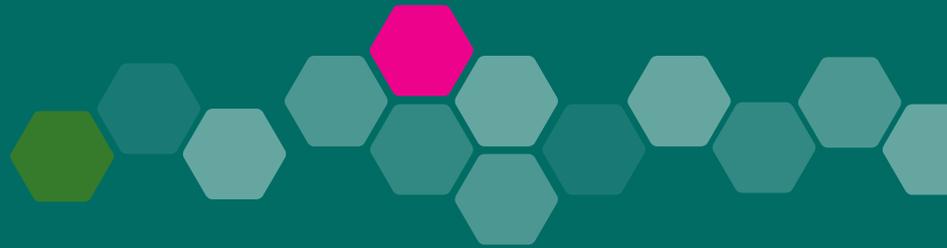




An Assessment of the Opportunities to Retain and Increase Sheep and Lamb Processing in Scotland



AGRICULTURE, ENVIRONMENT AND MARINE

**An Assessment of the Opportunities
to Retain and Increase Sheep and Lamb Processing in Scotland**

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Executive Summary & Recommendations

ES1 Over half of lambs born in Scotland and almost all Scottish cull ewes and rams are slaughtered outwith Scotland each year. Having contracted sharply in the 1990's, Scottish lamb processing has been relatively stable since 2002 as Scottish processors focused on supplying UK supermarkets and premium export markets. If more lambs were retained for processing within Scotland, the Scottish economy would potentially gain in terms of employment and Gross Value Added.

ES2 Any significant increase in the output from Scottish processors would need new market outlets. However, consumption of sheepmeat within Scotland is relatively limited, both by a small overall population and low per capita consumption. This means that markets outwith Scotland are of critical importance. The majority of sheepmeat reared and processed in Scotland is already sold to the rest of the UK and the EU. If the UK leaves the EU without an agreement that maintains largely unfettered access to continental markets, demand for lamb and mutton would be seriously cut.

ES3 Demand for different cuts of sheepmeat varies geographically and through the year, and utilising the entire sheep carcass (carcass balancing) is a challenge. This is exacerbated by the seasonal nature of sheep production, with the availability and quality of sheep for slaughter being very uneven.

ES4 There are market opportunities in the UK and beyond the EU, and a "hard" Brexit would necessitate their development. However, different markets can have markedly different consumer preferences and regulatory requirements, meaning that exploiting them may require considerable and sustained effort – which Scottish processors may not be able and/or willing to expend (even with support from QMS and/or Government).

ES5 Processors may lack the confidence and capacity (skills and time) required to gather information on export markets and to establish necessary new contacts and contracts. Moreover, they may face difficulties in accessing capital to finance investments, and/or in recruiting appropriately skilled labour to increase production. As such, there appears to be little existing appetite amongst Scottish processors to seek new markets to absorb any additional throughput. As most process cattle too, the option to focus more on beef than lamb, is strategically sensible.

ES6 Data on, and understanding of, consumer preferences are imperfect, particularly with respect to the demand for processed products and food service – despite these accounting for the majority of sheepmeat consumption within the UK. Similarly, although halal consumption is a growing market segment, it is not homogenous and distinctions between different certification schemes and forms of slaughter are unclear.

ES7 A modern, value-chain-based perspective of red meat supply-chains has been promoted repeatedly over recent decades, both in the UK and other countries with significant sheep sectors, and offers demonstrable benefits in terms of

facilitating production efficiencies and market development. There are examples here of better chain based thinking over the last decade or so. However, achieving the necessary degree of trust and information sharing remains a challenge that could be converted into an opportunity.

ES8 A number of recommendations follow from these findings:

1: Seek better measurement of actual lamb consumption and supply routes, particularly for processed and food service market segments. UK sheepmeat consumption surveys focus on fresh/frozen cuts of meat for consumption in the home, yet the majority of lamb consumption is apparently of processed products and via catering services. This contributes to imperfect understanding of evolving consumer preferences and market dynamics.

2: Seek greater transparency and consistency in the presentation of volume data, ideally with an agreed measure of saleable meat. Presentation of Scottish (and UK) sheepmeat production and consumption uses a variety of volume metrics, including headage, carcass weight equivalent (CWE) and saleable meat. This hampers reconciliation of estimates from different data sources and can lead to confusion, but also hinders a market orientation focus on consumer preferences.

