Sheep Rearing in Sweden

A niche with agroecological potential

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Foreword

“I want to make the world a better place,” a small and skinny one-day lamb once bleated at its mother. It was still wet behind its ears, and the faintest hint of meconium yellow still clung to its innocent and otherwise spotless, curly coat. The ewe opened one eye, as she lay, stoically ruminating. With the flick of an eyelash, she blinked away a fly that had taken advantage of the moment to attack her eyelid. “Dear, dear,” she replied slowly, burped, and closed her eyes again. What else was she to say?

Indeed – a bold statement for such a wobbly little lamb. But boy, was it appropriate and sincere. And it is, most certainly, the truest of all desires that the world’s agroecologists carry in their chest. At the same time, it is the deepest of their worries. For what does, actually, make the world the best it can be?

Well, “agroecology” is assumedly one easy answer to this question – so easy, in fact, that it summoned me to Alnarp in the pandemic-laden summer of 2020; this kick-started a crucial, shaken but development-inducing period of my life.

The agroecology programme has certainly not made me to become some strange exception to the Dunning-Kruger rule. No, indeed it hasn’t. Effectively, after these two years, I know more than I ever did, but my brain is emptier and hungrier than ever. In this thesis alone, I have delved deeper into the fascination with human lives that kneel so humbly at the hooves of their flocks than I have ever had the chance to – but sharper than ever do I see the face of a foolish fraud in the mirror when I call myself a farmer, an agriculturalist or, for that matter, an agroecologist. More strongly than ever am I perplexed by the relationship of love that exists unconditionally between plants and animals and the earth, and baffled by how it is mirrored by farmers loving their herds and their fields. And less than ever do I feel like my farming knowledge could suffice to even scratch one snowflake off the iceberg of global agricultural dilemmas.

During the puzzling journey through the programme’s soft hills of knowing and its deeper valleys of No-Idea, I have had the honour of absorbing the beauties of the Swedish language. To hear and mimic how it hops from syllable to syllable, every vowel or diphthong a new born lamb, hopping from one fresh, green consonant to the next. Moreover, I have begun to navigate my way through Swedish paradise, where ‘shortage’ seems to be a foreign word and where most doors stand widely open; I have learned to simply go through them and spare myself the question, every time anew, of why it is so easy. I am simply thankful that keys to doors seem to have been forged up in this country. I have, through the courses entailed by the programme, moreover gained the plain but crucial skill of meeting people and situations as they are, curiously wondering, rather than expecting, what they may bring to the world. And finally, I have come closer to mastering the art of being stoic, to sit, when needed, like a ewe, ruminating, waiting for the weather to turn. It does in fact, always turn – eventually.

And so, I’ve learned to evaluate the world through a new, sharp pair of eyes that the past two years have carved for me. I see much clearer now, with a lens that finally catches all the previously hidden footnotes chiselled into the memories of life experiences that I carry in my attic. Footnotes that, in fact, explain the world to me in a more holistic way than it appeared to me before. I see, now, how sheep farming is to today’s agriculture as romantic poems are to modern literature. I see how conventional farmers are to agroecologists as pop artists are to classical musicians. Both sides feel

that they are right, whilst they try, sincerely try to understand and respect the other – and they come close to doing so, but never fully manage. They have common grounds, yes, and that is where they meet. And the best ones amongst them never give up trying to understand and respect the other fully. They too try to see the parallels between the lives of different entities. And so, by way of interdisciplinarity, I have learned (or begun to learn) how to assemble the big painting of the world through specks of oil colour I encounter, and vice versa, to detect where paint has cracked in the big picture. And after having written this thesis, specifically, I see sheep in every topic and every topic in sheep.

What is it then, remains to be asked, that I have understood through this programme, this thesis, and the past two years? Well, "agroecology" is again the quick answer to that question – and my new-gained, agroecological understanding has, in fact, directed me away from Alnarp.

What does, actually, make the world the best it can be? Does it function best when every individual puts himself to work in the fields most desperately in need of forces? This would require me to stay, for vegetables need desperately to be grown, compost must be turned and sheep wait to be shorn. But maybe the world can unleash its full potential best when each individual does what he or she is best at, regardless of how desperately the world has called for it…

"What is 'a calling'?", I often wonder still. Is it to hear the desperate, demanding screams of the world, and to deliver what it needs? To be the agroecologist that Gliessman wants or that Altieri shouts for? That the world most desperately needs? Or does 'following a calling' mean that you shall dig out all that lies within your soul, all you have to give, and to deliver it without one single reservation, and regardless of how desperately the world needs just that? The latter approach may well mean walking down a path that is paved with concrete rather than with wood shavings for compost worms to chew at. Which approach to 'calling' is really the most selfless? Which is truly agroecological?

Regardless of how one answers these questions, the past two years have helped me grasp the wealth of what I have to give from inside 'Me', what my life has to give to the life of the world. And I have chosen to give that, all of it, rather than to listen and deliver on the world's command. This choice was made reluctantly but consciously, and yes, to some (and myself too) it can well seem naïve to lay down the hayfork and look away from agriculture in times as precarious as our current ones. It can seem cruel to watch, as food systems collapse because rising temperatures melt away the feet they have been standing on for centuries, or because pollution etches away the mortar that has been holding our agroecosystems upright for millennia.

Yet, the Krona has finally dropped into the quarter-full wallet of my brain, that I may in fact be best at giving to the world in ways that are not farming. And I have not ceased to hope that the world may, in fact, stop screaming, when I do give it my soul, whole as it is, even though Earth may not have actually been yearning in these decades of severe, environmental crisis, just for my gift.

Abstract

Sheep production in Sweden is an agricultural sector that today exists merely as a small niche, despite its agroecological potential. Through literature research, a survey and 18 semi-structured interviews, this paper defines the sector's marginality and attempts to explain it. The effects of the sector's marginality on the sustainability of Swedish sheep farming and agriculture as a whole are evaluated. Finally, desirable directions for development of the Swedish sheep sector are suggested. The findings showed that the marginality of the Swedish sheep sector to a large extent is a product of socio-cultural factors that affect the structure of the sheep sector. Not least, the sector's marginality reinforces itself. In addition, bio-physical, historical and political circumstances have played a role in marginalising the sector. Several weaknesses and strengths regarding sustainability were recognized within the current, small-scale structures of Swedish sheep farming. Opportunities were identified through which the sheep sector could actually contribute to agricultural sustainability precisely through its marginality. Equally, threats to sustainability that arise from the sector being limited to its niche were acknowledged. Overall, the findings suggest that it would be beneficial for the Swedish sheep sector to grow if agroecological, sustainable farming is the ultimate goal. Whether this growth can and will be achieved, however, is questionable.

Keywords: sheep, marginality, Sweden, sector, rearing, sustainability

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Abbreviations

AI	Artificial insemination
CAP	Common Agricultural Policy
FAO	Food and Agriculture Organization of the United Nations
EU	European Union
LP	Sveriges Lammköttsproducenter, mostly referred to as 'Lammproducenterna'
LRF	Lantbrukarnas Riksförbund (Farmers' National Association)
n. d.	no date
SCB	Statistiska Centralbyrå
SDS	Svenska Djurbönders Smittskyddskontroll (Swedish Animal Farmers' Association for Controlling the Spread of Infectious Diseases)
SEK	Swedish Krona
SF	Svenska Fåravelsförbundet
SLU	Sveriges lantbruksuniversitet
VSC	Viltskadecenter (Swedish Wildlife Damage Center)

1. Introduction

1.1 Agroecology, sheep farming and sustainability

As the name intuitively suggests, agroecology is often described as a combination of farming and ecological views. Ironically, this well-meant merging of agriculture and ecology into one word only underlines the still prevalent mindset in which farming systems and ecosystems are treated as two separate fields of interest, whilst actually, they have always been inseparably intertwined. Also, the fact that a new term seems to be needed to become conscious of the reality that agriculture does not happen alongside nature's ecosystems, but directly in them shows the desperate state 'modern' agricultural thinking is in and emphasizes how urgently we need to find new, more appropriate ways of thinking when dealing with the world's food and fibre – or rather – agroecological systems.

Though it is safe to say that agroecologists overall aim to manage the world's agricultural systems in a more sustainable way than has been done in the past decades, the term 'agroecology' itself can, by different parties, be both interpreted as a science, a movement, or a practice respectively. Whilst agroecology has been treated as a scientific discipline in greater part of the 1900s, movements against industrial agriculture have arisen towards the end of the millennium, and originating from these, sets of common agroecological practices are found today (Wezel, et al., 2009). Considering these different uses of the term, one must be careful to specify what is meant by the word 'agroecology' in a particular context.

Though definitions of the term may vary, common understandings when in the field of agroecology do exist and these, rather than one fast definition, have shaped the ideological framework for this thesis. The premises in question mostly and quite specifically describe the form of agriculture that is ultimately strived for; agricultural systems should for instance depend only minimally on purchased, external input and adapt to the local biophysical conditions rather than changing them. They should also use local and renewable resources, produce in accordance with local needs through the knowledge of locals, and must conserve both biological and cultural diversity. Amongst other common premises these are

characteristics already found in many traditional agroecosystems existing across the globe (Gliessman, 2015). Therefore, it can be argued that agroecology is the mimicking of traditional food production systems in order to bring about sustainability.

In light of this argument, it is paradoxical that animal farming, having been a central part of agricultural systems for thousands of years, should be so often overlooked in discussions about agroecology. Stephen Gliessman, an influential agroecologist today, dedicates a mere eight of over 300 pages to heterotrophs in his renowned book dealing with the foundations of agroecological principles (Gliessman, 2015). Of these, a fair part deals with insects, fungi and parasites, leaving the topic of ruminants to be scratched only at the surface. Similarly, Miguel Altieri, another important scholar in the agroecological discourse, writes about striving for a "*proper balance between crops, soils, nutrients, sunlight, moisture, and other coexisting organisms*" (Altieri, 2018, p. ix), again reducing domestic animals to side figures that merely exist alongside crops that stand in the centre. Altieri's book moreover contains not a single chapter dedicated to animal rearing, but instead revolves around topics which are for the most part relevant only to crop production systems.

Altieri's and Gliessman's approaches are problematic in that they fail to value animal husbandry as a core pillar of some, or maybe even most, food systems that have sustained themselves for centuries, and are amongst the most sustainability-driven today. In regions where arable farming is not feasible, due to soil type, steepness or climate, animal husbandry is the only way to produce food at all and to ensure the local supply of protein for local residents. In organic crop farming, animal husbandry is often seen as the central way of refining fertilizer needed in order to produce crops at all. Bio-dynamic practices in particular see the ruminant as a farm's centre for precisely this reason (Steiner, 2010). Finally, animal husbandry is not least also core to the entire European agricultural landscape, whose biodiversity and cultural heritage relies on the preservation of open landscapes through grazing (Hofmann, 2014). The examples show that animal husbandry can be essential to food security, social justice, environmental preservation and cultural wealth, all of which should be part of any agroecological movement's goals.

Indeed, as agroecologists repeatedly point out, there is a great need for transformation of agroecosystems on an environmental, social and economic level. Sheep production in particular has the potential to contribute invaluably to this transformation. In developing countries, small ruminants often support poorer rural dwellers (FAO, 1986) through small flocks of goats and sheep that rest in the hands of peasants (Devendra, 1980). In this way, small ruminants contribute significantly to the socio-economic situation of those areas. In Europe, examples of sheep

contributing to dyke maintenance are found (Förster & Müller, 2015), where cows for instance would be unsuitable. Finally, where practiced on a larger scale, as is the case in Australia and New Zealand, sheep farming can moreover contribute to the production of high-quality, natural fibre and provide a reliable, economic pillar for the respective area. These examples, amongst others, show that the agroecological potential sheep farming bears is not only abundant, but also diverse.

Whilst animal husbandry is already somewhat neglected in the field of agroecology, sheep farming seems to be downright ignored in most agricultural contexts per se. Only few countries can today be said to have a somewhat established, influential sheep sector that appears of national or global importance. In the better part of the globe, sheep rearing is a more or less neglected niche of agriculture, at the feet mostly of other animal husbandry types such as the beef or dairy sectors. Around the turn of the millennium, Morand-Fehr et al. (1999) report sheep numbers falling, especially in the industrialized countries. Although today these are increasing again, most recent FAO statistics show that in 2018, the global value of gross sheep meat production was less than 20% as high as the value of gross beef production (FAO, 2021). Clearly thus, the importance of sheep farming as opposed to the rearing of cattle is marginal on a global scale and in Europe, the discrepancy between the beef and sheep meat sectors is especially pronounced (FAO, 2021). Unfortunately, the low level of significance seen in the sheep sector can easily lead agriculturalists and society at large to overlook both the potential and the issues going on in it.

Perhaps the most commonly accepted idea within agroecology is that by following an agroecological path, a higher level of sustainability will be reached in the world's agricultural or agroecological systems. Ultimately, sustainability comprises the "*environmental soundness, economic viability and social justice*" of a system (Gliessman, 2015, p. 18). Considering this and the potential of sheep farming elaborated above, one begins to question why the sheep sector in most cases remains so marginal. Has sheep farming not enough to offer after all in terms of agroecological contributions to be a more sought-after form of agriculture? Why does the sheep sector remain of comparatively low economic importance in most areas of the world? Why does the term 'shepherding' bear such an old-fashioned connotation and why does the profession seem to be outdated? Why is sheep farming mostly overlooked in politics? And why is it so seldom focused on closely in research? These questions puzzle indeed, and have sparked this investigation.

1.2 Questioning marginality

When talking about an agricultural sector being 'marginal', it is important to remember that the term 'marginality' cannot be reduced solely to the economic power or weakness of a sector if dealing with the issue in an agroecological context. Environmental and societal aspects need also to be considered to remain true to the holistic way of thinking that defines agroecology. In the context of this thesis, the marginality of the Swedish sheep sector is therefore defined not only by its small economic contribution to agriculture, but also by its low impact on landscape and environment that can be a result of, for instance, low animal densities. Equally, from a social perspective, the number of farmers employed in a sector and its contributions to their respective socio-economic situations should be taken into account before labelling an agricultural field as marginal. By examining the term 'marginality' from these multiple angles, the thesis sets itself apart from research previously done on marginality of sheep farming from a purely economic stance, for instance by Kumm (2006) or Hollertz (2019).

When defining marginality as 'of small economic, environmental and societal impact', one naturally begins to question the actual effects of a marginal sector on sustainability. Should such a sector grow if agricultural sustainability is the long-term goal? How do farmers engaging in an uncommon type of farming impact the agricultural landscape of a given area? What contributions do they make, not only environmentally, but socially and economically, to the sustainability of a region? In what ways might their activities perhaps threaten agricultural sustainability? And considering all these points, how bad or good is it really, that a given sector is limited to a marginal 'agricultural niche'? How much, if at all, would such a sector need to grow in order be helpful towards reaching the goal of sustainability? Could some of its potential actually lie precisely in the fact that it is small and does not dominate the agricultural landscape?

All these questions become relevant when dealing with sheep farming in Sweden, since it is a country in which the sheep sector is both especially marginal whilst at the same time driven by a strong, sustainability-focused spirit. Though exact numbers are not available, the economic contribution of the sheep sector to the GDP must be vanishingly small considering that the agricultural sector as a whole already makes up for as little as 1.6% of the country's GDP and that livestock, much less sheep or goats, are not named amongst the country's main agricultural products (Central Intelligence Agency, 2022). The number of farmers employed in the sheep sector is low and most of them do not depend on their sheep farming practice economically. Wallman et al. (2011) refer to Swedish sheep production as a 'niche' characterised by 'many extensive "*hobby-farmers*"' (p. 57), underlining the socioeconomic marginality of the sector. Inevitably, the environmental impact of

sheep farming must also be negligible, simply because it is practiced so little and animal densities hence are low. At the same time, a glance at Swedish farmers' homepages showed that sheep farmers seem to hold high sustainability-related ideals; many recognize and value the contributions they make towards biodiversity, local food production and the preservation of natural pastures. At first sight thus, there seems to be a discrepancy between the high potential the Swedish sheep sector bears in terms of agricultural sustainability and its nonetheless marginal role in Swedish agriculture. This investigation aims to recognize the actual potential of the Swedish sheep sector for sustainability and tries to better understand if and how the sector's current, marginal position is affecting the extent to which this potential is unlocked or on the contrary left lying idle.

2. Aim and Research Question

2.1 Aims

Firstly, the aim of this paper is to better understand why the Swedish sheep sector is as marginal as it is. Marginality in this context is concretely defined as entailing low economic significance, a low number of producers, small average herd sizes, a low sheep-density across the country, as well as hobby sheep farming largely dominating professional sheep production.

Secondly, the aim is to better grasp the effects of the Swedish sheep sector's marginality on sustainability, by evaluating the sector's contributions towards sustainable agriculture.

Thirdly, the goal is to pin-point in which ways the sheep sector ideally should develop in the future, assuming sustainable agriculture to be the long-term goal.

2.2 Research questions

With the above aims in mind, three research questions guided the investigation:

1. What have been and are the historical, political, bio-physical and sociocultural conditions that make the Swedish sheep sector a marginal branch of agriculture?

2. In which ways does the marginality of the Swedish sheep sector hinder or foster the country's transition to sustainable agriculture?

3. As a result, what should the development of Sweden's sheep sector ideally be characterised by?

2.3 Hypotheses

It is assumed that Swedish sheep production being limited to an agricultural niche …

… is due to the country's historic, political, bio-physical and socio-cultural preconditions,

… may in fact on the one hand be an asset to the country's transition towards sustainable agriculture,

… is on the other hand in some ways hindering the unlocking of the whole potential the sheep sector has to offer in terms of its contribution to sustainable agriculture,

… is an unnegotiable circumstance that can, if at all, undergo only slow change and will influence the role sheep farming takes on in the country's (hopefully more sustainable) agroecosystems in the future.

3. Research approach

3.1 Agroecological research design

In order to achieve the necessary transformations in food production that agroecology calls for, it is necessary to acknowledge the systemic and complex nature of the agroecosystems that enable it. The past decades have unveiled vulnerabilities in today's widespread industrial agricultural systems and have shown that simply fixing particular problems within the current systems will not suffice. Rather, the systems themselves must be questioned and for this, a new way of looking and analysing them is necessary (Gliessman, 2015). Not in vain, therefore, is agroecology characterised by the idea that a paradigm shift and utterly new ways of thinking are indispensable in order to bring about the needed changes to today's agroecosystems.

In response to this necessity, agroecology has embraced a holistic way of thinking that takes into account the complexity of agroecosystems. For one, the three pillars of sustainability, "*ecological soundness, economic viability, and social justice*" (Gliessman, 2015, p. 18), are given equal importance when examining, analysing and evaluating an agricultural system. Furthermore, the theory of systems thinking described for instance by Richard J. Bawden (1991) is applied in agroecological research where possible. According to this model of thinking, parts of an agroecosystem are not seen as isolated from one another; instead, the system is seen as a "*whole*", that consists of several "*subwholes*" and is itself part of a larger "*suprawhole*" (Bawden, 1991, p. 2365). In practice, this means that what is of interest for the investigator ultimately are the properties that emerge from the interaction of the different systems and sub-systems or 'wholes' (Bawden, 1991). These emergent properties in fact determine the social, economic and environmental sustainability of a system, and thus, the systemic, agroecological approach is one especially suited for dealing with sustainability issues effectively, precisely because it acknowledges the complexity of food systems as an unnegotiable circumstance.

Admittedly, the agroecological, holistic ways of thinking described above pose challenges, both to conventional methods of investigation, as Bawden (1991) recognises, and to practical work dynamics in the field, as Bawden and Packham (1993) describe. Nonetheless, complexity-embracing perspectives and corresponding research results should and can be strived for; this can be done for instance by employing several, diverse and less linear methods of investigation than have been common in scientific research of the past century. By choosing methods of investigation that embrace the complexity of agroecosystems, such as for instance systems analysis, participative action research or semi-structured interviews (these capture a wider palette of perspectives on a system than a merely quantitative experiment limited exclusively to a laboratory environment would), a fuller understanding of how things are interlinked can be gained, and problems can be unravelled. This is especially true when such complex techniques are combined effectively with more 'conventional' methods where the latter remain appropriate. The systemic and holistic way of thinking described here gains utmost importance as soon as the complexity of agroecosystems themselves is recognized as the most indispensable of all keys to resilience and sustainability.

Considering these agroecological ideas, it becomes clear that the topic of this study not only lends itself to a systemic research approach, but more so, requires one. Even though the research questions elaborated on in the sections above may restrict the investigation geographically and content-wise, the study aims to examine Swedish sheep farming as a complex system, that in turn exists within the framework of the entire Swedish agricultural landscape, which then again is part of the global food system. Naturally – and this is merely emphasised by the agroecological ideology described that this thesis rest on – the issues that are discussed are complex, interrelated and co-dependent. Moreover, they are inherently crucial to both the environmental and socio-economic sides of agriculture, as farming is itself the embodiment of the interdependence of nature and society. In this, this study can be seen as an example of how the transformation or paradigm shift that agroecology calls for can be undertaken, if perhaps not in direct agricultural practice, then at least in the way agricultural issues are pondered.

In practice, several methods of investigation were employed in this investigation. Both primary and secondary sources of information were used. Primary data was gathered through 18 semi-structured interviews with sheep farmers and other national experts in the field and a survey among 210 Swedish sheep farmers was conducted. Secondary data was gained from a range of sources including published scientific literature, theses, published and unpublished reports and websites. Insights gathered from the interviews were deepened through the secondary data. Equally, quantitative patterns emerging through survey answers were confirmed or contradicted by indications from literature. Figure 1 shows the methodological

approach to this investigation, which is based on the concept of triangulating research methods to address the research questions at hand. The goal that is aimed for with this choice of methods is to successfully address the complexity and broadness of the topic.

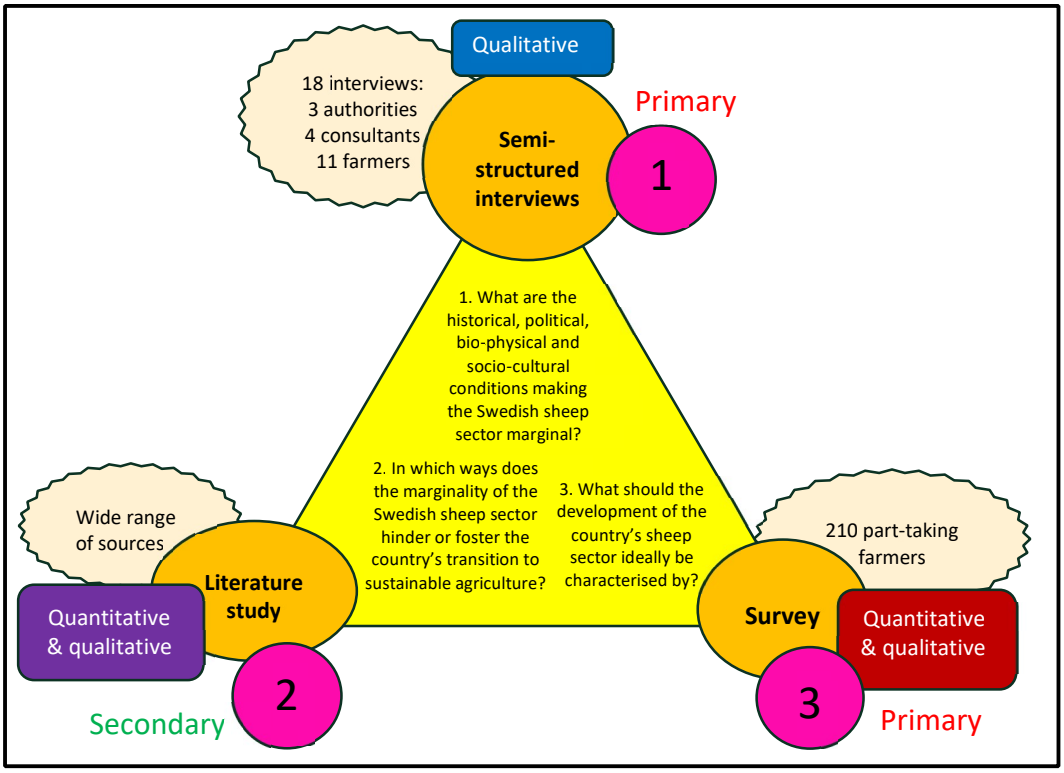

Figure 1: Triangulated approach towards answering the three core research questions. Initially, 18 semi-structured interviews were conducted, which were followed by a literature study and a survey (order of steps in pink). A combination both of secondary and primary sources and of qualitative and quantitative data was used. Source: this research.

3.2 Data collection

3.2.1 Semi-structured interviews

Eighteen semi-structured interviews were conducted with a selection of Swedish sheep farmers and other actors in the sheep sector, such as consultants or representatives of institutions or companies related to Swedish sheep production. Through interviewing these different groups of actors, a holistic picture of the sheep sector was aimed for. By interviewing farmers, specific-location bound circumstances were brought to light, whilst interviews with persons guiding the production process in other ways, for instance through advisory services or institutions with legislative roles, provided a more overarching view of the sector and indicated possible connections between the farmer's answers. The goal was to

obtain a stratified sample of interviewees within these actor groups that would represent the sheep sector well both geographically and regarding professional focus.

In practice, this meant selecting farmers of different farm sizes, held breeds, level of professionalism (part-time or full-time rearing), and representatives of at least some of the central Swedish institutions that pursue sheep issues. Farmers were initially selected from a list of Swedish sheep farms provided by the Swedish Sheep Breeding Association (Svenska Fåravelsförbundet, n. d.), keeping the mentioned characteristics in mind. Then, during the first farmer interviews with the farmers that had been selected in this way, recommendations for further potential interviewees were collected. These were researched through their respective websites and if appropriate, contacted via email or telephone. The selection of interviewees was continuously updated and improved over the course of the interview period.

Of the 18 persons that finally were interviewed, almost all currently held sheep in practice. Of the three who didn't, two had worked with sheep or had owned a herd in the past. Three of the 18 interviewees held an official position in one of Sweden's sheep-related associations and were approached with a partial focus on their work there. Four interviewees were approached in their role as consultants, although two of them also currently held sheep in practice. The 11 persons interviewed merely in their role as farmers had flocks located in 10 different counties, which included both the most Southern county of Skåne and the most Northern county of Norrbotten, as well as Gotland. Most farms were nonetheless located in the Southern half of the country. Nine out of the 11 farmers stated that they tended to their sheep full-time. Amongst the full-time farmers, herd sizes varied between approximately 60 and 1000 ewes, whilst the two part-time farmers stated they held 50 and 65 ewes respectively. In several cases, the farmers' respective partners had a different source of income. Although one dairy sheep farmer was interviewed, most farmers focused on lamb meat production in their work, at times accompanied by the sale of skins, wool or live animals. Partial focus on touristic or educational work to complement the income achieved through the sale of meat was also named.

It is important to note that the sampling goal was to obtain a group of interviewees through which the issues in the sheep sector would be brought to light effectively – not necessarily that the interviewee sample would represent the sheep sector accurately in its proportions. As a result, the sheep farmers interviewed did represent most regions of Sweden, but their answers were in no way weighted depending on the importance of their respective region for Swedish sheep farming. Equally, the average herd size amongst the interviewed sheep farmers was larger than the Swedish average and a larger proportion of the interviewed sheep farmers

were full-time farmers than of Swedish sheep farmers in general. On the other hand, all relevant parties were in some way included in the interviews; both part-time and full-time farmers were encountered, and a range of herd sizes and geographic regions as well as various professional focuses were represented. Therefore, despite the sheep sector's structure not being mirrored proportionally in the interviewed sample, the issues prevailing in it were nonetheless expected to be brought to light effectively in the interviews.

