 15, 694; DI 4, 202, DI 7, 32, DI 10, 93 and DI 12, 645; DI 3, 241, DI 4, 229, DI 7, 31, DI 14, 29 and DI 15, 693.

consistent number of cows and ewes, though there are only three years between the dates assigned in *Diplomatarium Islandicum*. These figures are significant because it appears that there was a common factor at work between the fourteenth and sixteenth centuries. Einholt shows more variation in its recorded livestock numbers, with the greatest number of sheep recorded in 1397 and an expansion of their bovine dairy herd in the sixteenth century. On the other side of the inlet, Bjarnanes saw a reduction in cow numbers. The recording of twenty sheep and a decrease in ewes shows that the church was moving towards a sheep economy, but milk was still the dominant product. Between these centuries the church had acquired ownership of the entire *heimaland* and may then have exercised more control over its farming practices.

Table 13: Hornafjörður and Suður Múlasýsla Case Studies

Church-farm	***Heimaland***	**1343**	**Mid 1300s**	**1397**	**Late 15th**	**Mid 16th**	**Late 16th**
Kálfafell, Hornafj.	100%	8 cattle 48 sheep	8 cattle 50 sheep	9 cattle 48 sheep	8 cattle 50 sheep	-	8 cattle 104 sheep
Borgarhöfn, Hornafj.	-	-	16 cows 40 ewes	12 cows 40 sheep	-	-	5 cows 30 ewes, 20 sheep
Einholt, Hornafj.	-	-	-	2 cattle 62 ewes, 16 sheep	-	8 cows 30 ewes, 12 sheep	8 cows, 1 neat 36 ewes, 12 sheep
Bjarnanes, Hornafj.	100% (50%)	-	16 cows 40 ewes	12 cows 40 ewes	-	-	5 cows 30 ewes, 20 sheep
Hof, Múlaþing	100%	5 cows 54 ewes	-	5 cows 55 ewes	10 cows, 1 neat 54 ewes, 10 sheep	-	10 cows, 1 neat 104 ewes, 6 sheep
Geithellur, Múlaþing	-	-	-	3 cows 18 ewes	4 cows 24 ewes	-	-
Háls, Hamarsfj.	100%	-	-	4 cows 72 ewes, 1 sheep	6 cows 60 ewes		4 cows 60 ewes, 13 sheep
Berufjörður, Múlaþing	50%	-	-	9 cows 60 ewes	10/9 cows 60 ewes	10 cows 60 ewes, 240 sheep	-
Heydalir, Breiðdalur	100%		4 cows, 1 neat 23 ewes	4 cows, 1 neat 23 ewes	300 cattle 1,020 sheep	12 cows, 1 neat 96 ewes, 1 sheep	9 cattle

Further north, Hof seems to have expanded its herds from the fourteenth century until the end of the sixteenth century. In the late fifteenth century there was an increase in cows followed by an increase in ewes in the sixteenth century, showing a shifting farming emphasis over this time period, while the overall cattle:sheep ratio suggests little long-term change in practices.

Geithellur shows an increase from 1397 to the turn of the fifteenth century. Unfortunately there is no data for the sixteenth century. Háls shows consistency in cows (not cattle) and sheep, yet the number of ewes decreased while the number of non-milking sheep stayed stable. It is unclear whether the recorded livestock figures for Berufjörður indicate continuity of herd size or of the copying of earlier *máldagar*. The addition of dry sheep in 1536 may show an effort to record their property in more detail although the number of cows and ewes remained the same. Disregarding Berufjörður, there were increases in cows over the centuries, showing that not all church-farms in the east turned to sheep farming.

By contrast, Heydalir shows no set practices through the centuries as there are variations in livestock numbers. This *staðr* was wealthy, but the latest *máldagi* lists no milking stock and only nine cattle between one- and three-years of age, a dramatic reduction in livestock property, suggesting that the loss of the milking animals as milking stock was more likely to be listed. It is not clear if this reduction was due to management or other factors.

As can be seen, again there were no universal farming economies in the south-east, since the number of livestock on some church-farms fluctuated while others remained constant. Overall, there were some increases in non-milking sheep, such as at Háls, indicating a growing preference for wool production, but this was not the case for all. The case of Heydalir shows how drastically farming practices could change over time.

5.7.3 LAND AND FLÓI[716]

The south-west is and was a densely settled area of relatively flat grassland broken by numerous rivers. In this study the inland area of Land will be compared to the more coastal area of Flói in order to discern whether location, near the coast or inland, had a noticeable effect on livestock rearing. Both Snjallshöfði and Vellir show no change in livestock population in the fourteenth century. Snjallshöfði was a poorer church-farm in terms of livestock, whereas Vellir was wealthy and supported three clerics. Fellsmúli had a consistent number of cows from the fourteenth to sixteenth centuries, but tripled its ewe population. Næfurholt also shows an increase in the sixteenth century in cows, although the number of

[716] DI 2, 697, DI 4, 86 and DI 15, 660; DI 2, 696, DI 4, 65 and DI 15, 660; DI 3, 266, DI 4, 64 and DI 12, 656; DI 2, 694, DI 4, 68 and DI 15, 662; DI 2, 695, DI 3, 405, DI 4, 67, DI 12, 655 and DI 15, 662; DI 1, 410, DI 7, 45 and DI 12, 659; DI 4, 95, DI 6, 319 and DI 15, 657; DI 2, 62-62 and 661, DI 4, 59, DI 6, 318-319 and DI 15, 657; DI 1, 403, DI 2, 671, DI 3, 114, DI 4, 56 and DI 15, 656.

ewes remained constant. Klofi also saw a tripling of cows in the sixteenth century, with an additional two *kúgildi* of ewes. From these livestock figures there appears to have been some commonality in Land, as Vellir, Næfurholt and Klofi all slightly increase their cattle. There were differences however, such as between the neighbouring farms of Vellir and Fellsmúli, whereas the more distant Snjallshöfði shows similarities to Vellir in the fourteenth century.

Table 14: Land and Flói Case Studies

Church-farm	***Heimaland***	**13th**	**Early 14th**	**Mid 14th**	**Late 14th**	**Late 15th**	**Late 16th**
Snjallshöfði, Land	-	-	2 cows 6 ewes	-	2 cows 6 ewes	-	-
Vellir, Land	25%	-	8 cows 72 ewes	-	8 cows 72 ewes	-	10 cows, 1 neat 54 ewes
Fellsmúli, Land	-	-	-	2 cows	4 cows 6 ewes	-	[1553] 4 cows 18 ewes
Næfurholt, Land	-	-	3 cattle 30 sheep	-	3 cattle 30 sheep	-	8 cattle 30 sheep
Klofi, Land	-	-	2 cattle 18 sheep	[1387] 2 cattle 18 sheep	2 cattle 18 sheep	-	6 cattle 30 sheep
Oddgeirshólar, Flói	50%	-	-	-	-	5 cattle 30 sheep	[1553] 5 cattle 30 sheep
Hróarsholt, Flói	100% (33%)[717]	-	-	-	4 cows 18 ewes	8 cows	4 cows 24 ewes
Villingaholt, Flói	50%	[1269] 3 cows 12 ewes	5 cows 18 ewes	-	10 cows 30 ewes	4 cows 40 ewes	6 *kúgildi*
Gaulverjabær, Flói	100% (50%)	[c.1220] 4 cattle	30 cattle 109 sheep	52 cattle 60 sheep	42 cattle 68 sheep		23 cows, 1 neat 60 ewes, 12 sheep

Within Flói, Oddgeirshólar saw no change in livestock in the sixteenth century, and the absence of data for the early thirteenth century does not allow comparison. Hróarsholt, in contrast, documents a decrease in cows from the fourteenth to sixteenth centuries but a slight increase in ewes. Villingaholt, after a prosperous fourteenth century, shows a downturn in cow numbers and an increase in ewes. The oldest *máldagi* listed two clerics, whereas the later charters record only one, suggesting that the church was established with higher expectations than it could provide for. Gaulverjabær became a *staðr* sometime before 1331 but did not

[717] Hróarsholt and Gaulverjabær are recorded as *bæandakirkjur* in their first *máldagar* but later owned their entire *heimaland*.

maintain the fourteenth century number of dairy stock, though still owned more cattle and sheep than its neighbours.[718]

There was a variety of farming strategies employed in these two areas. Most church-farms saw some form of increase in cattle and/or sheep between the fourteenth and sixteenth centuries, but neighbouring church-farms were operating different economies. For example, Gaulverjabær had an increase in non-milking cattle and a decrease in non-milking sheep, suggesting a move towards a beef economy, whereas Hróarsholt and Villingsholt appear to have increased their ewe population at the expense of cows. In the Land area there appear to be more similarities than changes, such as the slight increase in cows suggesting some form of commonality in farming, but this was not always the case as shown by the case of Fellsmúli.

5.7.4 BORGARFJÖRÐUR[719]

The valley system of Borgarfjörður in the west contains well-known *staðir* such as Borg, Stafholt and Reykholt, and the other church-farms in the sample are also *staðir*, so we are able to examine the entire livestock numbers on these farms. Melar, on the coast, shows an expansion of its bovine dairy herd by the end of the fourteenth century, though it is unclear if this expansion was due to farm management or additional donations. Then there was a move towards a more sheep-dominated economy by the late fifteenth century. Borg showed a rapid increase in the number of ewes during the fourteenth century, but the three sixteenth century *máldagar* show an increase in cows and ewes. Hvanneyri also showed a little change in cow numbers in the fifteenth and sixteenth centuries, whilst sheep show an overall increase although there was a reduction in the 1560 *máldagi*. The mid-fourteenth century was not a prosperous time for Stafholt in terms of livestock, especially compared to the other church-farms in this sample. It did nonetheless support four clerics. By the late sixteenth century the number of cows and ewes had risen significantly. When the numbers of all cattle and sheep are viewed, Stafholt was wealthy enough to rear dry cattle when it was established, before changing strategy to sheep, and by the 1570s it was clearly geared up to produce wool.

[718] The c.1220 *máldagi* records Gaulverjabær as owning half the *heimaland* but by the 1331 *máldagi* the church owned the entire *heimaland*.
[719] DI 1, 418, DI 4, 192, DI 6, 174 and DI 15, 627; DI 3, 88, DI 4, 187, DI 8, 379-380 and DI 15, 618; DI 3, 125, DI 4, 191, DI 5, 408, DI 6, 174, DI 13, 552 and DI 15, 626; DI 1, 178, DI 3, 88, DI 4, 188 and DI 15, 620; DI 3, 123, DI 4, 191, DI 5, 401, DI 7, 60, DI 12, 666 and DI 15, 626; DI 1, 279 and 466, DI 3, 122, DI 6, 173 and DI 15, 623; DI 3, 248-249, DI 4, 118-119, DI 7, 590 and DI 15, 624; DI 2, 358-359, DI 4, 121, DI 5, 403, DI 7, 442-443 and DI 15, 553; DI 7, 1, DI 4, 123, DI 5, 676, DI 6, 172, DI 7, 737 and DI 12, 666.

Table 15: Borgarfjörður Case Studies

Church-farm	***Heimaland***	**11th ,12th + 13th**	**14th**	**1397**	**Mid 15th**	**15th - 16th**	**Late 16th**
Melar, Borgafj.	100%	[c.1220] 5 cattle	-	30 cows 42 sheep	[1478] 10 cows, 8 cattle 55 ewes, 16 sheep	-	9 cows 12 ewes
Borg, Borgafj.	-[720]		[1354] 10 cows 19 ewes	11 cows 1,200 ewes	-	[c.1512] 12/10 cows 80/60 cows	10 cows 60 ewes
Hvanneyri, Borgafj.	100%	-	-	1 neat	[1463 and 1478] 8 cows 48 ewes	10 cows 30 ewes	10 cows 60 ewes
Stafholt, Norðurádal.	100%	[1140] 20 cows, 10 cattle 100 ewes, 180 sheep	[1354] 9 cows 18 ewes	17 cows 18 ewes	-	-	34 cows, 4 cattle 96 ewes, 1,440 sheep
Bær, Hvítársíða	100%	-	[1358] 13 cows 60 ewes	17 cows 60 ewes	[1463-1470] 13 cows 60 ewes	[1491-1518] 15 ewes [1553-1554] 5 cows 36 ewes	6 cows 36 ewes
Reykholt, Reykholtsdal.	100%	[1185 and 1224] 20 cows, 1 neat 150 ewes	[1358] 20 cows, 4 cattle 70 ewes, 13 sheep	-	[1478] 20 cows 99 ewes, 240 sheep	-	18 cows 108 ewes
Lundur, Lundar-reykjadal.	-	-	[1368] 10 cattle	2 cows		[1501] 5 cattle 30 sheep	7 cattle 30 sheep
Gilsbakki, Hvítársíða	100%	-	[1306] 12 cows, 1 neat 90 ewes, 2 sheep	13 cows, 1 neat 20 ewes, 2 sheep	[1463] 18 cows, 1 neat 100 ewes, 2 sheep	[1499] 2 cows, 1 neat 12 ewes, 120 sheep	12 cows 66 ewes
Húsafell, Hvítársíða	100%	[c.1170] 5 cows, 3 cattle 30 ewes, 12 sheep	-	6 cows, 1 neat 30 ewes	[1472] 8 cows 18 ewes	[1478] 5 cows 30 ewes [1504] 7 cows, 3 cattle 48 ewes, 240 sheep	[1553-1554] 7 cows, 3 cattle 48 ewes

Further inland, Bær had an overall decrease in its livestock, with approximately 50% less in the late sixteenth century than in the mid-fifteenth century. Between the twelfth and fifteenth centuries, Reykholt had moved from an ovine dairy economy to a wool economy. The absence of non-milking sheep at the end of the sixteenth century is suspicious and is perhaps

[720] Though the *máldagar* do not record the *heimaland* ownership for Borg, it is generally considered a *staðr* (100% ownership of *heimaland*).

a scribal over-sight. The *máldagar* for Lundur indicates a dramatic loss of cows between 1368 and 1397. The sixteenth century shows a recovery but not to the same level suggesting a long-term loss of resources by the church.

The furthest inland church-farm was Gilsbakki. The number of milking stock was at the maximum in 1463, but were reduced by 1499. Interestingly, the 1499 *máldagi* lists one *hundrað* sheep, indicating in the immediate aftermath of the plague practices were undertaken to minimise the labour input whilst still utilising the church's resources by rearing non-milking sheep. By 1575 Gilsbakki had returned to the fourteenth century numbers for cows, but not for ewes, indicating a permanent move towards wool and/or meat, but not milk. Similarly, the nearby Húsafell shows a move towards sheep farming over the centuries, especially in the sixteenth, when the recording of two *hundruð* non-milking sheep demonstrates the church was geared towards wool.

In this region, as with the others, the church-farms' economies appear dissimilar to each other as they all show different timings and degrees of change. For example, Stafholt had the fewest livestock in the mid-fourteenth century, whereas Melar and Bær had fewer cows in the mid-fifteenth century. What is distinctive among these churches, however, is that some appear to have been increasing their sheep flocks, especially at Gilsbakki and Húsafell. It is possible, based on the *máldagar* dates that these church-farms are showing the farming response to the second plague outbreak. As the church maintained a preference for sheep farming these changes appear to be long-term. The inland location of these particular farms may have also encouraged this decision.

5.7.5 ÍSAFJARÐARSÝSLA[721]

The Westfjords are unique in Iceland since the second plague epidemic left the region unscathed to the point where some of the poorer inhabitants repopulated the north of Iceland after the plague had ended. With this point in mind, there should be more continuity of practices in the Westfjords throughout the fifteenth century.[722] It is difficult to judge, however, because in our sample only Otradalur has a *máldagi* dated to 1491-1518, around the

[721] DI 3, 91, DI 4, 148 and DI 15, 580; DI 2, 576, DI 4, 147, DI 7, 80 and DI 15, 580; DI 2, 832, DI 3, 126, DI 4, 145 and DI 15, 577; DI 3, 324, DI 4, 141 and DI 15, 572; DI 2, 260 and 700, DI 4, 140 and DI 15, 570; DI 4, 133, DI 8, 286 and DI 15, 566.
[722] Karlsson, *Iceland's 1100 Years*, p.111.

time of the second plague outbreak. Assuming that this *máldagi* is from after the second plague outbreak, it could show change due to the plague because it records a reduction in cows but ewes remain constant. Yet, if we examine earlier *máldagar*, we see that Otradalur was steadily reducing the number of cows from the mid-fourteenth century, and so the late-fifteenth century reduction may be a continuation of this practice and not influenced by the plague.

Table 16: Ísafjarðarsýsla Case Studies

Church-farm	***Heimaland***	**13th**	**Mid 14th**	**1397**	**Late 15th**	**Late 16th**
Selárdalur, Arnafj.	100%	-	5 cows, 2 cattle 35 ewes	19 cows, 25 cattle 16 ewes	-	13 cows 120 ewes
Otradalur, Arnafj.	100%	-	[1324] 12 cows	10 cows, 3 cattle 12 ewes	3 cows 12 ewes	7 cows 30 ewes, 12 sheep
Sandar, Dýrafj.	100% (50%)	-	[1346] 9 cows [1358] 9 cows 6 ewes	10 cows, 1 neat 24 ewes	-	5 cows 42 ewes
Holt, Önundarfj.	100%	-	[1377] 12 cows 2 sheep	12 cows, 2 cattle 144 ewes, 4 sheep	-	12 cows, 4 cattle 120 ewes, 480 sheep
Eyri, Skutilsfj.	100%	[1286] 5 cows 20 ewes	[1333] 2 cows 18 ewes	13 cows, 1 neat 60 ewes	-	8 cows, 2 cattle 34 ewes, 260 sheep
Vatnsfjörður, Ísafj.	100% (50%)[723]	-	-	1 neat	-	[1509] 2 cows, 20 cattle 1 sheep [1570+] 14 cows, 4 cattle 84 ewes, 422 sheep

All the church-farms in this sample are *staðir*, located in and along the coast of the north western fjords and show a move towards sheep farming by the sixteenth century. Selárdalur and Otradalur had varying numbers of livestock in the fourteenth century before a decrease in cows and an increase in ewes in the sixteenth century, though their ratios differed. The figures for Sandar also indicate a move towards sheep farming by the sixteenth century as a result of a decrease in cattle and an increase in sheep.

[723] Vatnsjörður's 1397 *máldagi* records the church as owning half the *heimaland*, but by the late sixteenth century the church owned the entire *heimaland*.

Holt underwent a much greater change between the fourteenth and sixteenth centuries. The number of cows remained the same in the *máldagar*, whereas the number of ewes dropped, but the overall total number of sheep rose. The numbers for Eyri, again, demonstrate the effect that the recording of additional livestock in later *máldagar* can have on the cattle:sheep ratio as non-milking sheep were only mentioned in the second half of the sixteenth century. Vatnsfjörður only has livestock recorded in two *máldagar* for the sixteenth century, which reveal increasing numbers of milking and non-milking livestock in a few decades. The growth in numbers of sheep indicates an effort to farm for wool. It is unclear why Vatnsfjörður saw this increase in livestock in the sixteenth century. Without earlier *máldagar* to compare them to it is not possible to comment on previous herd size, though fewer than two cows is unlikely. The number of non-milking cattle suggests that Vatnsfjörður was farming for beef, not milk, but underwent a reversal by the late sixteenth century. The 1397 *máldagi* records the church owning half the *heimaland* and supporting three clerics, whereas by 1509 the church owned the entire *heimaland* and supported four clerics. It is likely that the church did own livestock previously but did not record them as the church was not a *staðr* in need of documentation to protect its rights.