3: Promote a value-chain approach, combining cost efficiencies with market orientation and good information flows. Establishment of good working relationships through the open sharing of information, the adoption of appropriate technology (particularly digital and genetics) and a clear focus on consumer preferences has been shown to deliver improved profitability along meat supply-chains. As such, a value-chain approach is relevant to increasing domestic processor throughput by addressing cost-efficiencies, product and packaging innovation, and marketing. Moreover, developing and supplying new markets requires coordinated action across all parts of the supply-chain, including primary producers, processors, manufacturers, retailers, food service providers, levy boards and Government.

4: Explore options for addressing seasonality in farm production and achieving carcass balance through product and market development. Extending the time period over which sheep are available for slaughter would mitigate the peak-supply problem. Equally, balancing utilisation of all parts of the carcass would be aided through new products and/or new markets. (It is, however, acknowledged that there are practical obstacles to all of these).

5: Publicise, to industry members, the strategic importance of sheepmeat sales outwith Scotland, highlighting that (given the small size of the Scottish market) any increase in processors' output has to be matched by market development elsewhere. Market share for Scotch lamb is highest in Scotland, but low per capita consumption and a small population limit the size of the domestic market. This means that Scottish sheepmeat production is already predominantly sold outwith Scotland, and any significant increase in production will mostly have to be sold to the rest of the UK or abroad.

6: Review prioritisation of strategic target markets for promotional campaigns, either solely by QMS and/or jointly with other bodies (including other sectors and even competitor countries). Promotional campaigns within Scotland are highly visible to Scottish primary producers and processors, but ultimately have less potential for growth than targeting other geographies (e.g. public sector procurement of lamb in Scotland may be symbolically important, but is trivial relative to overall production volumes. Continued collaboration with other levy bodies (e.g. AHDB) may be desirable for exports beyond the UK, and tie-ups with other sectors (e.g. Scotch Whisky) may have some potential. (It should, however, be noted that increases in lamb consumption inevitably mean reduced consumption of another meat, which may include Scotch beef or pork).

7: Explore further the specifics of particular halal market segments. Lamb's share of overall meat consumption is relatively low, and declining relative to chicken in particular. However, the halal market segment is growing, both in the UK (especially England) but also the EU and abroad. As such it represents a possible priority target. However, it is not a homogeneous nor a static market, with different and evolving preferences that vary with geography and demography. Combined with halal certification being somewhat fragmented and contested, and controversies around the use of non-stun slaughter for some halal segments, this implies that development and servicing of halal markets may not be straightforward.

8: Offer support to processors to encourage them to develop new export markets. Scottish sheepmeat processors with currently stable (and profitable) supply contracts appear to have little ambition to increase production for export markets. However, advice/training, capital grants and export guarantees might help to overcome perceived barriers such as lack of (language/marketing) skills and exchange rate or payment default risks. Assistance with maintaining a skilled workforce may also be relevant. Given the current dominance of the EU as an export market, Brexit adds some urgency to new market development – although it is important to recognise that other markets are often highly competitive (e.g. Middle East and China already dominated by Australia and New Zealand) and typically offer lower prices than the EU.

9: Review allocation of funding between production and market development activities. Across the UK, red meat levy rates and the share of levy bodies' funding allocated to market development are fairly consistent (although comparisons are not necessarily straightforward). However, Bord Bia in the Republic of Ireland has lower levy rates yet higher funding due to significant direct grants from government. Post-Brexit, it may be that a small proportion of funding currently directed towards Scottish primary producers would be better allocated to market development efforts. This would, however, require a clear strategic intent and rationale.

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List of acronyms and abbreviations

cwe	Carcase Weight Equivalent
FTA	Free Trade Agreement
GVA	Gross Value Added
KO%	Killing Out Percentage
QMS	Quality Meat Scotland
YE	Year ending

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1 Introduction

1.1 This report presents findings of a project, commissioned by the Scottish Government and overseen by a Steering Group including industry representatives, to assess the opportunities for increasing the number of sheep processed in Scotland.