The interview set-up differed between the respective interviewee categories. The interviews with consultants or authorities covered the following interview topics:

- **Job characterisation**: description of the interviewee's work as well as who he/she works with, previous professional experiences, goals the interviewee feels dedicated to etc.;
- **Role of sheep in Sweden**: the role sheep play in Swedish agriculture, culture and/or the economy from the interviewee's perspective;
- **Marginality reasons**: factors the interviewee identifies as causing the struggles of the Swedish sheep sector and the low level of sheep production in Sweden;
- **Effects of marginality**: the environmental, economic and societal effects the interviewee recognises as originating from the current structures of sheep production in Sweden;
- **Sustainability**: issues the interviewee identifies in the Swedish sheep sector regarding sustainability including possible contributions the sector is making towards sustainability;
- **Future**: wishes for the future of the Swedish sheep sector, the issues in the sector that are perceived as the most severe, the most beneficial circumstances that prevail currently.

The answers collected through these interview topics provided a number of valuable interpretations of the Swedish sheep sector from an overarching point of view. Naturally, farm-specific issues and circumstances experienced in farming practice were missing in these interviews and were instead covered through the interviews with farmers that covered the following subjects:

- **Farm characterization**: a description of the farmer's daily work, productive goals, the intensity of work (such as part-time or full-time);

- **Motivation**: factors motivating the farmer to respectively continue or reduce his/her work, ideals he/she is driven by (e. g. organic production, self-sufficiency, the joy of working with sheep, etc.), the farmer's long-term goals for the farm or in some cases the whole sector;

- **Difficulties**: challenges the farmer faces in production itself, in collaboration with institutions or other colleagues, and, when relevant, in private life, difficulties the farmer sees for Swedish sheep farming overall;

- **Politics and Region**: a description of the region, ease or challenge of production under the given bio-physical circumstances, experiences regarding availability of land, collaboration with customers and colleagues in the region and political preconditions and support systems in place regarding sheep farming practice;

- **Sustainability**: the farmer's view on sustainability in general, the importance of sheep farming for it, possible sustainability issues that are perceived within the sheep sector;

- **Future**: wishes for the future of the Swedish sheep sector, the issues in the sector that are perceived as the most severe, the most beneficial circumstances that prevail currently.

The topic choice allowed the interviews to reveal how sheep farming in Sweden is experienced at farm level, under farm-specific circumstances. This approach allowed for perspectives of sheep farmers as the sector's most important actors to be included in this study. It was moreover useful in that it could point out specific, detailed issues that are concealed when examining Swedish sheep production from a larger distance. After having conducted several interviews, recurring opinions began to emerge, whilst other opinions were identified as unique to a single farm.

The interviews themselves were carried out via video-calls or simply aurally on the telephone and varied in length between approximately 30 and 90 minutes, depending on the willingness of the interviewee to talk freely. The majority of interviews was approximately 60 minutes long. The interview structure was rather loose in order to give the respondents the opportunity to bring up points they personally thought were relevant.

3.2.2 Literature study

The picture of the Swedish sheep sector that was gained from the interviews was validated and deepened through literature research. As said earlier, views and statements were tested by confirming or dismissing them through literature. Peer reviewed papers, graduate and undergraduate theses, official national governmental or international statistical databases, reports published by governmental institutions, informal media but also information compiled by institutions for internal use such as a survey conducted by the Swedish Sheep Breeding Association (SF) amongst its members were used in the research process.

3.2.3 Survey

Some points that were made in the interviews or some statements discovered through literature research were tested for their significance through a survey conducted amongst Swedish sheep farmers. The survey was carried out online over the course of three weeks in November 2021. Since part-taking in the survey was entirely voluntary, the number of respondents was determined largely by the farmers' willingness to answer it. Unfortunately, the response rate remains unknown, but in total 210 farmers ultimately took part in it. The link to take part in the survey was published by Svenska Fåravelsförbundet both on their webpage and in the weekly newsletter received by its members. As a result, the respondent sample most likely consisted in large part of SF members, although the link was open to anyone and can therefore have been spread also to non-SF-members through informal channels.

The survey was designed to complement the interviews and the literature research carried out initially, focusing both on points that had not been treated sufficiently in literature and that were not mentioned consistently by a significant number of interviewees. Accordingly, the survey was mostly designed after having done the interviews and the literature study. Some of the included survey questions were also intended to support statements that had already been more or less confirmed through the interviews and through literature.

The following topics were covered in the survey (for more detail see appendix):

- Farm sizes and geographic distribution;
- Reasons for and circumstances related to part-time sheep farming;
- Income sources, profitability and the role of state support for farms;
- Habits and structures regarding slaughter, meat production and meat sale;
- Experiences regarding wolves;
- Prevailing breeding practices, structures and goals;
- Customs regarding the handling of wool;
- Collaboration between sheep farmers, other farmers and institutions;
- Experiences regarding the availability of land, infrastructure and buildings;
- Perceptions of the what the main challenges for the Swedish sheep sector are.

3.3 Data analysis

The data collected through the methods mentioned above was analysed through a process of thematic analysis, described in six steps by Braun and Clarke (2006). In the initial step of 'familiarization' with the collected data, all interview material was listened to a second time and notes were developed further. Parallelly, literature research was begun, in order to deepen understandings of the topics that were raised in the semi-structured interviews. Secondly, 'codes', which Braun and Clarke (2006, p. 88) describe as "*features of the data that appear interesting*", were identified in the interview material. These codes were merged into a cause-and-effect tree to begin understanding the reasons for the marginality of the Swedish sheep sector. Through this approach, possible relationships could first be visualised and farmer survey could then be designed appropriately with the goal of supporting or rejecting the findings that had so far been gathered. Finally, as Braun and Clarke (2006) suggest, recurring 'themes' that consisted of a number of codes were identified in the data. The themes were categorized and named as nine main reasons for the marginality of the Swedish sheep sector. These reasons are discussed in the results section of this thesis.

By applying Braun and Clarke's method of thematic analysis, the data analysis process in this investigation also embodies the concept of qualitative analysis provided by Huberman and Miles (1994). According to Huberman and Miles, data collection is both accompanied and followed by 'data reduction' (i.e. "*the process of selecting, focusing, simplifying, abstracting and transforming data*"), 'data display' (i.e. "*organized, compressed assembly of information*") and ultimately, 'conclusion drawing' or 'verification' (Huberman & Miles, 1994, pp. 10-12). Both the literature review and the semi-structured interviews in this study required just this continuous summary, assessment and interpretation of gathered information. Moreover, data from the interviews and the survey was reduced and displayed in the mentioned cause-and-effect tree and through graphs. Ultimately, conclusions were drawn based on these reflective processes. Clearly, the specific, practical approach to data analysis taken by Braun and Clarke that was applied in this investigation is in concept just as reflective and its steps just as intertwined and interdependent as Huberman and Miles' approach to qualitative analysis.

It should be noted that in the research-approaches that both Braun and Clarke as well as Huberman and Miles dedicate themselves to, data analysis is in fact carried out simultaneously to data collection. In other words, gathered information is documented, analysed and interpreted as it comes in. This was also the case in this investigation. As a result, methods of data collection in this investigation were by no means independent of the results; rather, findings obtained from the different steps of data collection strongly guided the steps to follow. In practice, this could for instance refer to the fact that interviewees were chosen based on suggestions of earlier interviewees and the themes that emerged from interviews already conducted, or that the survey questions were designed in dependence of the remaining gaps in information or the need for validation of findings that appeared after the interviews had been conducted and analysed. This interdependence of data collection and analysis is strongly in line with the agroecological principle of systemic thinking that Bawden (1991) stresses so vehemently; no part of a system (and be it a system of research) should be regarded in complete isolation, but rather the connection between the different subsystems (data collection, analysis and interpretation) acknowledged and used to the advantage of the system's purpose – in this case the drawing of systemic conclusions about the Swedish sheep sector. This interdependency within applied methods should be remembered when examining and evaluating the results discussed in the section to follow.

4. Results & Discussion

4.1 Sheep farming in Sweden: marginal and idealistic

The Swedish sheep sector takes up an only insignificant economic and productive role in the EU's and Sweden's agricultural landscape. In 2020, less than 1% of the EU's total number of sheep were held in Sweden (Eurostat, 2021), where just under 8000 farms held sheep in some form in 2020. Despite the latter corresponding to 13,5% of all Swedish farms, only 2% of the country's agricultural land was used for the sheep and goat sector (Jordbruksverket, 2021). This shows both that the available land is used predominantly for other types of farming, but also that sheep flocks must be small and spread out over a relatively high number of farms. Indeed, the average herd size of just around 33 ewes per Swedish sheep farm (Jordbruksverket, 2021) is very low compared to sheep-intensive countries such as Australia, where an average flock consists of well over 2000 animals (Australian Bureau of Statistics, n. d.). Similarly, the statistics also show that less than 40% of all Swedish sheep holders place a productive focus on their sheep (Jordbruksverket, 2021); for the most part, farmers who hold sheep in some way in Sweden mostly rely on at least one other, more important agricultural production branch in their farming and simply hold some sheep alongside. The small average herd size is an indicator of this. In general, the Swedish sheep sector clearly is one of low economic and productive ambition, characterised to a large extent by economically hardly significant hobby enterprises.

Accordingly, the impact sheep farming practices have on the Swedish population is equally low. A vanishingly small percentage of the overall Swedish population (Statistiska Centralbyrån, 2020) and a mere 5% of all agricultural employees (Jordbruksverket, 2021) is employed in the sheep sector. Moreover, of those employed in the sheep sector, the majority is most probably not economically dependent solely on it, but rather have a secondary source of income to rely on. It is quite obvious that the sheep sector with its low level of productivity cannot be a major socio-economic factor for the Swedish population.

Due to the low level of sheep production in Sweden, the contribution of sheep herds to the Swedish landscape is also limited. In 2020, the number of sheep (sum of ewes, rams and lambs) held across the whole of Sweden lay slightly over 500 000 (Jordbruksverket, 2021), resulting in a sheep density of 0,17 animals per ha of agricultural land. Figure 2 shows that cattle and pig densities lie more than twice as high: 0,48 and 0,45 animals per ha agricultural land respectively. In contrast, numbers from Norway or the UK indicate an opposite pattern. There, the sheep densities (again, the sum of ewes, rams and lambs) lie at 2,33 and 1,89 respectively compared to cattle densities in turn of 0,9 and 0,56 and pig densities of 0,78 and 0,29 (Statistik sentralbyrå, 2021; Department for Environment, Food and Rural Affairs, 2021). Though Sweden's overall animal densities appear lower (possibly due to the fact that woodland is included in Sweden's agricultural land area while excluded in the UK's and Norway's), the numbers clearly demonstrate that Sweden's density of sheep compared to that of other productive animals is low. This circumstance suggests a low level of impact on Swedish agricultural land. As a result, it becomes more comprehensible that open, short-grazed pastures are indeed associated much more with sheep-focused countries like Norway and the UK than with Sweden. The physical impact of the Swedish sheep sector on the agricultural landscape of the country seems therefore just as marginal as its economic one.

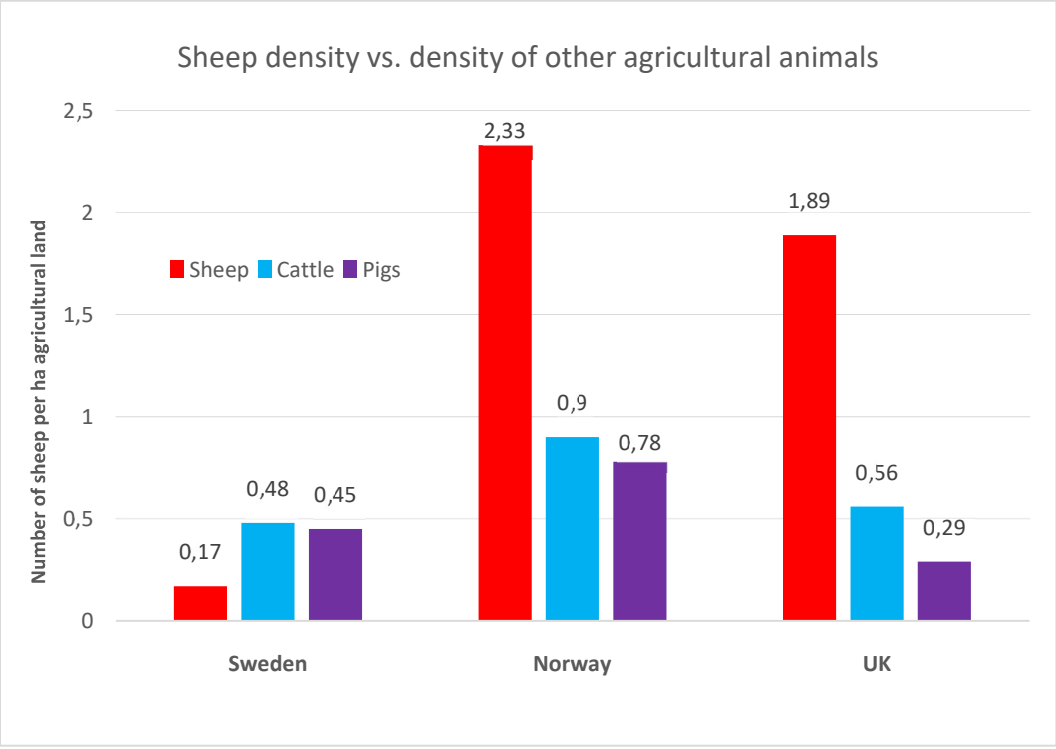

Figure 2: Sheep density compared to the density of other production animals in Sweden and Norway and the UK. Data sources: Jordbruksverket (2021); Statistik sentralbyrå (2021); Department for Environment, Food and Rural Affairs (2021).

Interestingly enough, one Swedish region provides an exception to the rules described here. On the island of Gotland, the sheep density lies over 0,5 animals per ha of agricultural land (Jordbruksverket, 2021). Though statistics were not available on the proportion of part-time farmers or the percentage of the population in Gotland employed in sheep farming, it is likely that both more full-time sheep rearing is practiced on the island than on the mainland and that a larger portion of the population living on Gotland is involved in the sheep sector than elsewhere in the country. In 2021, the average number of adult sheep held per farm on Gotland was 95 compared to the Swedish average herd size of 32 adult animals per farm (Jordbruksverket, 2021), showing simply that the economic significance of sheep rearing for each sheep-holding farm seems to be larger on Gotland than in Sweden on average. With this, the island seems to be the exception that proves the rule; it highlights how marginal of a role sheep farming plays in most of Sweden, and that this role would be even smaller if Gotland were to excluded from the overall Swedish sheep sector statistics. Though it could be interesting to conduct a study in the future on the reasons for the contrast in sheep farming practiced on Gotland and the mainland, this topic goes beyond the scope of this investigation and is therefore not covered in this report. Nonetheless, the reader is welcome to keep in mind Gotland's unique position in an otherwise sheep-poor country and see the island's situation as a contrasting mirror to the rest of Sweden when reflecting on the current state of the country's sheep sector.

Thus, with the exception of Gotland, sheep farming appears to have a low economic, social and environmental effect on Sweden in general. However, it is at the same time characterised by a high level of motivation to tackle sustainability issues. A sheep consultant interviewed for this investigation argued that many Swedish sheep farmers have high, idealistic standards for their work. Several interviewees also suggested that the 'new green wave phenomenon' (Swedish = nya gröna vågen) had brought city-dwellers to the countryside who began setting up sheep farming enterprises. Nitschke (2019) shows that urban-to-rural migrants do mostly engage in alternative ways of food production after having moved to the countryside, sheep farming being a classic example of this. Since the new green wave movement is seen as a response to current, unsustainable societal and agricultural systems (Nitschke, 2019), it can be assumed that specifically those sheep farmers in Sweden that enter the sector with the new green wave trend have a high level of consciousness towards sustainability issues. Finally, a number of farmers interviewed for this investigation also saw their own work as an important contribution to sustainability. Some mentioned that they saw sheep meat as the most sustainable type of meat and were able to name ecological services they provided, such as the preservation of biodiversity, as contributions to sustainability. These examples all confirm that an awareness for sustainability issues must exist within the Swedish sheep sector.

Overall, the previous paragraphs show that the Swedish sheep sector is both marginal and at the same time sustainability-driven. In this, the question arises why the sector has remained as small as it is and how its current structure affects the extent to which desired improvements in sustainability can be reached.

4.2 The Swedish sheep sector in literature

The literature existing on sheep production worldwide appears to be mostly focused on either the Mediterranean region, the tropics and subtropics, or Australasia. Specifically in the tropics and sub-tropics and Australasia, the investigated topics indicate that there is a continuously on-going search for ways to strengthen the sheep (and goat) sectors of the respective regions. In the tropical developing countries, a number of studies such as by Kosgey et al. (2006) and Getachew et al. (2016) attempt to find ways of exploiting the productive potential of the sheep sector without jeopardizing the advantages traditional rearing systems of low productivity bear. Meanwhile, in Australia and New Zealand, research such as that done by Martin (2014) or Morris (2009) focuses more simply on ways of maximizing productivity in the highly rationalised rearing systems of the area. Mediterranean sheep production systems on the other hand are approached more on a systems-level, as research by Ripoll-Bosch et al. (2013) or de Rancourt et al. (2006) shows. A number of sustainability topics are put into question here. The overall impression gained from the international literature is that the future development of the sheep sector is more fundamentally questioned in the Mediterranean regions, whilst the general importance of the sector is taken for granted both in the competitively producing areas of Australasia and the economically less developed countries of the tropics and subtropics.

This pattern becomes important when evaluating how the Scandinavian or Swedish sheep sectors are represented in literature. Scandinavia can be assumed to face some of the same issues the sheep sectors in the Mediterranean are facing. On the one hand, unlike the tropics and sub-tropics, where sheep and goat farming can be a crucial contributor to the socio-economic situation of farmers if it only generates a small amount of income, it is not sufficient for European sheep farming to generate only low amounts of turnover. Instead, farming systems are expected to provide a fairly high level of income, as all non-agricultural and agricultural professional activities in this region of the world. At the same time, compared with Australia, the sheep sectors both in Scandinavia and the Mediterranean exist in a more diverse landscape, consisting both of mountainous areas and low-land, as well as different climate zones. These preconditions are likely to require smaller flocks in the Mediterranean region and Scandinavia, due to the existing need to adapt to the varying climatic and topographic conditions of Europe. In this, the European sheep

sector most likely faces a conflict between geographical challenges on the one side, and high economic expectations set for it on the other. If anything, these preconditions are likely to weigh heavier in Scandinavia than in the Mediterranean, as it is wealthier and faces harsher climatic conditions than Southern Europe.

Under these circumstances, it is plausible that Scandinavian sheep production is not in a position to carry a country's economy or contribute significantly to European agriculture. This in turn would also explain why the sheep sectors in Northern Europe are not represented strongly in international literature. Nonetheless, some literature in English and more in Swedish exists specifically on the Swedish sheep sector. The English literature covers topics such as genetic potential for increased productivity in Swedish sheep farming (Näsholm, 2004) and raises sustainability issues such as methane production (Allard, 2009) or animal welfare (Lindqvist, 2002). In Swedish literature, the economic sustainability of the sheep sector is investigated by Hollertz (2019) and Kumm (2006). The role of sheep farming amongst other agricultural sectors for social and environmental sustainability is discussed by Eriksson (2017). Genetic potential for productivity appears to be discussed less in the Swedish than in the English literature. Instead, other productivity-influencing factors are examined, such as housing by Meiner et al. (2009), animal nutrition by Helander et al. (2015) and management routines by Henry Bergman (2019). Animal health issues, including parasites for instance, are discussed to a fair extent by both the Swedish and English sources. Overall, the literature available on the Swedish sheep sector often deals with issues relevant to sheep farming worldwide, but that are also observed in Sweden. The research focusing specifically on Swedish circumstances however, places emphasis both on sustainability and ways of adapting farm management in order to achieve more successful sheep farming in Sweden. This research is unlikely to gain any international attention, as the sector plays too small a role in the global sheep farming landscape.

Having obtained a general overview of conducted research in the field of sheep farming, one may begin to identify literature that indicates factors explaining the Swedish sheep sector's economic marginality. Hollertz (2019) comes to the conclusion that the lack of capital and profitability at farm level as well as sheep farmers' attitudes towards their work are the most important factors that hinder growth of the sector. Possibilities of counteracting the weak economic situation of the sector are searched for mostly at farm level; Kumm (2009) comes to the conclusion that for sheep production to be profitable with a small flock, low-cost production resources, such as unremunerated family labour and already existing buildings and machines need to be in place. Karlsson (2019) demonstrates that managing a herd so that spring-born lambs reach maturity in time for autumn slaughter is important for a farm's profitability. Bernes & Jeppson (2015) mention

that the survival rate of lambs from a given lambing period influences the profitability of a rearing system, but equally point out the complexity and breadth of factors that affect profitability and the challenges associated with calculating costs in settings where they are not clearly documented or hidden behind unpaid family labour forces. No sources could be found that examine the economically marginal situation of the sheep sector explicitly from a political point of view, although challenging political conditions are hinted at occasionally. Overall, the literature on the economic situation of Swedish sheep production systems confirms the low level of economic sustainability that was suspected in the sector. Moreover, it suggests that solutions to the economic deficits of the Swedish sheep sector could be found at farm level if change in production structures and management practices took place.

In comparison with the literature on the economic situation of Swedish sheep farming, literature dealing with the social contributions of agriculture and specifically of the sheep sector to the Swedish population is sparse. This is not surprising considering the rapidity with which agricultural work has been replaced by employment in the secondary and tertiary economic sectors in Sweden over the course of the past two centuries and the resulting minimal contribution of the agricultural sector to the country's GDP (Central Intelligence Agency, 2022). On the other hand, historically, farming surely has laid the foundations for the Swedish culture prevailing today. Eriksson (2017) points out severe socio-cultural changes that would occur if animal husbandry in Sweden were to cease. Therefore, despite the currently limited socio-economic importance of the Swedish sheep sector for the population as a whole, social sustainability issues within the sector are still relevant because they do concern a part of the population that is important for Sweden's cultural wealth. Nonetheless, exasperatingly little literature on social sustainability of the Swedish sheep sector exists. Merely Thomsson et al. (n. d.) point out that high physical burdens prevail for Swedish sheep farmers in their daily work. Otherwise, it can only be assumed that the financial challenges examined by Hollertz (2019) can lead to social burdens for sheep farmers. It is likely that the low socio-economic importance of the sheep sector for the majority of the Swedish population has caused the topic of social sustainability within the sheep sector to remain neglected in the literature. However, the topic is indisputably relevant when dealing with agriculture from an agroecological standpoint. Equally, it is likely that the prevailing social sustainability topics are in fact linked to the economic marginality of the Swedish sheep sector.

Literature on the environmental issues arising from the Swedish sheep sector is mostly limited to evaluations of climate-related environmental impacts at farm level. Most notably, Wallman et al. (2011) published a Life Cycle Assessment investigation on Swedish sheep production in which they point out that high

climate-relevant environmental impacts in Swedish lamb production compared to lamb production in other countries could amongst other things be a result of low productivity levels prevailing in Swedish sheep rearing systems. In general, the emission of greenhouse gases from sheep rearing is discussed both in formal and informal literature sources, possibly because it is one of few measurable sources of environmental impact. Contrastingly, the environmental problems or benefits arising from the low national density of sheep are not discussed in literature and though the positive impact of sheep farming on biodiversity is generally acknowledged on a side note, sources clearly quantifying the impact of Swedish sheep farming on biodiversity could not be found. An overview over the available literature suggests that environmental impacts arising from Swedish sheep farming have to date not been treated holistically in research, but have been largely limited to the few quantifiable factors at farm level that exist. As a consequence, whilst some effects of extensive, hobby sheep rearing at farm level on environmental sustainability are hinted at, the effect of small herd sizes and low animal densities in Sweden overall remains largely unknown.

It is interesting to note that a fair amount of research has been dedicated to two additional issues that concern the Swedish sheep sector. The first of these is the growing wolf population in Sweden, which is treated from several angles in literature. Whilst official and objective data on the Swedish wolf population has been published by Svensson et al. (2021) of the Swedish Wild Life Damage Center (Swedish = 'Viltskadecenter'), many sources treat the topic from either a more emotional, or alternatively neutral, but socio-culturally investigative standpoint. Some sources, like Du Rietz (2012) seem to argue ultimately for the biodiversity benefits the wolf contributes, whilst others accentuate more the wolf critics' side of the discussion, like Sjölander-Lindqvist (2006). Again others, like Dalerum (2021), more soberly point out the socio-economic tensions affecting the human-wolf conflict in Sweden. In most sources, the production challenges arising from the wolf for sheep rearing are mentioned and psychological pressure on sheep farmers is mostly recognised. Several sources, such as Solevid & Berg (2010) and Karlsson & Sjöström (2007) come to the conclusion that the subjective, emotional responses to the topic are dependent on closeness of contact with wolves. Clearly, the wolf topic is one of socio-economic and environmental, but also emotional and sociocultural relevance. It can therefore be assumed that the wolf influences the Swedish sheep sector in several ways; on the one hand, it causes practical production challenges whilst on the other sparking emotional responses from sheep farmers that can ultimately affect the structure of the Swedish sheep sector too.

Almost as intensively discussed in literature is the neglect of Swedish wool as a resource. Virtually all sources on the topic problematize the circumstance that wool in Sweden is mostly discarded as waste. In response, they analyse the potential of

Swedish wool and discuss creative ways to increase the use of existing wool resources. A fair amount of research, such as that by Olofsson et al. (2010) and Jaxelius & Kjellberg (2020) is done at the Swedish School of Textiles in Borås, or at the Swedish University of Agricultural Sciences (SLU), like by Sjöling & Eriksson (2018). Unlike the wolf-related literature, research regarding Swedish wool is almost exclusively in Swedish, suggesting that the topic is at most of national relevance. Moreover, much of it is done in the form of graduate or undergraduate theses. This shows that the issue still remains a marginal one, both in the textile and agricultural sector and in research, despite the positive, sustainability-oriented intentions it is driven by. Having said this, the literature on Swedish wool can be seen as a mirror of the Swedish sheep sector's overall situation; sustainable approaches and ideals exist within it, but its economic position is weak, its actors few and its impacts on environment and society accordingly low.

Some limitations become apparent when trying to come to conclusions on the basis of the literature that is available on the Swedish sheep sector. As already stated, a large part of the accessible literature consists of graduate or undergraduate theses which can be expected to hold a lower level of validity and reach a smaller audience than information from peer-reviewed articles or nationally commissioned research papers. Likewise, the available statistics on Swedish sheep production are basic compared to other agricultural sectors and other regions of the world. For instance, whilst for cattle and pigs, the Swedish slaughter statistics separate the categories of slaughtered animals by gender and age into several categories (calves, heifers, cows, bulls, etc.; weaners, sows, boars, etc.), slaughtered sheep are merely divided into two categories: 'ewes & rams' and 'lambs' (Jordbruksverket, 2021), most likely due to the carcass handling structures at the slaughterhouses themselves. Market data from the UK, in contrast, is more conclusive in that it can employ more defined categories like 'spring lamb', 'hoggets' and 'cull ewes' (Horne, 2015; Geary, 2021).

Clearly, literature on the Swedish sheep sector exists, and in many ways, it is helpful in discussing the sector's marginality. At the same time, in some instances, it lacks depth or specialization on the Swedish situation. At times, the validity and precision of data is also limited. All these circumstances restrict the insights that can be gained from the available literature. More importantly however, they indicate a lack of funds for extensive research in the field and underline once more the sector's marginality as a whole.