The increase, or the recording, of non-milking sheep in the sixteenth century indicates the importance of wool production, such as at Otradalur, Eyri and Holt. The fourteenth to sixteenth centuries were a time of overall expansion of herds, unlike other regions where there was some decrease in the fifteenth century. Vatnsfjörður stands out with clear increases in all livestock categories in the sixteenth century.

5.8 CONCLUSION

For the twelfth and thirteenth centuries, *máldagar* are scarce, before becoming relatively abundant in the fourteenth century and then more infrequent again in the fifteenth and sixteenth centuries, but their existence means it is possible to analyse whether there were changes in farming management across Iceland over these centuries. From the limited number of *máldagar* for the twelfth and thirteenth centuries, it can be seen that at this point there was more homogeneity of farming strategies amongst church-farms throughout Iceland. There were no church-farms solely devoted to cattle or sheep rearing as there were in later centuries, and the small variation in the cattle:sheep ratio indicates that all followed a similar

farming strategy. Nevertheless, there were still differences as had potentially been the case since the settlement.

Árni Daníel Júlíusson asserts that there was much change in farming strategies between the fourteenth and sixteenth centuries based on the cattle:sheep ratio.[724] This study does broadly agree with the greatest change in cattle:sheep ratio being in the West and the least change in the East, however, there are differences, probably resulting from the longer time period considered in this chapter. There was a drop in the cattle:sheep ratio in the South, indicating that church-farms in the region were generally turning more to cattle farming than to sheep farming, whereas for the rest of Iceland there was a general move towards sheep rearing, except in the East where sheep farming was already prevalent in the fourteenth century.[725] It is likely that church-farms were adapting to the most efficient farming strategies in light of plague outbreaks, economic demand, and environmental change. By the late sixteenth century, the immediate effects of the Reformation would have encouraged churches to maximise their returns from livestock as they lost sources of income and rights.

The vast body of data provided by the *máldagar* on numbers of livestock suggest no clear differences over time and between different regions in the middle ages. While two or three church-farms within a small district may show similar trends, within and across regions church-farms were responding on an individual basis. The fluctuating number of livestock in the *máldagar* for many church-farms demonstrates the varying nature of Icelandic farming, especially after the fourteenth century, when changes can be assigned to management rather than donations as this practice became more infrequent. Farming practices on church-farms, at least, were responsive, not static. The practices were no doubt influenced by a wide range of factors, including but not limited to climate, landscape conditions, disease outbreaks, lack of labour, the demands of foreign trade, and even in the short term, raiding. In addition, there are always the individual notions of those responsible for deciding the farming strategies on each farm.

[724] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, pp.124, 181.
[725] Árni Daníel's comparison of cattle:sheep ratio with the zooarchaeological bovine: caprine ratio as showing similarities between the tenth and eleventh centuries and the *máldagar* of the fourteenth century are representing the production and consumption patterns, which are not the same thing.

Some factors had a more immediate effect on farming, such as climate change and human disease outbreaks. It is known that climatic change was taking place during these centuries, leading to increased occurrences of ice along the north coast and less favourable growing conditions across Iceland, so it is possible that the *máldagar* for the Eyjafjörður churches discussed above were reflecting this greater climatic variation. The move towards wool production recorded at the turn of the fifteenth century at Reykholt, Gilsbakki and Húsafell (all Borgarfjörður) appears to have been due to the second plague epidemic; a lack of available labour probably encouraged less labour intensive farming strategies. Epidemics usually have significant short-term effects as the population contracts, but in the medium term the abundance of resources results in an expansion as the survivors utilise previously limited resources. While various mortality rates have been argued for Iceland, it is unclear how quickly re-population occurred.[726]

Looking at the wider context, the general decrease in cattle numbers could have been influenced by a number of factors. The decrease in livestock owned by churches could be a result of the sharp decline in the human population in the fifteenth century due to the two plague outbreaks. As there were fewer people, there was less labour to milk the cows, shear the sheep and gather fodder, so livestock would have been slaughtered. The amount of hay that was harvested in the short hay-making season was also a controlling factor on the number of animals that were kept and unfavourable conditions resulted in less hay and so less livestock, specifically cattle. Karlsson has argued that 20% of farms were still abandoned 40 years after the first plague.[727] The estimate acknowledges that this would have varied depending on area and not all abandonments were likely to have been contemporary or permanent. Yet Karlsson's estimate does not take into account that five out of the six estates he examined were in the north of Iceland. If greater annual variability in weather conditions had already begun by this time, then these other factors could have also been reasons for abandonment.

The variation in livestock numbers suggest other factors too. The reduction in livestock numbers on some church-farms in Borgarfjörður based on *máldagar* dated to the turn of the fifteenth century would lend support to the negative impact the epidemic had on agricultural

[726] Callow and Evans, 'The mystery of plague', pp.281-282.
[727] Karlsson, 'Plague without rats', p.272.

production. An older study on settlement abandonment, however, explained that there was little sign of desertion on Snæfellsnes between the fourteenth and fifteenth centuries possibly due to the growth of the fishing industry.[728] Guðrún Sveinbjarnardóttir's study reveals a range of possible influences of farm abandonment and how these varied between regions.[729] There was no one reason for these processes, and human resourcefulness, including the exploitation of marine resources aided Icelanders in hard times. Indeed, a recent study of Rangárvellir demonstrates the adaptability of Icelanders over the centuries and argues that farm abandonment should instead be viewed as farm re-location, as farms appear to have moved when their immediate surroundings became unsuitable.[730] The Rangárvellir study points to pre-1650 as a time of settlement stability whereas 1650-1800 was a period of instability.[731] The reasons for abandoning, or re-locating, a farm are multi-faceted and vary between areas, if not farms. There were direct and indirect causes for the changes in livestock numbers and farming strategies, but we can only view them through the *máldagar* and so our temporal resolution does not allow for the exacting explanations we would like. Nevertheless, it is likely that in the face of these factors, adaptation was occurring, both during and after the epidemics, into activities that yielded the greatest returns to ensure survival.

Furthermore, while the human population may have returned to pre-plague levels within a hundred years, it is possible that changes in farming practices adopted in the aftermath of the plagues had a long-term effect on livestock numbers and management. The sixteenth century preference for sheep farming, as shown by the variation in cattle:sheep ratio, could have been one of these changes.[732] Caution is needed when making generalisations such as this because, as shown above, there was not a general increase in sheep farming on all church-farms. The variable rate in different regions also indicates factors under human control. Where it has been possible to investigate human agency, for example in homefield enrichment patterns, it has been demonstrated that farming practices underwent changes from the fourteenth century onwards, and the possible social reasons behind them have been discussed.[733] A reduction of

[728] J. Sandnes, 'Settlement Developments in the Late Middle Ages (approx. 1300-1540)' in S. Gissel, E. Jutikkala, E. Österberg, J. Sandnes and B. Teitsson (eds.) *Desertion and Land Colonization in the Nordic Countries c. 1300-1600* (Stockholm, 1981), pp.78-115, p.101.
[729] Sveinbjarnardóttir, *Farm Abandonment*, pp.173-178.
[730] Elín Ósk Hreiðarsdóttir, Gúðrún Alda Gísladóttir, Kristborg Þórsdóttir and Ragnheiður Gló Gylfadóttir, 'Abandoned Settlements at the Foot of Mt Hekla: a study based on field survey in Rangárvellir', *Archaeologia Islandica* 11 (2015), pp.33-56, pp.49-50.
[731] Ibid., pp.49-50.
[732] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, p.184.
[733] Bolender, *The Creation of a Propertied Landscape*', pp.222-228.

livestock, though, does not necessarily indicate impoverishment but could reveal a change in farm resource management, for example a heavier reliance on wild and marine resources with livestock kept to cover basic needs.

The development of non-milking sheep farming in the Westfjords in the sixteenth century was not caused by the second plague epidemic as it does not appear to have reached the region. Instead, we must look to other explanations. As already noted, the Westfjords had limited good quality pasture land, so sheep would have been the better-suited species as they are able to survive on sparser, poorer quality vegetation. In addition, the non-milking sheep could graze on the uplands unsupervised. Milking stock were kept to cover subsistence needs, while non-milking sheep provided both meat and wool. In contrast to the daily labour demands imposed by a milk economy, a wool economy would only need labour during lambing, shearing and the round-up. A mainly wool economy would also make labour available during the fishing season and would provide wool that could be processed for export. Therefore, non-milking sheep farming could be advantageous for Iceland's export economy. For farms with larger households where labour could be spared or labour duties imposed, the incorporation of fishing is likely to have covered subsistence needs and generated a surplus. Smaller households may have banded together to fish collectively and share equipment.[734] The frequency and success of fishing trips would be a factor governing the amount of surplus for all farms. The geographical proximity of farms to fishing grounds may also have influenced the role fishing played on church-farms.[735] This could have contributed to the preference for sheep farming on all the church-farms in Ísafjarðarsýsla after the fourteenth century when fish became the most important export as a result of overseas demand.

The temporal distribution of sources means we cannot chart exactly when changes in livestock herds happened, or narrow down specific causes for each church-farm. The annals may give indications, but doubts have been raised about their usefulness when used in other studies.[736] It appears that farming strategies were more homogenous in the twelfth and thirteenth centuries than in the sixteenth century. Some changes were underway by the fourteenth century, which was also a time of expansion of livestock herds on church-farms.

[734] Sveinbjarnardóttir, *Farm Abandonment*, pp.173-174.
[735] Ibid., p.174
[736] Ogilvie, 'Local knowledge and travellers' tales', pp.265-267.

The evidence for the sixteenth century shows that some church-farms were even increasing their herds. Overall, there was a move towards sheep farming for the purpose of wool production.

The preference for sheep farming was sensible in view of changing conditions, where sheep could be fed on less but still provide a range of products.[737] While a change towards sheep farming might have meant less milk and meat, it would also have resulted in more wool that would be manufactured into clothing and *vaðmál* for export. Sheep farming also complemented fishing activities, which permitted a diversification of resources to ensure survival.

[737] *Búalög* lists the suggested hay fodder for cows and ewes, showing that sheep were recommended less hay than cows, making sheep a better return for hay intake. *Búalög*, p.36.

CHAPTER FIVE
PRODUCTS AND CONSUMPTION

6.1 INTRODUCTION

Whereas in the previous chapter the composition of herds was used to identify what was produced, this chapter will address the products and their consumption. Products can be primary: meat, bones, tallow, hair and skin. They can also be secondary: milk, wool, offspring, draught-work and manure. These are not exhaustive lists and represent the most common products from Icelandic domestic livestock. Þorvaldur Thoroddsen's work still contains the most detailed historical overview of the products produced by Icelandic farms.[738] However, unlike Þorvaldur, this chapter examines more than just the contrasting economies of milk or meat for cattle and sheep. It considers other products for which there is less evidence and how the living animals also functioned as products. While Þorvaldur and Árni Daníel Júlíusson both concentrate on livestock numbers or populations for the less frequently discussed goats and pigs, this chapter will examine the available evidence for pigs and goats products.[739] By examining their products we gain a greater understanding of their scarcity because their products were not of great enough significance for them to be reared, even at wealthier farms. Horses will be re-evaluated because they were more than a source of meat. Modern zooarchaeological evidence indicative of livestock utilisation will be incorporated, as too will saga and documentary evidence to provide a fuller understanding of the products.

Context can greatly influence consumption. The main form of consumption addressed in this chapter will be within the economic sphere, whether as food goods, clothing and craft-working, and relied on the economic value of goods, be it a quantity of butter or length of *vaðmál*. Whilst this thesis concentrates on the economic aspects of pastoral farming, it is necessary to consider the social and religious attitudes as these also influenced consumption patterns. For example, the Church's prohibitive attitude to horse-meat consumption changed the utilisation of horses after death from a meat-bearing animal to one that had its meat consumed by other animals. Gunnar Karlsson shows the diverse uses of horses in Iceland, from riding and fighting to generating manure, though unlike in other regions of Europe

[738] Thoroddsen, *Lýsing Íslands* III, pp.246-247, 267-273, 336-341; IV, pp.45, 67-68, 69.
[739] Ibid., IV, pp.67, 72; Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* IV, pp.113, 133, 135.

Icelandic horses were not used to pull wheeled vehicles, but does not show the various ways they were utilised after death.[740]

Products were also passed along exchange networks, so we should not think of farms where products were generated as the sole destination for products.[741] Animal products were important in regular exchanges, such as tithes and rents. More recent published research has expanded our knowledge of trade as a form of exchange, and though the research shall be incorporated at different points, trade will not form the main focus of this chapter.[742] Neither will *vaðmál* be discussed as it has been examined by others and as a manufactured good is somewhat removed from livestock.[743]

This chapter will demonstrate that different aspects of farming were inter-related and how these relationships influenced the proportions and numbers of livestock kept by farmers. For example, a decrease in the number of oxen over time can be connected to a reduction in arable farming, and increased the reliance on horses as beasts of burden. I will argue that the keeping of goats, while influenced by ecology, was also a conscious choice rather than a necessity for some farmers. The survival of people in Iceland has been due to their ability to gain as much as possible from their resources, including livestock. The following section will examine the most frequently mentioned cattle products: milk and meat. Then move onto evaluate other cattle products, such as their use in ritual activity and as beasts of burden.

6.2 CATTLE

Cattle had both economic and social significance, and their prominence in the economy is well documented.[744] Patterns of consumption indicate the extent to which farms followed a milk or meat economy, though there were more products to be obtained from cattle. Cattle were utilised for food stuffs, leather, horn, manure, tallow, and as beasts of burden. Dairy cattle were used for breeding and milking, oxen for traction and bulls for reproduction. Meat

[740] Karlsson, *Lífsbjörg Íslendinga*, p.148.
[741] As well as producer farms, which produced goods, there was also consumer farms and non-farm sites that consumed goods, such as Gásir and urban sites. There was the export market too.
[742] For example, R. Harrison, 'Connecting the Land to the Sea at Gásir: International Exchange and Long-Term Eyjafjörður Ecodynamics in Medieval Iceland', in R. Harrison and R. Maher (eds.) *Human Ecodynamics in the North Atlantic: A collaborative model of humans and nature through space and time* (London, 2014), pp.117-136.
[743] Þorláksson, *Vaðmál og verðlag*.
[744] See Section 4.2.

and vellum could be obtained from calves, and skins or leather from adult cattle. Bone, tallow and manure were produced by all cattle. In medieval Iceland, cattle products do not appear to have been destined for the international market in the same way as *vaðmál* or dried fish. Instead they were mainly used within the household and local economy. Butter, for example, was a form of payment accepted for tithes.

6.2.1 Milk or meat?

Any discussion of Icelandic cattle farming will generally focus on the production of milk and meat. It is unlikely that any farm would have followed a solely meat or milk model. It is more likely farmers would maintain herds that mixed the two economies to suit their own requirements and resources. The literary sources record the sustaining properties of milk at all levels of life; from the gods to humans, milk was essential for survival. In Norse mythology, the cow Auðhumla is famed because her milk fed the giant Ýmir from whom the world was made.[745] Two examples from *Íslendingasögur* illustrate the life-giving properties attributed to milk. In *Egils saga*, Egill refused food following the death of his sons, but is tricked into drinking milk and gains the strength to continue living.[746] In *Þorvalds þáttr víðförla*, Máni, a Christian does not want to interact with heathens so survives on the products of a cow that grazes in the enclosure surrounding a church.[747] Máni does not appear to have any other food resources apart from dairy products, something that is just about conceivable but more likely this represents another tale emphasising the importance of cattle. Most of our evidence of milk production comes from archaeology and through examining age-at-death profiles.[748]

For cattle farming, the most resource-efficient management strategy is dairy farming because milk cows will produce more than their carcass weight in products over a lifetime.[749] The archaeological recovery of large numbers of neo-natal bones and adults that had passed their growth peak, with few specimens aged between infants and older adults, is thought to show a milk economy.[750] This pattern suggests that infant calves were slaughtered to provide more milk for human consumption as well as the slaughter of unwanted males. The adults slaughtered were most likely worn-out milkers who had reached the end of their productive

[745] *Gylfaginning* lines 5-8, A. Faulkes, *Edda: Prologue and Gylfaginning* (Oxford, 1982), p.11.
[746] *Egils saga skalla-grímssonar*, ÍF II, chapter 78, p.245.
[747] *Þorvalds þáttr víðförla*, ÍF XV, chapter 8, p.84.
[748] The documentary evidence is not useful for this aspect because it does not record these details while the sagas only record the age-at-death only in exceptional circumstances.
[749] Hambrecht, 'Zooarchaeology and the Archaeology', p.7.
[750] Amorosi, 'Icelandic Zooarchaeology', p.406.

lives. All these animals would eventually provide meat and other products. Halstead has also argued that high numbers of calves in animal bone assemblages may demonstrate high rates of natural mortality, such as still births, due to malnutrition and disease among other reasons.[751] The difficulty of distinguishing between natural deaths and selective slaughter makes it difficult to separate the two processes, and it is further complicated by how people chose to dispose of the carcasses. It is unlikely that calves that died of natural causes were eaten by humans because of the uncertainty surrounding cause of death. Instead, the carcass may have been processed for cat or dog consumption, but it remains unclear if the bones were disposed of in the middens in the same manner as slaughtered calves, or whether cats and dogs would discard of the bones elsewhere.[752]

In contrast, a meat economy is generally assumed to be indicated by the remains of more adults aged 1.5-3 years when they were in their 'prime meat' stage of life and the meat would have been of the best quality. In a meat model, animals were not kept for milk, thus there was no need to slaughter calves to reduce competition but weak or unsuitable calves would be slaughtered. There would be an abundance of animals aged 1.5-3 years with some older adults present as good breeding cows would have been kept to produce the next generation. The age profiles of milk and meat economies are almost inverted examples of each other.[753]

These models are only general patterns and neglect to consider the role of individual farmers and other factors that might influence what cattle a farm produced. Scholars studying medieval dairy production outside of Iceland have questioned the age of observed calf mortality as not actually fitting the 'milk model'.[754] It has been suggested that, in some cases, calves would need to be kept with the cows for longer to trigger milk let-down and ensure a continuous supply of milk, resulting in an age-at-death profile of months instead of the common idea of days or weeks. The higher proportion of neo-natal (less than three months) deaths recovered from Icelandic excavations – 15%-50% of the bovine bone assemblage –

[751] P. Halstead, 'Mortality Models and Milking: Problems of Uniformitarianism, Optimality and Equifinality Reconsidered' *Anthropozoologica* 27 (1998), pp.3-20, p.12.
[752] Slaughter marks on calf bones would help distinguish between processed and un-processed carcasses, but this aspect would be masked if the carcass would processed for cats or dogs, as likely to be the case in a country where nothing went to waste.
[753] E.J. Reitz and E.S. Wing, *Zooarchaeology* (Cambridge, 2008), pp.306-307; Payne, 'Kill-off Patterns in Sheep and Goats', pp.282-284.
[754] F. McCormick, 'Early Faunal Evidence for Dairying', *Oxford Journal of Archaeology* 11(2) (1992), pp.201-209, p.202; Halstead, 'Mortality Models and Milking', pp.3-20, provides an in-depth discussion of the debate and other methods of maintaining continuous lactation.

stands in contrast with the age of living calves used to ensure a milk supply.[755] Indeed, the general Icelandic archaeological age-at-death profile supports infant calf mortality. Yet, it is unclear whether Icelandic cows needed their calves to be present in order to lactate or when calves chosen for rearing were weaned. Modern cows, including Icelandic cows, do not need calves present to induce milk let-down, but it is uncertain when this trait emerged because it was not present in medieval European cows.[756] When discussing the early modern period, Þorvaldur Thoroddsen stated that calves were given milk for 6-8 weeks and then weaned onto other food, but does not say if calves were needed for milk production.[757] Unfortunately, the Icelandic medieval sources are silent on the matter. It is possible the calves were allowed restricted access to their mothers, to aid the milk let down, then removed so that the milk could be collected for human consumption. Alternatively, calves could have been allowed to suckle after milking to ensure the cow was sufficiently milked. The presence of small stalls in excavated *fjós* would support the keeping of calves alongside the milking cows. The most efficient method would be for milking cows to accept calves other than their own, so the least number of calves were needed to aid milking.