1.2 The motivation for the project was that, continuing a long-term trend, the majority of Scottish-born sheep going to slaughter in 2018 did so outwith Scotland: only 42% of Scottish-born lambs, and almost no ewes or rams, were processed in Scotland.

1.3 If a greater number of sheep were retained for processing, the Scottish economy could gain additional employment, value added and export volumes. In turn, this would support the sheep sector's contribution to rural communities, heritage and landscapes. Uncertainties around Brexit add some urgency to such considerations. In addition, reduced reliance on long-distance haulage of live animals to abattoirs in southern Britain could mitigate some animal welfare and transport-carbon emission concerns.

1.4 The project had four objectives:

- i. Investigate, through a literature review and engagement with a wide range of stakeholders, the key drivers for the reduction in sheep slaughter and processing numbers in Scotland, including the impact it has had on the supply chain
- ii. Provide an assessment of what needs to be done by the industry and Government to a) increase lamb processing in Scotland and b) combat the significant leakage and displacement of activity that is currently going south of the border (England and Wales)
- iii. Explore what opportunities or challenges there are for Scotch Lamb to tap into other growing market opportunities in the UK or overseas
- iv. Provide recommendations for policy and industry to ensure a strong and profitable industry for the future.

1.1 Methodology

1.5 To meet these objectives, the project team undertook a literature review, analysed available statistics and, importantly, contacted and/or interviewed a range of industry members and stakeholder experts.

1.6 Relevant literature, including government and industry reports as well as academic papers, were identified through a combination of formal database searches and referrals from industry and stakeholder contacts, plus the research teams' own prior knowledge (see References for list of published material consulted).

1.7 Insights offered by the literature included perspectives on the Scottish industry relative to its own history, the evolution of production and consumption patterns for sheepmeat and other meats, and industry and market developments outwith Scotland.

1.8 Statistical data that were used included publicly available aggregate figures for livestock numbers, slaughter volumes, trade volumes and consumption patterns, plus also some disaggregated but restricted-access and/or commercially sensitive information offering greater detail (see Appendix 2 for key summary data).

1.9 Insights offered by statistical data included quantification of trends in the level and composition of demand for lamb and other meats, but also a highlighting of some issues around information gaps.

1.10 A range of industry members from different parts of the supply-chain plus selected stakeholder experts were, with assistance from the project's Steering Group, identified and approached for their views. In some cases this was simply by email, but in many cases it was via a telephone or face-to-face interview (see Appendix 1 for a list of people and summary discussion guides used).

1.11 Input offered by industry members and stakeholder experts included practitioner perspectives on operational and strategic challenges and opportunities, but also some commercially sensitive information not available from other sources.

1.12 Given information gaps arising from incomplete official data and commercial sensitivities, insights offered by industry members and stakeholder experts were crucial to understanding the practicalities of realising ambitions to increase processing volumes.

1.13 Although these insights were typically qualitative and subjective in nature, the consistency of themes and points raised in discussion, plus triangulation with the literature and statistical analysis, offers reassurance that the report's findings are sufficiently illustrative of broad patterns and trends to support conclusions and recommendations that are reliable and relevant.

1.14 The remainder of the report is structured as follows: the next Chapter 2 summarises the current position of the Scottish sheep sector; Chapter 3 presents an analysis of different markets for Scottish sheepmeat; Chapter 4 considers potential opportunities for increasing Scottish processing; Chapter 5 offers some conclusions and recommendations; and a series of Appendices provide some supporting material.