4.3 Research Question 1: Reasons for marginality

4.3.1 Summary

In the following sections the reasons for the Swedish sheep sector's marginality that this study brought to light will be discussed. The collected data showed that a lack of demand is not the cause for the marginal position of the Swedish sheep sector. Demand for sheep meat is higher than volumes produced, and most of Sweden's consumed sheep meat is in fact imported (Karlsson, 2016). In 2019, around 10,000 tonnes of sheep and goat meat were imported (Jordbruksverket, 2020) whilst 17,020 tonnes were consumed (Jordbruksverket, 2021). With this, imported meat makes up over half of the consumed volume.

Whilst demand for sheep meat is high, sheep farming remains an agricultural niche. This is mainly attributed to economic and psychological stress factors that farmers face, which became clear through the interviews conducted throughout the course of this investigation and could be backed up by literature and the results of the survey that was carried out. The drought of 2018 is an example of how stressful farming situations can lead to a decrease in the number of farming enterprises; from 2018 and 2019 there was a statistically significant decrease in the number of sheep and a drop in the number of sheep farms in Sweden (Karlsson, 2019), as Figure 3 shows. Several farmers mentioned challenges confronted in the summer of 2018 in the interviews conducted for this study. It is likely for stress like this to cause reluctance amongst citizens to become or remain part of the Swedish sheep sector, or for that matter any other agricultural sector affected by the drought, though arguably some sectors are likely to be able to buffer such periods better than others. In practice, stress periods can cause farmers to give up their sheep, whilst few potential sheep farmers exist that could replace them.

Figure 3: Number of sheep-holding farms in Sweden from 2010 – 2021 (note that the y-axis is adjusted in scale to match the data points' range). There was a decrease in farms after the drought in the summer of 2018. Data source: Jordbruksverket (2021).

In addition to the low number of sheep farmers overall, the high level of economic stress experienced in the sector can lead a high proportion of the remaining producers to hold sheep part- instead of full-time, often for lack of economically viable alternatives. Around 85% of the farmers taking part in the survey for this study tended to their sheep part-time. Over 60% of these stated that they had a second job to survive economically and over 40% stated they would in fact prefer holding their sheep full-time. The large proportion of part-time sheep farming results in small herd sizes, as these are managed more easily alongside a primary income source. Ultimately, small herd sizes paired with a low overall number of sheep holders naturally result in a low national sheep density.

Clearly, the different types of stress sheep farmers face are central to the sector remaining marginal. The stress has different roots. A thematic analysis of the conducted interviews allowed a categorisation of the factors causing it. It was concluded that the following circumstances are responsible for the economic and psychological stress that Swedish sheep farmers experience:

1. The low level of profitability reached with sheep rearing;
2. Bio-physical conditions that favour other agricultural branches;
3. The increasing wolf population and problems associated with it;
4. Historical and traditional preconditions;
5. Certain cultural trends;
6. Lack of professionalism amongst Swedish sheep farmers;
7. Lack of adequate breeding material;
8. Institutional attitudes and structures in the field of sheep farming;
9. Self-reinforcing marginality;

These factors are complexly interlinked in that they cause and depend on each other and they exert pressure on sheep farmers in various ways. As stated earlier, a low number of farmers are willing or able to withstand this pressure, which ultimately results in few producers, small herds, low sheep density and a high level of hobby- instead of professional practice. In the following sections, the listed factors are discussed in more detail.

4.3.2 Economic pressure on farmers due to low profitability

Compared to other branches of agriculture, the profitability of the sheep sector is extremely low and this was named repeatedly as the most important challenge for the Swedish sheep sector by the interviewed sheep farmers. This corresponds with the findings of previous research. Lukkarinen & Jirskog (2012) name financial insecurity as one of the main reasons for the sector's marginality. Likewise, Hollertz (2019) names the lack of profitability amongst the three main reasons for the sheep sector's failure to grow economically. Reasons for why no higher profitability seems to be reached within the sheep sector are complex and manifold, but may be summarised as a combination of the failure to keep production costs low and income high enough to reach an overall positive balance.

Factors impacting production costs within the Swedish sheep sector are several. The following were mentioned in the interviews conducted for this study: high animal welfare standards, high protection requirements against the wolf, low levels of specialization and rationalization, low technological advancement within the sheep sector and dysfunctional production systems paired with management mistakes. In addition, climatic preconditions of Sweden can in some cases account for higher production costs than in other countries. The reasons for high production costs are discussed in more detail in the sections to follow.

Interestingly enough, though the high production costs are very relevant for the economic challenges of the Swedish sheep sector, it was pointed out in one of the interviews that they actually betrayed one fundamental point of sheep rearing. According to the interviewee, sheep farming is supposed to be a low-cost system of meat production at its core. Indeed, some sources indicate that the key to successful sheep farming lies more in keeping production costs low rather than intensifying production (Garner, 1998) or increasing income (Schoenian, 2021). An economic study by Kumm (2006) showed that employing cheap production material and keeping investment costs minimal is the only way in sheep rearing to achieve any level of profitability with a relatively small herd size. Schoenian (2021) emphasises the different ways of lowering costs in sheep rearing specifically by achieving a cheap feeding system. Kumm (2008) further mentions low opportunity costs on grazing land as crucial to the profitability of sheep production systems. These examples indicate that reducing the currently high production costs in Swedish sheep farming could bear important potential for reaching an economic stability of the sector. Moreover, they are most likely an important reason for the lack of profitability in the sector.

Efforts to reduce production costs need if anything to be pursued more vehemently in the light of the current market price situation for Swedish lamb, which is in fact quite promising. Market prices for lamb lie at a record high (Jordbruksverket, 2021)

and have steadily been increasing in the past decade, as Figure 4 shows. In 2020, the market price was 52,6 SEK, which corresponds to around 5,10 €[1]. Average market prices in the European Union also lay between 5,00 and 6,00 € in the same year. However, certain EU-countries such as France, Portugal or Spain continue to reach considerably higher lamb prices than Sweden has in the past two years (European Commission, n. d.). The market price for sheep meat in Sweden therefore continues to be an issue in the quest for profitability. However, because the price has already improved so strongly and reached a decent level, it does not bear any significant potential for change in the current economic situation of the Swedish sheep sector, nor can it really be made responsible for a lack of economic viability in Swedish sheep production to date.

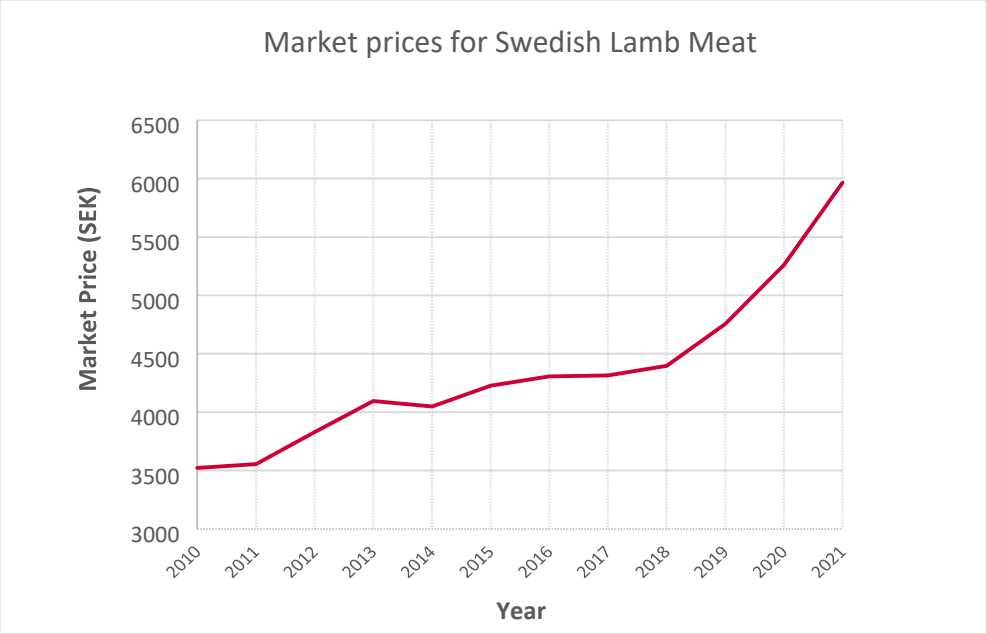

Figure 4: Clear increase in market prices for Swedish lamb over the past decade. Note that the y-axis is adjusted in scale to match the data points' range. Data source: Jordbruksverket (2021).

In order to achieve meat prices that lie over market price level, it can be an option for Swedish sheep farmers to sell their meat directly to consumers instead of to the slaughterhouse. Some sheep farmers are successfully doing this; 40% of the sheep farmers taking part in the survey for this study stated that they in fact offered meat boxes (Swedish = 'köttlådor') to customers, where meat can be ordered and collected directly from the producer. However, by far not all are able to use direct sales channels like this one, either because the contracts they have with the slaughterhouse do not allow it (as one interviewee stated) or because the sheep farmers do not have facilities and workforces to carry out direct sale. Of the survey respondents selling part or all of their meat to the slaughterhouse at market price,

[1] Swedish lamb prices in fact continued to rise since 2020 and reached a level of 56,77 SEK per kg lamb in February 2022 (HKScan, 2022).

38% indicated that they would in fact like to sell more meat on-farm, but lack the time and the facilities to do so. A lack of on-farm resources can therefore limit the profitability of farms especially when production costs are not reduced effectively and the farm relies on high meat prices to remain economically viable.

Furthermore, low income achieved from other sources than meat production within the sheep rearing enterprise can contribute to low profitability. Most importantly, it is (despite missing statistics) commonly known that wool prices have been low for decades. The wealth of literature sources lamenting the 'waste' of Swedish wool indicates this, and the lack of market price statistics on Swedish wool if anything emphasises the low economic importance of wool as a resource in Sweden even more. Though sheep skin prices in Sweden seem to be quite high judging by the perception of the interviewees in this study, the selling of skins does not seem to balance out the other economic deficits, especially considering that not all farms process their animals' skins. Relevant statistics on sheep skin production and sales are missing. It simply seems that the income generated through sheep products is not sufficient to cover the costs, despite comparatively good price levels achieved through meat, and in some cases sheep skin.

The lack of profitability is a key cause for the entire sector's marginal position in Swedish agriculture and society as a whole. Firstly, the described economic difficulties allow few sheep farmers to stay in the sheep sector successfully at all. It is likely that the lack of profitability forces a high number of farmers to give up sheep farming and that the lack of economic perspective makes the sector less attractive for young farmers. Secondly, those few farmers that do decide to continue to hold sheep often fail to do so professionally because they need to rely on a second, more income-secure profession. As a result, they keep their farming practice at hobby level, which amongst other things leads to small herds being the norm. Indeed, Figure 5 shows that over 60% of the survey respondents in this study had fewer than 60 ewes, and around 35% even had fewer than 30 ewes. Official statistics show that average herd sizes lie around 33 adult animals per sheep-holding farm and have consistently been at this low level over the past years (Jordbruksverket, 2021). Thirdly, the lack of profitability can prevent the few professional sheep farmers remaining in Sweden from expanding their practice if desired. A low economic viability both limits access to grazing land on a market dominated by economically more powerful agricultural enterprises such as cattle farms and does not either allow for accumulating enough financial buffer to be able to build the buildings necessary for winter lambing in the Swedish climate. As a result, even sheep herds of professional farmers in Sweden remain small, resulting in a significant difference in average herd size between Sweden and other European countries, such as for instance, Ireland, where an average sheep flock consisted of 140 animals in 2016 (Central Statistics Office, n. d.).

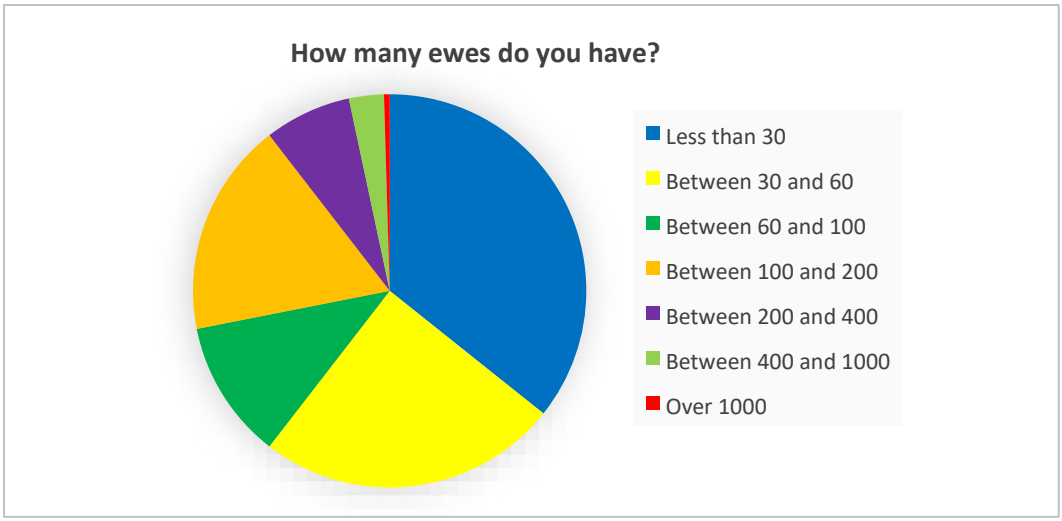

Figure 5: Number of ewes survey respondents reported they held. Over 35% had fewer than 30 ewes (blue) and the majority (blue and yellow) had fewer than 60 ewes. About a third of the respondents had more than 60 ewes (dark green, orange, purple, light green & red). Source: this research.

As these points have all shown, the lack of profitability in Swedish sheep production clearly contributes to the marginal position of the Swedish sheep sector. However, the reasons for the prevailing high production costs have yet to be discussed. Equally, explanations for why income generated through meat, wool and other sources currently is not sufficient have not really been dealt with either. Thus, these aspects will be unravelled in the next sections. Additionally, other factors that marginalise the sheep sector, but are not necessarily related with its economic situation will also be discussed.

4.3.3 High production costs due to Sweden's bio-physical preconditions

In many areas of Sweden, sheep farming is likely to come with high opportunity costs arising from the fact that the country's agricultural land is to a large extent both fertile and versatile. Kumm (2008, p. 13) argues that grazing land used for sheep is required to have low or no value for other types of production in order for a given sheep production system to be profitable. In contrast to this, most areas in Sweden are suitable and therefore preferably used for forestry. Sixty-nine percent of the country's land is forest land (Statistiska Centralbyrån, 2019) and of the few remaining areas with open land, a large part, particularly in Southern Sweden, is either sealed through urban landscapes or suitable for more lucrative crop production. As a result, only 8% of Swedish land consists of natural grazing land (Statistiska Centralbyrån, 2019). The majority of Sweden's sheep are held in Västra Götaland, Gotland and Skåne (Jordbruksverket, 2021). In all three counties, land is comparatively open and thus more suitable for sheep farming, or for that matter grazing in general, than the more forestry-focused areas of both the entire Northern

part of the country and of some of the counties in the Southern part, like Kronoberg or Jönköping län (Statistiska Centralbyrån, 2019). At the same time, one can also tell that the eligibility of land for crop production limits the extent to which sheep production takes over in a given area; Gotland, thanks to its landscape hardly lending itself to arable farming, accounts for a large percentage of the country's sheep, despite its comparatively small size. Skåne, in contrast, achieving slightly higher harvests of winter wheat both in total and per ha than Västra Götaland, has correspondingly lower sheep numbers than the latter. Considering these aspects of Sweden's land structure, it becomes understandable that sheep farming must indeed be limited to the very few areas of the country in which other forms of land-use are sufficiently unprofitable to make the rearing of sheep economically viable.

Though it may indeed be inevitable that landscape structure will continue to keep sheep farming from becoming a common form of agriculture in Sweden, it is questionable whether the existing, potentially sheep-suited land areas have been fully exploited. A consultant interviewed for this investigation stated that many areas which could be used for sheep farming in theory were currently not in productive use because their owners simply trimmed them to fulfil the political requirement of keeping them open in the most cost-effective way. Indeed, Jordbruksverket (2021) confirms that the subsidised preservation of grazing land may be carried out by machinal trimming just as well as by grazing animals. Considering the high input of labour and level of expertise needed to hold grazing animals like sheep all-year round, it can seem plausible from an owner's perspective to fall back on mowing the grass by machine, instead of holding sheep for grazing purposes. In the light of these circumstances, the objection of another interviewee is justified, who reckoned that significantly more sheep could be held in Sweden without competing with primary food production. All in all, it seems that the preconditions of the Swedish landscape alone could indeed allow for more sheep farming than is currently practiced, but that this is limited amongst other factors by subsidy structures linked to the preservation of Swedish landscape elements.

Just as landscape structures favour other forms of agriculture over sheep farming within Sweden, the Scandinavian climate also poses challenges for the Swedish sheep sector when compared with sheep production systems abroad. Most obvious is the short growing season naturally most pronounced in Northern Sweden, which requires large amounts of preserved winter fodder. Apart from high production costs, fodder in some cases also requires appropriate storage facilities, for instance when hay instead of silage is fed, which generates building and maintenance costs. In addition, Swedish production systems mostly require relatively high amounts of indoor space and equipment per ewe, due to lambing largely being carried out indoors. One interviewee described that they decided to increase their number of

sheep by buying up unfinished lambs to fatten over the winter instead of increasing their number of ewes, simply because they lacked the necessary conditions for lambing in their available buildings. On the contrary, European countries such as the UK or Ireland seem to have established outdoor lambing as fairly common practice judging by the abundant information material published on this topic. Considering these circumstances, in combination with findings that identify the lying area per animal as the strongest cost-inducing factor when building stables (Loxbo & Ekman, 2014), it seems likely that Sweden faces higher building costs in sheep rearing compared to countries with milder climates. From this perspective, it is fortunate that the most common production system in Sweden culminates in autumn slaughter and therefore requires less indoor area for lambs than any other, due to the large part of lamb fattening occurring outdoors by grazing (Norlén, 2004). Nonetheless, considering the need for space for ewes lambing indoors and the long period of winter fodder dependence, Swedish sheep production systems should in general be seen at a disadvantage compared to rearing systems of milder climatic zones.

4.3.4 Economic and psychological pressure on farmers due to the wolf

Wolves are becoming an increasingly relevant topic of discussion in Sweden. After being declared extinct in Sweden in the 1960's, wolves were put under protection in 1966 (Wild Sweden, 2021). The number of wolf packs and wolf pairs counted in Scandinavia has increased from 10 in the winter months in 1998 to 1999, to 75 in the winter from 2020 to 2021 (Naturvårdsverket, n. d.). The total cross-border population with Norway is recorded to consist of over 450 individuals, over 80% of which are based in Sweden (Svensson, et al., 2021). Though the main wolf population is concentrated in Svealand, the population is expanding and beginning to occupy for instance areas in Skåne as well (Svensson, et al., 2021). Naturally thus, the impact of wolf populations on agriculture in general is expected to increase.

The sheep sector (alongside the reindeer sector) is the sector the most affected by the wolf of all animal husbandry types in Sweden (Naturvårdsverket, 2016). This is likely due to the convenient size of sheep as prey, as well as the high prevalence of natural grazing as opposed to enclosed stable feeding in the sheep sector. Indeed, 5% of the survey respondents reported that their herds had been attacked by wolves and almost 37% stated that they were familiar with colleagues in their region whose herds had been attacked. Considering that the wolf was categorised as extinct not too long ago, these numbers appear high. Although the development of the total number of sheep in Sweden (Jordbruksverket, 2021) so far does not seem to be negatively correlated with the rising number of wolves, problems arising due to the

presence of the wolf are of all the agricultural sectors likely to be experienced most severely within the sheep sector. Increasing wolf populations may thus well be a factor contributing to the sheep sector's marginality in that they induce economic and psychological stress on sheep farmers that few farmers are willing or able to endure.

The interviews suggest that the most apparent challenge through the wolf for sheep farmers are the costs arising from precautionary measures taken to prevent herd attacks. Several interviewees reported that investments into wolf precautions were not sufficiently reimbursed by the state. Though the available official legal literature was unclear regarding this topic, it does overall seem like the decision for or against the granting of varying amounts of state subsidies are decided on from case to case by the respective county's administrative board. It is interesting to note that two specific examples of difficulties with receiving appropriate state support recurred during the interviews. Firstly, it was stated by several interviewees that governmental support did not cover the increase in working time needed to set up the subsidised protection material, such as higher fencing. Indeed, the subsidised amount is fixed at 50 SEK per metre of fencing (Jordbruksverket, n. d.) and 96 out of 170 survey respondents in this study stated that the support received for wolf protection was indeed not sufficient to cover the increase in costs associated with it. One respondent in particular specified that in his case only 50% of the additional costs associated with wolf protection could be covered by state subsidies. Secondly, it was repeatedly reported that farmers who lease land from year to year without long-term land-use contracts, are not granted support for pasture protection at all. Measures taken on temporary pastures are, in effect, not subsidised as they are considered non-permanent protection measures (Jordbruksverket, n. d.). Over 23% of the survey respondents reported that they grazed on land they felt was in need of wolf protection measures but that was not eligible for state support. In summary, the situations surely vary from case to case, but in general, it can be assumed that the increasing necessity for wolf protection measures does in fact increase sheep farmers' overall production costs considerably.

In addition to the costs for necessary protection measures, an important economic risk for sheep farmers obviously also arises when a wolf attack actually occurs, regardless of the precautionary measures taken beforehand. Apart from the obvious loss of income through animals that cannot be slaughtered any longer after a wolf attack, flocks carry irreplaceable breeding values, that are lost when herd animals are attacked and killed. Clearly thus, the economic challenges that arise through wolf attacks in Sweden are increasing and make it harder for Swedish sheep farmers to reach profitability. Ultimately, this contributes to fewer sheep farmers being able to remain in the sector.

Furthermore, next to economic challenges, the increasing wolf populations also cause psychological pressure on farmers, which may cause farmers to leave the business. Two interviewees reported either of themselves or of others being in the process of giving up their herds because of the emotional burden they were unable to carry further after a wolf attack. Eighteen survey respondents indicated that they were considering giving up their flock due to wolf issues and some individuals emphasised through personal comments that if their herd were to be attacked by a wolf in the future, they would give up their farming practice. One respondent wrote in a personal comment that he had reduced his sheep number due to wolf issues in order to avoid "*putting all his eggs in one basket*". It must be remembered, that a deeper attachment from a sheep holder towards his animals exists than simply that of him/her seeing them as an income source. A study amongst Norwegian sheep holders showed that the attitude towards large carnivores such as the wolf becomes more strongly negative the more intense the emotional attachment of a farmer to his/her livestock is (Vittersø, et al., 2015). In accordance with this, the general mood of the interviews in this investigation indicated that the wolf's mere existence brings a considerable degree of anxiety to farmers. Almost 70% of the survey respondents in this study stated that they were afraid of a wolf attack on their own flock (see Figure 6, pink). The anxiety seems to arise from the constant, lingering threat of a wolf attack and the uncertainty associated with this. Four personal comments were left by survey respondents naming the psychological stress arising from wolf issues (see Figure 6, crosshatched light green). With increasing numbers of wolf attacks in Sweden, this pressure is intensified and could well contribute to a decreasing number of sheep farmers in the country.

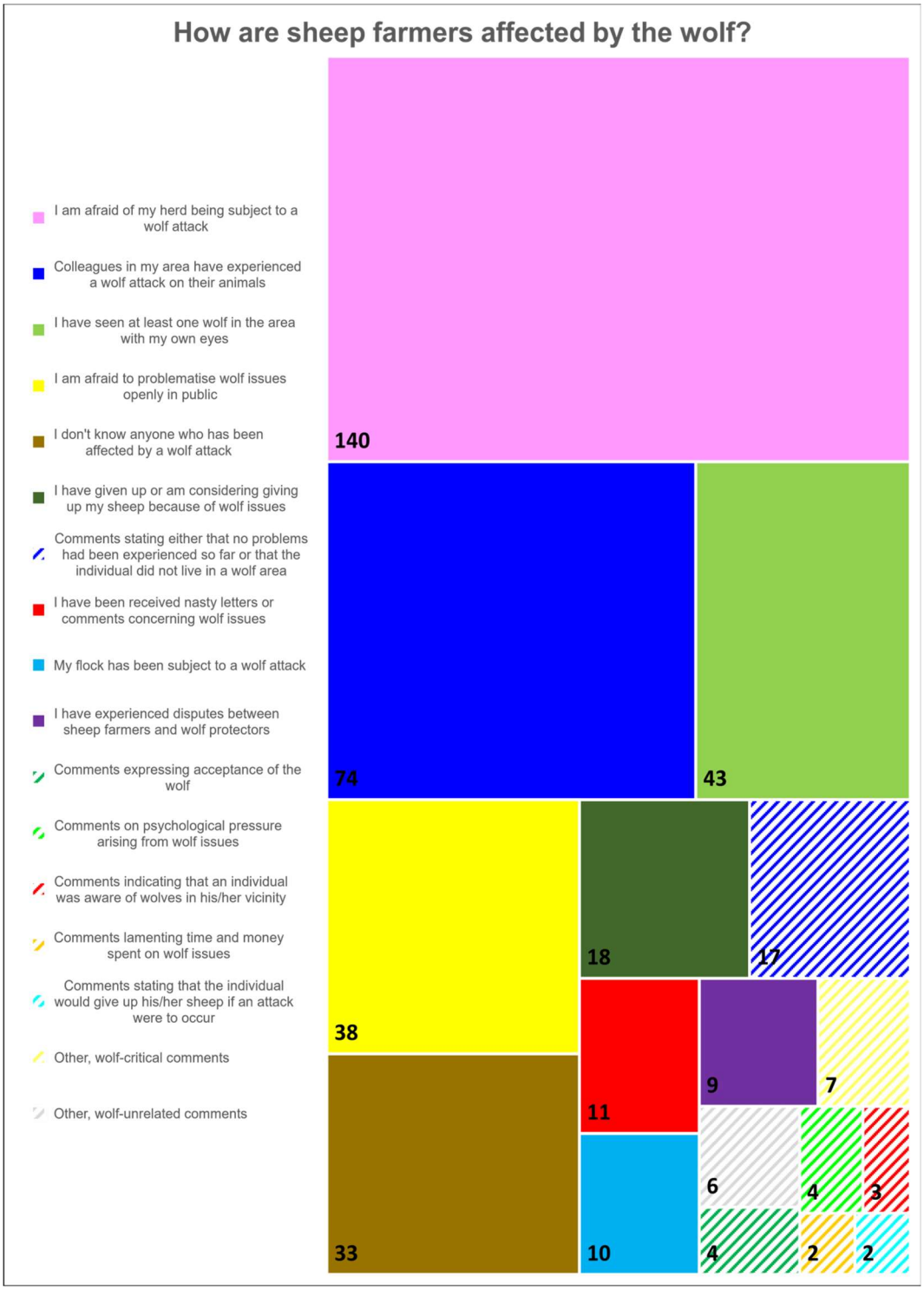

Figure 6: Survey respondents' experiences of the wolf. 201 farmers answered the question with both the option of checking different suggested answer options (full colour filling) and leaving personal comments (crosshatched filling). The numbers indicate how many times the respective point was raised in total. Clearly, the wolf's existence is overall experienced as problematic. Source: this research.