A by-product of a dairy economy or high calf mortality rates was the availability of calfskins as well as meat and rennet.[758] Calfskins were used most notably for vellum, an essential part of manuscript construction, on which our saga evidence was written.[759] There must have been a need for vellum as Christianity became established from the eleventh century onwards.[760] It is thought that one calfskin could produce between two and eight sheets depending on the size of sheets required.[761] An eighteenth century French text stated vellum production should use skins from calves aged between eight days and six weeks, but it is unknown whether this was the case for all cattle breeds.[762] If calves of a certain size or age were selected, it would be advantageous to discover if farms where scriptoria are known to have existed had a different age-at-death profile for calves. We can assume that Skálholt, Hólar, monasteries,

[755] R. Harrison, 'Interim Report of faunal analysis from the 2005 Excavations at Gásir, Eyjafjörður, N Iceland', NORSEC Zooarchaeology Laboratory Report no.28 (2006), p.9. http://www.nabohome.org/publications/labreports/Norsec36Gasir05zooarch.pdf
[756] Halstead, 'Mortality Models and Milking', p.5; McCormick, 'Early Faunal Evidence for Dairying', p.202.
[757] Þorvaldur Thoroddsen, *Lýsing Íslands* III, p.246.
[758] Rennet was used in the processing of dairy products, and rennet from milk fed calves is thought to be better than from hay fed calves, see Amorosi, 'Icelandic Zooarchaeology', p.389.
[759] Calfskins were also used for more mundane items as clothing.
[760] J. Kristjánsson, *Icelandic Manuscripts: Sagas, History and Art* (Reykjavík, 1993), p.44.
[761] Ibid., p.47.
[762] De La Lande, M., *Art de faire le parchemin* (Paris, 1762), p.24.

and possibly some *staðir*, had some use for this farming by-product because of book production, but were unlikely to have influenced calf slaughter practices.

In Iceland, as elsewhere, cattle were a versatile species useful for primary and secondary products. The potential for cows to milk all year round made them valuable creatures. Meat, skin and other products were obtained when a neat was slaughtered, though the age when the animal was slaughtered depended on the farm's management strategy.

6.2.2 Patterns of consumption

Livestock are reared for their products and how these products were consumed informs us about several aspects of society, for example the social status of sites, ritual activity and the method of slaughter.[763] The balance between meat and milk production at a site gives insights into the economy practised at that site and the potential resources available to those people. It is, therefore, of great importance to examine consumption patterns and what these patterns indicate about the farming strategies employed with regard to cattle farming. This section will concentrate on a selection of sites, mainly in the Mývatn and Eyjafjörður areas, to examine the variety of consumption patterns on individual farms.

The production of beef was an evitable part of cattle farming, however, the age-at-death profile would show whether it was the desired product or a by-product of dairy farming. Þorvaldur Thoroddsen argued that beef was consumed by all people in the Sturlunga Age, as mutton was in later centuries.[764] However, he could not address the issue of domestic livestock's age-at-death nor the regularity of beef consumption, which might be interpreted as a signal of social status, because zooarchaeology was yet to be incorporated into archaeological research. Árni Daníel Júlíusson and Jónas Jónsson report that beef and cattle innards were eaten daily pre-1100, but again do not discuss the age-at-death that would indicate the desired products, as opposed to the consumption of by-products.[765] The significance of cattle ownership or beef consumption as a symbol of high status can be seen in the zooarchaeological record. Sites that are known from the written sources to have been

[763] It is assumed that the more cattle, compared to sheep, a farm owned the higher status the farm had. Cattle were more expensive animals to rear and required good quality hay and housing. Further, farms established earlier in the settlement are thought to have had access to more resources and were so able to call upon more resources to maintain larger livestock herds. Bolender et al., 'Unsettled Landscapes', p.225.
[764] Thoroddsen, *Lýsing Íslands* III, pp.220, 266.
[765] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* III, p.123.

wealthy, such as Bessastaðir and Viðey, have higher relative percentages of bovine to caprine fragments when compared to a small farm like Steinbogi, indicating high status farms more frequently consumed beef.[766] For several farms in the Mývatn area, it is assumed that a higher cattle:caprine ratio in earlier contexts, compared to later contexts, actually reflected the diminishing availability of better quality meadows that was essential to feed cattle.[767] Others, however, have argued that the reduction in cattle numbers over time may be due to the lack of good quality fodder and a move towards wool production, which was advantageous because *vaðmál* was a commodity for export.[768]

Generally, Icelandic farms appear to have followed a mostly milk economy for cattle, regardless of herd size or status, with higher percentages of neonatal bones (less than 3 months old), usually comprising of 15-50% of the total bovine archaeofauna, and bones from individuals over three years.[769] There are, of course, exceptions to this pattern. Gásir, a trading centre, is distinct from farm sites because the archaeofauna has hardly any neonatal bones, c.5%, reflecting its nature as a high status consumer and not a producer site. The presence of some older cattle bones and an abundance of animals aged between 1-1.5 and 2.5-3 years indicates that cattle were consumed as 'prime beef' not as dairy by-products.[770] The age profile demonstrates that the cattle consumed at the site had been reared specifically for beef.[771] The farms supplying Gásir, therefore, must have at least in part managed their cattle to produce 'prime beef'. The regional studies around Gásir and Mývatn have allowed this hypothesis to be tested, as will now be discussed.

Nearby to Gásir, the farm of Oddstaðir (Hörgárdalur) is unlike other Icelandic farm sites as it shows stability in the relative abundance of livestock species throughout the life of the site,

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[766] Harrison et al., 'Gásir in Eyjafjörður', p.107; S. Brewington, R. Harrison, C. Amundsen and T. McGovern, 'An early 13th c Archaeofauna from Steinbogi, Mývatn District, Northern Iceland', NORSEC Zooarchaeology Laboratory Report No. 13 (2004), pp.2, 16 classes Steinbogi as a small site and later as a small farm. http://www.nabohome.org/publications/labreports/Norsec13Steinbogi.pdf

[767] T. McGovern and S. Perdikaris, 'Report of Animal Bones from Selhagi, Mývatn District, Northern Iceland', NORSEC Zooarchaeology Laboratory Report No. 7 (2003), p.8. http://www.nabohome.org/publications/labreports/Norsec7Selhagi.pdf

[768] Amorosi, 'Climate Impact and Human Response, p.123.

[769] Harrison, 'Interim Report of faunal analysis from the 2005 Excavations at Gásir', p.9; McGovern, 'The Archaeofauna', p.190 state bovine neonatal bones comprise of 30-50%, but this ignores farms such as Stóraborg, Viðey and Steinbogi. Harrison et al., 'Gásir in Eyjafjörður', p.108.

[770] Harrison et al., 'Gásir in Eyjafjörður', p.108. Percentages based on NISP.

[771] Seventeenth and eighteen century contexts testify that Skálholt was undertaking beef farming and it is the only other Icelandic farm to have a 'prime beef' cattle profile. Hambrecht, 'Zooarchaeology and the Archaeology', p.8.

from the late ninth to late fourteenth centuries.[772] It has been argued that this stability was due to Oddstaðir (and other farms in the area) continuing to supply nearby Gásir with 'prime beef'.[773] At Oddstaðir, cattle make up 18-25% of the NISP and the cattle:caprine ratio was approximately 1:3 for three of the four phases of the site, with phase IV having a ratio of 1:4.[774] In comparison to contemporary sites, a ratio of 1:3 is a middling value. Known wealthier farms tend to have ratios closer to 1:1, while the poorest sites can have ratios in excess of 1:10. At Oddstaðir, the only identifiable change in cattle management was the reduction in the proportion of neo-natal bones recovered, a reduction from approximately 30% in the earlier periods of the site to less than 15% after the thirteenth century.[775] The reduction in neo-natal bones and the increase in meat-bearing elements would indicate a shift in the economy to one that focused more on beef, and maybe better nutrition for cows pre- and post-calving. Caution is needed, however, with the bovine aging because of the small sample size that the results are based on.[776] Another proposed explanation for the stability was that Oddstaðir was owned by another, well-resourced farm that had resources to rear cattle for beef, as opposed to the more efficient dairy economy.[777]

The celebrated farm site of Hofstaðir (Mývatn) is the most extensively researched site in Iceland and most of the zooarchaeological data comes from three middens.[778] The percentage of cattle bones recovered remains roughly the same throughout the history of the site and shows a low level of calf mortality in comparison to other Mývatn farm sites.[779] In fact, when compared to a range of different sites, calf mortality of c.20% at Hofstaðir falls between the trading site of Gásir and other Icelandic farm sites where neonatal bones account for between 30% and 50% of the total cattle bones.[780] Unlike Sveigakot, another farm in Mývatn, Hofstaðir, appears to have slaughtered some adult cattle before they had reached the age of a worn-out milker.[781] Selhagi, also situated in Mývatn and dating from the ninth to twelfth

[772] R. Harrison, 'Oddstaðir in Hörgárdalur, N. Iceland: Report of the 2009 Archaeofauna', NORSEC Zooarchaeology Laboratory Report No. 58 (2012), p.26. http://www.nabohome.org/uploads/ramonah/RH_Oddstadir_NORSEC_Report_NR_58.pdf
[773] Harrison, 'Connecting the Land to the Sea at Gásir', pp.117-136.
[774] Harrison, 'Oddstaðir in Hörgárdalur', p.29.
[775] Ibid., pp.31-32.
[776] Ibid., p.31.
[777] Ibid., p.32.
[778] McGovern, 'The Archaeofauna', pp.174-175.
[779] Ibid., p.188.
[780] Ibid., p.188.
[781] When estimating age based on tooth wear, caution is needed because it has been suggested that the quality of fodder could affect tooth wear patterns, the rougher the fodder the more wear on the teeth and the older the age attributed to the animal. Sveigakot's cattle could. Therefore, be younger than the tooth wear analysis suggests.

centuries, further emphasises the difference in Hofstaðir's economy. Preliminary findings show Selhagi's neo-natal cattle bones accounted for 51% of the NISP for cattle, whereas the adult cattle accounted for 38%.[782]

Hofstaðir seems then, to have kept a mixed cattle economy because it combined a milk model represented by the slaughter of a number of calves soon after birth and older adults, and a meat model represented by another age cluster of cattle approaching their full growth potential.[783] Unfortunately, it is not possible to say whether Hofstaðir's cattle herd reflected a beef economy because Hofstaðir, a wealthy central farm, could have drawn on surrounding farms for livestock, or else distributed some to allies and dependent farms. If this was the case, then the zooarchaeology would reflect the consumption, but not the livestock herds at Hofstaðir.

It is well established that in Europe the consumption of meat, especially beef was an indicator of high status.[784] More specifically in England, beef was consumed by the elite while the poorer sections of the population lived on vegetables; when they ate meat it was often in the form of pork.[785] In Iceland, however, the reliance on pastoral farming resulted in all sections of society consuming some form of meat as a by-product of a dairy economy, though the regularity of this meat consumption is difficult to discern. It was the balance between milk and meat consumption that indicates social status in Iceland. The consumption of 'prime beef' demonstrates a farm's inhabitants were of higher social status because they could afford to slaughter animals before the animals had reached the end of their productive life. Thus, the Icelandic diet was atypical of other regions in north-western Europe because Iceland was more dependent on pastoral farming. In contrast to Þorvaldur's argument, it is apparent that the consumption of cattle products in Iceland was more complex than a general decrease in

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The analysis at Hofstaðir and other farms, however, is based on several methods of aging to provide more robust age estimates. McGovern, 'The Archaeofauna', p.193.

[782] Orri Vésteinsson, 'Archaeological investigations at Sveigakot 2001: with reports on preliminary investigations at Hrísheimar, Selhagi and Ytri Tunga', Fornleifastofnun Íslands Report FS173-00212 (2002), p.99.
http://www.nabohome.org/uploads/fsi/FS173-00212_Sveigakot_2001.pdf

[783] McGovern, 'The Archaeofauna', p.195.

[784] R. Hoffman, 'Frontier Foods for Late Medieval Consumers: Culture, Economy, Ecology', *Environment and History* 7 (2001), pp.131-167, p.137.

[785] U. Albarella, 'Pig Husbandry and Pork Consumption in Medieval England', in C. Woolgar, D. Serjeantson and T. Waldron (eds.) *Food in Medieval England* (Oxford, 2006), pp.72-87, p.73.

beef-eating. At present, the quality and quantity of zooarchaeological collections limits our ability to say more.[786]

6.2.3 Ritual consumption

The slaughter of an animal is not always about obtaining products but can have a social significance, for example in ritual activity. Whilst the written sources, mainly the sagas, give details about the supposed context of these activities, archaeology gives another perspective. Zooarchaeology gives information on the method of slaughter, the possible implements used and on who had access to the bones. A comparison of butchery practices at several Mývatn sites have shown that axes or cleavers were used to initially dismember animal carcasses.[787] The utilisation of animals for their products was not one event such as slaughter, instead consisting of multiple stages of processing to utilise all useful parts of the animal. The consumption of animals within the social sphere could occur at any stage in the processing, either living animals dedicated to gods, ritual sacrifices or deposition.

It is impossible to discuss ritual activity in Iceland, especially relating to cattle, without reference to Hofstaðir because there was potentially ritual evidence recovered from the site. Within the longhouse 23 cattle skulls were recovered dating from the tenth and early eleventh centuries. These skulls had signs of 'specialized butchery and prolonged display on the outside of a structure', which includes impact to the front of the skull and beheading.[788] This suggests the people involved had a flair for the dramatic. Doubt has been raised about the ritual activity at Hofstaðir, mainly whether the rituals were as theatrical as the site reports suggest.[789] Setting aside the ritual activity aspect, the skulls provide an insight into the rearing of cattle. Of the skulls that could be analysed, five out of the seven have been found to be adult males.[790] These bulls were larger than other cattle across the Norse North Atlantic.[791] While these skulls show non-economic consumption of bulls, the rest of the carcasses were presumably eaten, but discussions have so far failed to appreciate the wider context: at an

[786] *Máldagar* have not been discussed here because they indicate the production of livestock, not the consumption of livestock. The *máldagar* are examined in Chapter Four.
[787] McGovern and Perdikaris, 'Report of Animal Bones from Selhagi, Mývatn District', p.8.
[788] McGovern, 'The Archaeofauna', p.249.
[789] S. Sindbæk, 'Book Review of Hofstaðir: Excavations of a Viking Age Feasting Hall in North-eastern Iceland', *Antiquity* 85(329) (2011), pp.1100-1101, p.1100; C. Callow, 'Book Review of Hofstaðir: Excavations of a Viking Age Feasting Hall in North-eastern Iceland', *Early Medieval Europe* 20(3) (2012), pp.369-371, p.370.
[790] McGovern, 'The Archaeofauna', p.195.
[791] Ibid., p.240.

early date in Icelandic history Hofstaðir had access to bulls that were bigger than others found in the Norse North Atlantic. We are left questioning whether the size was due to larger cattle brought to Iceland with the settlers, selective breeding in Iceland, or the availability of fodder that encouraged growth. These are important questions when examining past livestock management. As of yet, there is not the evidence to answer these questions, but hopefully further research will try to look beyond the ritual to more economic aspects.

Not surprisingly, the recording of the ritual use of cattle is restricted to the *Íslendingasögur*, which are meant to be set before or during the infancy of Christianity in Iceland, and they contain some indication of slaughter practices. The examples of the ritual use of cattle convey pagan beliefs, such as the dedication of an 'old ox' to Freya, which dies immediately after the dedication.[792] The significance of using an old ox was that nothing was wasted from livestock; the animal was approaching the end of its productive life and would have been slaughtered anyway. If the ritual use of old animals past their productive age is true then there would be less of an economic impact because the animals would no longer have been useful. For the same reason and to the same god, another character has a bull slaughtered for a feast in *Brandkrossa þáttr*.[793] There is no description of age but the animal was a bull (*graðungr*), which emphasises the connection between sacrifice and male animals. The slaughter of animals specifically for secular feasts, such as weddings, equally tell us little about the method of slaughter. In *Finnboga saga*, oxen were slaughter for a feast and the higher status of the occasion was made clear by the brewing of *mungát* and *mjöðr*, ale and mead, but is uninformative about slaughter practices.[794] Sagas, therefore, inform us about the context and intentions of the characters, but not the slaughter practices or whether there were differences between ritual and secular slaughter.

It is assumed, however, that there would be differences between secular and ritual slaughter. Secular slaughter would aim to use all parts of the animal, whereas ritual slaughter, such as at Hofstaðir, where cattle were beheaded was not concerned with the full utilisation of the carcass. Beheading as a method of slaughter was only recorded once in the sagas.[795] In *Egils*

[792] *Víga-Glúms saga*, ÍF IX, chapter 9, p.34, '*uxa gamlan*'.
[793] *Brandkrossa þáttr*, ÍF XI, chapter 1, pp.185-186.
[794] *Finnboga saga*, ÍF XIV, chapter 29, p.301.
[795] Not all ritual use of livestock in *Íslendingasögur* involved the death of the animal. It appears that livestock could be dedicated to a god without the need for sacrifice, as *Flóamanna saga* related that an ox was dedicated to Þórr when it was a calf, and was only killed when it was thrown overboard in an attempt to rid a boat of pagan items. *Flóamanna saga*, ÍF XIII, chapter 21, p.281.

saga two oxen were lined up next to each other and were simultaneously beheaded.[796] A slab of rock was placed underneath the oxen's necks and it only took one swing of an axe to decapitate both animals. The saga does not explain if beheading was the typical method of slaughter. As the incident took place after a herd of oxen had been driven to the farm in the autumn, it is likely that the oxen had spent the summer out at pasture and were returning to the farm for the winter, but it is not mentioned if all the oxen were meant to be slaughtered. As beheading does not make the most of the products available and makes processing the carcass difficult, it would be a wasteful form of slaughter.[797] There was no sacrificial significance attached to the slaughter in *Egils saga* and may have been included to emphasis the distant past of the incident. Indeed, Skallagrímr was a distinguished character known to have been gifted with the axe so his method of slaughter could be a literary device and unreflective of farming practices. We have evidence of beheading as a method of slaughter, though, it is not common in the archaeological record, probably because it made processing the carcass more difficult and was unlikely to have been a practice used in the routine slaughter of animals.