2 Explaining the decline in Scottish sheep processing

2.1 The current situation

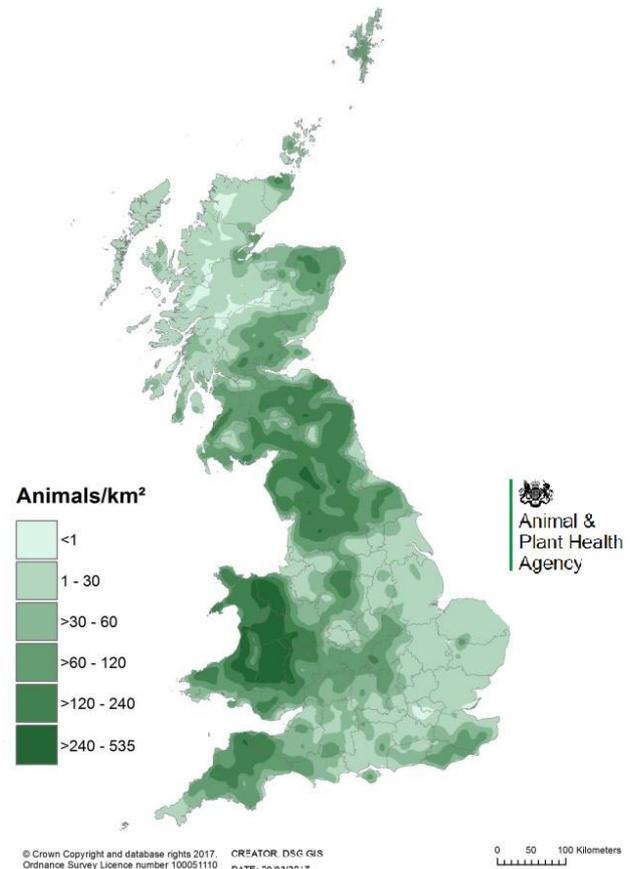
2.1 Highlighting the localities where sheep are most prevalent, Figure 1 shows sheep density (sheep per square kilometre) across Great Britain (GB) in 2017. Whilst areas of the Highlands and Islands have low sheep densities in comparison to better quality grazing land in the lowlands, sheep production is still the dominant land-use in these marginal areas.

2.2 In 2018 across the UK 12.8 million prime sheep (lambs under one year old) and 1.6 million cull sheep (older ewes and rams) were slaughtered (Defra, 2019). Scottish abattoirs accounted for 1.1 million (8.6%) of UK prime lamb and 22,000 (1.4%) of UK cull sheep (Defra, 2019). An estimated 118,000 English and 16,000 Welsh prime lambs were killed in Scottish abattoirs³ meaning fewer than 1 million Scottish sheep were slaughtered in Scotland during 2018.

2.3 In 2018 the average carcass weight of lambs processed in Scotland was 20.3kg (QMS, 2018) meaning around 20,775 tonnes carcass weight equivalent⁴ (CWE) of lamb were produced in 2018. Scottish cull sheep had an average carcass weight of 30.8kg (QMS, 2018) in 2018 meaning around 676 tonnes CWE of mutton was processed in Scotland.

2.4 The locations of the main Scottish sheep abattoirs are shown in Figure 2, along with the major processors in England and Wales.