Next to the psychological pressure arising from the physical threat of the wolf itself, the wolf debate going on in society can also be a source of psychological pressure for sheep farmers. It was reported by several interviewees that they had to some extent either experienced harassment through social media regarding the wolf topic or felt anxiety about possible other, various forms of harassment from 'wolflovers'. Nine survey respondents had experienced disputes between sheep farmers and wolf protectors (see Figure 6, purple) and one interviewee even reported having witnessed a heated wolf-debate related fight between wolf protectors and sheep holders. A couple of interviewees highlighted that there was a general reluctance amongst sheep farmers to speak openly about wolf attacks that they or colleagues may have been subject to, for fear of being targeted, harassed or threatened by animal protectors and almost a fifth of the survey respondents stated that they were uncomfortable with speaking publicly about wolf issues (Figure 6, yellow). 11 participants indicated that they had been the victim of some form of harassment associated with the wolf debate (Figure 6, red). Though the interviewed farmers emphasised that these types of harassments and fears would ultimately not cause them to give up their practice, the pressure surrounding the whole topic of the wolf nonetheless seems to be a factor contributing to the challenges that sheep farmers face certainly make the sheep sector in general more unattractive for farmers to be a part of.

4.3.5 Historical developments and traditions that have shaped the sector

It was mentioned in one of the interviews that low wool prices, created by the cultural shift from natural, woollen to synthetic fibre throughout history is one important factor for the Swedish sheep sector's marginal situation today. Indeed, the Swedish textile industry underwent a severe crisis after World War II as the demand for woollen textiles from the army's side went down and other countries produced a variety of textiles for significantly lower prices. This trend was aggravated by nearly unrestricted import policies. Around the 1960's, the intense efforts towards a rationalisation of the wool industry that had been made during the war were given up and most machines were not updated any longer (Brodén, 1958). It is likely that breeding efforts neglected wool quality after this industrial development, contributing to the coarseness of Swedish wool today. The latter, in combination with small herd sizes that lead to small wool batches of varying quality, can explain the low wool prices achieved by Swedish sheep farmers and with that, the low profitability reached in the sector.

Despite these developments, some wool processing infrastructure has been brought back to life around the country in recent years, theoretically creating the option of increasing the use and value of Swedish wool, regardless of its coarseness.

However, the intentions of the larger wool processing companies make this difficult. Most have taken to processing mainly Merino wool that needs to be imported, as in the case of WoolPower in Östersund (Woolpower, n. d.), or focus on other fibres such as cotton or linen alongside their wool processing line, as in the case of Klippan Yllefabrik AB in Skåne (Klippan, n.d.). Swedish wool is not likely to replace imported Merino wool in the foreseeable future, considering the high price and quality competition on the global wool market, which arises from the highly rationalised breeding and production structures in New Zealand and Australia that dominate global wool production. Rather, Swedish sheep farmers wanting to market their wool in an economically viable way have to rely on wool processing companies purposefully prioritising regionality over wool quality. Currently, some companies are taking such a regional approach that prioritises Swedish wool, such as for instance 'Svensk Ullberedning AB', 'Ullkontoret', 'Filtmakeriet' or 'CC Wool'. Spinneries such as 'Wåhlstedts Ullspinneri' or 'Solkustens Spinnverkstad' are further examples of regionally-oriented enterprises. However, these companies to date remain small. The demand for and the value of Swedish wool remains low both inland and abroad, despite the efforts to revive the wool processing industry. This ultimately causes wool to remain a negligible income source for most Swedish sheep farmers, which contributes to a low overall profitability within the Swedish sheep sector.

Apart from the struggling wool market, a couple of the interviewees also named the lack of sheep eating tradition in Sweden as a challenge for the sector. Of the four main types of meat eaten in Sweden (pork, beef, chicken and lamb) the Swedish population by far eats lamb the least (Lukkarinen & Jirskog, 2012) and this has been the case in the entire past decade (Jordbruksverket, 2022). A study by Nilsson & Larsson (2017) showed that even game was consumed more frequently by survey respondents than lamb. The trend of lamb being consumed at any significant level in Sweden at all is moreover fairly recent, considering that consumption lay under 1 kilogram per capita and year by the turn of the millennium. In comparison, over 30 kg of pork were already consumed per person in 1990 (Jordbruksverket, 2021). As a consequence of these consumption structures, widespread knowledge about the preparation of lamb and mutton cannot be assumed amongst the general population today. Therefore, it is well possible that demand for sheep meat from the general public such as private persons and canteens remains low, despite the fact that lamb consumption has risen in the past 30 years until 2017 (Jordbruksverket, 2021). This demand structure may contribute to Swedish sheep farmers continuing to sell their meat to slaughterhouses rather than on-farm, even when the latter is logistically possible. Amongst other conveniences, slaughterhouses have more established sale channels at their disposal to those who demand lamb meat specifically, like high-end restaurants or wholesalers. In

consequence, farmers are likely to have to accept lower prices for their meat from slaughterhouses than they might otherwise receive through direct sale.

Some interviewees also made the lack of sheep meat eating tradition in Sweden responsible for the fairly unestablished classification systems for sheep meat. Although lamb carcasses, just like beef carcasses, are classified at the slaughterhouses using the EUROP standard (HKScan, 2021) and farmers are rewarded accordingly, there seems to be no standardised system for communicating lamb meat quality to the consumer after slaughter. Whilst LRF, Jordbruksverket and the farmers' association Svenskt Kött have collaborated to establish a system for classifying the marmoration of Swedish beef in order to increase the added value of beef meat along the production chain (Stenberg, 2016), a similar large-scale classifying system for lamb and mutton is missing. The smaller association 'Exceptionell Råvara' is attempting to bridge this gap by evaluating not only beef and pork, but also Swedish lamb (Exceptionell Råvara, n. d.). However, their efforts do not seem to have reached the masses and as a result, the meat price currently paid by end-consumers remains unchanged regardless of meat quality. By implementing a change in pricing system between slaughterhouse and consumer, the prices passed on to producers could be improved and increase incentive for farmers to produce meat of high quality. Currently, a large number of farmers see aspects other than meat production as the priority of their sheep rearing, such as environmental conservation services like grazing, the production of valuable sheep skin or simply the joy of holding animals in a natural, albeit less productive, way. As a result, carcasses reaching the slaughterhouses can be of relatively low quality, receive lower EUROP-classifications, and thereby limit the achieved market prices per kg meat. This ultimately jeopardizes the Swedish sheep sector's economic viability. A higher level of sheep meat consumption amongst the general population could create incentive for a more elaborate and appropriate pricing system of Swedish sheep meat, which in turn could be helpful towards better economic sustainability of the sector.

Overall, up until today, the historical cultural developments of Sweden have been disadvantageous specifically to the wool and meat production branch of the sheep sector and may in part be responsible for the sheep sector's marginality. However, several sources indicate that the trends are changing. Wool has been receiving a high level of media attention recently. The topic of wool being seen as a valuable product rather than as waste is addressed frequently by less formal sources, such as Regnander (2019) or Hult (2019) to name just two. Apart from that, projects such as the 'Baltic Wool conference' or collaborations between Swedish sheep farmers and the company 'Järbo' are being launched (Baltic Wool Conference, 2021; Linderstam, 2020). High-end clothing producers are beginning to see the sustainability value in Swedish wool and are beginning to process it (Gentlemanna

Guiden, 2021), and the examples given earlier of regional wool processing companies and spinneries show that initiative is taken to increase the use of Swedish wool. Several interviewees moreover pointed out the high level of dedication from SF's side to the use of wool in Sweden. Unfortunately, official statistics about the development of Swedish wool prices in light of these developments could not be found, but some of the described developments do indicate that it may not be all too audacious to hope for at least a slight price increase in the decades to come.

Like the trends in wool processing, meat eating habits in Sweden are also changing in a way that may be advantageous to the sheep sector. The demand for lamb has risen until 2017 (Jordbruksverket, 2021) whilst beef and pork have remained at a steady level (Naturvårdsverket, n. d.). The increase in the consumption of sheep meat may both be attributed to a higher sustainability awareness of the population, a growing familiarization of Swedish citizens with international cuisine, as well as the growing Muslim population of New-Swedish citizens in the country. Concerning the latter, the interviews in this study indicated that meat price and method of slaughter ('halal' slaughter is currently forbidden in Sweden) were usually seen as more important than regionality for this consumer segment. Depending on the extent to which Swedish and New-Swedish consumers ultimately choose Swedish sheep meat over imported meat, the rising overall demand for lamb gives reason to hope that a better reward system for Swedish sheep meat of high quality might be expected in the future. As a matter of fact, the market price for lamb has indeed been rising in the past years and has reached a level of up to 19,27 SEK per kg mutton (adult sheep) and up to 56,77 SEK per kg lamb in February 2022 (HKScan, 2022). The current, favourable price development was in fact pointed out by almost all interviewees without being explicitly asked, showing that producers are well aware of the positive trends going on for them in society.

The recent cultural developments show that the historical paths of development are in the process of changing in Sweden and that limiting cultural traditions are beginning to break. This is advantageous to the sheep sector and it becomes clear that the main reasons which lock the Swedish sheep sector into its niche existence today thus lie less in Sweden's historical and cultural background than in other marginality-causing circumstances that are discussed above and below this section. The historical developments and traditions of the country should be seen more as elements that have brought the Swedish sheep sector to where it has been in the past decades rather than as significantly influential factors for the Swedish sheep sector today or in the future.

4.3.6 Psychological pressure & economic challenges due to current cultural trends

Though lamb consumption has been growing in past decades compared to other meat types (Jordbruksverket, 2021), the trend to vegetarianism and veganism in society on the other hand is adding a challenge to the work of sheep holders. Possibly, this trend might explain why the consumption of not only lamb and mutton, but also beef and pork has decreased slightly, but unmistakably in most recent years (Jordbruksverket, 2021) (see Figure 7).

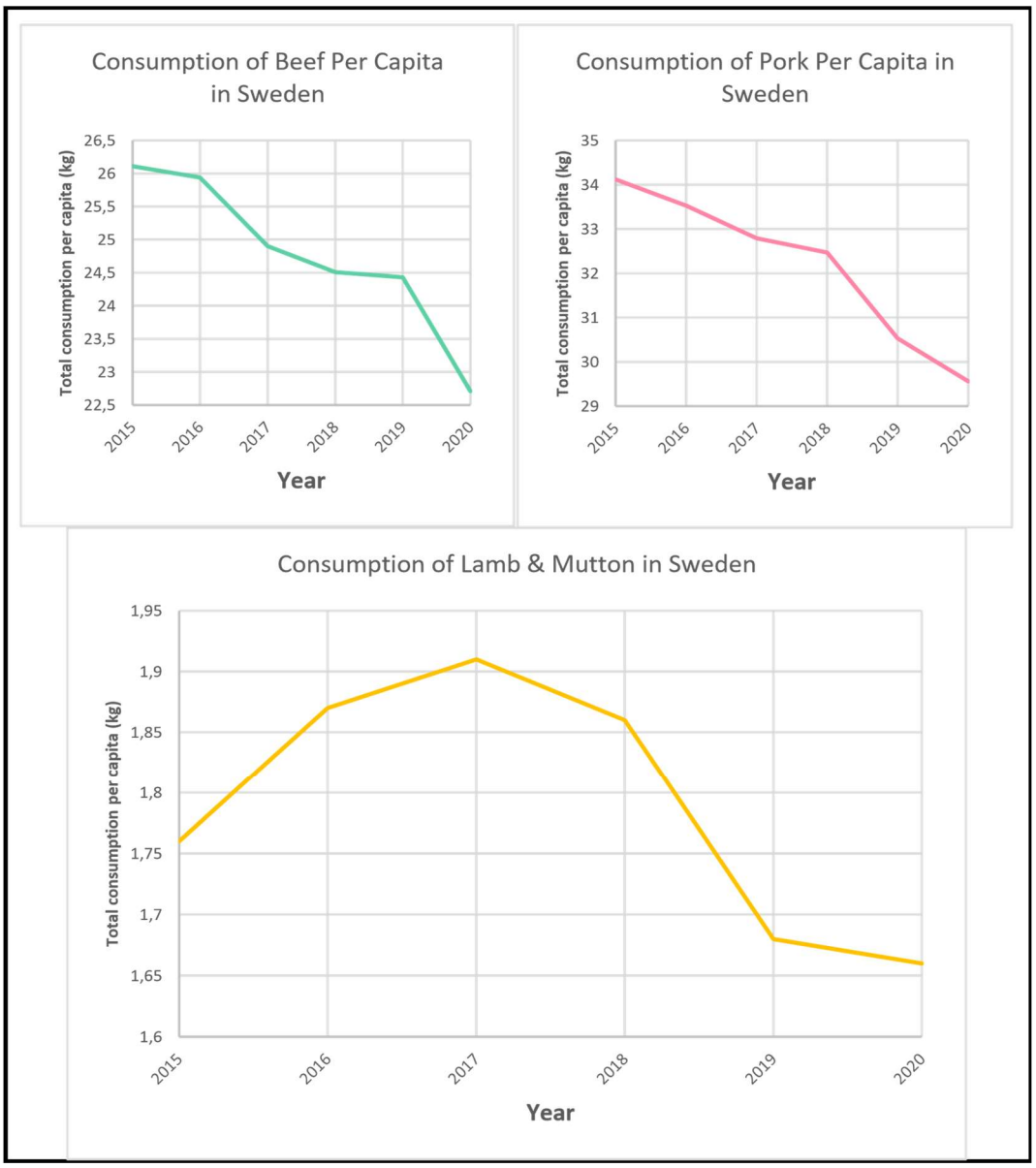

Figure 7: Per capita consumption of lamb & mutton (orange), pork (pink) and beef (green) in Sweden from 2015 until 2020. Data for 2020 is preliminary. Note that the y-axes are adjusted in scale to match the data points' range. The consumption of all meat types decreases clearly in the most recent years. Data source: Jordbruksverket (2021).

The fact that animal husbandry as a whole is currently being challenged in society puts sheep farmers in an as equally controversial position as is the case for all animal farmers. A study by Simons et al. (2018) about the acceptance of animal husbandry amongst consumers showed that more or less all participants, including those eating meat, seemed to have a certain degree of mixed feelings towards the holding of animals for slaughter. Furthermore, a study by Janssen et al. (2016) attempting to understand the growing popularity of animal-free eating in society, revealed that vegan consumers' eating behaviour was motivated not only by ethical, but also environmental and health-related reasons. This multi-angled and critical view of animal husbandry from society may on its own already be a stress factor for Swedish farmers, and indeed, some sheep farmers interviewed for this study reported that they had at some point been subject to harassment on social media by animal welfare activists, vegans or other groups that are against the slaughter of animals for food. Naturally, the feelings associated with these moments of harassment were negative amongst the interviewees and the existence of such online attacks must certainly be seen as a source of psychological pressure. On the other hand, the interviewees also reported that the described kinds of comments on social media were far from influencing them significantly in their work. This indicates that these online channels of criticism or even attack may, in fact, be less destructive than one is inclined to think. An Australian study about online animal welfare activism comes to the conclusion that activism carried out through social media channel bears limited power because is received as little credible (Buddle, et al., 2018). The interviewees' reactions in this study confirm this, as they were similarly unimpressed by the vegan activism they had faced so far. Hence, though it should well be acknowledged that the societal trend to animal-free nutrition probably places some pressure on sheep farmers, it does not appear to be a significant reason for them to give up their practice.

Apart from trends in *what* is eaten, trends in *how* food is consumed have also changed in the past decades. The term 'just-in-time production' was mentioned with skepticism in several of the interviews. Farmers felt that consumers' request for fresh meat all-year-round was a problematic, cultural development. Indeed, the trend seems to be relevant. Slaughterhouses, such as HKScan, strive to adapt as quickly as possible to consumer trends which are currently characterised both by an increase in snacking culture as well as the increase in demand for ready-to-heat products from the hotel, restaurant and catering sector (HKScan, 2021). These trends rely heavily on fresh instead of frozen meat, and an interviewee working in the slaughter process chain confirmed that the slaughterhouse seldom froze and stored meat to sell it later, but rather sold it as immediately as possible. Consequently, the just-in-time production of food that is required by modern Swedish eating culture could well be impacting the structure of the animal husbandry. What is more, the just-in-time trend within food production is likely to

have an especially high impact on Swedish sheep farmers compared with sheep farmers abroad or Swedish farmers holding other animal types because of the rearing system applied in the Swedish sheep sector. The season-bound production of lambs dominating in Sweden fails to provide the constant, even supply of fresh meat that just-in-time production structures require. Both cold temperatures that challenge lamb survival after winter lambing, as well as the traditional use of strictly seasonal sheep, most notably Gotland sheep, cause most production systems in Sweden to be based on spring lambing, in order for farmers to be able to take advantage of milder temperatures and an approaching grazing season, followed by autumn slaughter. As a result, a peak supply of lamb occurs in Sweden in October (Figure 8), after which meat prices are lowest in November and conversely peak in May (Figure 9), when the supply of slaughter animals has been low for several months (Jordbruksverket, 2021). Both other animal types such as cattle or swine, as well as aseasonal sheep breeds that are more widely-used abroad can be produced more easily independently of season. As a result, the request for fresh meat is easier to fulfil abroad and with other animal types in Sweden than with the Swedish sheep breeds. Indeed, Figure 10 shows prices are more stable on an EU average than in Sweden (European Commission, 2021).

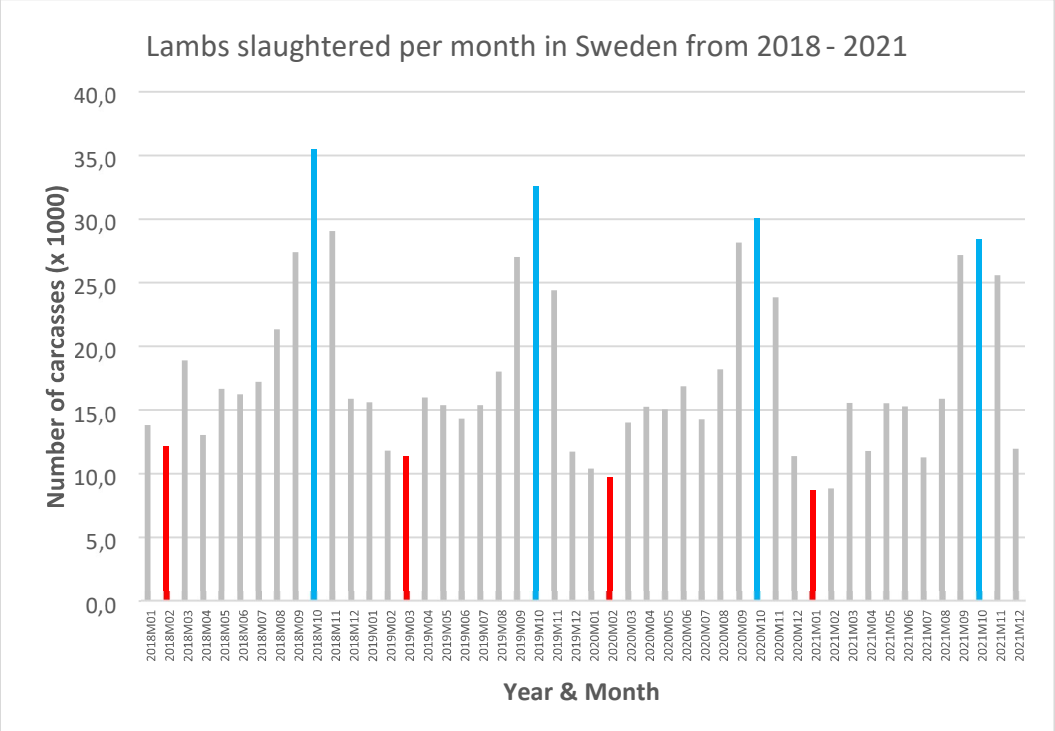

Figure 8: Number of slaughtered lambs per month in Sweden from 2018 – 2021. Most lambs are slaughtered in October (blue), whilst a shortage occurs either in January, February or March (red). Data source: Jordbruksverket (2021).

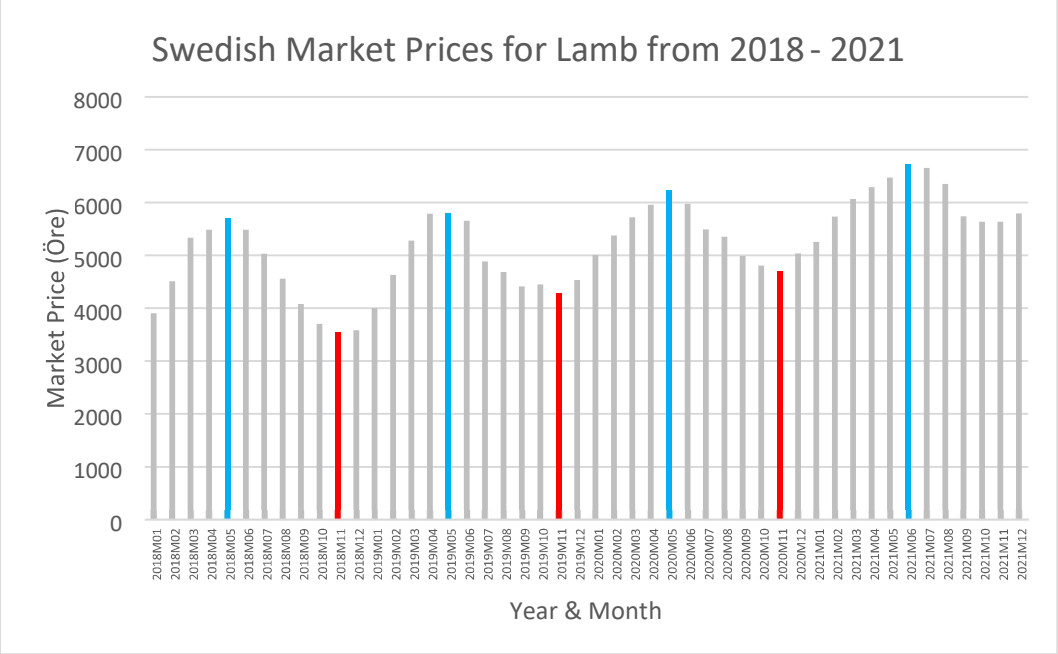

Figure 9: Swedish market prices for lamb from 2018 – 2021. In all years, prices peak in May or June (blue) whilst being at their lowest in November (red). Data source: Jordbruksverket (2021).

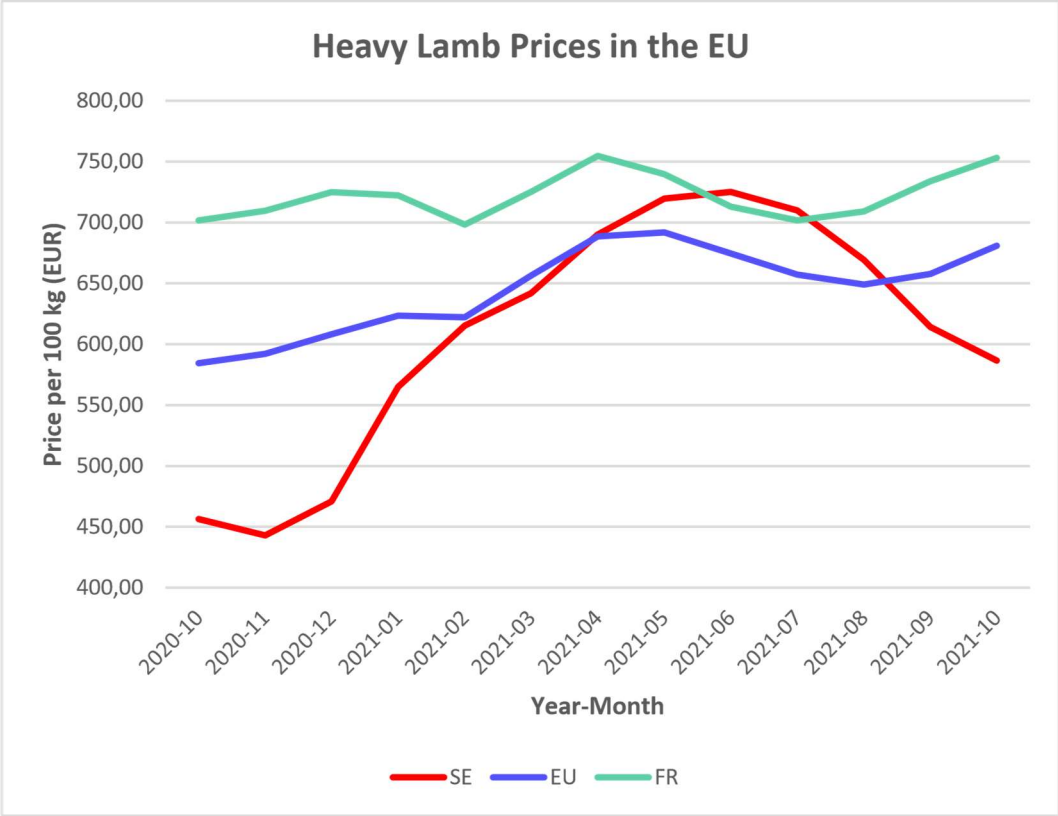

Figure 10: Lamb price development in 2020/21 in the EU, Sweden and France (note that the y-axis is adjusted in scale to match the data points' range). The seasonal price variation is stronger in Sweden than on average in the EU. In France, lamb prices are hardly dependent on season. Data source: European Commission (2021).

Overall, Swedish sheep farmers sit at an economic disadvantage compared to other agricultural production systems and sheep farmers abroad because of cultural consumption structures, climate and tradition. Possibly, an increase in consumer willingness to purchase frozen meat could reduce this difficulty by allowing slaughterhouses to offer more stable prices.

4.3.7 Economic failure due to lack of professionalism

During the interviews with sheep farmers and consultants that were performed for this study, the Swedish sheep sector was repeatedly characterised as being 'unprofessional' or hobby-like when compared to other countries' sheep production structures. Professionalism in this context is defined as placing focus on a well-structured, rationalized production system with production-oriented techniques. The lack of professionalism was in fact named several times by survey respondents when asked to state the most important challenges the Swedish sector was in their opinion currently facing, as Figure 11 shows.

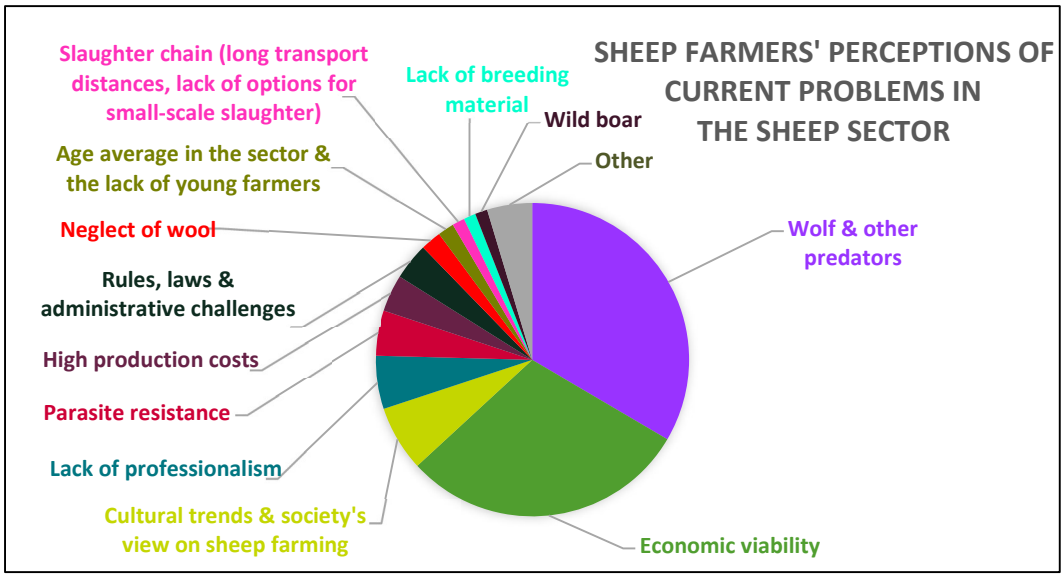

Figure 11: Survey respondents' perceptions on the most important issues the Swedish sheep sector is facing. Economic and wolf-related issues were by far named the most frequently. In total, 236 points were raised by 173 respondents. 37 farmers made no statement and are not included in the diagram. Source: this research.