6.2.4 Beasts of Burden

When discussing farming it is important to take a holistic approach to 'products', otherwise we run the risk of narrowing our understanding of the connections between different types of farming. In this section, the use of cattle and horses as draught animals will be examined. The use of draught animals is mostly discussed by scholars in connection with arable farming.[798] In the first centuries of Icelandic settlement, small scale arable farming was conducted and beasts of burden were needed for ploughing. Due to Iceland's climate, arable farming was only ever marginal, leaving meagre evidence, and it is thought that it had ceased to be a viable form of farming by the sixteenth century.[799] Besides arable farming, however, there was a need for draught animals to pull sledges and move hay, as well as providing a mode of transport for people, something that is supported in numerous sagas. Oxen were not the only beasts of burden. The sagas record horses being used too. It is necessary to examine how oxen were used and to distinguish them from the utilisation of horses for a better understanding of these essential tasks that underpinned all farming. Sagas suggest that oxen

[796] *Egils saga skalla-grímssonar*, ÍF II, chapter 38, p.95.
[797] The tongue is easier to remove when supported by the neck, McGovern, 'The Archaeofauna', p.249.
[798] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* III, p.123; Thoroddsen, *Lýsing Íslands* III, p.112.
[799] Simpson et al., 'Soil limitations', p.424.

were used as draught animals, both for ploughing and for pulling sledges across snow and ice.[800] Þorvaldur Thoroddsen stated that cattle were used for ploughing, not horses, and arable farming was limited to chieftains' farms.[801] Horses, instead, were used for carrying loads of various kinds and pulling sledges. Árni Daníel Júlíusson and Jónas Jónsson, on the other hand, assert that oxen were used for ploughing more in the Saga Age before they were mostly replaced by horses in the fourteenth century.[802] The question, then, is whether oxen were used exclusively for ploughing until arable farming ceased or whether there was a gradual replacement of oxen by horses.[803]

Soil conditions are thought to govern the draught animal used for ploughing, as in England where generally oxen were used for plough-work when the soils were heavier because it is considered that they had the strength to pull the plough through the heavier soils.[804] Horses, on the other hand, did not have such strength so were limited to ploughing lighter soils, yet had the advantage over oxen of being faster. If this thinking was applied to Iceland, the replacement of oxen by horses may be linked to the reduction in arable farming and the need to transport goods, such as hay, quickly between destinations.[805] There was probably not an outright displacement of oxen by horses because *Grágás* and *Jónsbók* both mention fully grown plough-oxen as being individually assessed in the spring, signalling they were still present at least when the laws were composed in the twelfth and thirteenth centuries.[806] Þorvaldur's view was that oxen were actually widely used as draught-animals, notwithstanding the saga evidence for horses used as draught animals. He also claimed that oxen were used for draught-work in some places in the sixteenth century, which is possible as

[800] *Íslendinga saga*, *Sturlunga Saga* I, chapter 129, pp.415; *Svínafellinga saga*, *Sturlunga saga* II, chapter 8, p.95; *Landnámabók*, ÍF I, chapters 8, p.43; *Droplaugarsona saga*, ÍF XI, chapter 3, p.144; *Fljótsdæla saga*, ÍF XI, chapter 10, p.239.
[801] Thoroddsen, *Lýsing Íslands* IV, pp.10, 181.
[802] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* III, p.231.
[803] J. Langdon, *Horses, Oxen and Technological Innovation: The Use of Draught Animals in English Farming from 1066-1500* (Cambridge, 1986), pp.159-160, 163-164, 255-265 provides a comparative study of the introduction of horses into English medieval farming, the advantages of both animals as draght animals and possible reasons for the favouring of horses over oxen. As Langdon emphaises, context is of paramount importance for this discussion as regionality and soil conditions influence which animals chosen for tasks.
[804] J. Langdon, *Horses, oxen and technological innovation: the use of draught animals in English farming from 1066 to 1500* (Cambridge, 1986), pp.255-256.
[805] In a Europena context, oxen could be favoured because they did not need their diet supplemented by grain as horses did in order to be fit for work, McCormick, 'Animal husbandry', p.6. In Iceland, it appears that this was not a factor as neither oxen nor horses were fed grain.
[806] *Grágás* K.246, (1852), p.193; *Halldórsson, Jónsbók*, VIII, 6, p.215.

oxen continued to be reared.[807] Þorvaldur however, did not provide evidence for this assertion so we cannot comment on regional practices.

Þorvaldur appears to make the distinction between oxen's use as draught animals, for sledges for example, and horses used to carry goods.[808] This distinction, however, is not supported in either the *Íslendingasögur* or *Sturlunga saga*. *Fljótsdæla saga* has several references to horses pulling sledges with various goods (hay, people and turf) and two of these are across ice or frozen ground.[809] Only once does this saga mention oxen pulling a sledge of people, and in this case all fall through the ice, suggesting that the saga writers potentially thought oxen were unsuitable for this task.[810] Other sagas show both oxen and horses pulling ploughs, but mainly sledges across ice and in bad weather indicating that there was no difference in their use.[811] Indeed, in opposition to Þorvaldur's assertion, *Heiðarvíga saga* names a horse *Eykjarðr*, which is to say a horse that pulls a plough.[812] A distinction between the uses of oxen and horses cannot be supported and more likely depended on the availability of these animals, the means to rear them and the strength needed for the assigned tasks.

Þorvaldur's comparison of the number of cattle and horses in the *máldagar* which led him to conclude that there were more cattle than horses until at least the fifteenth century, does draw attention to the relative proportions of the animals yet does not tell us anything about their function. [813] Similarly, the comparison does not fully appreciate the nature of the *máldagar*, namely that they can neglect to record non-milking livestock. Most of the oxen recorded in the *máldagar* are listed as *uxi* (sg.) and dated to the fourteenth century. The last *máldagar* to record plough-oxen, *arðuruxi* (sg.) has been dated to 1397 for Garðar (Álptanes), where two old plough-oxen were listed.[814] While later *máldagar* do record oxen, they do not specify the purpose of the animal. No plough-oxen were recorded in the confiscation document of Guðmundur Arason in 1446, even though as Þorvaldur pointed out, seldom-mentioned pigs

[807] Thoroddsen, *Lýsing Íslands* III, p.217.
[808] Thoroddsen, *Lýsing Ísland* IV, p.31.
[809] *Fljótsdæla saga*, ÍF XI, chapters 12, pp.246-247, 13, p.249 and 19, pp.273-274.
[810] *Fljótsdæla saga*, ÍF XI, chapter 10, p.239. The same motif is used in *Droplaugarsona saga*, ÍF XI, chapter 3, p.144.
[811] *Vatnsdæla saga*, ÍF VIII, chapter 34, pp.90-91; *Droplaugarsona saga*, ÍF XI, chapter 3, p.144; *Landnámabók*, ÍF I, chapters 8, 83, pp.43, 120; *Svínafellinga saga*, *Sturlunga saga* II, chapter 8, p.95; *Prestssaga Guðmundar góða*, *Sturlunga saga* I, chapter 19, p.146.
[812] *Heiðarvíga saga*, ÍF III, chapter 22, p.278 and footnote 1.
[813] Thoroddsen, *Lýsing Íslands* IV, p.12. Also, it fails to appreciate the range of products obtained from cattle and horses, mainly meat but also horn and lard.
[814] DI 4, p.108. 'xviii kýr, xxx ásauðar, vii naut tvævetur, vi naut vetur-gaumul, ii ardurynx gamler'

were listed. Þorvaldur uses this absence as evidence for arable farming having ceased at Reykholt and other major farms in the west of Iceland by the mid-fifteenth century.[815] Recent pollen analysis has shown that barley cultivation ceased the the area around Reykholt by 1300, and there is no indication of arable farming in the fourteenth-century *máldagar*, as there is in an earlier *máldagi* dated to c.1185.[816] This earlier *máldagi* does not list oxen, only twenty cows, one two-year-old bull and 150 ewes. It, therefore, appears to be the case that either plough-oxen were used but not recorded, horses were used instead or arable farming had already ceased even at this early date.

It appears, therefore, that there were two main reasons for the decrease in non-milking cattle both related to their functions. Firstly, they were an inefficient use of resources, as dairy cows and sheep produced more goods for fodder. Secondly, there was less draught-work as arable farming became more marginalised, though we are unsure how widespread and for how long arable farming was undertaken in Iceland. Thus, the perceived decrease in the non-milking cattle population in Iceland partially appears to have been linked to the cessation of arable farming and the increased use of horses for traction and burden. This examination of beasts of burden, whilst brief, emphasises the significance of considering wider farming practices. It was not just fodder resources that influenced decisions about livestock rearing. Rather, changes in other functions and the suitability of these animals to undertake certain tasks also proved influential.

6.2.5 Manure

Another aspect of the holistic approach that will now be discussed is fertiliser, an essential part of farming as it maintains soil fertility. Various forms of fertiliser were available on medieval farms, one of which is manure, a by-product of every living animal. Wood ash could be also used as fertiliser, and it is likely that when people first arrived in Iceland woodland was burnt to make way for farms, and this enriched soil on which hay was later grown.[817] Yet, woodland became a closely controlled resources from at least the thirteenth century, which ruled out its further use as fertiliser.[818] From that time on, fertiliser came in

[815] Thoroddsen, *Lýsing Ísland* IV, p.181.
[816] Erlendsson, 'Plant Macrofossil and Pollen Evidence from the Surrounding Area', p.254; Benedikt Eyþórsson, *Búskapur og rekstur staðar*, pp.21-22; DI I, 279-280.
[817] Jóhannesson, *A History of the Old Icelandic Commonwealth*, p.293; Thoroddsen, *Lýsing Íslands* III, p.123 lists other type of fertilisers used in Iceland.
[818] Dugmore et al., 'Abandoned Farms, Volcanic Impacts, and Woodland Management', p.8.

the form of manure (human and animal), fuel ash and domestic waste.[819] Manure was also a multi-purpose resource as it too was used as fuel in Iceland. In early modern Iceland, sheep manure was used for burning while cattle manure was reserved for fertiliser. We cannot retrospectively apply these practices though, as at some ninth and tenth centuries farmsteads there is no evidence of sheep manure used as fuel. Indeed, Hofstaðir (Mývatn) has no evidence for the use of manure as fuel, whereas Sveigakot (Mývatn), a poorer farm, used cattle manure, which may be evidence for fuel scarcity because of its importance as fertiliser.[820] Therefore, while manure had different uses, during the time period considered in this thesis it appears that it was used mainly as a fertiliser. It is also important to appreciate that not all manure was the same, and cattle and sheep manure was favoured over horse manure, as the latter needed to be stored until it had sufficiently rotted down.[821]

Not all land was manured however, and in Iceland land was divided into two types in Iceland: cultivated and uncultivated. The cultivated land included hayfields, meadows and arable land, and were the areas that received manure. Indeed, the connection between manure and hayfields can be seen in the names for hayfield, *taða*, and manure, *tað*.[822] Uncultivated land was also manured when livestock grazed on it, for example the uplands, but this was unfocused and depended on where the sheep grazed. The introduction of manure on cultivated land took two forms: by being collected from elsewhere and then spread on the land, or directly from animals grazing the land and which trampled the manure into the soil.[823] The written sources tell us most about the distribution of manure by humans as there are several sagas examples of manure being moved, cleaned out of livestock buildings or manure heaps, *haugur*, near livestock buildings.[824] The placement of manure heaps near livestock buildings indicates that manure was stored on the farmstead until it was spread on the land.[825] Jóhannesson mentions the use of harrows, made from bundles of twigs or sticks,

[819] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* IV, p.21; Karlsson, *Lífsbjörg Íslendinga*, p.118. Animal manure is referred to as *tað* whereas human excrement is referred to as *skarn*. Simpson et al., 'Soil limitations', p.438.
[820] Vésteinsson and Simpson, 'Fuel utilisation in pre-industrial Iceland', p.182.
[821] Thoroddsen, *Lýsing Íslands* III, p.123.
[822] Jóhannesson, *A History of the Old Icelandic Commonwealth*, p.294.
[823] R. Jones, 'Why Manure Matters' in R. Jones (ed.) *Maure Matters: Historical, Archaeological and Ethnographic Perspectives* (Farnham, 2012), pp.1-12, pp.7-8 discusses the long history of this practice.
[824] *Brennu-Njáls saga*, ÍF XII, chapters 44, pp.112-113; *Svarfdæla saga*, ÍF IX, chapter 19, p.184; *Fljótsdæla saga*, ÍF XI, chapter 12, p.247; *Bjarnar saga Hítdælakappa*, ÍF III, chapter 12, p.139; *Grettis saga Ásmundarsonar*, ÍF VII, chapters 69, p.225; *Eyrbyggja saga*, ÍF IV, chapter 20, pp.52, 53.
[825] See R. Jones, 'Understanding Medieval Manure', in R. Jones (ed.) *Maure Matters: Historical, Archaeological and Ethnographic Perspectives* (Farnham, 2012), pp.145-158 for a discussion of manure beyond its economic value.

that were dragged around the hayfields in order to break up the manure, and thereby making it easier to mix into the soil, and so connected to draught animals discussed above.[826] Unfortunately, the sagas do not give any information on how the manure was spread, whether raked by hand as it was in later centuries, or with the use of draught animals.[827] From the saga evidence, we know that manure was collected and storaged, but not who undertook this task or the methods employed to spread the manure. For this aspects we now turn to the legal texts and modern soil analysis to gain an insight into past practices.

The meadowland where hay was grown was of great importance in Iceland, and this is demonstrated in the attention paid to meadows in the laws. *Grágás*, the earliest legal text, states that a tenant must take on enough people to work the meadows.[828] Yet, it is not until *Jónsbók* that we find evidence for the storing and spreading of manure. According to *Jónsbók*, at the end of a tenancy a tenant must move all manure to the fields, otherwise he will have to pay double for any manure not moved and for the moving of the manure by the new tenants.[829] The taking of manure from a rented farm was also forbidden and resulted in a fine and the labour of spreading the same amount of manure to the same standard as an owner.[830] These two clauses demonstrate a concern, not about working the land, but about who was responsible for providing the labour and that manure produced on a rented farm should be used to enrich its own farmland. *Grágás* did not have this concern and *Jónsbók* must reflect later awareness of changes in soil fertility and the labour involved to undertake manure spreading, both in moving and working it sufficiently into the soil. It has been argued that the number of livestock and availability of labour were controlling factors on manuring practices, and that the lack of both limited arable farming.[831] This is an important point as pastoral and arable farming cannot be separated because growth relies on enrichment from manure, which relies on fodder from arable and hay.[832] The grazing of livestock on hay-making and arable land after the crop had been cut would have been a less labour intensive method of manuring, but ran the risk of uneven distribution. At two sites in the south-west,

[826] Jóhannesson, *A History of the Old Icelandic Commonwealth*, p.294. See Section 6.2.4.
[827] Bolender, *The Creation of a Propertied Landscape*', pp.224, 226 gives early modern examples of manure being raked.
[828] *Grágás* (1852) K.219, p.135. Due to conditions in Iceland, if hay is not cut annually then hummocks form, which in turn makes hay-making difficult and reduces the amount of hay that can be cut.
[829] Schulman, *Jónsbók*, p.181, VII, 8.
[830] Ibid. *Jónsbók*, p.187, VII, 14.
[831] Simpson et al., 'Soil limitations', p.440.
[832] P. Fowler, *Farming in the first millennium AD: British Agriculture between Julius Caesar and William the Conqueror* (Cambridge, 2002), p.227.

Akurey (Kollafjörður) and Ketilstaðir (Mýrdalur), the soil evidence between the ninth and fifteenth centuries suggests livestock grazing with the use of additional fertilisers, though it is unclear whether the manure was worked into the soil or not.[833]

Modern soil analysis in Iceland has advanced our understanding of past manuring practices, and shown that the more frequent the manure application the greater depths that the manure can reach.[834] A study of Icelandic homefield enrichment has shown changes in practices over the centuries on several farms, with more even enrichment from the twelfth to fourteenth centuries, and patchier enrichment in the samples dated to the fourteenth to eighteenth centuries, which in some cases cluster around buildings.[835] As Bolender argues, population loss played a role in the reduction of manuring, but property ownership, or tenancy in other words, was significant too. As tenancies were relatively short-term, a year or two, there was no incentive to invest large amounts of labour in spreading manure and maintaining soil fertility.[836] As mentioned elsewhere in this thesis, there is some debate about the prevalence of tenancy before the eighteenth century, but it seem reasonable that tenants would attempt to minimise labour expenditure when there was no long-term benefit to themselves.[837] Others have also shown differences in manuring practices, as at the sites of Akurey and Ketilstaðir, where manure application was low at both sites, but was reduced further at Ketilstaðir from the fourteenth century onwards.[838] In addition to labour and land security raised by Bolender as explanations, Simpson et al. include the availability of manure as demand was greater than supply due to the small number of livestock kept on average farms.[839]

The gathering of fodder to feed livestock through the winter was an essential part of Icelandic farming and manure was used to aid this vegetation growth. As shown in *Grágás*, there was an early awareness in Iceland of the amount of labour needed to work the land. Possibly more labour than a household alone could provide. Then *Jónsbók* suggests that even by the thirteenth century there was concerns about the fertilisation of rented land and who was responsible for that task. Furthermore, soil analysis has shown that manuring practices

[833] Simpson et al., 'Soil limitations', pp.431-432.
[834] W.P. Adderley and I. Simpson, 'Soils and palaeo-climate based evidence for irrigation requirements in Norse Greenland', *Journal of Archaeological Science* 33 (2006), pp.1666-1679, p.327.
[835] Bolender, *The Creation of a Propertied Landscape*', pp.223-224.
[836] Ibid, pp.226-227.
[837] See Section 1.2.
[838] Simpson et al., 'Soil limitations', pp.438-439.
[839] Ibid, p.440.

changed, potentially reflecting losses in population, land security and the availability of manure. Manuring practices are one of the aspects of farming that we have very little written evidence for, nevertheless, the utilisation of manure along with other forms of fertiliser must have been undertaken. Future soil analysis projects will increase our understanding of the complexities of these practices.