Figure 1 GB sheep density 2017

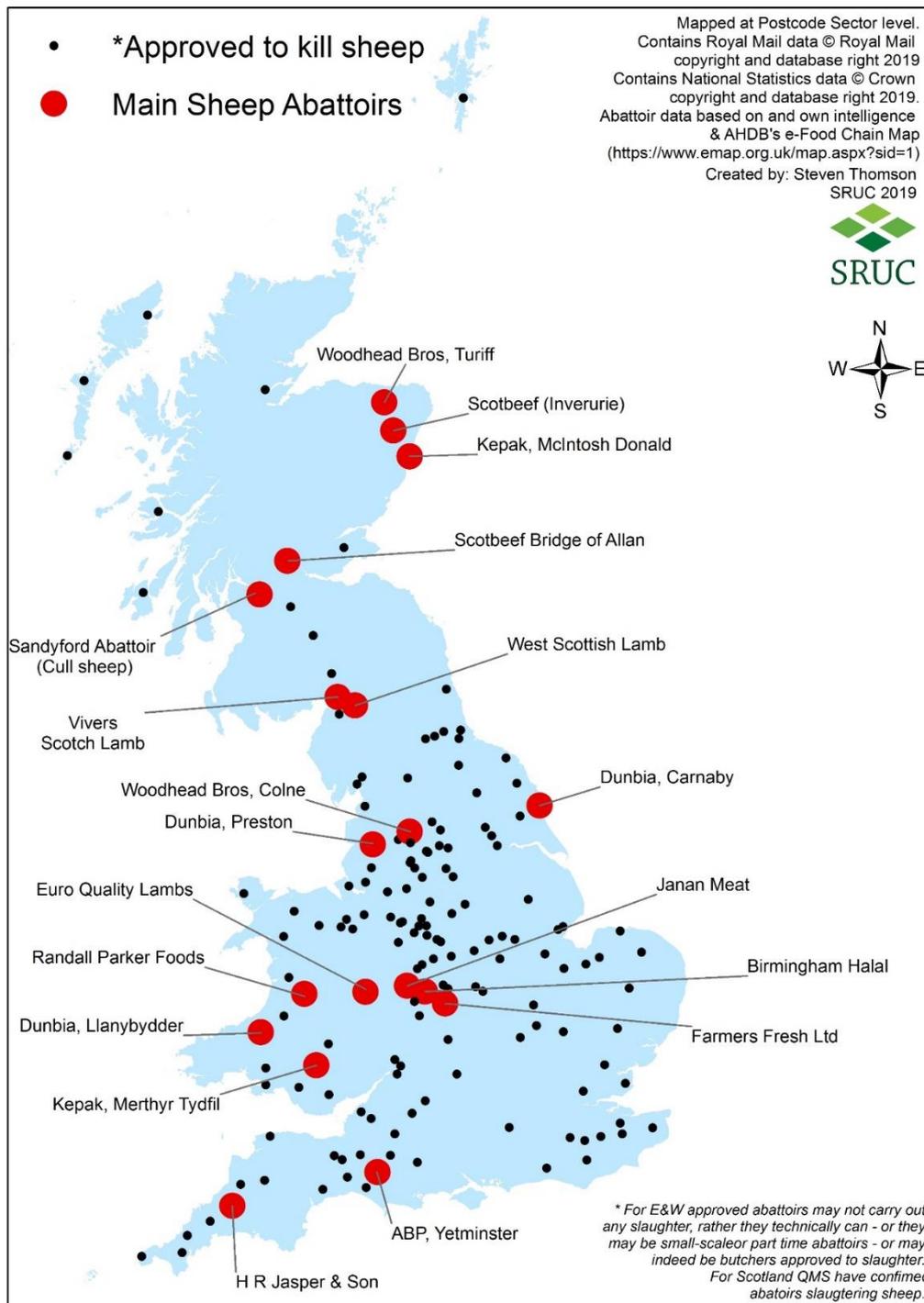


Source: APHA (2017)

³ Pers. Comm. ScotEID, March 2019.

⁴ Sometimes called 'dressed weight' this represents the weight of the butchered animal, e.g. with internal organs and skin removed.

Figure 2 GB sheep abattoirs



2.5 The Scottish sheep processing sector is dominated by three companies, which accounted for 88% of prime lamb slaughtered in Scotland in 2018⁵. None of these processors slaughter cull sheep but all are dual species (i.e. they also slaughter cattle or pigs) with the exception of a single specialised lamb only abattoir. Based on interview findings the main lamb processors in Scotland are:

⁵ Pers. Comm.: RESAS and QMS, February 2019

- a. **Scotbeef** processes lambs mainly for UK supermarkets while its sister company **Vivers**⁶ (sheep-only abattoir) mainly focuses on premium export markets in the EU. Scotbeef also operates a plant in Inverurie,⁷ although few lambs are currently processed there. No cull sheep are slaughtered by Scotbeef at any of its plants.
- b. **Woodheads** is the only supermarket owned processor so kills lambs largely for parent company Morrisons (just under 1,000 lambs a week are killed for a third party). Woodheads plant in Turiff also processes (butchers) most of the prime lamb slaughtered in Morrisons' English abattoir. A small tonnage of lamb cuts are exported to Italy.
- c. Irish firm **Kepak** acquired the former McIntosh Donald plant in 2018 when it bought 2 Sisters red meat division. The number of lambs slaughtered at the Portlethen plant had declined in recent years when the focus had principally been on supplying Tesco's Scottish-based stores as well as supplying around half of Tesco's organic lamb across GB. But the Portlethen plant has increased its lamb kill since the Kepak takeover.