Apart from the survey respondents, 10 out of 18 interviewees mentioned spontaneously that sheep production in Sweden was not professional because applied management practices were inefficient or ineffective and grave management mistakes were made that resulted in production systems not being economically viable. It may be relevant, at this point, to remind that the large majority of interviewed farmers had professional- and not hobby enterprises. Hence, the interviewed farmers were likely to see the lack of professionalism in the

Swedish sheep sector more critically than many of their part-time colleagues who not represented in the interviews. At the same time, the fact that the issue was mentioned at all, shows that it is likely of some relevance – if not for the entire sheep sector, then at least for part of it – and thus needs to be dealt with.

Most importantly amongst the management mistakes, the inefficiency of breeding systems applied on sheep farms were named. Only 15% of the survey participants appeared to consciously use the heterosis effect to their advantage by crossbreeding systematically, despite literature indicating that pure-bred flocks, specifically in meat production, are often clearly inferior to cross-bred flocks (Leymaster, 2002). Though admittedly, pure-bred flocks are necessary in order to be able to cross-breed in the first place, it is likely that the potential lying in the numerous pure-bred flocks in Sweden is not fully exploited, because all too few, systematically cross-breeding farms exist in order to be able to take advantage of it. The latter was indicated by interview statements and emphasised when comparing Sweden's situation to that of more sheep-focused countries such as the UK, where most farmers are involved in a strict, 'stratified' breeding plan that is oriented towards efficient meat production (National Sheep Association, n. d). It is likely, in fact, that a large number of Swedish sheep farmers are currently underperforming from a meat production point of view, because they are not taking systematic advantage of the cross-breeding options that are available. At the same time, it should be remembered that the choice for or against cross-breeding is dependent on a variety of factors. Farmers may dedicate themselves to pure-breeding because they are receiving subsidies to preserve rare landraces or because they have the goal of producing purebred animals for sale. Some may also wish to obtain explicitly one productive quality that would be lost in crossbred animals, such as the fleece quality of Gotland sheep. The again others may simply like the breed they have for aesthetic or other, more personal reasons. These motivations are certainly not to be judged as wrong or right, nor should one, from the sparse data that was gathered in this study about farmers' breeding intentions, jump to conclusions about the actually applied breeding systems on the survey respondents' farms or the effectiveness with which they pursue their breeding goals. The survey responses too were, as a matter of fact, only little helpful in evaluating the breeding structures on Swedish sheep farms quantitatively; 40% of the respondents exclusively had purebred ewes, 47% had both crossbred and purebred ewes and a small number of under 12% had no purebred ewes at all, showing no obvious preference amongst farmers for a certain flock composition from which conclusions could be drawn. It is possible that some respondents holding only purebred ewes may cross-breed by employing a different breed of ram. Equally, some farms may be in the transition phase of building up a purebred flock from a crossbred one they had taken over from somebody else, accounting for some of the farms that stated they had both pure- and crossbred ewes. In these cases, the crossbred ewes are being selected out gradually, as one survey

participant indeed confirmed to be true in his/her personal case. The data gathered therefore can be interpreted only tentatively, although one can, as mentioned, assume that breeding practice is significantly less production-oriented than in the UK; breeding on many Swedish farms may depend to a significant extent on temporary circumstances such as available rams or immediate farm issues rather than long-term breeding goals. To sum up, the statements made here about the breeding systems employed on Swedish sheep farms remain quite speculative indeed, and further, more targeted investigation is, in fact, needed to understand the situation fully. At any rate though, almost 70% of the survey respondents in this investigation did state that they carefully planned their mating and lambing seasons. Though this does not necessarily mean that a well-thought-out breeding system is in place, at least some level of planning seems to be going on in Swedish farms that can bear potential for development.

The issue was raised in the interviews that many farmers not only relied on ineffective breeding systems, but also pursued the wrong breeding goals. Specifically, focusing too much on carcass weight and too little on the number of lambs per ewe was seen as a problem by one interviewee. When asked for their main breeding goals, the survey respondents named 'rate of lamb growth' twice as often as the 'number of lambs raised per ewe' or 'ewe fertility', as Figure 12 shows. Likewise, 'skin and wool quality', 'animal temperament' and 'health', as well as 'meat and carcass quality' were named more often than 'ewe fertility'.

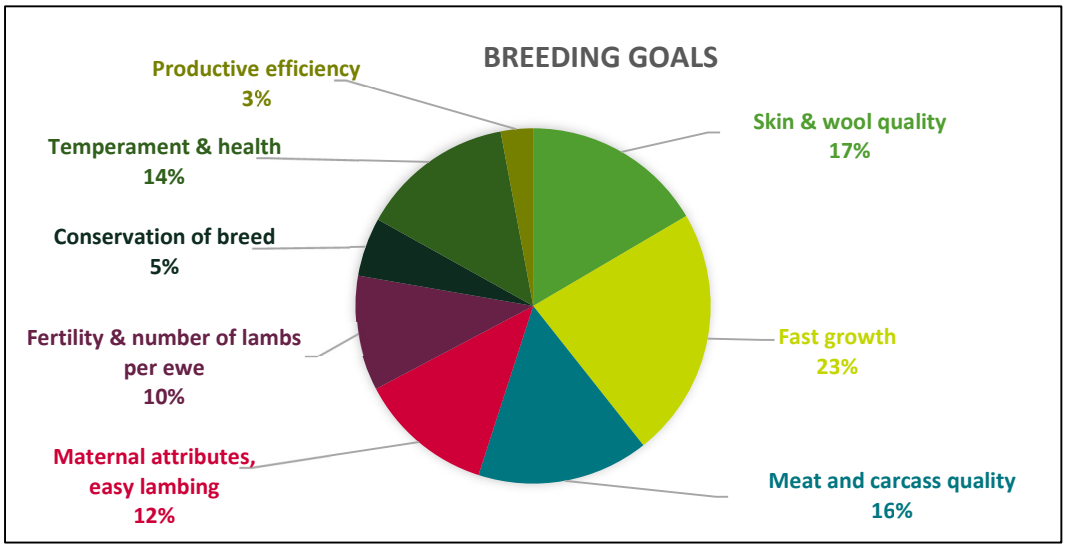

Figure 12: Breeding goals that were stated by the survey respondents. Source: this research.

Though the data here indicates that the number of lambs produced per ewe indeed does not currently lie at the heart of Swedish sheep farmers' breeding goals, the reason for this is probably less the lack of importance ascribed to ewe fertility overall rather than the fact that the productivity of Swedish sheep herds is already sufficiently high. For Swedish meat breeds the productivity level lay at just over

1.7 born lambs per ewe in 2019 and even higher for land races with over 2 lambs born per ewe (Svenska Fåravelsförbundet, 2020). Although this data neither takes into account those ewes that did not lamb nor how many lambs the respective ewes actually raised successfully, it still shows that litter sizes are high and that the fertility of Swedish ewes is in fact not worryingly low at all. On the contrary, a couple of respondents stated that they were actually aiming for lower lamb numbers per ewe, most likely with the intention of achieving easier lambing, a higher survival rate of born lambs or simply an easier handling of ewes, specifically in herds where litters of three lambs occur more than occasionally. National statistics on lamb and sheep numbers in Sweden over the course of the past decades must therefore also be interpreted accordingly. Figure 13 shows a growing difference in the number of farms with lambs on the one hand (blue) and farms holding adult animals (green) on the other, indicating that a larger portion of sheep farms in Sweden today hold ewes without having them lamb than in the 1980's. Consequently, the decreasing number of lambs to adult animals shown in Figure 14 (Jordbruksverket, 2021) should be attributed to the increased use of ewes for services that do not require lambing, like grazing for environmental conservation purposes, rather than to a loss of ewe fertility. Of course, it is, despite currently high productivity levels, important for ewe fertility not to fall out of focus completely while farmers concentrate predominantly on breeding for fast growth, easy handling of ewes, and carcass quality in order for the number of lambs raised per ewe to remain sufficiently high in the long-run.

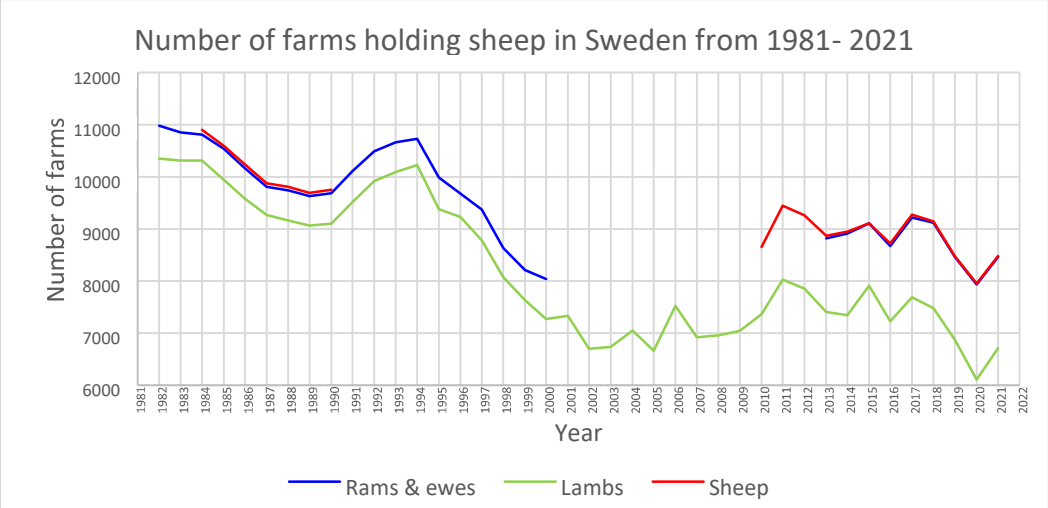

Figure 13: Number of farms holding ewes and rams (blue), lambs (green) and sheep at all (red) in Sweden from 1981 – 2021 (note that the y-axis is adjusted in scale to match the data points' range). Numbers sank from close to 11 000 farms with ewes and rams in the 1980's to barely over 8000 at the shift of the millennium and reached a minimum of 7595 adult animal-holding farms in 2005. Despite a slight increase in farms since then, considerably fewer sheep enterprises exist today than in the past century. Moreover, the number of lambing herds seems to have decreased recently, as the difference in area between the blue and green lines in more recent years as opposed to from 1982 to 2000 shows. The data overall contains some gaps, especially between 2000 and 2013. Data source: Jordbruksverket (2021).

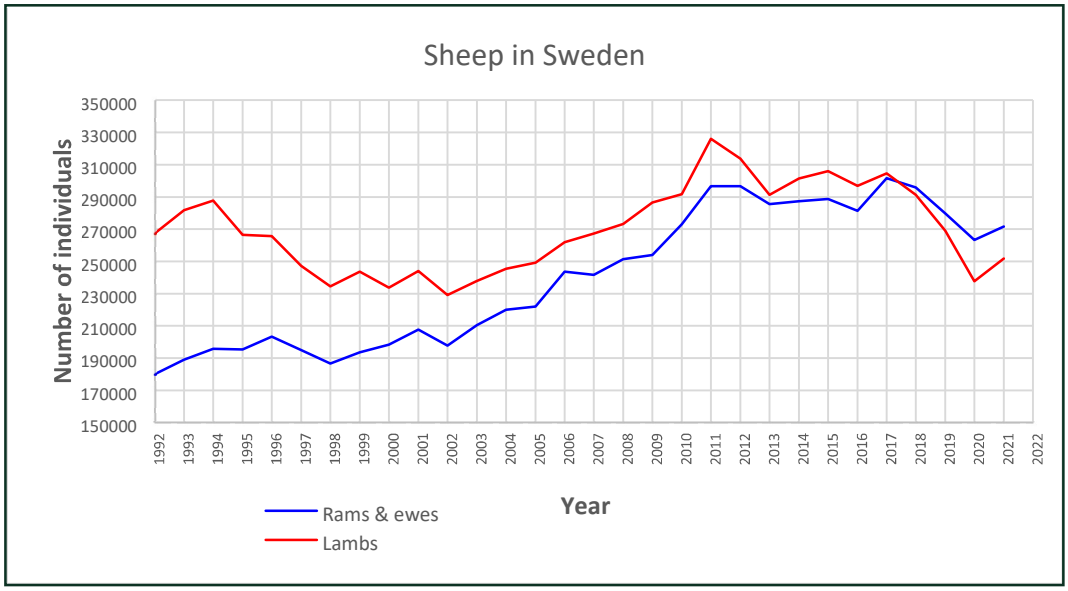

Figure 14: Number of sheep in Sweden from 1992 – 2021 (note that the y-axis is adjusted in scale to match the data points' range). Rams and ewes in blue, lambs in red. The number of adult animals begins to exceed the number of lambs from 2018 onwards. Data source: Jordbruksverket (2021).

Several of the interviews named other management mistakes, such as rudimentary feeding errors as problems within the sheep sector. For instance, one interviewee raised the issue of feeding too much around lambing time, resulting in difficult lambing. Another commented on the lack of awareness for the amount and quality of fodder needed for a given number of ewes over a given period of time, and a lack of feeling for when it was time to move to a new piece of pasture. Several of the sheep consultants interviewed confirmed that the advice their customers required was often at an extremely basic level. In comparison, the material provided by services in other countries, for instance the American 'Penn State Extension' service (Penn State Extension, 2021) seems to be agriculturally more advanced. The basicness of the educational opportunities offered in Sweden are symptomatic of a low level of professional education amongst sheep farmers, which several of the interviewees confirmed. Several of them further pointed out that the skills and knowledge required for economically successful sheep rearing are often underestimated, causing many start-ups to not be able to reach any economic viability. Their worries are justified; 50% of the survey participants of this study were not able to generate any noteworthy profit from their sheep farming practice, and of these almost half stated that their costs were actually usually higher than their income, causing them essentially to 'pay' for their own sheep production. It is well possible, specifically in the course of the current new green wave phenomenon mentioned earlier, that many of those entering the sheep section assume that sheep farming is 'easy'. One of the interviewed consultants confirmed she had herself worked with and seen fail a high number of start-ups in the sheep sector. The low

level of professional education amongst new and even more long-term sheep farmers who fail to recognise their inexperience may indeed be a cause for the struggle to reach economic viability within sheep rearing in Sweden.

Furthermore, the lack of rationalization and structure amongst sheep farms in Sweden was brought up and criticised in the interviews. Specifically, the failure to for instance consistently weigh animals before sending them to slaughter was named, making for low price offers from the slaughterhouse. Indeed, over 10% of the survey respondents reported that they did not weigh their animals at all. Some gave reasons for not weighing them, such as "*weight is not important because I sell directly to the customer*" or the "*weighing is futile since all animals need to be slaughtered anyway*", but most participants did ultimately recognise the importance of weighing. Some stated they would like to weigh their animals more frequently but did not have access to an appropriate scale. Indeed, the lack of appropriate working equipment and technology amongst Swedish sheep farms was also addressed in particular by one interviewee. Whilst other branches of agriculture have undergone steady technological development in the past century, the Swedish sheep sector seems to have remained more or less stagnant, as one interviewee argued. On the one hand, this high level of manual work causes significant workrelated physical problems for farmers, which, as Thomsson et al (n. d.) show, are higher than for example in the dairy and pork sector of Sweden. Furthermore, the low level of rationalization amongst Swedish sheep farms additionally makes for high labour costs, which are hardly covered by market prices for meat and thus lead to a low level of profitability amongst sheep farms. Consequently, physical health strains along with the low level of remuneration for the work hours that are invested are likely to make the sheep sector unattractive for potential farmers, and contribute to it remaining locked in its marginality.

One may question why such ineffective practices and production mistakes persist, then, if they so clearly limit the sector. To some extent they may be explained by the previously mentioned 'new green wave', which is likely to be especially strong in the sheep sector compared to other forms of animal husbandry in Sweden. The number of people interested in living in the countryside and being self-sufficient is growing rapidly (Göransson & Burén, 2014) and several of the interviewed farmers and consultants reported that they experienced a large number of start-up sheep farms, run by people from 'the city' as a symptom of this new green wave. These people naturally have not been able to acquire a high level of relevant education in sheep rearing throughout their lives. This, paired with high, idealistic standards for their work can result in the management issues raised above. Moreover, the term 'cuteness factor' (Swedish = 'gullighetsfaktor') was repeatedly used by interviewees to describe the Swedish sheep sector. They implied that sheep farming was somewhat romanticised amongst Swedes and practiced for fun, rather than

being seen as a serious form of agriculture. In addition, the initial investments required to start up a sheep herd are fairly low and a flock can be started off in improvised buildings. Also, sheep are simply easier to handle than cattle as a farming beginner, due to their convenient, small size. Considering all of these circumstances, it is comprehensible that city-dwellers wanting to make a lifechange and start farming in a rural area might likely start by holding sheep, and that a higher number of unexperienced farmers thus find their way into sheep rearing than into other forms of animal husbandry.

Aside from the new green wave phenomenon, several of the interviewees raised the high age average amongst Swedish sheep farmers as a problematic issue for the sector that could be responsible for the low level of rationalization and structure within it. Indeed, although one might expect the new green wave to contribute to a rejuvenation of the sector, the percentage of sheep farmers in Sweden above the age of 60 is in fact higher than that of cattle or pig farmers (Jordbruksverket, 2021), as Figure 15 shows.

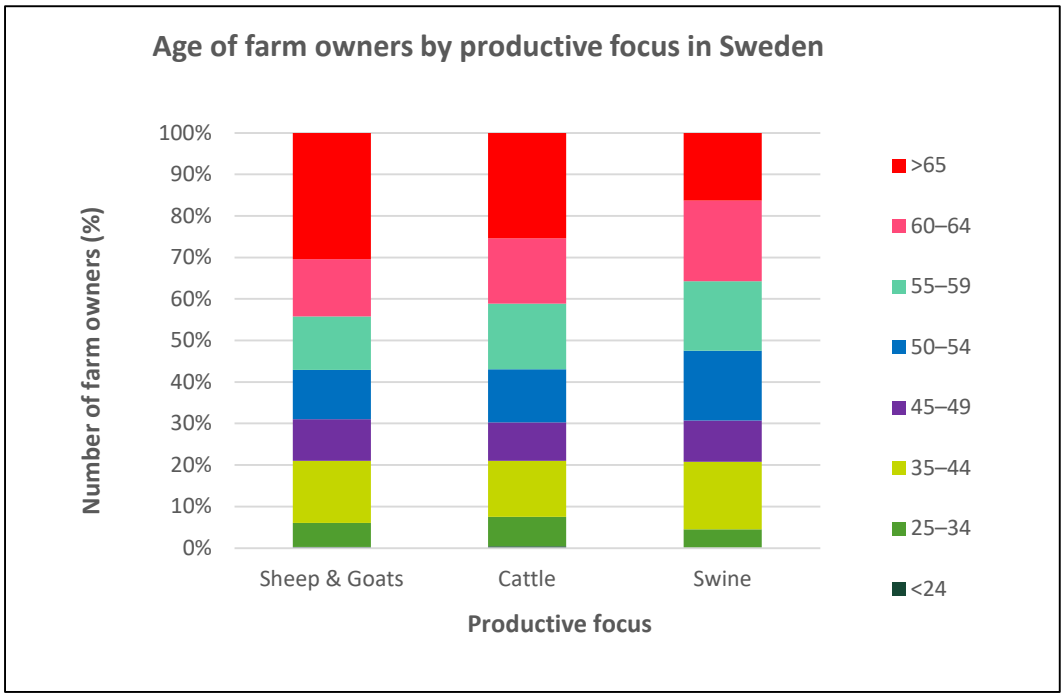

Figure 15: Age of farm owners in Sweden in three types of animal husbandry in 2020. High age (pink and red) seems to be slightly more common amongst sheep farmers than amongst the holders of cattle or swine. Data source: Jordbruksverket (2021).

A study by Tauer (1995) showed that farmer productivity peaks and then generally decreases with age, most likely for mental and physical reasons. A few interviewees in this study concurred that specifically amongst older sheep farmers, traditional views regarding production techniques prevailed, which limited the level of technological advancement and innovation in the sector. As Tauer (1995) suggests, low productivity linked to high age may have negative results on the success of

farmers in a competitive environment. For the Swedish sheep sector, this ultimately means that the high average age of sheep farmers could limit the sector's ability to be viable economically.

Besides management mistakes, some interviewees felt that the extensive, summer pasture-based rearing system that prevails in Sweden was responsible for the limited productivity of the Swedish sheep sector. It was argued that the extensive grazing practices resulted in heterogeneous slaughter batches and low amounts of sold meat, leading to low profitability on many sheep farms. One interviewee argued that the extensive summer grazing could not ensure the weight gain necessary for lambs to be ready for slaughter in autumn. This is likely to be the case for many, as pasture-based rearing requires much knowledge and experience to be successful in achieving adequate weight gains in lambs. However, autumn slaughter seems appropriate under the given climatic circumstances; spring lambing is simply easier than winter lambing in Sweden's cold climate and indeed, Figure 16 shows that countries with a comparably cold climate like Iceland also slaughter mainly in October, whilst in Mediterranean climates, slaughtering around Easter is the norm (Eurostat, 2021).

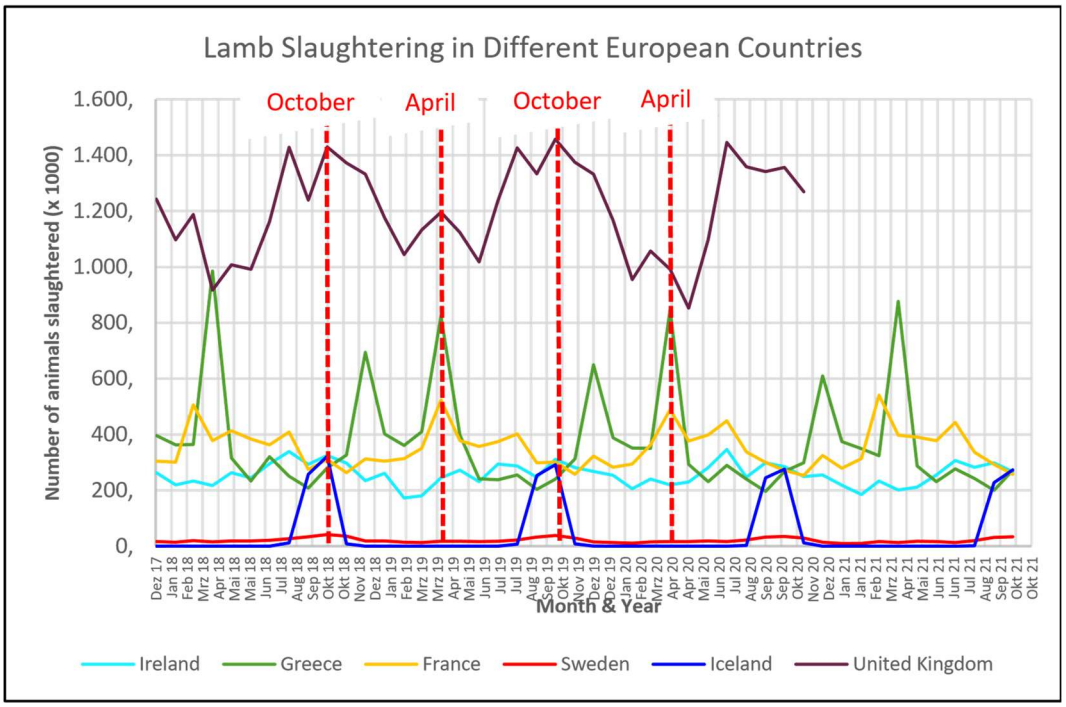

Figure 16: Sheep slaughtered per month in different European countries from 2018 – 2021. Colder climatic regions like Sweden and Iceland seem to slaughter predominantly in October, whilst in the milder climates of Greece and France, slaughter peaks are generally in April. The UK has less isolated peaks, and Ireland seems to slaughter fairly evenly across the year. Data source: Eurostat (2021).

The tradition in Sweden of raising seasonal breeds like 'Gotlandsfår' reinforce the season-dependent lambing periods. Moreover, pasture-based feeding systems are likely to be preferred both by sustainability-conscious farmers and hobby-rearers, who make up a large portion of Swedish sheep farmers, providing yet another reason for why the given production structures hold themselves established. It remains fairly unclear if and in which ways the Swedish production system itself is limiting the productivity and profitability of sheep farming in the country. Indisputably though, the lambing, feeding and slaughter systems require a specific type of professional knowledge in order to be successful. One interviewee who has been economically successful with a summer pasture-based rearing system described in more detail his sources of knowledge and the challenges in acquiring it, in part from abroad. Whether or not most Swedish sheep farmers are able to go to similar lengths to perfect their productive process is questionable, since a considerable number come from totally agriculture-unrelated backgrounds and because the time that can be spent on production questions is quite limited for the large fraction of sheep holders farming part-time. Ultimately thus, the Swedish pasture-based summer rearing system followed by autumn slaughter seems not to be a problem in itself, but is likely to be disadvantageous when considering the preconditions of Swedish sheep producers.

Whilst facing all the described economic challenges that come with a lack of professionality in sheep rearing, one interviewee further addressed that those farmers holding sheep more or less at a hobby level tended to create additional challenges for their full-time, more professional colleagues. Specifically, the issue of unprofessional behaviour with regard to disease spread between herds was criticised, as those holding sheep at a professional level were reliant not only on themselves but also their colleagues to keep their animals isolated from other herds so as not to spread possible diseases from one herd to another. A lack of professionalism regarding topics like this can indeed cause those raising sheep at a highly professional and delicate level to encounter production difficulties when their colleagues fail to display professional behaviour. Almost a quarter of the interview respondents stated that they saw unprofessional behaviour from other sheep farmers as a problem, and the lack of professionalism was the challenge perceived most frequently by survey respondents as a problem for the sector right after wolf-related issues, the lack of economic viability and society's views on sheep farming (see Figure 11 earlier). Ultimately, the economic success of the few ambitious, professional sheep farmers in Sweden may indeed by limited by certain dysfunctional working relationships with their less professionally oriented colleagues.

4.3.8 Economic challenges due to lack of adequate breeding material

Throughout the interviews, the lack of appropriate breeding material within the sheep sector was repeatedly referred to as problematic by the interviewees. Mainly, this can in fact be seen as a result of the sheep sector's marginality, which is elaborated on in the section below ' The vicious cycle of marginality'. In short, because there is such a limited number of sheep holders there is also a lack of breeders and breeding material. One interviewee spoke about her region being an important and known breeding region decades ago, whilst today most sheep farmers had given up their herds. Indeed, as Figure 13 showed, the number of farms holding ewes and rams in Sweden today is significantly lower than it was in the 1980's (Jordbruksverket, 2021). As already mentioned, it has also become more common to hold ewes without having them lamb, naturally entailing a low production of lambs that could be new breeding material. This issue is aggravated by the fact that breed diversity is high in Sweden and that a fair part of held breeds are rare breeds. This in combination with low numbers of herds in general causes the pool of breeding animals within a given breed to be limited. Really, a shortage of breeding animals creates difficulties for all types of sheep producers, since all rely on good genetic material.