6.3 SHEEP

Sheep are a versatile species able to produce milk, meat and wool, and their ability to survive on poor quality grazing through the winter made them a pillar of Icelandic farming. Any general work will contain a list of ovine products, and there have been numerous works on the significance of wool and especially *vaðmál* to the Icelandic economy, both domestic and foreign.[840] As this chapter is concerned with raw products and not processed goods, it will not examine *vaðmál*. As already discussed, the zooarchaeology generally shows that the relative abundance of sheep to cattle bones increases over the centuries and these increases are variously assumed to show changes in farm fortune, a drop in social status, soil degradation, and times of stress.[841] Within the sheep archaeofauna, the age-at-death profiles inform us about the relative proportions of these products sought from these animals, which is more than the occasional saga references can do. The age profiles shall be discussed to give an overview of consumption patterns and infer what products sheep were reared for. An *Íslendingasögur* example will then be examined to demonstrate the reliance on sheep in Iceland and how the loss of products must have been a common concern.

6.3.1 Milk or wool?

It is acknowledged that sheep in Iceland were exploited for milk and wool, operating a dual flock system of milking ewes and non-milking sheep.[842] The dual system was more efficient than a single flock, because milking ewes produce a lighter fleece and their fleece weight reduces after their third or fourth year. In contrast to milking ewes, wethers produced a heavier fleece.[843] Meat was a by-product of these economies, obtained from lambs,

[840] For products see Karlsson, *Lífsbjörg Íslendinga*, p.139; Jóhannesson, *A History of the Old Icelandic Commonwealth*, pp.310-312. For discussion of *vaðmál* see Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* III, p.59; Þorláksson, *Vaðmál og verðlag*; Gelsinger, *Icelandic Enterprise*, pp.127-128.
[841] A clear example of these assumptions can be seen in McGovern and Perdikaris, 'Report of Animal Bones from Selhagi, Mývatn District', p.8.
[842] Ingimundarson, 'Of sagas and sheep', p.62.
[843] Ibid., pp.64-65.

slaughtered to increase the availability of milk for human consumption or to ease the strain on ewes, in addition to older sheep that had reached the end of their productive lives. As with calves, lamb mortality may reflect the slaughter of young animals or death from natural causes, but was usually less than 10% on Icelandic farms across the centuries covered in this study.[844] Difficulty in distinguishing the relative proportions of milk and wool production in flocks arise in the zooarchaeology because of the potential overlap in ages.[845] Unlike the meat profile where sheep would be slaughtered at the 'prime meat' age of 2-3.5 years, ewes and wether were productive from two-years and kept alive for as long as they were productive. Jón Haukur Ingimundarson's ethnographical study argues that wethers could be kept until they were seven or eight-years-old, and ewes could lamb until ten years if sufficiently fed and housed. Therefore, wethers and ewes could reach similar ages before they were slaughtered.[846] Aging of the ovine archaeofauna can inform us what products farms were consuming from sheep, whether meat, or milk and wool. Further differentiation between milk and wool products is not possible, but we can turn to the *máldagar* for more information on flocks owned by church-farms.[847] With these issues in mind, a brief overview of sheep age-at-death analysis will be presented to demonstrate that not all farms were following the general pattern of milk and wool sheep economies.

From the caprine age-at-death profiles we can see that neonatal bones usually account to less than 10% of the total caprine bones.[848] From this small percentage, it can be inferred that lambs were not generally slaughtered to preserve milk for human consumption. Instead most sheep appear to have been reared to six or seven months indicating that some were slaughtered in the autumn, assuming they were born around May. This would give the lambs time to increase their carcass weight and provide more meat, thus maximising the quantity of meat without making demands on winter fodder resources. Hofstaðir (Mývatn) has a peak between 4 and 14 months and then again at four-years and older suggesting some lambs were slaughtered in the autumn and through the following year, possibly as their potential for breeding or wool was realised.[849] By the end of their second summer their long-term fate had

[844] Amorosi, 'Icelandic Zooarchaeology', p.408.
[845] See Reitz and Wing, *Zooarchaeology*, pp.174-176 for a discussion of aging methodology and related problems. Another difficulty is the combined category of 'caprine', which blurs the results because goats were exploited for milk and meat, not wool in Iceland.
[846] Ingimundarson, 'Of sagas and sheep', pp.64, 69. I am aware that these ages refer to modern Icelandic sheep, but they do give some indication of the ages that would be reached.
[847] See Chapter Four.
[848] McGovern, 'The Archaeofauna', p.197.
[849] Ibid., p.197.

been decided and they were used for milk or wool. Indeed, it has been argued that there was a similar herding pattern at Hofstaðir and nearby Sveigakot and Steinbogi.[850] At Steinbogi, approximately 20% of the sheep were five-years and older, and proportionally few were under 11 months, again indicating that most lambs were not slaughtered until they had time to show their potential.[851]

Möðruvellir demonstrates changing consumption over time with a greater emphasis on meat in the late medieval period. Most caprines survived into their second year based on long bone analysis, c.87.5% in the phases dated 1200s-1400s, and over 80% in the phase dated c.1550-1700.[852] For the pre-1400 phase, over half were five-years and older, whereas in the later phase only 25% of the animals were aged as five-years or older. From the tooth eruption comparison, few caprines died before two-years and most survived until 2-2.5 years, though the sample size for the late medieval phase is too small for conclusive results.[853] At Möðruvellir it appears that sheep were allowed to live until their potential could be judged in their second year. However, there was a slight change to consume sheep between 2-5 years, and therefore animals in their 'prime meat' stage of life in the post-1400 phase. From this change, it can be argued that Möðruvellir had modified its farming strategies with more emphasis on meat consumption and less on milk and wool.

The ninth to fourteenth century farm of Oddstaðir provides clear evidence for the consumption of 'prime' mutton as there is a peak in the age of caprine around two- and three-year of age.[854] Nevertheless, there were still some relatively old animals recovered for the phases covering the mid-eleventh to twelfth centuries and late thirteenth to late fourteenth centuries, demonstrating that during these times Oddstaðir was farming for meat, but also for milk or wool. As stated above, it has been argued that Oddstaðir was supplying Gásir with 'prime meat' and this included mutton as most of the caprines consumed at Gásir were aged between 2 and 3.5 years.[855] Gásir stands in stark contrast to Icelandic farms, both in function

[850] Brewington et al., 'Archaeofauna from Steinbogi', p.12.
[851] Ibid., pp.9, 11.
[852] R. Harrison, 'Möðruvellir in Hörgárdalur, N. Iceland: General Overview of the Archaeofauna Analyzed from the 2006-08 Midden Mound Excavations', NORSEC Zooarchaeology Laboratory Report No. 59 (2011), p.27. A caveat of the c.1550-1700 phase is the small sample size on which the aging is based. http://www.nabohome.org/uploads/ramonah/RH_Mruvellir_HERC_NORSEC_Report_NR_59.pdf
[853] Ibid., pp.28-29.
[854] Harrison, 'Oddstaðir in Hörgárdalur', p.40.
[855] R. Harrison, 'The Gásir Area A Archaeofauna: An Update of the Results from the Faunal Analysis of the High Medieval Trading Site in Eyjafjörður, N Iceland' in H.M. Howells (ed.) 'Gásir Post Excavation Reports

and consumption patterns. The Gásir economy was not typical of Icelandic farms but does demonstrate the viability of a 'prime' mutton economy in the fourteenth century.

The consideration of meat, wool or milk consumption is useful for understanding past farming economies, and future research into aging and sexing will aid our understanding of consumption. Sheep were important to the Icelandic economy, but also to the survival of households. This is stressed throughout the sagas, where the loss of sheep could put the existence of households at risk of failure. Previous discussions of exchanges have focused on the social aspects, but in the following example the potential economic consequences of an appropriation of livestock will be examined.[856]

While part of a wider feud narrative, *Droplaugarsona saga* provides us with a detailed example to examine a common theme throughout the sagas: the consequence of livestock loss.[857] Þorgeirr recently purchased fifty ewes but they 'wandered away from him'.[858] Eighteen of these ewes returned to their previous owner, Þórðr, who had milked the ewes and used the milk. The saga says that Þorgeirr had lost much livestock during the previous winter, so the purchase of fifty ewes was to replace that lost livestock. With regard to these eighteen ewes it is unclear about the length of time that elapsed between the ewes going missing and being found, but it should only have been a short time before they were noticed missing because ewes were milked on a daily basis. Nevertheless, the milk was valuable and compensation was worth commencing legal action. The saga makes no mention of the other 32 ewes either, preferring to concentrate on the appropriated milk and resulting difficulties. The large number, however, are too many to have been simply lost whilst grazing.

The wider significance of this example is that Þorgeirr did not have, and could not breed, enough replacement ewes quickly enough to satisfy his household's needs, and therefore had to buy a large number of ewes to ensure his household's survival. Þorgeirr had suffered during the previous winter, as the saga records 'later during the winter there was great famine

Volume 1 (Part Three)', Fornleifastofnun Íslands Report FS423-010712 (2009), p.16. https://www.instarch.is/pdf/uppgraftarskyrslur/FS423_GAS_PX_Vol1.pdf

[856] Miller, *Bloodtaking and Peacemaking*; W. Miller, 'Gift, Sale, Payment, Raid: Case studies in the Negotiation and Classification of Exchange in Medieval Iceland', *Speculum* 61(1) (1986), pp.18-50.

[857] *Droplaugarsona saga*, ÍF XI, chapter 5, p.150.

[858] '*gekk brott frá honum*', 'The Saga of Droplaug's sons', *The Complete Sagas of Icelanders* IV, p.362.

and loss of sheep', and his household possibly would suffer during the coming winter.[859] He needed to realise the potential returns of all his livestock, including those milked by Þórðr and so Þorgeirr sought compensation. A household could survive a hard winter and loss of livestock if it had sufficient stored resources. Successive hard winters, though, would deplete these resources and risk the survival of the household, forcing the household to look to its support network and local *hreppur*. Household survival depended on all livestock, but the level of detail in this example demonstrates the importance of sheep to Þorgeirr's household. Þorgeirr did not buy milking cows after a hard winter but rather milking ewes. This indicates that it was sheep that he depended on. All conflicts need a spark and livestock fulfilled this role because of their value. As illustrated, *Droplaugarsona saga* gives enough detail to show the extent that Þorgeirr's household was dependent on ewes and the potential consequences if he could not find a way to make up the loss of products. The loss of livestock and products were likely concerns experienced by all farmers.

6.4 HORSES

Horses are exploited for a range of products, however, discussions have centred on the human consumption of horsemeat and the role of horses in ritual activity.[860] These topics will be re-evaluated and draw on both the written and archaeological evidence to show that the eating of horsemeat was never frequent before the conversion to Christianity, though the impression that the practice stopped completely after the Conversion is incorrect. The scarcity of evidence for eating horsemeat after the Conversion cannot be used to support the cessation of this practice.[861] The penalty for horsemeat consumption was slightly relaxed when the prohibition was re-affirmed in the sixteenth century. Nevertheless, it can be assumed that horsemeat continued to be eaten during times of food shortages, but it was not publicised due to the perceived taboo and threat of punishment. The zooarchaeological evidence does show a decrease in the relative proportion of horse bones recovered from contexts post-dating the Conversion, but the bone fragments can be inconclusive about whether horse was eaten by humans, fed to other animals or used in craft-working. Horses were deposited differently to other livestock, which served to remove them from middens, the usual source of zooarchaeological evidence. It is here argued that horses were utilised in a number of ways

[859] '*eftir um vetrinn gerði hallæri mikit ok fjárfelli*', *Droplaugarsona saga*, ÍF XI, chapter 5, p.149; 'The Saga of Droplaug's sons', *The Complete Sagas of Icelanders* IV, p.362.
[860] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, pp.76, 304; Thoroddsen, *Lýsing Íslands* IV, pp.44-51;
[861] McGovern, 'The Archaeofauna', p.220.

and that our evidence does not demonstrate the full spectrum of uses. Discussions should also go beyond the roles conveyed in the sagas, to acknowledge more of the products gained from horses.[862]

Sagas, as a source of information on horsemeat consumption, are unhelpful as they incorporate horsemeat eating as part of pagan practices or as insults. The most famous example of horsemeat consumption is when King Hákon was pressurised into consuming the grease of boiled horsemeat.[863] Indeed, in Scandinavia, there is a long history of horse sacrifices predating the settlement of Iceland.[864] The use of horses in these rituals is thought to indicate human consumption of horsemeat. In the Icelandic context, our main source of evidence for the utilisation of horses comes from two different site types: middens and graves. The two forms of deposition give us an insight into the varieties of uses: the economic on the farm and the ritual from burials, though these are not mutually exclusive. Therefore, we have two separate but related issues about the consumption of horses. First, the consumption process horses underwent to be deposited in either of these sites. Second, whether this process involved the human consumption of horsemeat.

The consumption of horsemeat in Iceland is thought to have been an accepted but infrequent practice, which then decreased after the adoption of Christianity in the eleventh century. The deposition of horses in Icelandic graves, however, rarely indicates the consumption of horsemeat. In only one grave (Miklabær grave 2) have the horse remains been interpreted as food offerings because there was only meat-bearing joints with no skull recovered.[865] None of the other graves in Iceland indicate that the horses were utilised for meat before being placed in or on the graves, and skeletons include both meat-bearing and non-meat-bearing bones. The recovery of articulated skeletons further demonstrates that the animal was not slaughtered for consumption but placed intact in the grave. The inclusion of animals in burials might not derive solely from their productive function but could be symbolic or associated with belief in the supernatural.[866]

[862] See Section 6.2.4 for horses as beasts of burden.
[863] *Hákonar saga góða*, ÍF XXVI, chapter 17, p.172.
[864] P. Shenk, 'To Valhalla by Horseback? Horse Burial in Scandinavia during the Viking Age', (Unpublished MA thesis, University of Oslo, 2002), p.14; J. Simpson, 'Some Scandinavian Sacrifices', *Folklore* 78(3) (1967), pp.190-202, p.201.
[865] Kristján Eldjárn, *Kuml og Haugfé* (2nd edition revised by Adolf Friðriksson) (Reykjavík, 2000), p.310.
[866] N. Price, 'Passing into Poetry: Viking-Age Mortuary Drama and the Origins of Norse Mythology', *Medieval Archaeology* 54 (2010), pp.123-156, p.130.

A brief overview of the horse burial evidence in Iceland is necessary to demonstrate what horses were used in these cases and what we can infer from the remains. In Iceland, at least 126 horses have been found at 87 grave sites.[867] In nine of these places two horses were buried with one person, and in eight of these graves the two horses were placed in the same grave cut.[868] In Friðríksson's updated burial catalogue, it was concluded that most of the horses were killed by having their throats cut, though there is evidence of two other techniques: one where the horse is struck on the forehead and the other decapitation.[869] The different method of death distinguishes these two animals even before they were put in the grave. Throat-cutting is an effective method of slaughter as the animal dies quickly and would facilitate the collection of blood for use in food stuffs, if the blood was collected. Decapitation, alternatively, may have added drama to the burial process.[870]

In 1962, an examination took place of the horse bones from graves that were held at the National Museum of Iceland. The study found that all the horses represented by the 19 bones were from male animals aged between four and 24 years, seven of which were older than twenty years and an old age for horses.[871] More recently at Litlu-Núpar, of the horses that could be aged one horse was at least five-years, another fifteen-years and a third over twenty-years of age, and of those that could be sexed two horses were confirmed as male.[872] Of the 23 animals aged in the 1962 and Litlu-Núpar analysis, eight of the horses were past their most productive years and consequently would have been less of an economic loss than a younger horse. Indeed, it cannot be ruled out that some of these animals may have died of natural causes and were not slaughtered. Unlike the horses from the 1962 analysis and those from Litlu-Núpar, horse bones from Hofstaðir that could be aged are from horses between c.1.5-3.5 years-old, indicating a potential difference in the age of horses recovered from

[867] H. M. Roberts and E. Ó. Hreiðarsdóttir, 'The Litlu-Núpar Burials', *Archaeologica Islandica* 10 (2013), pp.104-130, pp.114-124; H. M. Roberts and A. Friðriksson, 'Ingiríðarstaðir 2013' Fornleifastofnun Íslands Reports FS523-08167 (2013), p.6. http://www.instarch.is/pdf/uppgraftarskyrslur/FS523_ING13_IS_EN.pdf; Eldjárn, *Kuml og Haugfé*, pp.255, 301.
[868] Eldjárn, *Kuml og Haugfé*, p.308.
[869] Ibid., p.309. No comment is made on the slaughter process for Litlu-Núpar and Ingiríðarstaðir, except no cut marks discovered on the horse in Burial VI at Litlu-Núpar, Roberts and Hreiðarsdóttir, 'The Litlu-Núpar Burials', p.122.
[870] See Section 6.2.3 for cattle decapitation.
[871] G. Nobis, 'Zur Frühgeschichte der Pferdezucht: Die Pferde der Wikingerzeit aus Deutschland, Norwegen und Island', *Zeitschrift für Tierzüchtung und Züchtungsbiologie* 76 (1961), pp.125-185, pp.130-131; Eldjárn, *Kuml og Haugfé*, p.311.
[872] Roberts and Hreiðarsdóttir, 'The Litlu-Núpar Burials', pp.114, 122-124.

middens and graves.[873] Further analysis of horse bones would shed more light on the topic but preliminary analysis of age would argue for the deposition of older horses in the grave, such as a riding horse, best fighter or stallion, or selection due to old age.

It is usually assumed that the eating of horsemeat had been an acceptable practice in Iceland in the pre-Christian period and again became acceptable from the late eighteenth century onwards.[874] The written sources are unclear about how regularly horsemeat was eaten in the intervening centuries and so for evidence of horsemeat consumption in Iceland we must look to archaeology. The presence of butchery marks, the splitting, burning or charring of bones would be evidence of consumption. In middens, the frequency of consumption of certain species is usually deduced from their relative proportion in the archaeological record. It is usually assumed that the more prominent the species, the more they were consumed. There are, of course, many facets to this assumption and we should be aware of the different methods of deposition and recovery involved in zooarchaeology. With horses, it appears that they were disposed of differently to other livestock because they are so poorly represented in the middens and so do not give us the full representation of horses in Iceland.

The zooarchaeological collections, however, show that there was some variation across time as earlier sites have a larger percentage of horse bones. At the average sized tenth-century farm-site of Granastaðir (Eyjafjörður), horse bones represented 4.32% of the total domesticate NISP, and the archaeofaunal evidence indicates that horses were processed for human consumption in the same way as cattle.[875] At the longer lived farm of Sveigakot (Mývatn), a ninth to twelfth century small to medium sized farm, there was also evidence for human consumption of marrow as one of fourteen recovered horse bones was split for marrow extraction.[876] It is likely that in the early years of settlement, Icelanders were extracting all products from slaughtered livestock to ensure survival whilst they established themselves, and this included the consumption of horsemeat and marrow.

[873] McGovern, 'The Archaeofauna', p.221.
[874] Karlsson, *Lífsbjörg Íslendinga*, p.147; Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* I, pp.76, 304; III, p.266.
[875] T. Amorosi and T. McGovern, 'A preliminary report of an archaeofauna from Granastaðir, Eyjafjarðarsýsla, Northern Iceland' in Bjarni Einarsson (ed.) *The Settlement of Iceland; A Critical Approach: Granastaðir and the Ecological Heritage* Reykjavík, 1995), pp.181-194, pp.183, 190; Vésteinsson et al., 'Enduring Impacts, p.129.
[876] Perdikaris et al., 'Report of Animal Bones from Tjarnargata 3C', p.15.