2.6 **John Scott Meat (Paisley) Ltd**, which operates out of the council owned Sandyford abattoir at Paisley, is the only Scottish abattoir to process a notable number of cull sheep in Scotland. The cull sheep sector is dominated by the plants in the Lancashire, Yorkshire and Midlands triangle that service the GB halal market.

2.7 Lamb processing is also very concentrated at the GB level with three Irish owned processors accounting for the majority of GB lamb slaughtering in 2018:

- a) Northern Irish owned **Dunbia** formed a strategic partnership with Dawn Meats (Irish Republic) in 2017 with the UK operations trading under the Dunbia name. Dunbia process Scottish lambs at their main plants; Preston, Carnaby, and Llanybydder.
- b) Anglo-Irish **ABP Food Group** became a major lamb processor in England when it acquired RWM Food Groups' plant in Yetminster in 2012.
- c) When **Kepak** bought 2 Sisters in 2018, in addition to the Portlethen plant it also acquired St Merryn Meats which had a major lamb (and cattle) processing plant at Merthyr Tydfil and a smaller dual species plant at Bodmin. These three plants will handle around 750,000 lambs⁸ annually (though the Merthyr plant can kill up to 24,000 weekly).

⁶ Vivers is a separate registered company to Scotbeef but both are owned by JW Galloway Ltd.

⁷ Scotbeef took over Mathers (Inverurie) Ltd and former ANM Group Ltd's 'Scotch Premier' plants in 2012.

⁸ Irish Farmers Journal, July 2018

Other important abattoirs and processing plants where Scottish lambs may be slaughtered include:

- d) **Euro Quality Lambs** is a specialist sheep processor based in Shropshire. This progressive plant specialises in halal markets in both Britain and the EU and has annual throughput of around 750,000 sheep.
- e) **West Scottish Lamb Ltd** is a relatively small processor based in Carlisle that specialises in light lamb processing and consequently is an important processor of Scottish hill lambs.

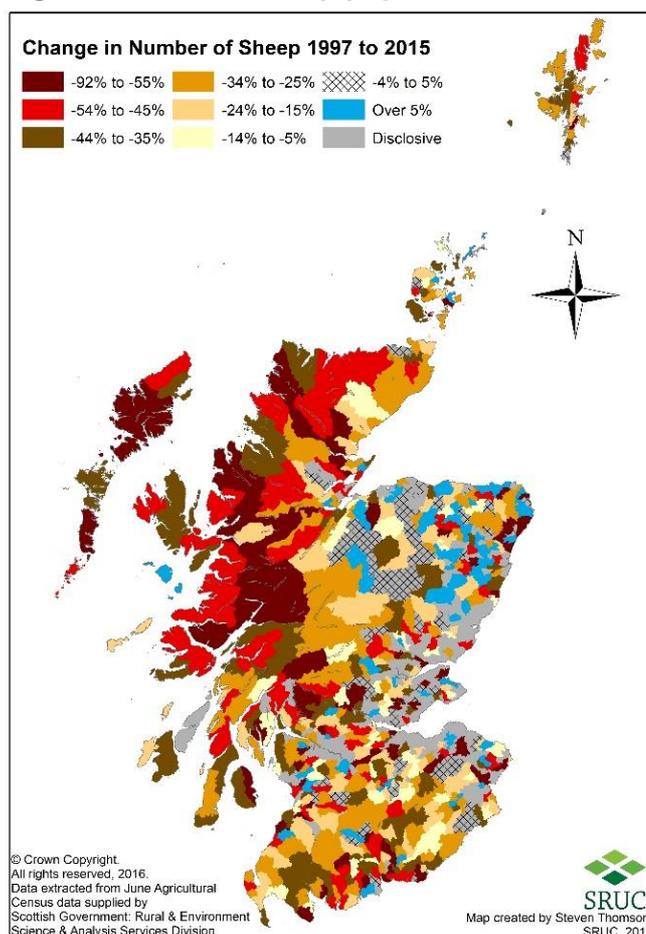
2.8 It was estimated that the overall red meat sector (beef, pig and sheep production) contributed around £2.4bn of Gross Value Added (GVA) to the Scottish economy and supported around 33,000 jobs. Of this contribution, £121m of GVA and 2,100 jobs arose directly from processing (Moxey, 2016). It is estimated that that sheep processing accounts for around 15% of Scotland’s total red meat processing output (QMS, 2018) which implies that sheep processing contributes around £18m of GVA to the Scottish economy and underpins around 300 jobs directly. As such, a 10% increase in Scottish lamb processing could perhaps contribute an additional £1.8m of GVA and 30 extra jobs.