A way to access better breeding material would be to import breeding material from abroad or to enhance the exchange of breeding material within the country by sperm and artificial insemination. However, the import of live animals is both fairly restricted (see section on 'Institutional attitudes & structures preventing economic development' below) and at the same time not always an option, when breeds are held that are native and exclusive to Sweden. In addition, the use of artificial insemination (AI) techniques is still quite uncommon in Sweden. Whilst several countries like France, Ireland, Australia and New Zealand had been employing artificial insemination in some way as more or less standard practice already in the 1980's (Evans, 1988), the use of sperm for AI has not made its way into the majority of Swedish sheep production systems (Svenska Fåravelsförbundet, 2021). Less than 8% of the survey respondents in this study reported that they inseminated at least some of their ewes, and merely 1% of all respondents stated they imported sperm from abroad. The insemination numbers are likely to increase as the Swedish Sheep Breeding Association continues to undertake efforts to promote artificial insemination. However, currently, the sperm quantities transported are negligible and therefore hard to rationalise. One interviewee reported that, to make one sperm order more worthwhile, producers decided to order sperm as a group. However, the attempt resulted in producers buying sperm from the same ram, defying the initial point of the sperm import, which had been to counteract the low genetic variety within Swedish sheep flocks. It was interesting to note that one interviewee

specifically criticised the fact that laparoscopic insemination was not authorized in Sweden, which a glance at sources describing the legal situation confirmed (Svenska Djurbönders Smittskyddskontroll, 2021). Whilst the ban of this more radical form of AI may be limiting the individual interviewee to some extent, the lack of laparoscopy practices in Sweden is hardly of large influence on the sheep sector in general. Overall, the low usage amongst Swedish sheep farmers of artificial insemination techniques altogether is more likely to reinforce the sheep sector's marginality, because it restricts the quality of breeding material and hence limits successful rearing.

4.3.9 Institutional attitudes & structures preventing economic development

Considering that Sweden's high animal welfare standards are generally praised in literature, it is not surprising that some of the farmers interviewed for this investigation were of the opinion that production costs for Swedish sheep were high due to the high animal protection standards they needed to adhere to. Specifically in the sheep sector, the Swedish production standards set themselves apart from other countries in that they require natural grazing in summer, forbid castration and the docking of tails, do not allow slatted floors in the resting area (Jordbruksverket, 2014) and prohibit without exception the slaughter of unnumbed animals (Dahlén & Kättström, 2012). However, it is unlikely that these disadvantages should be of any significant economic importance. After all, rams are generally slaughtered before the need for castration arises, and the native Swedish breeds, such as for instance Gotlandsfår and Finullsfår, are short-tailed, eliminating equally the need to dock. Comparing sheep production with other forms of animal husbandry in Sweden, a report by Dahlén & Kättström (2012) indicates that other types of animal husbandry held in Sweden are equally if not more concerned by the strictness of Swedish animal welfare standards than sheep rearing. Moreover, one should consider that high animal standards can be economically beneficial to a producer, for example by improving animal health and hence reducing the need for costly medication (e. g. antibiotics). Also, by consistently adhering to higher animal welfare standards, costs of continuously tightening EU-regulations are avoided in the long-run, since the required standards are fulfilled proactively. Hence, slightly higher welfare standards in Sweden than abroad are in fact very unlikely to entail significant economic limitations for Swedish sheep farmers, and thus do not help much in explaining the sheep sector's marginality.

Apart from regulations that set high animal welfare standards, Sweden holds a position concerning international collaboration and breeding that is fairly conservative. In one of the interviews this point was strongly stressed and criticised. Literature sources showed that the general institutional attitude is indeed very

cautious regarding the import of breeding material. Specifically, the association 'Svenska Djurbönders Smittskyddskontroll' (SDS) calls for a restrictive attitude towards the import of live agricultural production animals in order to maintain the animal health in Sweden at the current high level (Svenska Djurbönders Smittskyddskontroll, 2021). The advisory institution Gård- och Djurhälsan holds the same standpoint (Wahlberg, 2016). SDS tries in addition to promote an import of sperm or embryo material instead of breeding animals. This approach is surely one that has allowed animal diseases to be kept at bay, and has certainly enabled Sweden to gain a reputation as a country with exceptionally high animal health. At the same time however, it forces Sweden's lamb production approach to differ fundamentally from that of other countries, such as the UK, whose stratified rearing system depends heavily on the moving of animals from region to region (National Sheep Association, n. d).

The described, restrictive institutional attitude towards moving live animals gains increased relevance when considering the low application of AI in Sweden (see previous section on 'Economic challenges due to lack of adequate breeding material'). Within this setting, the exchange of sperm or embryos instead of live animals, specifically rams, can be no widely practiced alternative. This naturally limiting options for successful breeding. The import of fresh 'blood' in the form of sperm is hard to rationalise and structure efficiently for the sparse number of farmers who are open to it and appropriately educated to carry out AI. This point was elaborated on by one interviewee who addressed the issue of all those ordering sperm choosing sperm from exactly the same ram, consequently limiting the breed's gene pool within the region considerably and defying the point of importing sperm in the first place. The growth of the Swedish sheep sector may therefore be limited by institutional attitudes in the sense that these end up restricting successful breeding practices in a setting where AI methods are not widely established.

In addition to the restrictive approach to the import of breeding material, several of the interviewed sheep farmers expressed frustration with the inadequate representation of farmers' needs within the very institutions that are meant to support the sheep sector. One sheep farmer criticised that the Swedish sheep supporting associations, such as, most notably, Svenska Fåravelsförbundet (SF), consisted to a large extent of hobby sheep farmers holding sheep part-time. The survey indicated this to be true; of those bearing an active role in the sheep sector beyond their farm doors, the clear majority were part-time sheep farmers, despite the fact that a higher proportion (around 40%) of the full-time than part-time farmers (around 30%) were dedicating work to the sheep sector beyond their own farm (Figure 17). This is most convincingly explained by the circumstance that the Swedish sheep sector in general consists mainly of part-time farmers. As the interviewee criticised, associations largely influenced by part-time farmers may

indeed neglect the needs and interests of the more professional, full-time Swedish sheep producers. To counteract this development, the Swedish Lamb Producers' Association (Swedish = Sveriges Lammköttproducenter, mostly referred to as 'Lammproducenterna') (LP), has in fact begun to take this necessary, more professional and meat-focused stance to sheep farming in Sweden since the year 2000 (Sveriges Lammköttproducenter, n. d.), and so a viable, alternative institutional approach exists. In the meantime, SF has amongst other topics delved into a number of wool issues in the recent past. Though this was criticised by some interviewees and one survey respondent in this study, SF's work can and should ultimately be seen as the necessary other side to the coin of work done by the more meat-focused institutions, such as LP.

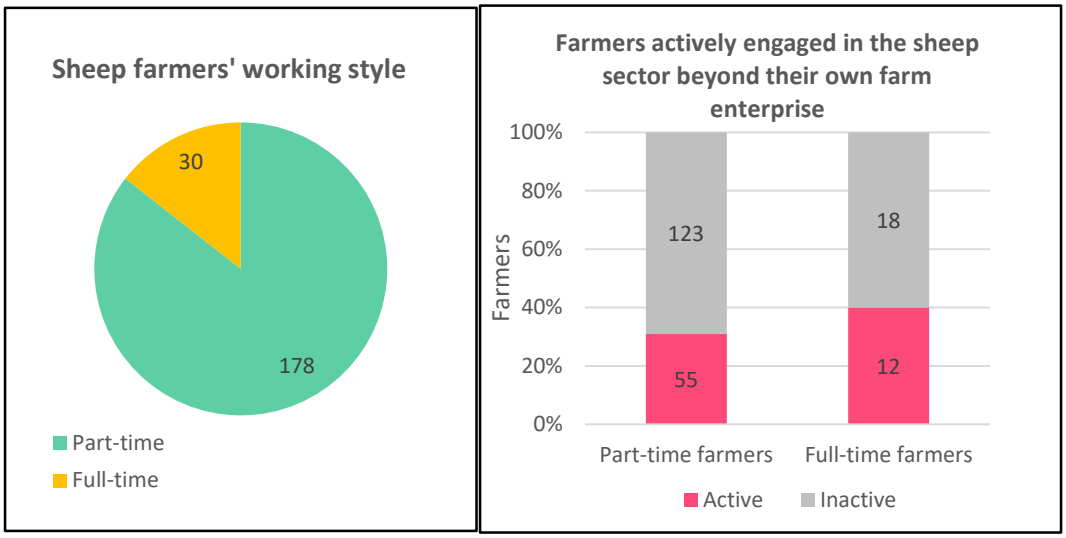

Figure 17: Survey results showing that the majority of respondents hold sheep part-time (left). On the right, the survey results show that the percentage of farmers dedicating active efforts to the development of the sheep sector beyond their farm doors is higher amongst full-time than amongst part-time farmers. Source: this research.

One interviewee moreover expressed annoyance regarding the support for landrace breeds in Swedish institutions, criticising that these breeds received high monetary support despite neither producing much or high-quality meat, good wool, valuable skins or milk, again a point only justified to some extent when regarding the issue holistically, from not only an economic, but also an ecological, diversity-valuing stance. Overall, clearly, some criticism towards the Swedish sheep institutions is justified, some less so. Indisputably though, the high influence of part-time sheep farmers in institutional work is likely to slow the development of the Swedish sheep farming landscape towards more professionalism and makes it less likely that the economic situation of full-time sheep farmers will be improved effectively from the institutions' side.

At the same time, the institutions and the aspects that were criticised about them cannot really be labelled as culprits in the quest for finding the cause of the Swedish sheep sector's marginality. Though the statements that were made about them by participants in this study are valid in that they accurately represent the feeling of the interviewed parties, they should not be ascribed too much importance when aiming to find the cause for the sheep sector's niche-existence. The institutions in question do not seem to be the actual source of any of the main problems Swedish sheep farmers face, such as financial or wolf-related challenges. Rather, the role of the institutions working to support the Swedish sheep sector mainly is to address the symptoms of already existing problems. Hence, the incidental failure of the institutions to represent individual farmers' situations should not be seen as a fundamental reason for the Swedish sheep sector's marginality. It rather highlights how difficult it is to counteract it.

Whilst institutional work regarding sheep production in Sweden has at most not succeeded in tackling the marginality of the Swedish sheep sector, the political work that shapes the framework within which Swedish sheep farmers operate may in some ways actually be a cause for the sheep sector being as marginal as it is. Several interviewees expressed that they felt political obstacles for their work, implying mostly cooperation regarding wolf-related matters. Indeed, other countries are likely to have both different political approaches to the wolf as well as a more strongly supported sheep sector in general. In the UK, where the wolf is less of a current issue due to the country being separated from the mainland by the Atlantic, political action in wolf-matters is hardly necessary. Moreover, attention paid in politics to the sheep sector in general is likely to be higher in the UK, since the sector is of national, agricultural importance there. Finland too, although only having a small sheep sector (Virtanen, et al., 2013), seems to have a thorough, established national system of agricultural state support that complements the EU CAP support system effectively by acknowledging the Finnish farmers' regionspecific needs (Ministry of Agriculture and Forestry of Finland, n. d.). Finally, Swedish areas account for the larger part of the growing cross-border wolf populations with Norway (Svensson, et al., 2021). Norway, exempt from the commitments of the EU-states towards the favourable conservation status of wolves (Epstein, et al., 2015), is able to maintain a high level of wolf poaching (International Wolf Center, n. d.) and even though the country had signed the Bern Convention on European Wildlife in 1979, it interprets it rather tentatively in wolfrelated matters and positions itself generally more in favour of domestic sheep (Trouwborst, et al., 2017). This is, not least, surely due to the fact that sheep production is less marginal in Norway and thus defended more vehemently in politics. Overall, one could therefore indeed argue that the political framework in Sweden contributes in some ways to the difficulties Swedish sheep farmers face

when trying to reach economic viability, especially when comparing the Swedish situation with that of their European neighbours.

To avoid losing perspective however, it should be remembered that the political circumstances within which the Swedish sheep sector exists are mild when compared with the more fundamental, political challenges and lack of support faced by farmers generally in less developed regions of the world. Accordingly, several interviewees actually contradicted the frustration with politics and concurred that the prevailing political framework in Sweden was not a cause for the sheep sector's niche existence. It was both stated that the legal requirements for the sheep sector were not any more challenging than any other agricultural sectors and that the requirements Swedish agriculture faced were not any harsher than those of other European countries in which the sheep sector takes up a less marginal position. It was interesting to note too, that despite the fact that the interviews were merely semi-structured and thereby directed to a large extent by the interviewees spontaneous lead, none of them entered the topic of EU-support for grazing land in any significant level of detail or depth. What is more, the survey results suggested that Swedish sheep farmers depend relatively little on financial support from the EU or Sweden; 60% of the survey respondents gain less than 40% of their income through EU-support, as Figure 18 shows. Considering that it has become a common phenomenon in agriculture for farms to in fact generate the majority of their income through state support (Milne & Braham, 2016), the numbers shown by Swedish sheep farmers here are low. Most likely, the low dependence of subsidies can be attributed to the high level of hobby-farming going on in the Swedish sheep sector. The latter may also explain why the farmers that were encountered throughout this investigation hardly questioned the amount of financial support received from the state. Whatever may be the explanation, the findings clearly indicate that Swedish sheep farmers are in fact fairly independent of economic support from the government. This somewhat relativises the importance that the political framework actually plays on the Swedish sheep sector's situation and marginality.

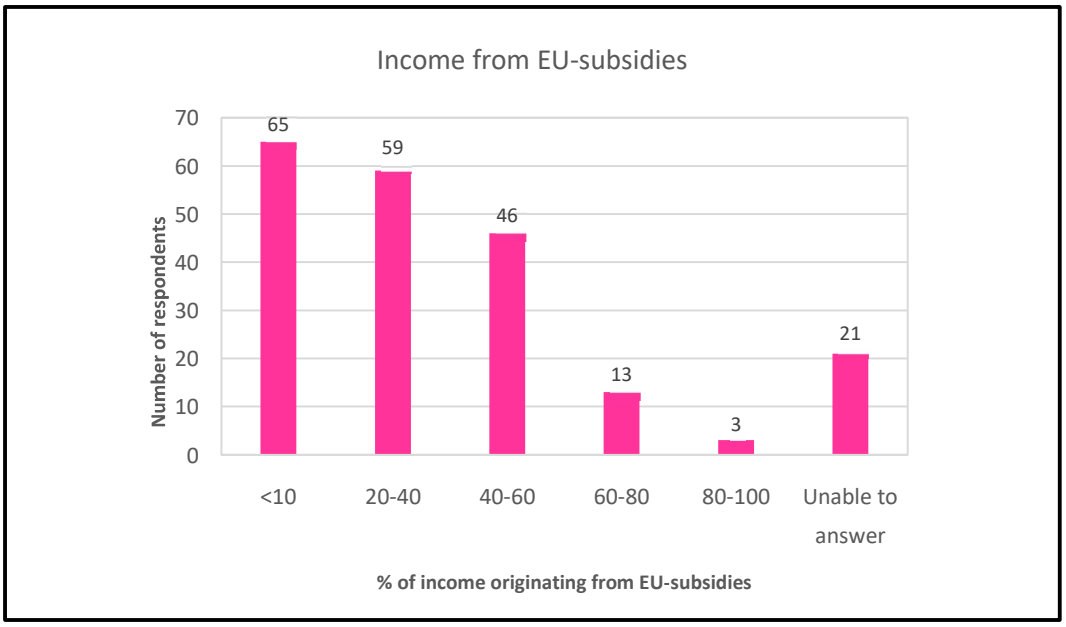

Figure 18: Survey results showing the percentage of the respondents' sheep-related income that EU-subsidies account for (207 answers in total). Naturally, the estimations are subject to inaccuracies on the respondents' side. Source: this research.

Overall, the actual impact of institutional and political structures on the Swedish sheep sector is hard to pinpoint; some arguments suggest that the sector's marginality is indeed caused or at least reinforced by prevailing circumstances in politics and sector-relevant institutions. Simultaneously, it seems from other perspectives like the institutions in question rather mirror than steer the development of the Swedish sheep sector and that the political framework in place does not have as weighty an impact on the sheep sector as one may initially think. By definition, politics reflect but also impact what is already occurring, and institutions naturally consist of parties that are engaged in established, partially problematic systems and at the same time want to change them. Therefore, whilst one source may argue that the expansion of the sheep sector is suppressed by subsidy structures that favour cattle (Larsson, et al., 2018), another approach may come to the conclusion that the sheep sector is in fact not very impacted by subsidy structures at all. Both perspectives may be true, and in consequence of complex relationships like these, the interviewees' and survey respondents' opinions and reactions to politics, institutional activity and practical sheep rearing issues, contradicted. Nonetheless, it is safe to say that the institutional and political structures concerning the Swedish sheep sector do bring to light challenges sheep farmers face, such as growing wolf populations or economically tricky production questions – and at times fail to counteract these challenges or possibly even reinforce them.

4.3.10 The vicious cycle of marginality

In several ways, the marginality of the Swedish sheep sector reinforces itself. The fact that there are relatively few, small-scale, only semi-professional sheep producers in Sweden, and that the density of sheep across the country is low brings challenges to the entire sector that make it hard for it to grow, even if all other preconditions were ideal for it to expand. Most importantly, the lack of sector organisation was named in the interviews. With small, heterogeneous batches of slaughter animals that result from small herds at hobby-level, it is difficult for slaughterhouses to rationalise both the reception and the slaughter of animals. As a result, prices offered from the slaughterhouses' side to the sheep farmers are lower than they could have been. Similarly, retailers interested in offering Swedish sheep meat are impeded by the lack of organisation in the meat chain; low amounts of available Swedish sheep meat that on top of this fluctuate (both in volume in quality) depending on season, lead to an inconsistent supply of meat, which retailers need to compensate through imported produce during the supply lows. Consequently, it is likely that supermarkets decide to cover their meat supply entirely through imported meat, not only because it is logistically simpler to handle and the marketed meat is of evener quality, but also because the smoother logistics make it cheaper. This, by the way, still leaves aside the fact that imported meat in itself is generally already produced more cheaply than Swedish meat. Ultimately thus, Swedish sheep meat production is locked into an unsuccessful marketing chain that makes it economically difficult for sheep farmers to exist and additionally makes the sector unattractive for young, potential farmers that could help the sector grow.

The same problem complex arises, if not more strongly, in the wool sector. Here, neither a classifying nor a collection system really exists, let alone an organised system for processing wool. Both Olofsson et al. (2010) and Sjöling & Eriksson (2018) identify the lack of a classifying and collection system as a hindering factor for the Swedish wool sector. Most wool continues to be burnt or discarded in other ways, which not only formal papers but also more informal media sources are beginning to discuss, such as for instance Cederblad (2017) or Nimbratt (2021). The interviewees encountered in this investigation reported a wide variety of ways of 'taking care' of their wool, from burning it to producing small amounts of yarn, or from selling parts of it in their farm shop to trying different kinds of collaborations with sheep shearers, horse-saddle producers and other customers that may use wool for instance for stuffing. Their responses show how much creativity the sector's lack of structural establishment requires of Swedish sheep farmers. Ultimately, the challenges associated with the dealing with wool contribute to making the Swedish sheep sector an economically unreliable one, and prevent it from expanding successfully.

Thirdly, the lack of sector organisation also is an issue in breeding. As discussed in one of the previous sections 'Economic challenges due to lack of adequate breeding material', the low practice of artificial insemination paired with the fact that few breeders in general exist across the country, has prevented a structured sperm transport system to become established. This in turn makes it difficult to increase genetic variety amongst sheep herds in Sweden and hence, hinders rearing success. For that matter, it should not be forgotten that the low genetic variety that needs to be combatted in order for sheep production to become more effective, is itself a result of the sector's marginality: low numbers of sheep in Sweden in combination with a high number of different breeds limit the genetic breadth within each breed. Consequently, efforts to increase genetic variety for breeding within Sweden's limited sheep stock are all more necessary, but are hindered by the low level of rationalisation in the sector. Ultimately these interdependencies show that the sheep sector's marginality in itself contributes to the persisting problem of a lack of sheep breeding material in Sweden. This in turn undermines farmers' efforts to reach economic viability with sheep rearing, preventing the Swedish sheep sector from growing out of its niche.

Furthermore, the marginality of the Swedish sheep sector reinforces its own weak representation in politics and institutions. With a small number of professional sheep holders existing, the Swedish lobby is accordingly small and surely not known for its influential political voice. This is true despite the positive, committed spirit and the supportive atmosphere of collegiality and helpfulness within the sheep sector that several interviewees reported they experienced. Aside from the small number of representatives in politics and institutions, the low contribution of the sheep sector to the Swedish economy could equally be reason for a lack of research funds within the sector. Few, if any, longer-term, intensive educational programmes directed towards sheep farming as a profession are established in the country. Even existing official vocational study programmes, such as the 'agricultural manager programme' (Swedish = 'Driftledare lantbruk') in Northern Sweden (Lundgren, 2020), are shorter, less specialised on sheep and more online-based than vocational programmes abroad. In comparison, three-year apprenticeships to become a shepherd are common in Germany (Stellenmarkt für Schäfer, n. d.). Other education possibilities that exist in Sweden mostly tend to be offered as online, parttime and freestanding courses. The courses 'Marknadsinriktad får- och lammköttsproduktion' (market-oriented sheep and lamb meat production) and 'Fårproduktion och landskapsvård' (sheep production and landscape management) offered by SLU are examples (Sveriges Lantbruksuniversitet, n. d.). Further, a series of evening classes treating lamb production on Gotland (Sandberg, 2021) seems to exist and the advisory institution Gård- och Djurhälsan offers educational possibilities such as a digitally carried out 'lamb academy' (Gård & Djurhälsan, n.

d.). Overall, the low representation of the sheep sector both in Sweden's economy, in its political structures and with that, in the educational system, poses further challenges for farmers to be economically successful and willing to dedicate their agricultural practice to sheep rearing, once again locking the sector into its marginal existence.

4.4 Research Question 2: Results of marginality

Having discussed the complex set of causes for the sheep sector's marginal position in Swedish agriculture, economy and society, shows an analysis of the strengths and weaknesses that the Swedish sheep sector in its current marginal situation bears with regard to its sustainability. Complementing them are the opportunities for and threats to its future contributions to agricultural sustainability.

Figure 19: SWOT analysis of the Swedish sheep sector considering its current, marginal position and its current and future contributions to sustainability. Source: this research.

Strengths • High animal health • Few compromises made regarding animal welfare and environmental integrity • High level of regional consumption	**Weaknesses** • Economic instability • Difficult working conditions for farmers • Food produced with inefficient resource use
Opportunities • Positive spirit, motivation and collaboration within the sheep sector • Creativity amongst sheep farmers	**Threats** • Long-term sacrifice of economic sustainability • High age average and lack of younger sheep farmers wanting to enter the sector

Thanks mainly to state efforts restricting and controlling the import of live animals, Sweden's sheep stocks have remained free from a number of diseases such as tuberculosis, paratuberculosis, brucellosis or sheep scab (Svenska Djurbönders Smittskyddskontroll, n. d.). A number of other pathogens that have appeared in the country, such as those causing pseudotuberculosis, Maedi-visna or salmonella, have not spread significantly or have been restricted through eradication programmes as in the case of Maedi-visna (Svenska Djurbönders Smittskyddskontroll, n. d.). The control of these diseases has, besides the fact that live sheep are moved between farms or auctions significantly less in Sweden than in other countries, surely also been aided by the overall low sheep density in Sweden. With a low number of sheep farms existing and these in addition lying loosely spread out across the country

(Gotland being an exception), outdoor interactions between sheep flocks can hardly be common. Moreover, the small average herd size naturally limits the number of animals infected at once in case a pathogen is introduced. These small-scale structures may have in fact also saved the sector from devastating effects of some of the hygiene risks shearing bears. About a decade ago, Eriksson & Jöngren (2009) still observed highly irresponsible unhygienic behaviour amongst Swedish shearers. One interviewee lamented a similar attitude amongst the less professional sheep holders. Further, the use of antibiotics in Sweden is low compared with other EU Member states (European Medicines Agency, 2020). Specifically in the sheep sector, this practice is most likely easier to maintain in a setting where herds are small and single-animal monitoring therefore easier, and where working time spent per animal is high due to the prevalence of hobby sheep farming. Overall, these examples indicate that the low intensity of sheep farming in Sweden actually can be beneficial to the animal health status in the sheep sector and, with this, may contribute to the sector's sustainability.

Moving away specifically from animal health towards the more general concept of animal welfare and environmental integrity, the Swedish sheep sector's marginality may also be an asset to its sustainability through the high prevalence of hobby rearing and low economic aspirations for a given sheep enterprise. In settings where sheep farming is practiced as a hobby independent of a farmer's main source of income, sheep holders can afford to place focus on more environmental ideals and high animal welfare standards than they might if their entire financial security depended on their sheep farm. One consultant interviewed for this study in fact referred to some sheep farmers holding quite "*fundamentalistic*" or radical views on how sheep should be held from an environmental and animal welfare standard. Admittedly, one should question whether these views, and the strict, sustainability-directed production techniques attached to them are really a result of the farmers' niche- and hobby practice, or whether the farms in question are, vice versa, limited to hobby enterprises at the sacrifice of their economic viability, as a result of idealistic production standards. Whatever the case, the fact that sheep farming takes up a small niche in Sweden's agricultural landscape and economy, allows for sheep farmers with high environmental and animal welfare standards to stand out and be seen in the sector. This likely makes communication to the public of such values possible and manifests the environmental sustainability of the sector.

Furthermore, the low level of productivity and the weakness of competition on the global market that comes with the Swedish sheep sector's marginality can in some ways also be an asset to the sustainability of Swedish sheep farming in an agroecological sense. A low self-sufficiency on sheep meat, due to small amounts of meat produced that in addition fluctuate depending on season, limit export and hence, most produced sheep meat is in fact consumed within Swedish borders.

According to FAO statistics, a mere 2% of the sheep meat produced in Sweden was exported in 2020 (FAO, 2021), ultimately allowing the sector to boast with a high level of regionality. What is more, as a result of the incompatibility of small-scale sheep rearing systems in Sweden with the collection, processing and marketing chains strived for by the largest slaughterhouses, sheep meat is fairly frequently slaughtered in smaller slaughterhouses and marketed directly on farm. Over 40% of the survey respondents in this study stated that they offered the service of 'meat boxes' to customers and over 30% stated that they sold a significant amount of meat to private customers, most of whom can be assumed to be consumers within a more or less close vicinity of the farm. As a result of these patterns, sheep meat consumption is, compared to other meat types extraordinarily local, a circumstance which is in line with Gliessman's 'Level 4 of conversion' towards ecologically based management (Gliessman, 2015). Considering local consumption as being one of the most important agroecological principles, the Swedish sheep sector's current existence as an agricultural niche can well be seen as an asset for the transition towards a more sustainable, agroecological food system in Sweden.