Horse bones at another early site of Herjólfsdalur (Westmannaeyjar) demonstrates how little horsemeat was consumed even in the first centuries as horse bones represented 0.09% of total NISP.[877] At Hofstaðir (Mývatn) the evidence from the Viking Age longhouse excavation was divided into three chronological phases. From these phases, there appears to have been a small increase in the proportion of horse bones recovered over time. For phase I (c.940-980) horse bones account for 0.42% of the total domestic NISP (12 bone fragments), in phase II (c.980-1030) it is 0.87% (42 fragments) and in phase III (c.1030-1070) it is 1.74% (19 fragments).[878] There is clear evidence of horse bones being butchered as c.33% of horse bones showing butchery marks. Nonetheless the overall number of bones compared with other domesticate suggest that horses were not an important source of meat.[879] The fragmentary nature of the horse bones makes aging them difficult, but they appear to have been mostly adult animals. From this limited evidence, it is possible that the animals died or were slaughtered due to accidents, defects or inability to work. The small proportion of horses in the zooarchaeofauna suggests that these animals were not reared as 'prime meat', but were an additional by-product. The percentages from these four early sites indicate that in the first centuries of settlement horses were infrequently consumed and did not contribute greatly to the diet of the first generations of Icelanders.

The monastic Viðey and secular Bessastaðir are two high status sites that span the medieval to early modern period. At the farm mound at Viðey, the late medieval phase had 1.64% of the total domesticates identified as horse and the early modern phase had only 0.17%.[880] These bones did not show 'extensive marks of butchery', so it is unclear if they were processed for meat or craft-working.[881] At Bessastaðir, the midden material shows a reduction in the proportion of horse bones identified, with horse bones in the late medieval phase (1450-1500) making up 27.47% of the total domesticates (25 fragments) whereas for the excavators' early modern period (1600-1849), horse bones were only 0.84% (15).[882]

[877] Amorosi, 'Icelandic Zooarchaeology', p.638.
[878] McGovern, 'The Archaeofauna', p.184. Phase I c.940-980, phase II c.980-1030 and phase III c.1030-1070. The doubling of the proportion of horses between phase II and III appears to be due to the small number of cattle and caprine bones recovered in phase III, not due to an increase in the number of horse bones.
[879] Ibid., p.220.
[880] Ibid., p.789. This study acknowledges dating resolution issues and the consequence of dividing contexts into 'late medieval' and 'early modern'. Late medieval appears to approximately fifteenth and sixteenth century, p.439.
[881] Ibid., p.410.
[882] T. Amorosi, P. C. Buckland, G. Ólafsson, J. P. Sadler and P. Skidmore, 'Site Status and the Palaeoecological Record: A Discussion of the Results from Bessastaðir, Iceland', in C. Morris and J. Rackham (eds.), *Norse and*

Bessastaðir appears to have had a sharp decrease in the proportion of horse bones recovered, but again this is a result of a larger early modern zooarchaeological collection covering a longer period of time. The percentage is exceptionally high compared with other Icelandic sites and considering the late date, clearly centuries after the prohibition on eating horsemeat, however, not all bones indicate human consumption. It is possible that the high percentage of horse bones recovered at Bessastaðir were due to craft-processing of combs and not the consumption of horsemeat.[883] As will be discussed shortly, horsemeat was viewed as a famine food, and the period 1600-1849 had many hard times recorded for it. Viðey and Bessastaðir should have been wealthy enough to buffer themselves against such food shortages. The recovery of horse bones indicates horse carcasses were being processed but not necessarily the eating of horsemeat because other products could be gained from the remains.

The scarcity of horses in the archaeofauna continued into the early modern period. For example, evidence for horses was only recovered for one context at Skálholt (group 383 – layer 454), which has been dated between the mid-seventeenth to eighteenth centuries.[884] The infrequent recovery of horse bones suggests that there was hardly any processing of horse bones at the site. Indeed horses made up just 0.29% of the total domesticate NISP for that context (13 fragments). The urban sites in Reykjavík also show the continued scarcity of horses. At Tjarnargata 3c, dated to between the seventeenth and nineteenth centuries, and Aðalstræti 10, dated to the mid-eighteenth century, horses accounted for 0.84% (10 fragments) and 0.68% (4 fragments) of the total domesticate NISP respectively.[885] The horse remains recovered from Aðalstræti 10 were all teeth and so it is not possible to comment on whether the animals were butchered.[886] At Tjarnargata 3c none of the horse bones showed evidence of butchery marks suggesting that horses deposited at this urban site were not intended for human consumption.[887] The relative proportions from these five sites show that

Later Settlement and Subsistence in the North Atlantic (Glasgow, 1992), pp.169-19, pp.172, 173. Percentage of total sample: late medieval 26.3% and early modern 0.1%. No information on butchery marks.

[883] Amorosi et al., 'Site Status and the Palaeoecological Record', p.174.

[884] G. Hambrecht, 'Faunal analysis of the early modern bishop's farm at Skálholt, Arnessysla Iceland', (Unpublished PhD thesis, City University of New York, 2011), p.58.

[885] R. Harrison and M. Snædóttir, 'Urbanization in Reykjavík: Post-Medieval Archaeofauna from the Downtown Area', *Journal of the North Atlantic* 19 (2012), pp.1-17, p.7. Total NISP: Tjarnargata 3c 0.01% and Aðalstræti 10 0.06%.

[886] R. Harrison, E. Alenander, F. Feeley, M. Gorsline, M. Hicks and S. Mitrovic, 'Faunal Analysis from the 2005 Excavation at Aðalstræti Nr. 10 in Reykjavík, Iceland', NORSEC Zooarchaeology Laboratory Report No. 40 (2008), p.14. http://www.nabohome.org/publications/labreports/Norsec40Adalstr102005.pdf

[887] Perdikaris et al., 'Report of Animal Bones from Tjarnargata 3C', p.14.

there was a decrease in horses deposited as refuse in later centuries. The small proportion on these urban sites is not surprising as the trading centre would have enabled the inhabitants to gain access to other sources of meat, even imported pork. The zooarchaeology, however, does not inform us about what happened to the remains of riding and pack-horses. These were essential animals for transportation so they would have been needed in some number. It is unlikely that in a country where use was made of all resources, carcasses of horses would have been wasted. Therefore, possible explanations shall now be discussed.

It is not clear if horse remains represent the consumption of horsemeat because of the limited information on the presence of butchery marks and burning. Hambrecht points out that a horse bone from Skálholt could be evidence of craft-working as an intact metatarsus was recovered.[888] Furthermore, not all bones may have been deposited in middens, limiting the recovery of evidence, and bones may have been fragmented due to craft-processing and so not preserved. The rarity of horse bones in the faunal record means horse carcasses must have been deposited in different ways to the rest of the livestock, and potentially off-site away from areas that have been excavated.[889] If horses were not consumed by humans, they may have been butchered for consumption by dogs and cats so eaten and/or hidden away from the farm.[890] In the sagas, there is no evidence of horse remains being consumed except by humans, and whilst archaeology provides us with gnawing marks, it does not tell us if the animals had access to the meat or not. Throughout the centuries we are, therefore, left with an under-representation of horses in the archaeological record and little idea of where to find the evidence to bridge it. The scarcity of dogs and cats in the archaeological record is perhaps a similar conundrum as they must have been present but leave little trace apart from teeth marks on recovered livestock bones.[891] The archaeological evidence would suggest that horses continued to be eaten, just in very small amounts. The difficulty of distinguishing meat utilisation for humans and other uses does not give a clear indication of how long the practice continued in Iceland.

[888] Hambrecht, 'Faunal analysis of the early modern bishop's farm at Skálholt', p.57.
[889] It is highly unlikely that an entire carcass would have been left to rot. Skin, hair and bones all can be utilised, as too can meat and innards for cats, dogs and even pigs.
[890] The Christian Law section of *Grágás* includes a clause stating pigs should be starved for three months if they had eaten horsemeat, to rid the animal of the impurity, showing knowledge that pigs would eat horsemeat, but that the meat should not be consumed by animals intended for human consumption. *Grágás* K.16 (1852), p.34.
[891] See for example McGovern, 'The Archaeofauna', pp.180, 220-221.

Another avenue of evidence for the study of horsemeat consumption is the written sources. The accusation of eating horsemeat due to food shortages is recorded in *Bandamanna saga*, where characters trade insults after the failed settlement of a dispute.[892] The example links the scarcity of food with the consumption of horsemeat, and the occurrence of famines through Iceland's history would provide the conditions where people would resort to horsemeat. Shortages of food are briefly recorded in the annals but we are not given information on how people survived. Food shortages or famines would mean a household was unable to support itself, becoming dependent on the *hreppur* along with a loss of independence and a drop in status. If the eating of horsemeat avoided this scenario and more importantly kept people alive, then it is possible that people took this option but would not publicise it.

A lack of evidence hinders the discussion of horsemeat consumption in later centuries and so gives the impression it did not occur. In 1594, however, a case of horsemeat eating at Flókadalur (Fljót) was referred to the lawman.[893] In 1596, the case came before the *Alþing* with the ruling that a fine of three *mörk* (sg. *mark*), which was more than the value of a milking cow, was to be paid for the eating of horsemeat.[894] This fine was to be paid even by the poor and even though there were hard times in Iceland. The *Alþing* had, thereby, burdened Icelanders even more during hard times by reducing their potential food supplies when they did not have the financial resources to support themselves. If they had the resources they would probably not have eaten horsemeat in the first place considering the apparent social stigma surrounding it. *Grágás*, however, prescribed a harsher punishment of lesser outlawry for eating forbidden meat, including horsemeat.[895] From these sources, it is shown that the human consumption of horsemeat must have continued in Iceland, albeit only during times of food shortages, and that an absence in the written records is most likely due to secrecy because of the severity of the punishment and few people knowing about or wishing to report it.

Discussions of the archaeological evidence of horse products has tended to focus on the human consumption of horsemeat. The written sources have demonstrated that horses were consumed in the form of horsemeat and the adoption of Christianity did not mean that the

[892] *Bandamanna saga*, ÍF VII, chapter 10, p.353.
[893] Jón Espólin, *Íslands Árbækur í sögu-formi* V (Copenhagen, 1826), p.77.
[894] Ibid., p.84.
[895] *Grágás* K.16 (1852), pp.34-35.

practice stopped. As we have seen, the written evidence, though scarce, does support the idea that horsemeat was a famine food eaten only when necessary. Evidence for the consumption of horsemeat is less likely to be found at high status or urban sites as these had the resources to buffer themselves against food shortages, either through their own resources or trade. While these discussions have offered an insight into the changing nature of livestock consumption in Iceland, it overlooks horses' other potential products, such as beasts of burden.[896] Horses could also have been processed for, among other things, skins for saddles and their hair was used to make ropes, both necessary equipment for transportation but are items with poor survival rates.[897] Furthermore, it is not always possible to age horse bone fragments, especially if the bones have been heavily processed, but the available age-at-death profiles adds another dimension to investigations of horse farming. It appears that older horses were placed in graves whereas younger animals were found in middens. It is possible that horses were deposited away from structures or off-farm, and so the evidence is outside the boundaries of excavations. If this is the case, then further data will only be provided through landscape surveys or accidental finds. Throughout the time frame covered by this thesis, horses were an essential part of the Icelandic farming system that have been under-appreciated in the scholarship, whether providing meat or transport and supported other types of farming.

6.5 GOATS

Goats are generally utilised for their milk, meat, hair and horns, though in Iceland, goats appear to have been utilised mainly for milk with meat as a less-examined by-product.[898] Goat products also included clothing. For example, *Brennu-Njáls saga* twice demonstrates the use of goat-skins, once as clothing and the other as an item for ritual use.[899] Due the scarcity of evidence for goats, previous scholars have tended to focus on issues of occurrences, population and value.[900] This thesis has already re-examined these topics.[901] This section will demonstrate how scarce evidence is for their consumption and products even though they were renowned for their milk, which was thought better than cows' milk in

[896] See Section 6.2.4
[897] Twentieth century examples of these items can be seen in museums in Iceland, such as at Laugar (Saelingsdalur) and Skógar (Hvolsvöllur).
[898] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* IV, p.113; McGovern, 'The Archaeofauna', p.205.
[899] *Brennu-Njáls saga*, ÍF XII, chapters 133, p.347 and 12, p.37.
[900] Karlsson, *Lífsbjörg Íslendinga*, pp.140-142; Jóhannesson, *A History of the Old Icelandic Commonwealth*, p.292; Thoroddsen, *Lýsing Íslands* IV, pp.62-65.
[901] See Section 4.6.

the treatment of tuberculosis.[902] The focus on cattle and sheep has overshadowed the role of goats in Iceland.

Zooarchaeology again provides a way to study the consumption of goats in Iceland, including their distribution, and sometimes their use in the economy. The problem as already mentioned before, is distinguishing goat from sheep in the zooarchaeology, as it is then difficult to separate out the economy profile.[903] The uncertainty about positively identifying remains has resulted in scattered identifications of goats, such as the single goat bone identified at Reykholt (Borgarfjörður) and in the 1987-1988 zooarchaeofauna collection at Viðey (Kollafjörður).[904]

Despite the lack of evidence generally, a relatively large number of goat bones were identified at Hofstaðir. An age-at-death profile for the site indicates that goats here were exploited mainly for milk, with young goats slaughtered at the end of their first summer providing meat.[905] Surprisingly goats increased relative to sheep over time in contrast to other Mývatn sites.[906] From the saga evidence it appears that goats could be an indicator of lower status. Nevertheless, at Hofstaðir the recovery of a male goat skull along with cattle skulls slaughtered as part of the putative ritual activity suggests that goats were also part of the ritual activities.[907] The fact that all the skulls showed 'depressed fractures between the eyes' illustrates that the same slaughter technique was used for both species, possibly for the same purpose in the ritual. Early on, goats were still exploited and slaughtered in the same way as other livestock, though they had different grazing habits.

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[902] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* IV, p.113.
[903] See Section 4.6 Reitz and Wing, *Zooarchaeology*, p.166; An example of a method to differentiate sheep and goats is provided by P. Halstead, P. Collins and V. Isaakidou, 'Sorting the Sheep from the Goats: Morphological Distinctions between the Mandibles and Mandibular Teeth of Adult *Ovis* and *Capra*', *Journal of Archaeological Science* (2002) 29, pp.545-553; J. Boessneck, 'Osteological Differences Between Sheep (Ovis aries Linné) and Goat (Capra hircus Linné)', in D. Brothwell and E. Higgs (eds.) *Science in Archaeology: a Survey of Progress and Research* Second edition (London, 1969), pp.331-358 still remains a foundational work on the skeletal similarities.
Sheep and goats have been distinguished by their postcranial material and teeth in research outside Iceland, however, there is increased difficulty when working with young animals that have not yet developed morphological markers. More recent published research, again outside Iceland, has analysed the bones, as opposed to identified them, to differentiate sheep and goats. M. Buckley, S. Kansa, S. Howard, S. Campbell, J. Thomas-Oates and M. Collins, 'Distinguishing between archaeological sheep and goat bones using a single collogen peptide', *Journal of Archaeological Science* (2010) 37, pp.13-20, p.14.
[904] Sveinbjarnardóttir et al., 'The palaeoecology of a high status Icelandic farm', p.201; Amorosi, 'Icelandic Zooarchaeology', p.407.
[905] McGovern, 'The Archaeofauna', p.207.
[906] Ibid., p.251.
[907] McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.32.

Goats and sheep overlapped in the products they generated, and the zooarchaeological collections from Mývatn show that early farms in the area maintained herds of both goats and sheep. An overview of the archaeofauna for the Mývatn area indicates the relative ratio of goat:sheep varied between farms, increasing from 1:3 to 1:13 at ninth to tenth century Sveigakot, but decreasing at Hofstaðir from c.1:13 to c.1:7 over the same time.[908] The changing reliance on sheep at Sveigakot and Hofstaðir implies that while the ratio may have varied there was some similarity in the proportions of sheep to goats consumed on the farms. Overall, it has been argued that goats were not as abundant in the tenth century in Mývatn as they had been during the settlement and were scarce by the early thirteenth century.[909] At Stóraborg (Eyjafjallasveit), a medieval to early modern farm, the late medieval zooarchaeology revealed a ratio of nine sheep to one goat, showing that goats were still being reared even in later centuries.[910]

Due to the scarcity of evidence we are limited in our conclusions about the role of goat products in the Icelandic economy, being only able to say what the products were, not really the input into the economy or how they were utilised. As argued in Chapter Three goats were associated with wealth and resources and may have circulated as gifts, symbols of status or been restricted to the farm, especially once they had become rare.[911] The ability to distinguish goat from sheep remains will greatly advance this discussion.

6.6 PIGS

The big debates concerning Icelandic pig farming are their overall population, extinction and re-introduction. Such concerns tell us little about their products beyond the fact that Icelanders could survive without them. It has been assumed that meat was their main product. Indeed, pigs give a higher percentage of their carcass weight as meat than either sheep or

[908] McGovern, 'The Archaeofauna', pp.204-205.
[909] McGovern et al., 'Landscapes of Settlement in Northern Iceland', p.40; McGovern, 'The Archaeofauna', p.205.
[910] Amorosi, 'Icelandic Zooarchaeology', p.379. Unfortunately, I could not find detailed information on the NISP of goats for Stóraborg as a detailed report is still pending, P. C. Buckland and E. Panagiotakopulu, 'Archaeology and the Palaeoecology of the Norse Atlantic Islands: A Review' in A. Mortensen and S. V. Arge (eds.) *Viking and Norse in the Norse Atlantic* (Tórshavn, 2005), pp.136-150, p.138.
[911] See Section 4.6.

cattle.[912] Their infrequency in the archaeofauna demonstrates their rarity from an early date and means that our knowledge of pig products comes mainly from the written sources.[913]

The sagas only mention that meat was gained from pigs in a couple of brief examples involving piglets in *Íslendingasögur*. In *Svarfdæla saga*, a man is said to have been killed in the same way as men from Grund slaughter piglets, by being cut in half. This suggests piglets were prepared for curing or cooking in this manner.[914] Pork is also consumed in the form of piglets in *Vatnsdæla saga*, when a piglet is slaughtered and cooked during a mountain search for lost sheep and pigs.[915] Apart from these incidents being used as fuel for later insults, they show that pork was consumed in the form of piglets. This would explain why sows with large litters were so valuable because the piglets were the source of meat, the more piglets the more meat could be produced. Care must be taken with this point because the handling and slaughter of a suckling piglet is portrayed in such a way as to question the masculinity and reputation of characters. The offering of piglets was also used as a form of ridicule. *Sneglu-Halla þáttr* has Haraldur Sigurðarson, king of Norway, sending a dish of roast piglets to the poet Halli in the context of testing his poetic skill.[916] The specification of the dish, whilst showing the author's awareness of the connection between the availability of pork and higher status, mocked Halli who was known for his appetite and had earlier declared porridge to be 'the best of food'.[917]

In addition to the exchanges of pigs discussed elsewhere in this thesis, *Valla-Ljóts saga* records servant women being paid in the form of a piglet for their supper, possibly because a piglet was enough food for a meal.[918] In this case, the piglets were kept at Torfufell (Eyjafjörður) and the farmer was 'rich, but not well-born', illustrating that the character, while lacking in inherited social standing, had the resources to keep pigs.[919] The saga states that the piglet was still suckling, so piglets could be consumed from a very young age, potentially a few weeks. Again, wealthier farms appear to have had the resources to rear pigs.