Whilst acknowledging that there are a number of valuable, sustainable aspects to the current niche situation of the Swedish sheep sector, the more problematic and unsustainable sides of the situation are admittedly more alarming. The most concerning weakness of the sheep sector at the moment clearly is that any attempts at reaching economic sustainability are stifled by sheep farming being such a marginal form of agriculture in Sweden. As has been discussed from several angles, the entire sector suffers from an economic situation that is not viable. Economic difficulties arise through bio-physical conditions, challenges posed by the wolf, certain historical trends and traditions as well as some more modern, cultural trends, a lack of professionalism amongst sheep farmers, low availability of adequate breeding material, and certain institutional and political attitudes. Besides these factors, which are elaborated on in the previous sections, the marginality of the sector itself poses economic challenges by providing not more than fragmented attempts at rationalising rearing, slaughter and marketing. Ultimately, these attempts fail in the given small-scale, extensive, hobby-dominated setting. As a result, the sector is not able to hold itself upright financially, and so from an economic perspective, the marginality of Swedish sheep farming in Sweden is a severe, sustainability-weakening factor. Clearly, there is a great need for compromises to be found between those aspects of the current, small-scale, extensive rearing that foster sustainability most notably from an ecological point of view, and changes in the sector that can actually allow sheep farmers to make a living from their rearing practice.

Naturally, the low economic sustainability of the Swedish sheep sector is also likely to limit its social sustainability. Low profit margins on farms require long working

hours per farmer and often lead to one single farmer assuming the entire responsibility for a herd rather than sharing the burden amongst several employees. This occurs at the sacrifice of free-time and leisure and sheep farmers are thus likely to take part less in social life than other members of the Swedish society or perhaps even other types of farmers. Indeed, 12 survey respondents and some interviewees in this study reported that their sheep were 'their holiday'. This number makes up significantly less than a tenth of all farmers encountered for the investigation and by far does not reflect the majority's feelings; however, the fact that these views were at all expressed should be cause enough for critical reflection on the sector's social sustainability. At the same time, the sheep sector is not the only agricultural sector suffering from such social sustainability issues. Animal farmers in general are subject to challenging work-life balance situations, as the fact shows that a number of sociologic studies, such as those by Madelrieux & Dedieu (2008) or by Martel et al. (2008), are carried out on the topic of work organisation within animal husbandry. However, the fact that some of these studies, such as those by Barlett (1986) and Fiorelli et al. (2010), dedicate themselves specifically to the cases of multi-job holder farmers, indicates that the addressed issues are likely to be especially serious and difficult to deal with in settings where farmers need to manage the workload of both on-farm and off-farm work. This is the case on many Swedish sheep farms, and holding a second job alongside sheep rearing is for many a result of economic insufficiency; over 65% of the survey respondents in this study reported that they had a second job "*in order to be able to survive financially*". Small-scale, hobby-level production structures are moreover concomitant with high levels of physically challenging hand-labour (Thomsson, et al., n. d.) and thus challenge the social well-being of Swedish sheep farmers on yet another level. Naturally, one cannot really know whether farms remain small because they are in fact not capable of expanding, or whether they have deliberately chosen to be small and therefore accept the socio-economic challenge of working off-farm alongside. It is equally possible that a high proportion of sheep farms are small because those owning small farms or wanting to engage in small-scale farming see sheep as an animal type that fits this small-scale ideal most optimally. Regardless of the reasons, the small-scale and economically little sustainable structures within Swedish sheep farming indisputably jeopardize the social sustainability of the sector in several ways.

Apart from bearing socio-economic disadvantages, the little rationalised, small-scale systems of production also come at an environmental cost; resource efficiency is not optimal in the sheep sector's current marginal production structures. In production systems where feeding is done by hand, it is more difficult to adapt concentrate feed rations to the individual animal based on its performance. As a result, the efficiency of conversion from feed to meat is likely to be fairly low. The Swedish sheep sector has yet to embrace technological improvements that other

sectors have already transferred to. Though perhaps automated, precision concentrate feeding systems that showed a raise in milk yield in dairy cows already decades ago (Pirkelmann & Böhm, 1982) may not find their most appropriate place in lamb production, technology such as automated silage dispensers may well be useful but is often not worth installing in small buildings or impossible to use in many make-shift buildings that Swedish sheep farming often takes place in. In addition to inefficient use of feed and fodder, greenhouse gas emissions are likely to be high amongst sheep farms in Sweden, due in part to the high proportion of hobby to professional rearing systems. In a study by Allard (2009), methane emissions calculated for Swedish sheep farms were more than twice as high in extensive rather than intensive sheep grazing systems, a result which must be attributed to the longer raising period required for extensively raised animals. A similar result was gained by Hijazi et al. (2014) in Syria. A large proportion of Swedish sheep farms however is likely to pertain to this relatively extensive grazing category with long raising periods, not least as a result of the many hobby rearers in the sector planning their grazing systems less meticulously and efficiently than the few professional sheep farmers. In summary, the small average herd sizes for which rationalising technology is difficult to implement and hobby-farming resulting in long raising times are aspects of the sheep sector's marginality that challenge the resource efficiency of Swedish sheep farming. Ultimately, this low resource efficiency places strains on the environment that are unsustainable.

Having considered the current sustainability situation of the Swedish sheep sector, one must next question in what way the Swedish sheep sector's structure contributes to enhancing sustainability in the future. Some promising opportunities lie in the positive, future-oriented energy that is found amongst the Swedish sheep farmers and others involved in the field. Several interviewees named the current positive attitude and spirit dominating the sector and their collaborations with other sheep farmers as one of the sector's greatest strengths. This social energy may in fact be a result of the sector's existence as a niche; it is possible that the feeling of essentially fighting for the same 'good cause' of holding sheep, against all resistance, actually welds the actors in the sheep sector together. In this sense, the niche-existence of the sheep sector may be beneficial in ensuring the positive energy necessary for the sector to successfully continue in its transition to sustainable, agroecological farming.

The marginality of the Swedish sheep sector also requires a high level of creativity of Swedish sheep farmers to deal with the challenges their field of agriculture poses. Specifically, when it comes to ways of surviving economically, Swedish sheep farmers have been extremely creative in developing life and farm concepts that ensure income from various sources. Several have more than one job, others have found ways to market their meat for sufficiently high prices in a farm shop and yet

again some have managed to combine tourism effectively with their farm activities. The creativity displayed in all of these cases could well prove to be a valuable asset in the future when it comes to ways of developing the sector in a sustainable way. Specifically, it may be of great help when ways of producing under increasingly challenging environmental conditions like droughts, such as the one experienced in 2018, need to be found. In a way, the struggles thrown at sheep holders through the marginality of the Swedish sheep sector can almost be seen as a training for sustainability issues that will need to be tackled in the future.

Whilst the Swedish sheep sector being a 'niche' bears opportunities for future sustainability in some ways, its marginality can on the other hand also pose threats, especially to long-term economic sustainability. As economically non-viable production is clearly on its way to becoming a norm in the sheep sector, efforts to stabilize the economic situation of sheep farmers are at risk of being given up. Ultimately, the out-cry for achieving economic viability in Swedish sheep farming is likely to be too quiet, simply because the sheep sector is as small and agriculturally marginal as it is. In this study alone, over half of the survey respondents reported that they made no profit at all from their sheep rearing practice or even 'paid' for it, by having higher costs than income (see Figure 20). In other, larger and more 'visible' sectors, an economic situation like this one would have been scandalous, whilst in the sheep sector, the circumstance seems simply to be tolerated. Hence, it is not over-dramatic to fear that sheep farmers essentially producing food 'for free' may establish itself as the Swedish norm in the long-run, which is anything but sustainable.

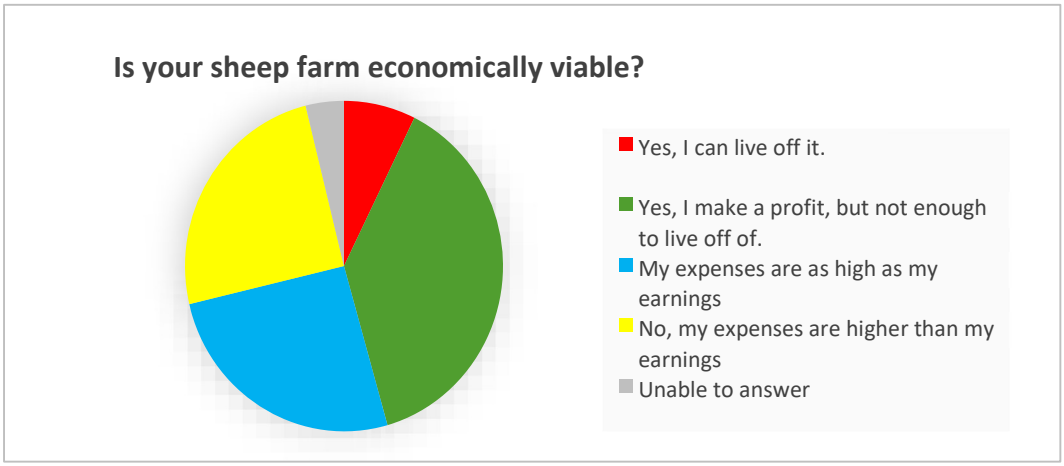

Figure 20: Survey responses regarding the profitability of the respondents' farms. More than half had non-profitable enterprises; of these, a fair number had higher costs than income (yellow) and the others had an economic balance of more or less zero (blue). Only few (red) reached profits that were high enough for them to live off of sheep farming, whilst the majority (green) reached some sort of profitability albeit without being able to finance their livelihoods from it. A small number (grey) had no statement to make about their economic situation. Data source: this research.

Finally, also the danger that the Swedish sheep sector could simply become too small to have any effect at all must be seen as a threat to future sustainability. Current, marginality-inducing factors, such as the high average age amongst Swedish sheep holders, wolf issues and low profitability on farms threaten to draw more sheep farmers out of the business in the future if these circumstances are not counteracted. A more or less non-existent sheep sector would not only cause society to miss out on the positive contributions towards sustainability that sheep farming has to make, such as its ecological services; it would also remove a cornerstone or at least a building block from Sweden's agricultural diversity. A number of sources, like Kazakova-Mateva & Radeva-Decheva (2015) or Maikhuri et al. (1997) to name just two, thematise the significance of diversity for agricultural sustainability. Gliessman (2015) also dedicates an entire chapter to this topic, asserting that diversity, besides being a system's product is also one of its foundations (Gliessman, 2015). With this, an even further marginalisation of the Swedish sheep sector can well in a way be seen as a fundamental betrayal of agroecological values; it should in any case certainly be interpreted as a threat to sustainability in the future.

4.5 Research Question 3: Directions for future development

Having discussed the reasons for marginality, as well as what this marginality means for how the path to agricultural sustainability is paved, it is important to discuss what developments are desirable for the sheep sector, assuming that agroecological, sustainable development is the ultimate goal. Most obvious seems the need to reduce the previously discussed threats to future sustainability, as well as to counteract those aspects of the previous section that currently weaken the sheep sector's sustainability. The key question is to which extent the sheep sector in fact should grow (or not grow) in order for its strengths and opportunities to outweigh its weaknesses and threats. Simultaneously, those developments that the sheep sector has already begun to embark on need to be considered. This will hopefully sketch an outline for the Swedish sheep sector's future and give some ideas as to how sustainability can be ensured.

It seems like achieving economic stability must be the most important sustainability goal for Swedish sheep farming. Reaching economic viability on farms would not only contribute to their immediate financial security, but would also eradicate the threat of sacrificing economic sustainability in the long-run, by letting unprofitability become the norm on sheep farms. Of course, economic success must be reached without jeopardizing animal health and welfare or environmental integrity, and the question is whether a growth or 'demarginalization' of the sector

allows this or not. Considering that the domestic market for lamb meat is far from being saturated and that the pandemic seems on top of this to have increased the demand specifically for Swedish lamb meat (Svenskt Kött, 2020) the economic prospects if the sector grows are in general glowing and regional consumption hardly at risk of being sacrificed even if Swedish sheep production increased. By professionalising the sector somewhat, some rationalisation could take place and a larger portion of potentially grazable grassland could be used as pasture – not at the expense but actually in favour of animal welfare. From an economic point of view that remains considerate of environmental sustainability and animal welfare, it is therefore definitely beneficial for the Swedish sheep sector to grow, at least until the Swedish demand for lamb meat can be covered by domestic production.

From a more social sustainability perspective, working conditions for farmers call for change. Again, the key question here is to what extent an expansion of the sheep sector would actually improve these. On the one hand, the professionalisation and rationalisation associated with increased production would create options for farmers to introduce work-facilitating technology that in the current small-scale farm structures simply would have been silly to install. Moreover, the higher level of economic stability associated with the growth of the sector could well reduce workloads because necessary extra workforces could more easily be afforded. On the other hand, it must be remembered that the physical burden of the farm work is in some cases self-inflicted; some farmers, as an interviewee in this study emphasised from his professional experience as a consultant, seem to hold romanticised, idyllic views on sheep farming, which can cause them in fact to want to work by themselves or by hand as much as possible. Within such a setting, a growth of the sector would hardly be embraced, small herd sizes would likely be maintained and the necessary burden of having a second job and facing long, physically strenuous working hours would continue to be accepted. Overall, therefore, demarginalization seems to be slightly less of a potent tool for increasing social sustainability within the Swedish sheep sector than it is for increasing economic sustainability.

The inefficient resource use that comes with the small-scale, little rationalised production and marketing structures of the Swedish sheep sector was discussed earlier and must be addressed when aiming for environmental sustainability. In many ways, growth of the sheep sector would be beneficial in making resource use more effective and hence efficient. A rationalisation of the sector could lead to a more precise, well-balanced application of resources such as concentrate feed, bedding in stables and fuel for transport. A professionalisation of the sector, by an increased number of full-time sheep farmers is moreover likely to come with higher levels of professional education amongst farmers, leading to more awareness for efficient resource-use and the ability to act upon it. Finally, a more rationalised

transport system for primary products would increase fuel efficiency. The fuel needed for the transport of slaughter animals could be reduced per kg of produced meat were slaughter batches larger and more synchronised, not to mention the improvement of the carbon footprint that could be achieved by the systematic collection and processing of wool if quantity and quality of fibre were high enough. Ideally too, all parts of the skin processing chain could – if inland demand and production structures became significant enough – be carried out within Sweden, saving large amounts of fuel. Currently, the tannery 'Donnia Skinn AB' in Tranås relies on a large part of their production to be carried out in Bosnia (Donnia Skinn AB, n. d.). Its competitor, 'Tranås Skinnberedning' on the other hand has in fact managed to carry out all steps of its processing chain within Sweden (AB Tranås Skinnberedning, n. d.). These examples show that resource efficiency has high potential to improve through an expansion of the sheep sector, improving environmental sustainability in the long-run.

With all talk about the benefits arising from growth of a currently marginal agricultural sector, the limits of the benefits should also be taken into consideration, and the need for a lid on growth acknowledged. Indeed, economic stability would be aided by the sector's growth, and a demarginalization could improve both working conditions and resource efficiency. However, economic success is dependent on unmet demand, which is, naturally, limited. Equally, social advantages arising from rationalisation are finite and environmental integrity is always put at stake to some extent in agricultural production. Therefore, as Figure 21 might help to visualise, the sheep sector should only grow until the point where social and environmental sustainability are well-balanced and economic stability is not sacrificed. Where this point in practice lies, is unclear; intuitively one might say that the sheep sector should grow until domestic demand for sheep meat can be covered by national production, but one could just as well argue that the sheep sector should grow to the extent that all pastures suitable for sheep are in grazing use. Equally legitimate may it be to wish for the sheep sector to grow enough in order for farmers to have as light a physical and psychological burden on their shoulders and minds as other members of society. Every one of these benchmarks seems sensible at its base, but is obviously equally hard to quantify. Moreover, the benchmarks should rather be considered in combination rather than in isolation, in order to remain true to all three pillars of sustainability. Therefore, if and how much the Swedish sheep sector should grow is dependent on a multitude of factors.

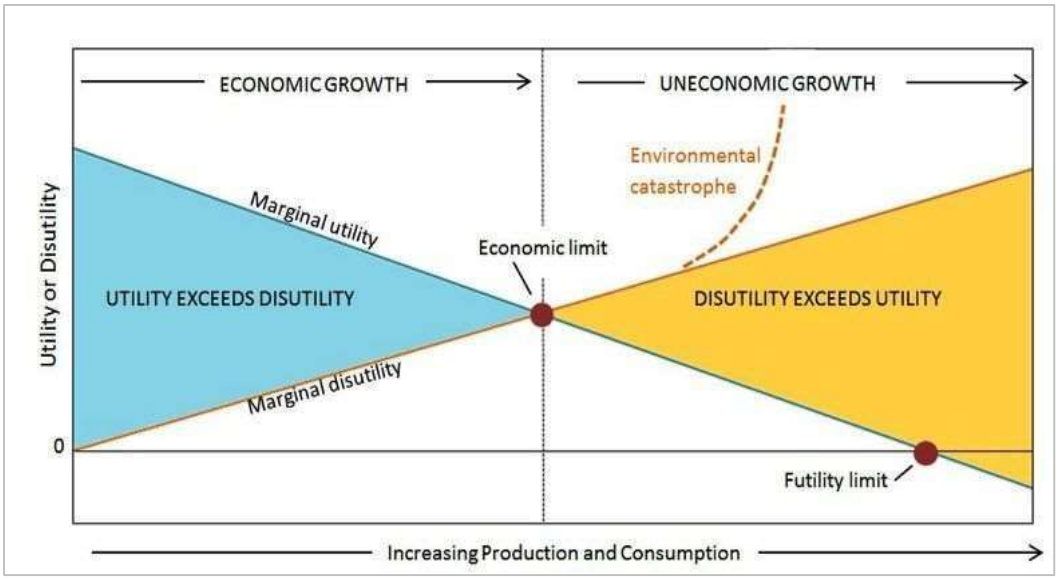

Figure 21: Diagram modelling growth and its limits. Currently, the Swedish sheep sector seems to be locked into the blue area of the diagram, for reasons discussed throughout this paper. From an obvious economic perspective, it would make sense for the sheep sector to grow until the point shown here as the 'Economic limit'. Considering social sustainability alone, there would be little harm done if the sector grew beyond this point and from a solely environmental perspective, the sector should remain as small as possible. Where sustainability requirements coincide is in practice difficult to pinpoint. Image taken from: Daly (2014).

In any case though, and without the need for quantification, this thesis strongly indicates that the Swedish sheep sector would be able to grow without putting sustainability at stake. As a matter of fact, it is likely that sustainability will increase by an expansion of the sector, as the preceding paragraphs have shown. Should the sector actually grow considerably (which is not certain and maybe not even especially likely), the sensible limits to this growth will most likely become apparent with time.

On the other hand, it is possible that the Swedish sheep sector may finish by becoming even more marginal than it already is. Arguably, this scenario is a more probable one than that of the sector growing too vastly. The drought in 2018 for instance seems to have affected the number of sheep farms negatively, as Figure 3 earlier showed, demonstrating that the sheep sector, just like any other agricultural sector, is susceptible to blows by external events. Moreover, it should be expected that some of the issues that have led to the sheep sector being marginal today may continue to marginalise it further, if not resolved. Examples of this are, for the sake of choosing the most obvious two, persisting challenges due to the wolf and low levels of professionalism amongst sheep farmers. This is problematic, because as this investigation indicated, a complete eradication of the sheep sector in Sweden would not be beneficial from a sustainability perspective. Clearly, the sector currently seems to be struggling to exist and because of this, calls strongly for

counteractive efforts. Practically, this means that the goal for the Swedish sheep sector right now should be to stabilise itself by growing, without for the moment worrying about becoming too large.

Having established these goals and wishes for the sector, one may ask how likely it is that the Swedish sheep sector will actually succeed in growing to the desired extent. Here, several factors give rise to both hope and concern. The pandemic seems to have increased the demand for Swedish sheep meat (Svenskt Kött, 2020), and the proportion of sheep meat of the total meat demanded by the market is slightly increasing (Jordbruksverket, 2021), as Figure 22 shows, possibly thanks to a growing proportion of New-Swedish consumers. Sheep meat prices in Sweden are higher than ever (Jordbruksverket, 2021).

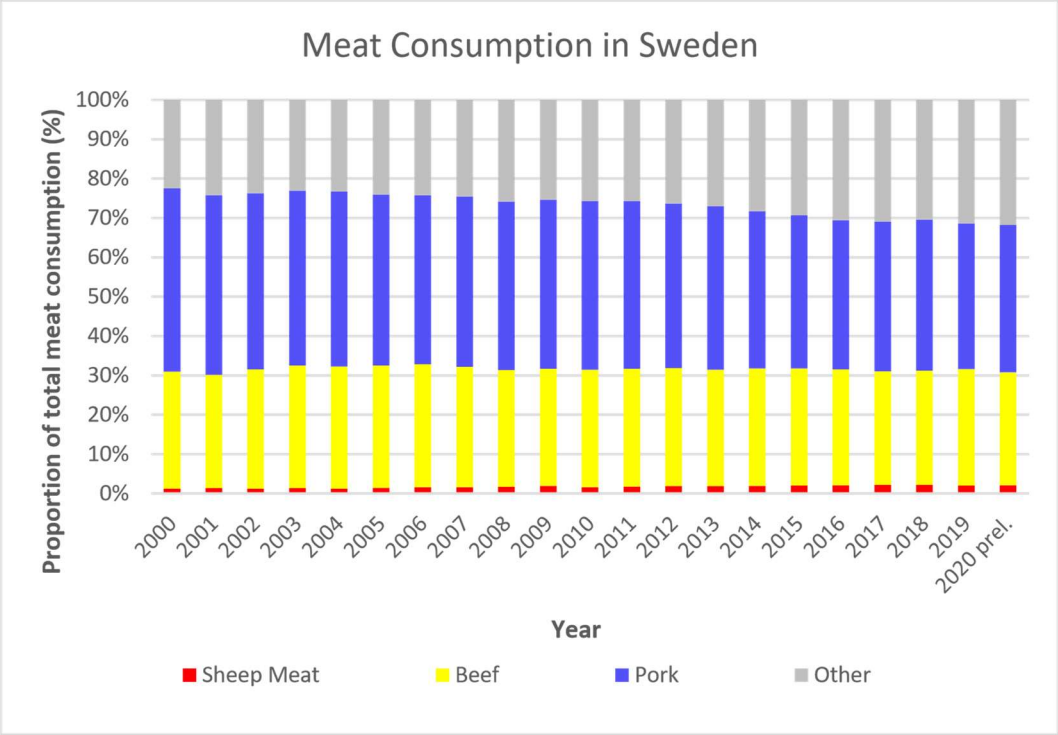

Figure 22: Percentages of different types of meat of the total meat consumption in Sweden. Note the decrease in consumed pork (blue) in favour of other meat types (grey, mainly chicken) - but also the slight increase in the importance of sheep meat (red). Data source: Jordbruksverket (2021).

At the same time, whilst lamb meat consumption has been on the rise over the past decades, in the most recent years a decrease in meat consumption overall and also of sheep meat has been recorded (Figure 7), possibly due to vegetarian and vegan culture trends. Further, it is questionable whether farm numbers will recover from the blow they received during the drought in 2018, whilst additionally, predator-related difficulties remain pressing. The latter were named most often by survey respondents (Figure 11) when asked for the main challenge they perceived currently for the Swedish sheep sector. Further, one respondent mentioned the issue of sheep

meat not being frozen, but marketed exclusively as fresh commodity. This necessity for just-in-time production on farmer side is perhaps not the highest hurdle the sheep sector will need to clear in the coming future, but it can be seen as a representative of a number of challenges that will persist in the future.

All this is not to say that no unexpected developments in the sector may take place in the near future. A paper by Strijker (2005) discusses the value of low-input farming systems, like many sheep rearing systems, for biodiversity. Similarly, Dawson et al. (2010) highlight the necessity to adapt and manage grazing systems, rather than to simply advocate or reject them. These approaches, that seem to gain acceptance, could add important value to the niche between intensive agriculture and nature preservation in which sheep often reside. Interestingly too, a thesis by Dibéus (2019) reveals that Swedish children living in the countryside associated more positive attributes with the wolf than their fellow students that were growing up in the city (Dibéus, 2019). This result is both surprising and promising considering that the pattern amongst adults is to-date exactly the opposite. Perhaps, the new mindset amongst students indicates that steps towards a more peaceful coexistence of sheep farmers and wolves are on their way of being taken. It will be interesting to see which direction the Swedish sheep sector takes in light of possibly unexpected but oncoming socio-cultural, scientific or political developments.

4.6 Method discussion

The investigation at hand was an agroecological one in several ways. Three research questions were in the investigation's focus, all of which have been answered over the course of the previous pages. They were approached through 18 semi-structured interviews with farmers, consultants and authorities, a survey conducted amongst 210 Swedish sheep farmers and a literature study based on a wide range of sources. The studied topic was broad and sustainability-focused and the research questions themselves challenged the marginality of the Swedish sheep sector from several perspectives. The approach to answering the research questions was multi-facetted in that it employed a variety of different, predominantly qualitative research methods. In consequence of the broadness and complexity of the topic, as well as the methods it was approached by, it is difficult to assess the strengths and weaknesses of the investigation in a straightforward, clear-cut way. Nonetheless, it is worth trying to evaluate some points here.

Despite the investigation's often qualitative approach, some comments about the reliability of results gathered throughout the study's quantitative parts can be made. For one, the number of semi-structured interviews naturally was limited. Only a handful of actors in the Swedish sheep sector were included, and these, as stated

earlier, did not necessarily represent the sheep sector in its proportions or all its dimensions. However, due to the semi-structured nature of the interviews and the length and depth of the conversations that were conducted, the information obtained from these interviews should nonetheless be regarded as valuable. As a matter of fact, Galvin (2015) proposes a way of evaluating how effectively a given number of qualitative interviews is in bringing views held amongst a given proportion of the population to light. Using his method (see Figure 23), views held by up to as little as 15.3% of the sheep sector's actors should be 95% likely to emerge in the 18 interviews conducted for this study. Of course, one would assume that the accuracy of this statement can vary with length and depth of the conducted interviews and how effectively questions are asked by the interviewer. However, considering that the study aimed to point out the most important rather than necessarily all issues prevailing in the Swedish sheep sector, the conducted number of interviews is acceptable.

Figure 23: Calculations to evaluate the effectiveness of the number of semi-structured interviews conducted for this study. Source: this research and Galvin (2015).

Calculating the effectiveness of qualitative interviews in bringing given themes to light that are held by a certain percentage of the analysed population, using a formula suggested by Galvin (2015)**:**

$$P = 1 - (1 - R)^n$$

where:

n = number of interviews conducted
R = the percentage of the analysed population that holds a given view
P = probability that a view held by R will emerge in n interviews

Rearranging the formula shows that 18 conducted interviews (n) are likely, with a 95% probability (P), to bring to light themes concerning 15.3 % (R) of a given population:

$$R = 1 - \sqrt[n]{1 - P}$$
$$R = 1 - \sqrt[18]{1 - 0.95}$$
$$R = 0.1533$$

The reliability of the survey results obtained in this investigation is equally acceptable. The number of responses indicates that 2% of all Swedish sheep farmers took part in the survey, which seems like a decent number for significant results. Indeed, the sample size achieved through the 210 survey participants – given a population size of 8479 Swedish sheep farmers in 2021 (Jordbruksverket, 2021) – bears a margin of error at a confidence level of 95% that lies within the acceptable range of 4 to 8% (Zoho Corporation Pvt. Ltd., 2019) (see Figure 24). In this, the survey results seem to be sufficiently reliable to draw sound conclusions from them.

Figure 24: Calculations to evaluate the reliability of survey results obtained in this study. The error margin attained with this investigation's sample size of 210 lies around 6.7%. Source: this research and Fox et al. (2007).

Calculating the margin of error in survey responses achieved with the sample size for this study, using the formula:

$$S = \frac{\frac{z^2 \times P(1-P)}{e^2}}{1 + \frac{z^2 \times P(1-P)}{e^2 N}}$$

where:

S = sample size
N = population size, here 8479 = number of sheep farmers in Sweden in 2021 (Jordbruksverket, 2021)
P = percentage value, in this case the recommended 0.5 for first-time surveys (Fox, et al., 2007)
e = margin of error as a decimal
z = z-score, here 1.96, corresponding to a confidence level of 95% (Fox, et al., 2007)

The calculations indicate that the margin of error the current sample size of 210 achieves, lies around 6.7%. If:

$$e = 0.0668$$

$$S = \frac{\frac{1.96^2 \times 0.5(1-0.5)}{0.0668^2}}{1 + \frac{1.96^2 \times 0.5(1-0.5)}{0.0668^2 \times 8479}}$$

$$S = 209.9$$

Whilst the reliability of the results collected through the interviews and the survey may be given, the validity of the interview results can be questioned from some angles. For one, the interviews did not examine the views of society members other than those directly involved with the sheep sector, which may have limited results. This concerns especially those sections of the interviews in which the sheep sector's existence may have needed to be challenged fundamentally. Naturally, the interviewees who were included in the study were all supportive of sheep production in principle and had considerable stakes in the sector. As a result, it was hardly possible to obtain opinions that shed a seriously critical light on sheep farming as a whole. Specifically, potential sustainability problems such as erosion issues, methane emissions or animal welfare problems that sheep farming may cause were hardly brought up; on the contrary, interviewees in some cases made excessive efforts to highlight the benefits of sheep farming. Had a group of vegan members of society for instance been interviewed, the sheep sector would most likely have appeared in a more critical light. In consequence, this thesis does little justice to perspectives from which the sheep sector as a whole would need to be severely criticised, and this circumstance should be kept in mind when examining the conclusions drawn in this paper. Perhaps, a gap in results and with this, an opportunity for further investigations can be identified here. Overall, the choice to

limit the selection of interviewees to those active in the sheep sector ultimately still seems sensible within the frame of this thesis, considering that a certain level of knowledge and experience about the sector was necessary amongst interviewees in order to be able to obtain processable results at all.

Similarly, the validity of survey results can be criticised, mainly due to the channels used to recruit survey participants. Due to logistic limitations encountered when spreading the survey amongst sheep farmers, the survey was ultimately published digitally by the Swedish Sheep Breeding Association (SF) and most likely reached most respondents this way. Consequently, it is likely that the majority of respondents were SF members and that sheep farmers who for whatever reason are not members of the association, were more likely to be excluded from the survey if word about it did not happen to reach them through an alternative channel. Thus, the representation of the Swedish sheep sector is at risk of being skewed towards the fraction – around a third (Bergström & Wendelius, 2020) – of Swedish sheep farmers who are SF members. At the same time though, an internal survey conducted by SF in 2020 (Svenska Fåravelsförbundet, 2020) shows that its members correspond more or less in age[2] and proportion of organic rearers[3] to all sheep producers in Sweden (Jordbruksverket, 2021) and it is quite likely that other sample group characteristics would correspond as well if they had been available for comparison. Hence, the selection of survey participants may be biased, but it is nonetheless expected to represent the Swedish sheep sector overall fairly well.

One large challenge of this study was to account for the broadness of the topic without drawing all too shallow conclusions. This balancing act of going into a topic only as deeply as necessary, but deeply enough to "*grasp the essentials*" (Frodeman & Mitcham, 2007, p. 513) is inevitably part of the interdisciplinarity that in fact defines agroecology. It was, for that matter, therefore not surprising to see that the interviewees in this investigation at times struggled between the extremes of on the one hand giving all too simple, intuitive explanations for the challenges prevailing in the Swedish sheep sector, and on the other hand acknowledging that many, unknown factors played into the issue, ultimately leaving the core of the challenges unexplained. Both literature research to reach the core of the discussed issues and at times the acceptance of a certain shallowness or lack of answer were needed in this study to be able to formulate constructive, meaningful results. The latter concerns especially the secondary research done for the investigation. Despite a range of sources being employed and efforts made to

[2] 62.7% of SF's internal survey respondents were over the age of 55. In comparison, 57.1% of Sweden's sheep farm owners were over the age of 55 in 2020 (Jordbruksverket, 2021) as shown earlier in Figure 15.

[3] 24.1 % of SF's survey respondents seem to produce organically (Svenska Fåravelsförbundet, 2020). In comparison, 20.5% of Sweden's total sheep slaughtered in 2020 were raised organically (Jordbruksverket, 2021).

back all results up with reliable findings, it seems that the performed literature research continues to merely scratch the surface of some issues. The topic of the wolf for example is one that – if dealt with in isolation – should be approached with significantly more ecological and historical depth than this paper could offer. Equally, specific production issues that could have an effect on profitability at farm level, such as optimal feeding or breeding questions could be (and have been by others) investigated more technically and with more attention to detail than was done in this study. In part, the investigation's limitations need to be attributed to time constraints. More importantly though, they should be evaluated taking into account the study's purpose. As Patton (1990) describes, compromises between breadth and depth are inevitable in qualitative research and must be embraced by defining the research goal clearly, and accepting the trade-offs that are necessary to reach it. In the case of this investigation, in-depth interviews were conducted that were accompanied by a broader survey amongst farmers as well as a literature review that displayed a considerable breadth and some level of depth. In this combination, the methods successfully pursued the goal of gaining an overview over the Swedish sheep sector as a whole, whilst accepting certain limits to depth. Hence, this report can help to shed a broad light on a very complex issue and may provide ideas for topics that need to be zoomed in on more closely in future research or through more narrowly focused literature reviews. It fulfils its agroecological purpose of examining a national food (and fibre) system from a holistic, systemic perspective. At the same time, it cannot be expected to have dealt with all topics that were touched upon in exhaustive depth. Accepting these limitations, the investigation at hand has shown how disciplinarity and interdisciplinarity both oppose but also complement each other (Frodeman & Mitcham, 2007), which is an idea that constitutes one of the main pillars of agroecological systems research.

Finally, it seems important to emphasise once more the value of the combination of methods employed in this investigation. A large part of the uncertainties that come with the qualitative nature of the results gathered and the complexity and subjectivity of the topic could be balanced out by combining interviews, the survey, and literature research, thus placing the risk of inaccuracy and invalidity on the shoulders of several research methods. An example where this was of particular importance is the complex topic of economic viability in the Swedish sheep sector. Whilst interviewees tended to feel that the interest for sheep meat and price paid for it amongst Swedish consumers was low, the survey contrastingly showed that many producers were actually successful in selling their meat directly on-farm through meat boxes, most likely for higher prices. Further, literature research revealed that Swedish lamb meat prices were actually quite acceptable in European comparison and that the demand for Swedish sheep meat is in reality far from being met. In this case therefore, the combination of methods actually made it possible to collect a number of perspectives on a complex topic and evaluate them in a way

that allowed them to be displayed in this report in a meaningful manner. Overall, one could argue that the triangulation of methods that this investigation rests on has only made it possible in the first place for readers who are trying to understand the Swedish sheep sector to actually draw valuable insights from this paper.

4.7 Answering the research questions

The study showed that the reasons causing sheep farming to be a marginal type of agriculture in Sweden today are mainly socio-cultural ones that often have socioeconomic effects. These social-cultural factors, discussed gradually over the course on the previous pages, are hardly categorizable because they are so complexly interlinked and interdependent. They do include however, for the sake of choosing a more distinct example, the lack of professionalism amongst Swedish sheep farmers. Further, some more easily distinguishable bio-physical, historical and political circumstances have also contributed to marginalising the sector. These include in particular, but not exclusively, growing wolf populations, climatic and topographic preconditions, historical developments for instance of the wool industry, the tradition of preserving landraces, and conservative attitudes to sheep breeding from institutions' sides. Finally, the marginality of the Swedish sheep sector reinforces itself, by preventing structures from becoming established that would allow for better production- and marketing efficiency of the sheep sector. Many of the discussed marginality-inducing factors have ultimately contributed to the sector's current situation by causing the profitability of Swedish sheep farms to remain low; this in turn reduces the ability of sheep farmers to take up sheep rearing or to stay in the field. Moreover, herd sizes remain small and rearing is often practiced as a hobby. As a result, sheep densities across the country too continue to be low.

The marginality of the Swedish sheep sector has a variety of effects on the agricultural sustainability of Sweden. Currently, the small-scale structures of Swedish sheep farming allow a high level of animal health and welfare to be maintained in the sector. Moreover, a low level of national self-sufficiency in sheep meat naturally leads to a high level of regional consumption of the meat that is produced within Swedish borders. On the other hand, the economic instability that results from the marginal situation of the Swedish sheep sector as well as the difficult working conditions that accompany it limit sustainability considerably. Equally, resource efficiency in many cases suffers from the small-scale, hardly rationalised production setting. In future, the transition towards a higher level of agricultural sustainability may be aided by the positive spirit of motivation and collaboration as well as the creativity amongst Swedish sheep farmers that their marginal position within Swedish agriculture has made necessary over the years.

On the other hand, economic viability of farms is at risk of being given up in the long term, as unprofitable farm businesses become the norm in the sector. This, paired with the high age average and the lack of younger sheep farmers wanting to enter the sector, is a serious facet of the sector's marginality that could potentially undermine the development towards agricultural sustainability in Sweden.

Lastly, the results showed that it is desirable for the Swedish sheep sector to grow in order for agricultural sustainability to be fostered most effectively. Farm profitability, working conditions and resource efficiency could be improved by a demarginalization of the sector. It is highly unlikely that the sector should grow vastly enough to threaten sustainability significantly. If anything, a further marginalisation of the sector is by far more likely to impend, but should be prevented for the sake of agricultural diversity. Whether the desired demarginalization of the Swedish sheep sector will actually be achieved, is questionable.

5. Conclusion

This paper has shed a light on the Swedish sheep sector as one that until today remains more or less hidden in a small agricultural niche, characterised by a high level of hobby farming, few and small flocks of animals, a poor level of profitability and low numbers of farmers employed in the sector at all. The reasons for these circumstances were discussed and the effects of the sector's marginality on agricultural sustainability today and in the future evaluated. These steps have led to the conclusion that it is desirable for the Swedish sheep sector to grow if agricultural sustainability is to be maintained and improved. Neither at the moment nor any time soon does the sector seem at risk of undermining sustainability by growing too vastly. It remains uncertain, on the other hand, whether growth will occur, given the prevailing societal and bio-physical preconditions and the existing structures within the sector itself.

Many questions remain unanswered after this investigation, the main one being what steps should be undertaken to make it most likely for the Swedish sheep sector to actually succeed in growing. Intuitively, the focus shifts towards the Swedish sheep farmers' roles in the matter. What ways can they find to live alongside the wolf in an economically and psychologically bearable way? How can producers use their creativity to rationalise their production systems and how can they increase their level of professionality so that they can effectively stabilise their socioeconomic situation? How can they continue to withstand the psychological pressure they face from those who hold a grudge against their farming practices? Admittedly, it seems a little unjust that these questions should place the responsibility for the Swedish sheep sector's development mainly on the shoulders of its farmers. However, after having gone through this investigation, it seems of more use to hope for development at farm level rather than to speculate and wish for changes in consumer behaviour or politics. Sheep farmers themselves appear to be the most promising and agile party when it comes to the sector's growth. Therefore, the questions above should be seen as encouragements for farmers to seize existing opportunities whilst navigating around difficulties in order to help the Swedish sheep sector to grow out of its niche. This will determine the sector's future and will contribute to the sustainability of Swedish agriculture as a whole.

Overall, this paper has summarised the emotions and struggles of many involved in the Swedish sheep sector. Through its scientific approach, it is able to mirror, structure and convey what is going on in practical Swedish sheep production as we speak, more soberly and analytically than is generally possible in the oral and less formal occasions for thought exchange that arise sporadically amongst farmers in the restricted time-slots that remain, for instance, between lambing, harvest or slaughter. Perhaps, the specifically agroecological, and hence interdisciplinary and holistic approach of this investigation can be of value and may be enriching to the reader's understanding of the Swedish sheep sector. It is hoped that this paper can both lift the Swedish sheep sector into a more public light and equally help those already familiar with it to see the situation in a more nuanced and constructive way, in order to ultimately contribute as sustainably as possible to the development of Swedish sheep farming and agriculture as a whole.

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Popular science summary

Domesticating animals has been part of society for thousands of years. Thanks to cattle, goats, sheep and horses, several ancient civilizations, such as the Egyptians or the nomads of the Mongolian Steppe, to name just two, have established thriving communities that developed over time into the world as we know it today.

Sheep, in particular, were one of the first domesticated animal species on the planet, and have been inseparably intertwined with human existence by providing not only meat, but also milk and wool to communities. Inevitably, by grazing, they have become a fully integrated part of the natural surroundings that we as humans depend on to produce food. They have fulfilled essential roles in some of the world's most diverse ecosystems that thrive, despite man-made threats, until today.

At the same time, in today's time and age, where consumer trends are marked increasingly by vegan ideals, the domestication of animals is put into question more than ever. It is thus necessary, expected even, that agriculturalists take a closer look at animal husbandry, assessing it from appropriate angles in order to make sensible, and above all, sustainable decisions about the future of global food production.

The paper at hand has evaluated the role that sheep farming plays in Sweden from a holistic, agroecological point of view. Considering the availability of pasture land in the country and the sustainable potential that assumedly lies in products such as lamb meat, wool, sheepskin and -milk, it has tried to uncover the reasons for why sheep farming is nonetheless hardly practiced in the country, whilst other forms of animal husbandry seem to be fairly common.

It became clear that sheep farming is neglected in Sweden for several socio-cultural, historical, political and environmental reasons. These form an intricate web of difficulties that Swedish sheep farmers have trouble escaping from with any level of financial security. This situation poses a considerable threat to socio-economic sustainability. Moreover, the Swedish sheep sector's scattered structure undermines resource efficiency, threatening environmental sustainability in the long-run.

In its current state, the Swedish sheep sector is most certainly endangered. In order to maintain the diversity of Sweden's agricultural landscape, it is of utmost importance that sheep rearing become a more cherished part of Swedish agriculture.

Fact Sheet – for farmers & the general public

Sheep farming plays only a marginal role in Swedish agriculture today:

- Only 2% of Swedish agricultural land is used for the sheep and goat sector
- Average herd size lies around 33 ewes – an extraordinarily low number compared to other European countries
- Often, sheep are held part-time and at hobby level in Sweden
- There are under 8000 sheep farms across the whole country

The reasons for this were investigated and showed to be the following:

- Sheep farms are often unprofitable (for a multitude of reasons)
- The Scandinavian climate poses challenges and the Swedish landscape naturally fosters other forms of agriculture that are more lucrative
- Increasing wolf populations pose economic and psychological challenges
- The European post-war era has come to an end, during which sheep products were hardly demanded any longer (eg. Swedish wool crisis 1950's)
- Vegetarian and vegan cultural trends as well as the demand for fresh meat rather than frozen meat put Swedish sheep farmers in a tricky position
- There is a lack of professional education, skill and knowledge in the field of sheep farming
- Adequate breeding material is hard to come by and the low acceptance of artificial insemination in Sweden makes breeding additionally difficult
- Possibly, some conservative attitudes within sheep-supporting institutions as well as their part-time farming orientation influence the sheep sector's dynamics to some extent, although this statement cannot be made without reservation
- The sheep sector's small-scale, little rationalised structure is itself making it difficult for farms to reach profitability and therefore limits the Swedish sheep sector to the small agricultural niche it currently fills.

The small-scale structures of the sheep sector bear both advantages and disadvantages when it comes to sustainability.

Ultimately, it is desirable for the sheep sector to grow in order to improve economic, environmental and social sustainability and to preserve the agricultural diversity of Sweden.

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Lastly, I thank all spirits of the universe that they have let me receive free education and peace throughout my entire life. I know I am lucky to have had the opportunity to write this thesis.

Appendix

On the following pages the survey questions posed to 210 farmers for this investigation are listed.

1. Hur många tackor har du?

   Markieren Sie nur ein Oval.

   - ◯ Färre än 30
   - ◯ Mellan 30 och 60
   - ◯ Mellan 60 och 100
   - ◯ Mellan 100 och 200
   - ◯ Mellan 200 och 400
   - ◯ Mellan 400 och 1000
   - ◯ Över 1000
   - ◯ Vet inte

2. Vilket län ligger din gård i?

   _____

3. Har du får i hel- eller deltid?

   Markera endast en oval.

   - ◯ Heltid
   - ◯ Deltid

4. I fall du jobbar som fårbonde på deltid, kryssa i nedan det som stämmer för dig. Lägg till eget ifall det saknas. Om du är heltidsfårbonde, snälla hoppa över frågan.

   Markera alla som gäller.

   - ☐ Jag föredrar att ha får på deltid för att ha tid för annat
   - ☐ Om jag haft möjlighet hade jag gärna bedrivit min fårverksamhet på heltid
   - ☐ Jag har ett annat jobb vid sidan av för att kunna klara mig ekonomiskt
   - ☐ Jag jobbar som fårklippare vid sidan av
   - ☐ Jag var heltidsfårbonde ett tag, men gav upp det av ekonomiska skäl
   - ☐ Jag anser att mina får fungerar som min "semester"
   - ☐ Att tjäna pengar på mina får har inte jättestor betydelse för mig

   Övrigt: ☐ _____

5. Lista dina huvudinkomstkällor kopplade till din fårverksamhet. Ange de viktigaste i få ord, den allra viktigaste först.

Tex: kött, förädlat kött, skinn, ull, mjölk, avel & försäljning av livdjur, hotel, restaurang, turism, naturvård... osv.

_____

6. Hur stor del av din fårverksamhets inkomster kommer från finansiella stöd från staten / EU?

Markera endast en oval.

- ◯ Mindre än 10 %
- ◯ 20 - 40 %
- ◯ 40 - 60 %
- ◯ 60 - 80 %
- ◯ 80 - 100 %
- ◯ Kan inte svara

7. Är din fårverksamhet ekonomiskt lönsam? Kryssa i (endast ett svar möjligt).

Markera endast en oval.

- ◯ Ja, den är lönsam nog att kunna leva av den
- ◯ Ja, den är lönsam, men inte tillräckligt för att kunna leva på
- ◯ I snitt är mina inkomster lika höga som mina utgifter
- ◯ Nej, mina utgifter är mest högre än mina inkomster
- ◯ Kan inte svara

8. Slakt - Vem slaktar åt dig? Kryssa i allt som stämmer och lägg till eget om det saknas.

Markera endast en oval.

- ◯ HK Scan
- ◯ KLS
- ◯ Gotlandsslakteri
- ◯ Övrigt: _____

9. Väger du dina lamm före slakten? Kryssa i det som stämmer för dig (fler svar möjliga) eller lägg till eget om det saknas.

Markera alla som gäller.

- [ ] Ja, regelbundet!
- [ ] Ja, en gång innan de åker för att ha koll på vikterna som skickas
- [ ] Ja, jag tycker det är viktigt att skicka in endast riktigt färdiga lamm till slakteriet
- [ ] Nej, jag behöver ju ändå skicka in alla djur till slakt oavsett vikten
- [ ] Övrigt: _____

10. Köttförsäljning - Kryssa i alla svar som stämmer för dig och lägg till eget om det saknas.

Markera alla som gäller.

- [ ] Jag säljer allt mitt kött till slakteriet
- [ ] Jag får tillbaks allt kött från slakteriet och säljer det på egen hand
- [ ] En del av mitt kött säljer slakteriet, en del säljer jag själv
- [ ] Jag har en gårdsbutik där jag erbjuder mitt kött
- [ ] Jag erbjuder köttlådor till kunder
- [ ] Jag säljer på REKO-Ring
- [ ] Jag säljer en viss mängd av kött direkt till restauranger eller liknande
- [ ] Jag säljer en hel del kött till privata kontakter (vänner, familj, kollegor)
- [ ] Jag förädlar allt eller en del av mitt kött till korv eller liknande produkter
- [ ] Köttet jag säljer själv är endast grovstyckat
- [ ] Jag säljer inte kött
- [ ] Övrigt: _____

11. I fall du säljer en del eller allt kött till slakteriet, kryssa i nedan alla svar som stämmer för dig. Om du redan säljer allt ditt kött själv, snälla hoppa över frågan.

Markera alla som gäller.

- [ ] Jag tycker det är smidigast att sälja mitt kött till slakteriet
- [ ] Jag hade gärna velat sälja mer kött själv men får inte det pga kontraktet med slakteriet
- [ ] Jag hade gärna velat sälja mer kött själv men orkar inte pga tid eller plats
- [ ] Jag har det svårt att själv hitta kunder som vill köpa köttet, därför säljer jag det till slakteriet
- [ ] Övrigt: _____

12. Vargen - Hur påverkar vargen dig? Kryssa i allt som stämmer för dig. Lägg till alternativ om du kommer på något mer.

Markera alla som gäller.

- [ ] Min flock har blivit drabbad av vargangrepp
- [ ] Jag är rädd för att få angrepp på min gård/flock
- [ ] Jag har lagt ner eller överväger att lägga ner min fårverksamhet pga vargen
- [ ] Jag har kollegor i närheten som drabbats av angrepp
- [ ] Jag har sett varg i mitt område med mina egna ögon
- [ ] Jag känner ingen som drabbats av vargattack
- [ ] Jag är rädd för, eller obekväm med att tala offentligt om vargen som ett problem
- [ ] Jag har blivit utsatt för hatbrev, elaka kommentarer osv gällande vargämnet
- [ ] Jag har varit med om bråk mellan fårägare och vargskyddare

Övrigt: ☐ _____

13. Hur bra finansiellt och professionellt stöd får du från länstyrelsen eller de ansvariga verksamheterna gällande vargfrågor? Kryssa i allt som stämmer för dig och lägg till eget ifall det saknas.

Markera alla som gäller.

- [ ] Stödet jag får för vargskyddet är jättebra och hjälpsamt
- [ ] Stödet för vargskydd är inte högt nog för att täcka de högre kostnaderna
- [ ] Jag har tyvärr inte rätt till stöd för alla betesmarker jag egentligen skulle behöva skydda

Övrigt: ☐ _____

14. Avelsfrågor - Kryssa i allt som stämmer för dig och lägg till egna alternativ ifall det saknas.

Markera alla som gäller.

- [ ] Jag har endast renrasiga tackor
- [ ] Jag har både korsnings- och renrasiga tackor
- [ ] Jag har bara korsningstackor
- [ ] Jag försöker dra nytta av heterosiseffekten genom mitt betäckningssystem
- [ ] Jag seminerar alla eller en del av mina tackor
- [ ] Jag köper in semin från utlandet
- [ ] Jag planerar exakt min betäckningstid och lammperiod
- [ ] Jag betäcker inga djur & har ingen lammning

Övrigt: ☐ _____

15. Kryssa i vilka raser/korsningar du har på din gård? Lägg till din ras i fall den inte finns på listan.

Markera alla som gäller.

- [ ] Texel
- [ ] Suffolk
- [ ] Dorper
- [ ] Dorset
- [ ] Findorset
- [ ] Finullsfår
- [ ] Gotlandsfår
- [ ] Gutefår
- [ ] Scottisch Blackface
- [ ] Ostfriesiska mjölkfår

Övrigt: [ ] _____

16. Vad är dina tre huvudmål med din avel? Skriv kort nedan.

Tex: Högt antal lamm per tacka, bra tillväxt, jämna slaktkroppar, ... osv.

_____

17. Ullhantering - Hur tar du hand om din ull? Kryssa i allt som stämmer för dig och lägg till egna alternativ ifall det saknas.

Markera endast en oval.

- ◯ Jag säljer min ull till klipparen
- ◯ Jag elder upp min ull
- ◯ Jag slänger min ull
- ◯ Jag tillverkar garn
- ◯ Jag säljer min ull
- ◯ Jag har ett samarbete med någon verksamhet som tillverkar ullen till andra produkter
- ◯ Mina får fäller sin ull, så jag behöver inte ta hand om den
- ◯ Övrigt: _____

18. Kollegor och samarbete - Hur påverkar fårbönder varandra? Kryssa i allt du upplever som stämmer och lägg till egna alternativ ifall du kommer på något mer.

Markera alla som gäller.

- [ ] Jag har gott samarbete med mina kollegor i regionen
- [ ] Jag upplever konkurrens mellan fårägarna i min region
- [ ] Jag saknar kollegor runt omkring mig som också håller på med får
- [ ] Jag tycker det är problematiskt med andra fårägare som visar oprofessionellt beteende
- [ ] Övrigt: _____

19. Aktivt engagemang för fårnäringen! - Vänligen beskriv kort vilka verksamheter inom fårnäringen som du engagerar dig aktivt i (dvs de du bär en aktiv roll i, som tex. ordförande, sekretär, volontär, politiskt, osv).

Ange namnen av verksamheten och din roll i dem.

_____

20. Vilka fårverksamheter har hjälpt dig när det gäller din gård? Kryssa i det som stämmer och lägg till egna alternativ ifall det saknas.

Markera alla som gäller.

- [ ] Svenska fåravelsförbundet
- [ ] Lammproducenterna
- [ ] LRF / LRF Kött
- [ ] Gård- & Djurhälsan
- [ ] Hushållningssällskapet
- [ ] Länsstyrelsen
- [ ] Gimrarna
- [ ] Avelsföreningar (Svenska Texel- eller Suffolkföreningen, Föreningen Svenska Finullsfår, osv)
- [ ] Övrigt: _____

21. Förklara gärna mer detaljerat hur de olika verksamheterna du har kryssat i ovan har varit hjälpsamma för dig som fårbonde.

_____

_____

_____

22. Har vissa verksamheter kanske inte varit hjälpsamma alls eller till och med gjort ditt jobb som fårbonde svårare? Hur då? Förklara gärna.

_____

_____

_____

23. Markfrågor - Har du svårt att få tillgång till lämplig mark till dina får? Kryssa i det som stämmer och lägg till alternativ i fall du vill dela något mer som inte finns på listan.

Markera alla som gäller.

- [ ] Jag äger all, eller den största delen av min betesmark
- [ ] Jag har inga problem med att arrendera tillräckligt betesmark till mina djur
- [ ] Jag saknar säkerheten att ha tillräckligt med betesmark år till år (tex. korta kontrakt för arrendering)
- [ ] Jag har bra samarbete med markägarna i regionen
- [ ] Jag upplever stor konkurrens om betesmark i allmänhet
- [ ] Jag upplever konkurrens mellan kobönderna och fårbönderna om betesmark
- [ ] Jag hade gärna ökat mitt antal djur om det hade funnits gott om betesmark
- [ ] Övrigt: _____

24. Byggnadsfrågor - Har du byggt något nytt fårhus sen du skaffade får? Kryssa i allt som stämmer och lägg till egna alternativ i fall det finns något mer du vill dela.

Markera alla som gäller.

- [ ] Ja, jag byggde nyss ett nytt fårhus
- [ ] Ja, jag byggde ett nytt fårhus för länge sedan
- [ ] Nej, jag behövde inte det, mina byggnader räcker
- [ ] Nej, jag hade velat bygga för länge sen, men det har ännu inte blivit möjligt ekonomiskt
- [ ] Jag har nyligen börjat fundera över att kanske bygga, men det är svårt att financera
- [ ] Mina byggnader är egentligen för små just nu för antalet djur jag har
- [ ] Jag hade gärna velat öka mitt djurantal om jag hade kunnat bygga
- [ ] Min fårverksamhet beror mycket på gamla eller improviserade byggnader
- [ ] Övrigt: _____

25. Tack för dina svar! Slutligen, vänligen ange det du upplever som största utmaningen för den svenska fårnäringen just nu:

_____

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