[912] Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* IV, p.135.
[913] The zooarchaeological evidence for pigs has been discussed in Section 4.5.
[914] *Svarfdæla saga*, ÍF IX, chapter 18, p.178, '*svá brytju vér grísina, Grundarmenn, aldrei meir en í tvá*'.
[915] *Vatnsdæla saga*, ÍF VIII, chapter 44, p.116.
[916] *Sneglu-Halla þáttr*, ÍF IX, chapter 5, p.274.
[917] *Sneglu-Halla þáttr*, ÍF IX, chapter 4, p.271, '*Görr mat res þat, smjörvan*' and p.272, '*Görr mat res þat, smjörvan*'; 'The Tale of Sarcastic Halli', *The Complete Sagas of Icelanders* I, p.346.
[918] See Section 4.5; *Valla-Ljóts saga*, ÍF IX, chapter 1, p.235.
[919] 'Valla-Ljot's Saga', *The Complete Sagas of Icelanders* IV, p.131.

With other livestock all parts of the carcass were utilised, yet, the sagas only record the consumption of pork and no other products. From saga examples it appears that piglets, rather than the adult animals, were the source of meat. In this way piglets can be seen as by-products from the adult sow, and their consumption a way to utilise the excess young as would have been done with the unwanted young of all livestock. While milking stock were valued for reproduction and milk, and wethers for wool, sows were only valued for their reproductive abilities. Pigs were advantageous during the settlement as their browsing habits and short gestation period meant they could open up wooded areas and quickly produce meat and lard. However, in the long term pigs were ill-suited to the Icelandic environment so had to be confined and this confinement made pig rearing more expensive. Their limited range of products also meant they were not as an efficient return on resources, as was the case with sheep. These factors resulted in pigs apparently being restricted to wealthier farms. Pigs did continue to be exchanged into the fifteenth century between the upper echelons of society, but these records are far too brief to inform us of how pigs were consumed or the products that were sought after by society.

6.7 CONCLUSION

The purpose of farming is to generate products for subsistence and possibly exchange. The main scholarly discussions of the Icelandic pastoral economy have been focused on milk, meat and wool production, the prominent products from cattle and sheep. While these discussions have been useful for identifying prominent farming strategies undertaken by Icelanders, they have been somewhat limiting in acknowledging the range of products the livestock generate. This chapter has illustrated the economic diversity of bovine and ovine products. This chapter has also focused on the several raw products, not the manufactured goods, such as *vaðmál*.

The combination of products gained from livestock was influenced by a range of factors, including but not limited to region, environment and human agency. Within farming, there were dependent relationships as shown with the rearing of oxen, a lesser discussed cattle category. The strength of these animals made them essential for arable farming, yet, as arable farming became more marginalised the number of oxen decreased because their product of traction was no longer needed. Horses overtook oxen as the main beast of burden due to their faster pace and lower level of maintenance. The evidence for beasts of burden is scarce, but

the use of draught animals acts as a proxy for arable farming and illuminates our understanding of past practices.

Sheep were seen as wool-producing animals, able to survive the Icelandic winter better than cattle. They provide milk and wool with meat as a by-product. The taking and use of sheep in the sagas echo a common concern about household survival. As a general shift to sheep farming took place in Iceland, the reliance on sheep for survival became more pronounced and the significance of milk- and wool-producing animals to the economy increased. Detecting differences in the prominence of sheep products is difficult based on the available evidence, but it is clear that wool and milk were continuously sought after.

In the published literature, there is an imbalance in discussions of livestock products, with an understandable preference for products gained from cattle and sheep due to the relative amount of evidence, but less so about horses (apart from horsemeat) and especially not for goats and pigs. Goats continued to be reared in Iceland whereas pigs appear to be absent from the mid-sixteenth century. Discussions of these creatures have centred on their presence or absence on farms, and as such these animals were reared on wealthier farms with sufficient resources, not average farms. Thus, goat and pig products would have been elite goods and generally consumed or given by the elites, as in the *Valla-Ljóts saga*. By considering the products we can speculate how their products fitted into society. A display of wealth may have involved the consumption of pork at a feast or the wearing of goat leather.

The first population figure we have for all livestock, including goats is from *Jarðabók*, but we must consider why these goats were continually kept until this time. There must have been reasons for the continuation of goat farming when the general trend in farming from the fourteenth century was to shift to sheep farming. The answer must be that some parts of the Icelandic population thought goats were profitable and worth the investment in resources. It appears that they were reared mainly for their milk, as they could be milked into the winter, unlike ewes, and had good skin and horns. On the other hand, pigs only ever seem to be reared for meat. There is no evidence for the use of their lard or skins, which made them a less versatile creature to rear than the other Icelandic livestock. The scholarly discussions of pigs and goats, on their value and population is partly due to the dearth of evidence about other aspects of their management. Therefore their products are inferred from scant evidence, resulting in an understanding that goats were reared for milk and pigs for meat. Other

products generated can only be assumed, such as skin, lard, bones, amongst other things. In Iceland as much of the carcass was utilised as possible, though it appears that they did not process the bones to the same extent as with horses.

Many scholars presume horsemeat consumption decreased or stopped after the adoption of Christianity. The archaeofauna attests to less horse-meat consumption after the eleventh century, but as shown by the late sixteenth century *Alþing* judgement, horsemeat was still consumed during hard times when the population was suffering from shortages of food, even though horsemeat was taboo and could result in a severe punishment. In addition, horses continued to be reared and performed essential farming tasks, yet there is little evidence for their existence from farms' middens. The deposition of male horses in early burials demonstrate their non-meat use in burial rites as all but one burials show no indicators of meat consumption. The relative absence of horses in the archaeological record shows that these animals were treated differently to other livestock and were disposed of away from the middens.

Products can be any goods gained from a living or dead animal, and as such there is great diversity. Much of the discussions have concentrated on the two dominant species in Icelandic farming: cattle and sheep; however, horses, goats and pigs were also reared. Scholarship has tended to focus on milk or meat, and wool from sheep. This is a narrow view of products and as shown in this chapter there was a greater range, though they are not always examined. Posing a dichotomy between milk and meat neglects the fact that a milk economy produced meat, from excess young, males and older females. No farm would follow one economy exclusively; a farm would manage their livestock for a balance of products to match their needs and available resources.

CONCLUSION

The purpose of this thesis has been to re-evaluate farming practices in Iceland up to c.1600 through the inter-disciplinary use of documentary and archaeological research. The advantages of this combined approach have demonstrated how far discussions can be advanced. The findings from this approach have challenged the traditional narrative of a Commonwealth 'Golden Age' of prosperity followed by a period of decline due to political, economic and climatic factors that reduced Iceland to a state of poverty. Discussions about farming practices have sometimes revolved around this dichotomy between abundance and scarcity.

This thesis has sought to avoid the artificial segregation of livestock species. Instead a holistic approach to farming has been taken. Instead of discussing animals as separate species, I have viewed them by theme where possible. This has meant considering farming as a whole unit with parts inter-connected. It is presumed in this thesis that most farms would have operated a dual economy of cattle and sheep, with horses kept for transportation and other secondary products.

The over-arching purpose of this thesis has been to consider how and to what extent Icelandic farming changed up until 1600. It has demonstrated, admittedly in line with some recent scholarship, that there was a reduction in the number of cattle and an increase in the number of sheep, as part of Icelanders' adaptation to changing economic, social and environmental conditions, amongst other things. From the evidence provided in the preceding chapters, it has been shown that farming underwent changes and while sources such as the laws make farming seem unchanged over centuries, farming was never static. The changes indicate that farmers were attempting to adjust their practices to cope with the changing world around them, as illustrated by an increased diversity of farming strategies with an overall move towards sheep farming. Of course, not all farms followed this trend or at the same time, and doubtlessly there would have been false-starts and failures. Farming is about trial-and-error, and practices that work for one farm may not have worked for another.

Several processes have been used as explanations for these changes and their interplay will briefly be summarised here. Outbreaks of human diseases, of which the fifteenth century

plagues are probably the best-known, changed farming strategies because the work force was reduced and so too was the number of animals that could be maintained. Epidemics in other regions of north-west Europe had a similar effect in reducing the human population, with the survivors taking advantage of the newly available land. The shortage of labour was one factor that encouraged sheep farming to become the dominant farming strategy across Iceland, as seen in the overall increasing cattle:sheep ratio. As Þorvaldur Thoroddsen and Árni Daníel Júlíusson point out, the most sought after agricultural product for export was woollen goods. By manufacturing these goods Icelanders had a better chance of engaging with the foreign market.[920] Engaging with the export market meant that Icelanders could obtain commodities unavailable in Iceland, gaining access to imported food stuffs as well as luxury items. It appears, therefore, that from the fourteenth century Icelandic farming was shifting towards a more sheep dominated system of farming, though not all regions followed this pattern and neither did every church-farm. Furthermore, some scholars have focused on wealthier farms making farming practices appear more homogeneous because they examine a small number of examples restricted to the higher strata of society.[921] However as shown, homogeneity of farming practices appears to have been more common pre-1318, whereas by the fourteenth century church-farms were employing diverse farming strategies, a trend that continued to the sixteenth century.

Apart from the issue of changing farming strategies, there are other smaller topics that have been addressed in the previous chapters. It is usually assumed in other studies of farming practices that the proportions of milking to non-milking stock and cattle to sheep differed across Iceland, but it is rarely examined in any great detail. This study has shown the diversity of farming across Iceland, both on regional and local levels, and has argued for a number of potential explanations, but due to the nature of the evidence some of the conclusions are more speculative than others. We should not shy away from these questions, but bear them in mind for future research. Conclusions from this thesis will now be summarised.

The demands on grazing varied during the year, with livestock populations being at their maximum in summer, with the addition of new-born livestock, ahead of the autumn

[920] Thoroddsen, *Lýsing Íslands* III, p.228; Júlíusson and Jónsson, *Landbúnaðarsaga Íslands* III, p.126.
[921] Unfortunately, it is not until the compilation of land registers in the early eighteenth century that we can examine the livestock on the less affluent farms.

slaughter. The winter, in contrast, was a time when livestock populations were at a minimum. As has been shown, Icelandic farming relied on the utilisation of all resources, both on and off the farm. The choice of grazing was governed by the type of livestock because milking stock needed to be near people in order to be milked, whereas non-milking animals could be allowed to roam unsupervised for months.

Animal fodder reserves were gathered from various locations, including shielings and islands. We have seen the various grazing locations from which fodder resources were gathered and re-evaluated the use of shielings, going beyond issues of identification to examine how these sites fitted into farming practices. Earlier scholars assumed a homogenous shieling practice across Iceland, and did not take into consideration local conditions. Due to the variety of activities the presence/absence of features approach to site identification, as followed by Gunnar Karlsson, is not appropriate. As with most aspects of farming, it is likely that the use of shielings adapted to the changing climate and society, and did not simply decline. Farmers and those involved in farming were making what they thought was the best use of their resources and energy. Future archaeological investigations will be able to advance our knowledge of shielings through dating and excavation of sites. The use of islands was also proposed as a potential area for future research.

Housing for livestock is shown to be more complex. The *fjós* is usually portrayed as a structure for housing milking cows, but it has been demonstrated that other cattle and livestock could be housed in them too. Structures for sheep also varied depending on function and location, but due to their distance from farm dwellings they have been neglected. An attempt was made to distinguish *fjárhús* and *fjárborg* on the available evidence. An examination of the different types of hay storage was also conducted to illustrate the diversity of practices within Iceland. A farm consisted of more than just the farmstead, drawing on distant resources to ensure the survival of its livestock and thereby its household.

The evaluation of livestock values has demonstrated a more rounded sense of medieval Icelanders' understanding of their livestock. The analysis of the legal texts and assembly price-lists shows there was long-term stability in the legal assessments. The actual valuation of a *kúgildi* relative to other non-agricultural goods varied over the centuries, but there was much similarity across extant texts in the relative value of livestock against the *kúgildi*. The stability of values continued even when the relative proportions of livestock were changing.

The listing of horses in the *máldagar* shows continuity in their values into the sixteenth century. The valuations were not homogenous across Iceland, however, while similar valuations were given for most livestock there were differences. The Árnes price-list demonstrates that there were regional variations at this point, and it is likely that there were divergences from the legal values in all þing areas, both before and after this date, reflecting the local supply and demand for livestock.

In addition, it has been proven that milking animals were not always the most valuable stock on an Icelandic farm. Other animals were esteemed for desirable characteristics; wool-producing wethers rivalled milking ewes in value, demonstrating the importance of wool to the Icelandic economy.

The potential carrying capacity of Iceland has long been a topic of discussion in the published literature as it is linked to the questions of landscape degradation and climate change. Estimates of total livestock populations have been used in the past, and resulted in various figures. No population estimates are given by this study as it is felt that there is not sufficient evidence. Instead, a more critical eye is cast over the evidence for livestock populations, including the number of animals supposedly housed in *fjós*. Cattle numbers on farms with visible or excavated *fjós* may have been exaggerated by previous scholars due to the assumptions that the *fjós* was fully stocked with only milking cows. However, there is archaeological and saga evidence to refute these assumptions that indicate different species were housed in these buildings, which might suggest there were fewer cattle on these farms.

Published discussions of total livestock populations also mask the difference in herd composition and what these proportions can tell us about the economy. The assumption that the Icelandic livestock economy was geared towards milk products has been re-assessed in this thesis based on herd compositions. From these calculations about 90% of church-farms had a majority dairy economy, however, some church-farms had over 80% of their cattle herds as non-milking animals indicating that some larger, wealthier farms went against the general trend. Within sheep flocks, it appears that there was a move towards wool production from the fifteenth century, if not before, even though at this time the demand for stockfish had overtaken the demand for *vaðmál*. Seventeenth century records show an export trade in knitted goods, indicating that woollen goods and thereby wool continued to feed into the export trade.

A wider perspective on livestock animals is taken in this thesis, including considering males and young animals, for which there is less evidence and so are rarely discussed. How these animals were managed, at times, was of such importance to have prompted legislation about their activities. Indeed, horses are also neglected, but as shown here, there is no evidence for the regional specialisation of horse-breeding found in early modern Iceland.

The evidence for pigs and goats, two lesser discussed species, has been collated to give an updated survey of their presence and distribution. Pigs were beneficial during settlement as a source of meat and to clear wooded land. They continued to be reared at least into the sixteenth century, but it is unclear when they became extinct before the compilation of *Jarðabók*. Goats were scarce compared to sheep, and were increasingly side-lined in favour of wool-producing sheep. Goats continued to be reared in locations with suitable grazing, as in Fnjóskadalur (Eyjafjörður) where woodland was recorded into the eighteenth century. Outside this area, where small numbers of goats were recorded, it is less clear if these were bred in Iceland or imported from abroad. Archaeologically, the difficulty of differentiating goat and sheep bones hinders greater consideration of goats' presence.

The vast corpus of *máldagar* permit an examination of livestock, and more than just exceptional numbers of livestock. This study instead has examined farming strategies, both within and between the main Icelandic livestock species of cattle and sheep. The *máldagabækur* allow somewhat of a snap-shot for the fourteenth century for both the Icelandic sees. Within the Hólar diocese, the average number of cattle and sheep owned by church-farms increased over the fourteenth century, regardless of how much of the *heimaland* they owned. Across the Skálholt diocese at the end of the fourteenth century, there tended to be proportionally more sheep than cattle in the East of Iceland than in the West or South, and the lowest regional proportion was in the Westfjords. The Hólar diocese shows that most church-farms were farming for milk, though Skálholt shows the church-farms were farming more for bovine than ovine milk.

The temporal distribution of the *máldagar* mean that we can view change over centuries across Iceland and within regions. When the pre-1318 and sixteenth century *máldagar* are examined, it can be seen that Iceland underwent changes on a regional basis. The North and East continued their farming strategies with a slight but not exceptional preference for sheep

farming, whereas the West, and to a lesser extent the Westfjords, went from slightly favouring cattle over sheep to clearly sheep dominated economies. The South witnessed a change in economy, moving to one that relied less on sheep, though the average cattle:sheep ratio masks a wide range of values, demonstrating that a wide variety of farming strategies were being employed in this region. This thesis has also considered whether church-farms increased or decreased their livestock herds. From this examination it was shown that there was a roughly equal number of church-farms that increased and decreased their herds, but when the number of livestock are viewed there was a large increase in sheep, further emphasising a move towards sheep farming between the fourteenth and sixteenth centuries. All these figures suggest that changes were occurring in the intervening centuries, but that these were not always negative changes. A long-term perspective shows that church-farms were more homogeneous in their farming strategies pre-1318 than in the sixteenth century, indicating that a diversity of practices were employed in later centuries as the church-farms attempted to adapt. Farming conditions were not the same in the sixteenth century as they had been in the previous centuries, and the church-farms reveal that their farming was not static either.

Based on the full temporal range of *máldagar* evidence, it is possible to say farming on church-farms changed over the centuries. As shown, there were some differences in livestock depending on whether the church was a *staðr* or *bændakirkja*, and it is likely that differences also existed between wealthier and poorer secular farms. Unfortunately, we have to wait until the compilation of *Jarðabók* in early eighteenth century for information on the livestock herds owned by poorer, lesser known farms.

The range of products generated by Icelandic livestock has been re-evaluated. Zooarchaeological evidence demonstrates how livestock were consumed, and at what age and in what proportions they were slaughtered. As previously stated, the products generated at a site may not have been the same as the products consumed at that site, therefore production and consumption pattern cannot be directly compared.

Domestic consumption can be inferred from the skeletal remains of livestock. The age-at-death is of significance in this respect because it can indicate what products the livestock were being exploited for. The recovery of young animals and older animals is suggestive of a milk economy, and a wool economy in the case of sheep. The presence of animals in their

prime, between a year and a half and three years, indicates that the animals were reared for meat. This is a simplified model and as shown, no farms followed an exclusively milk or meat economy. Farms, instead, combined the two economies to suit their needs. The scholarly discussion of milk let-down fails to acknowledge that not all neo-natal calves were the result of slaughter, but were also due to natural causes, such as unsuccessful calvings or premature deaths, especially if cows were under-fed, fed poor quality fodder or the calves were born weak. If we are, therefore, to believe that farming conditions in Iceland got worse as the centuries past, then we should be seeing higher proportions of neo-natal bovine bones not just because of preferred farming strategies, but due to higher mortality rates. Yet, we do not see a rise in neo-natal bovine bones in the archaeofauna, and neither do we see a rise in neo-natal sheep remains.

The investigations of beasts of burden show the importance of viewing farming in its wider context as the reduction in non-milking cattle appears to coincide with the discontinuity of arable farming. It is possible that as draught-cattle were no longer needed they were not reared. The keeping of one oxen, or sometimes a pair of oxen, was an expensive investment if there was not sufficient work for them, and horses could be used instead. Thus, it was function and fodder considerations that influenced the keeping of livestock.

Further, it is demonstrated that the eating of horse-meat was not widespread in Iceland even in the early years of settlement. Eating horse-meat was not a solely pagan practice and did not cease with the adoption of Christianity. Instead, horse-meat was consumed during hard times to ensure the survival of households. Horses had a role both in farming, as beasts of burden, and ritual activity, though there is scarce evidence for the ritual consumption of horse-meat in Iceland. Horses recovered in pre-Christian graves range in age, yet the presence of older horses reaching the end of their productive lives argues that they were less of an economic loss than younger animals.

Pigs and goats were utilised in Iceland, but as Icelanders adapted to changing conditions these species were less attractive as they offered less products in return for resources. Pigs were quick sources of meat and goats produced more milk than sheep, but this was not enough to ensure their existence or widespread distribution.

This thesis has aimed to bring together a range of sources on a variety on questions related to farming practices in Iceland up to c.1600. Most topics have been re-evaluated in light of modern advancement, whilst some have been opened up in the hope that future research can move the discussions forward. All indicate that farming consisted of a range of activities conducted in various ways. To simplify the practices down to one model would be misleading and fail to consider the diversity of the Icelandic landscape, the climate, social, political and economic factors, as well as others that influenced decisions about livestock. Instead of talking in negative terms of 'decline', we should acknowledge the diversity of farming practices undertaken in Iceland throughout the centuries, and try to understand how Icelanders were adapting to meet the farming challenges of each succeeding century.

APPENDIX ONE

SUMMARY OF ZOOARCHAEOLOGY BY SITE

Only those sites of interest for this study are included in the summaries below. This list is not meant to be exhausted, but to provide additional information to the reader.

Hofstaðir (Mývatn)

Arguably, the most famous site to be excavated in Iceland is that of Hofstaðir. Originally thought to have been a pagan temple, the modern investigation of this farmstead has argued instead for a high status farm site with some ritual activity. The open-area excavation is still continuing at the site, however, the Viking Age hall area has been completed and is fully published.[922] Most of the zooarchaeological remains were recovered from middens, though supposed ritual activity was recovered in the form of cattle skulls around the great hall structure.[923] Not everyone agrees with this interpretation, however, and doubts have been raised, to differing extents, about the perceived connection between the cattle skulls and ritual activity.[924] The zooarchaeological collection appears to show a similar pattern of consumption through the Viking Age. There were cattle reared mostly for milk with some indicators for 'prime beef' production, and sheep reared for milk and wool, with lambs probably slaughtered for meat.[925] The Hofstaðir consumption pattern notably differed from other early sites excavated in Mývatn.

Sveigakot, Selhagi and Steinbogi (Mývatn)

Several other farm sites have been investigated in the Mývatn area since the late 1990s.[926] Sveigakot, a small to medium sized farm, is dated from the ninth to twelfth century and based on the zooarchaeological evidence followed a dairy economy until the farmstead was abandoned. The nearby Selhagi, was a small farm dated to the ninth and thirteenth centuries, with evidence for a change in use from farmstead to shieling.[927] The site has not been fully

[922] G. Lucas (ed.) *Hofstaðir: Excavations of a Viking Age Feasting Hall in North-eastern Iceland* (Reykjavík, 2009).
[923] T. McGovern, 'The Archaeofauna', p.236.
[924] Sindbæk, 'Book Review of Hofstaðir: Excavations of a Viking Age Feasting Hall in North-eastern Iceland', p.1100; Callow, 'Book Review of Hofstaðir: Excavations of a Viking Age Feasting Hall in North-eastern Iceland', p.370.
[925] McGovern, 'The Archaeofauna', p.251.
[926] McGovern et al., 'Coastal connections, local fishing'.
[927] Vésteinsson, 'Archaeological investigations at Sveigakot 2001', p.82.

excavated yet, but the preliminary zooarchaeology shows an increase in the relative proportion of cattle and sheep, from c.1:2 to c.1:3, between the earlier and later contexts.[928] Steinbogi is a later farm site dated to the twelfth to thirteenth centuries and is thought to show the classic transition from a dairy economy to a wool economy based on a midden excavation.[929] These three sites have helped to flesh out the general patterns in the zooarchaeological collections from Mývatn that indicate that domestic and wild resources were consumed during the ninth and tenth centuries, then from the eleventh to twelfth centuries domestic livestock dominated the archaeofauna before fish became dominant from the fourteenth century onwards.[930]

Gásir (Eyjafjörður)

Another famous site in the north of Iceland, and known to us from the sagas, is Gásir, a trading site that was supplied by local farms.[931] The modern open-area excavation uncovered evidence of craft working, booths and a church demonstrating that the site was wealthy and a place of crafts and trade.[932] The zooarchaeological and structural evidence dates from the thirteenth to fifteenth centuries. Discussions are focused on one area, Area A, as the Area B sample is too small for analysis beyond presence/absence of species.[933] A large proportion of the cattle and sheep bones are indicative of animals slaughtered at their prime meat age.[934]

Oddstaðir (Hörgárdalur)

Inland from Gásir, Oddstaðir is thought to have been a medium sized farm. The archaeofauna recovered was from a midden dated to the late ninth to late fourteenth century.[935] It has been proposed that the change noted in the zooarchaeological collection around the mid-twelfth to late thirteenth century could be due to the site's connection with Gásir. Previously, the site had shown a greater diversity in resources, consuming birds and fish to a great extent. In addition, there was a higher proportion of neonatal cattle bones recovered in the earlier

[928] McGovern and Perdikaris, 'Report of Animal Bones from Selhagi, Mývatn District', p.8.
[929] Brewington et al., 'Archaeofauna from Steinbogi', p.2.
[930] McGovern et al., 'Coastal connections, local fishing', p.191.
[931] Harrison et al., 'Gásir in Eyjafjörður'; R. Harrison, 'World Systems and Human Ecodynamics in Medieval Eyjafjörður, North Iceland: Gásir and its hinterlands', (Unpublished PhD thesis, City University of New York, 2013), p.4.
[932] Harrison et al., 'Gásir in Eyjafjörður', p.115.
[933] Harrison, 'World Systems and Human Ecodynamics', p.149.
[934] Ibid., pp.159 and 168.
[935] Harrison, 'Oddstaðir in Hörgárdalur', p.7.

phases, suggesting a later move towards beef production.[936] Of the domestic species, sheep remained the dominant livestock species throughout the history of the site with cattle a substantial second. Evidence of the consumption of pork was also recovered from all phases of the site demonstrating the site was not a 'normal' farm.

Granastaðir (Eyjafjörður)

A relatively short-lived site is Granastaðir, a farm dated to the ninth and tenth centuries. Open-area excavations, test pits and trenches recovered a range of domestic livestock bones, including evidence of horses being processed in the same manner as cattle for consumption.[937] The cattle to sheep ratio is 1:2 and low compared to other sites. From the domestic bone collection of 1,064 fragments, there was relative high proportions of pigs, accounting for 6.77% of the domestic NISP, and horses 4.32% of the domestic NISP.[938]

Stóraborg (Eyjafjallasveit)

On the southern coast, Stóraborg was a farm site dating from the twelfth to nineteenth centuries and appears to have had a fairly stable livestock economy throughout its existence, with a cattle:caprine ratio of about 1:2.[939] The long-term stability at Stóraborg is unusual as zooarchaeological collections from farm sites show a relative increase in sheep to cattle over time.

Svalbarð (Þistilfjörður)

In the late 1980s a midden was excavated at Svalbarð (Þistilfjörður) and the farm was dated from the mid-eleventh century up until the nineteenth century.[940] The farm is distinguished by the reliance placed on sheep compared to cattle from the eleventh century (analytical unit (AU) 2), an early date when compared to other farms, which increased further in the subsequent centuries. The mortality profiles indicate that cattle were exploited for a milk economy. High levels of lamb mortality were recorded for the twelfth to thirteenth centuries (AU 4) and again in the 1636-1800 phases (AU 7 and 8). The 2008 re-evaluation of the site

[936] Harrison, 'Oddstaðir in Hörgárdalur', pp.22-23.
[937] Bjarni. Einarsson (ed.) *The Settlement of Iceland; A Critical Approach: Granastaðir and the Ecological Heritage* Reykjavík, 1995), p.99.
[938] Amorosi and McGovern, 'A preliminary report of an archaeofauna from Granastaðir', p.190.
[939] Amorosi, 'Icelandic Zooarchaeology', pp.378, 396.
[940] Amorosi, 'Climate Impact and Human Response, p.121.

has pushed the dates back to 1300-1477 for AU 6 and 7 and 1477-1800 for AU 8.[941] Amorosi originally correlated the high mortality in the later phase with the increase in spring sea ice and the location of the sheep-houses along the shoreline, though the reasons for high mortality in the earlier phase were not speculated upon.[942] In light of the earlier dates for AU 7 and 8, it appears that the high lamb mortality took place earlier and so over a longer period of time. The clear increase in seals in the original excavation's seventeenth and eighteenth centuries phase is suggested as another indicator of hard times, but more recent research has shown seal numbers not to be connect with increases in sea ice and other possible factors behind the increased utilisation of seals.[943] Spring sea ice may still be an explanation for the high mortality and possibly appeared earlier than previously thought, starting from the fourteenth century, though it is not clear how frequent or severe this spring sea ice was.

Bessastaðir (Álftanes)

Bessastaðir is a high status site well known in the written record. Rescue excavations were carried out at Bessastaðir, a high status farm site since the Commonwealth Period, which then became the residence of the Danish Governor and now the Icelandic President. The samples taken from the midden, dated as 1600-1849, were poorly preserved, in contrast to the deposits dated to 1450-1500 which had a smaller zooarchaeological collection.[944] The consumption patterns in the collections show a change from a caprine, followed closely by cattle and then horse to mostly caprine with less cattle and more utilisation of fish. There is also evidence for changes in butchery practices during the early modern period, which favoured larger cuts of meat and the consumption of pork, most likely imported.[945] The butchery practices and presence of pig bones distinguishes Bessastaðir from other farm sites, though the heavier reliance on fish and sheep within the domestic species, does follow the general pattern from other sites of the period.

Reykholt (Borgarfjörður)

Reykholt is another high status farm known from the written records. The farm is thought to have been established soon after the area was settled and by the twelfth century had become a

[941] G. A.Gísladóttir, J. M. Woollett, U. Ævarsson, C. Dupont-Hébert, A. Newton and O. Vésteinsson, 'The Svalbarð Project', *Archaeologica Islandica* 10 (2013), pp.69-103, p.75.
[942] Amorosi, 'Climate Impact and Human Response, p.127.
[943] S. Riddell, 'Harp seals in the Icelandic archaeofauna: sea ice and hard times?', *Archaeologica Islandica* 11 (2015), pp.57-72, pp.68-69.
[944] Amorosi et al., 'Site Status and the Palaeoecological Record', p.171-172.
[945] Ibid., p.172.

major church site.[946] Soil conditions at the site were unfavourable for bone preservation, so only a small archaeological collection was recovered, and some areas had been truncated by modern building limiting areas for investigation.[947] The archaeofauna came predominantly from two deposits, a midden [577] carbon-dated to c.980-1280, and the other deposit [704] dated to the twelfth century.[948] The zooarchaeology from the site, though limited, shows that a range of livestock species were consumed including goats and pigs.

Skálholt (Hvítá)

Skálholt was founded as the seat of the southern Icelandic bishopric in 1056. Though the excavations have been dated outside the time frame of this thesis, the site has proven a useful comparison as Skálholt stands in contrast to other farm sites due to the high proportion of cattle recovered from one of the midden trenches dated to the mid to late seventeenth century, 85% of the domestic NISP.[949] Other later midden trenches at the site recorded smaller proportion of cattle, for example in the mid-eighteenth midden 22% of the NISP were from cattle. Skálholt demonstrates that some sites in Iceland were going against the general move to sheep farming. It is one of the few sites in Iceland where evidence of polled (hornless) cattle has been recovered, as nine out of eleven crania were naturally polled.[950] Skálholt, therefore, was a site that was consuming relatively more cattle than other sites and indicates that breeding decisions were favouring polled cattle. The fact that Skálholt was a large, wealthy farming estate would suggest a connection between resources, the consumption of beef and the selective breeding of cattle.

Reykjavík

Not all excavations have been of farm sites. Several urban sites have been excavated in Reykjavík, of which two are of interest for this thesis: Tjarnargata 3C and Aðalstræti 10. Both were rescue excavations of early modern sites and though outside the time frame of this

[946] Sveinbjarnardóttir, *Reykholt: Archaeological Investigations at a High Status Farm*, p.18.
[947] Ibid., pp.29-31.
[948] T. McGovern, 'Animal Bones' in G. Sveinbjarnardóttir (ed.) *Reykholt: Archaeological Investigations at a High Status Farm in Western Iceland* (Reykjavík, 2012), pp.257-259, p.259.
[949] Hambrecht, 'Faunal analysis of the early modern bishop's farm at Skálholt', p.58. NISP (Number of Identified Species Present) is a method of quantifying the relative proportions of species present in a collection, see Reitz and Wing, *Zooarchaeology*, pp.202-205. For a discussion of techniques in an Icelandic context see C. Tinsley, 'The zooarchaeology of Settlement Period Northern Iceland: Some quantitative questions', in G. Guðmundsson (ed.), *Current Issues in Nordic Archaeology: Proceedings of the 21st Conference of Nordic Archaeologists 6-9 September 2001 Akureyri Iceland* (Reykjavík, 2004), pp.49-54, p.53.
[950] Hambrecht, 'Zooarchaeology and the Archaeology', p.482; Polled cattle crania were recovered from medieval and early modern contexts at Viðey, Amorosi, 'Icelandic Zooarchaeology', p.405.

thesis are useful as points of comparison where mentioned.[951] The archaeofauna from Tjarnargata 3C was from a midden with a date range from the seventeenth to nineteenth century and resulted in one of the biggest zooarchaeological collection recovered in Iceland. Aðalstræti 10 came from a midden dated to the first half of the eighteenth century.[952] These middens show a heavy reliance on fish, with sheep/goat the most relied on domestic livestock species. The zooarchaeofauna from Aðalstræti 14-16 has not been included due to the extent of damage and small sample size, which limits our understanding of farm economics at the site.[953]

Livestock structures

Lastly, several sites mentioned in this thesis relate to livestock structures: Þórarinsstaðir and Laugar (Hrunamannaafréttur), Lambhöfði, Áslákstunga and Sámsstaðir (Þjórsárdalur), Herjólfsdalur (Westmannaeyjar) and Goðatættur (Papey).[954] Generally, structures for livestock have received less attention than dwelling structures, and sometimes have not been excavated and thus presents us with difficulties. Discussions of these sites are therefore left to the relevant chapters where the context will be more beneficial.

[951] Perdikaris et al., 'Report of Animal Bones from Tjarnargata 3C', pp.1-64; Harrison et al., 'Faunal Analysis from the 2005 Excavation at Aðalstræti Nr. 10', pp.2-25.
[952] Harrison and Snæsdóttir, 'Urbanization in Reykjavík', p.6.
[953] C. M. Tinsley and T. McGovern, 'Zooarchaeology of Aðalstræti 14-16, 2001 Report of the Viking Period Animal Bones', NORSEC Zooarchaeology Laboratory Report No. 2 (2001), p.4, http://www.nabohome.org/uploads/nabo/Norsec2AdalstrVikingPd.pdf ; C. M. Tinsley and T. McGovern, 'Zooarchaeology of Aðalstræti 14-16, 2001 Assessment Report of the Post-Medieval Contexts', NORSEC Zooarchaeology Laboratory Report No. 3 (2002), p.2, http://www.nabohome.org/publications/labreports/Norsec3AdalstrEarlyModern.pdf
[954] Eldjárn, 'Eyðibyggð á Hrunamannaafrétti', pp.1-143; Berson, 'A Contribution to the Study of the Medieval Icelandic Farm', pp.37-64; Hermanns-Auðardóttir, 'The beginning of settlement in Iceland; Karlsson, *Lífsbjörg Íslendinga*, pp.128-129.

APPENDIX TWO

GLOSSARY OF LIVESTOCK TERMINOLOGY

The Icelandic sources consulted in this thesis contains various terminology to describe livestock. Below is a glossary of words and phrases found throughout the source material. Modern Icelandic spellings are given in the singular nomative form unless otherwise stated. Full definition can be found in the Old Norse Prose dictionary (http://onpweb.nfi.sc.ku.dk/wordlist_e.html).

Livestock

Búsmali – farm livestock.

Geldfé – dry cattle and sheep as well as horses.

Metfé – cattle and sheep.

Cattle

Nautaflokkur – a herd of cattle

Naut – neat (sg.), cattle (pl.), can refer to females and males, though sometimes understood to mean oxen or bulls.

Kýr – cow, milking cow.

Mjólkurkýr – milk-cow, occasionally used in the legal texts.

Neyti – neat (sg.), cattle (pl.).

Geldneyti – non-milking neat (sg.), non-milking cattle (pl.).

Kúneyti – milking cow (sg.), milking cows (pl.).

Kvíga – heifer, young cow that has not yet calved.

Kálf í kú – cow in-calf.

Kálfur – calf, refers to both female and male calves.

Kálfur sumargamall – summer-old calf, old enough to be weaned.

Griðungur – bull.

Heimagriðungur – home-bull, a farm's breeding bull.

Blótnaut – cattle used for sacrificial purposes, can sometimes refer to oxen.

Uxi – ox, castrated male.

Eyki – vehicle, though sometimes used to refer to the draught animal and the vehicle.

Eykur – draught animal, can refer to oxen and horses.

Sheep

Fé – general term for sheep.

Sauður – sheep (sg.).

Sauðfé – a flock of sheep.

Sauðpeningur – general term for sheep.

Ær – ewe.

Ásauður – milking ewe.

Geldær – barren or non-milking ewe.

Gimbur – young female sheep.

Geldingur – wether.

Forustugeldingur – leader-wether, known for their ability to lead other sheep to safety in bad weather.

Hrútur – ram.

Lamb – lamb.

Dilkur – milk-fed lamb.

Horses

Hross – horse, both female and male.

Stóð – collective term for horses.

Roskinn hestur – adult stallion.

Graðhestur – stallion.

Hestur – stallion.

Meri – mare.

Merhross/merhryssa – mare.

Hestamóðir – broodmare.

Geld – gelding, castrated male when referring to horses.

Kapall – pack-horse.

Reiðhestur – riding-horse.

Verkhestur/vinnuhestur – work-horse.

Trippi- young horse, both female and male.

Unghestur – young horse or stallion.

Folald/fyl/foli – foal.

Goats

Geitfé – collective term for goats.

Geitsauður –goat.

Geit – goat, can sometimes refer to female goat/nanny-goat.

Haðna – young or year-old female goat.

Hafur/kjarnhafur/bukkur – male goat, castrated or not.

Graðhafur – male goat/billy-goat.

Geld geit – non-milking goat.

Kið – young goat/kid.

Pigs

Svín – pig, both female and male.

Grís – boar, but can also refer to a pig.

Gylta – sow.

Sýr – sow.

Sýr… með grísum – sow with piglets.

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