2.2 Sheep production and processing change since the 1990’s

2.9 There has been a well-documented decline in Scottish sheep flock since the mid-1990s (SAC, 2008; RSE, 2008; Thomson, *et al.*, 2011; Thomson *et al.*, 2016) with breeding ewe numbers falling from a peak of 4 million in 1992 to 2.6 million in 2018 – a 36% decline (Scottish Government 2018a, 2018b). The decline in the breeding flock has resulted in 38% fewer prime lambs being reared in Scotland over the last 30 years, with larger declines witnessed in the north-west Highlands and Islands where lighter lambs were more prevalent on marginal grazing land. The changing dynamics of sheep production has inevitably impacted on Scotland’s sheep processing sector.

2.10 Figure 4 illustrates the sharp decline in the total number of prime lambs reared in Scotland as a result of the 2001 foot and mouth disease crisis. Ewe numbers and prime lamb production

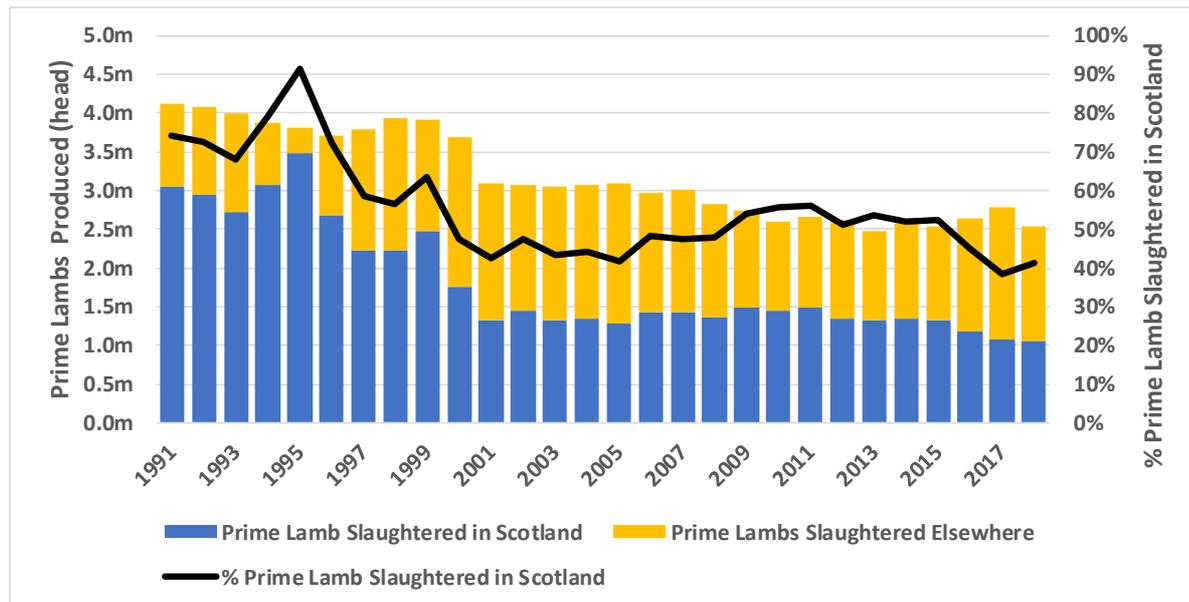
Figure 3 Scottish sheep population 1997-2015



Source: Thomson *et al.* 2016

never recovered from that sharp decline (600,000 fewer prime lambs were produced between 2000 and 2002). After a short period of stabilisation prime lamb production declined further as farmers adjusted to decoupled Common Agricultural Policy support payments (from 2005). The main decline in the number of prime lambs slaughtered in Scotland occurred during the 1990s falling from 3 million lambs to 1.8 million between 1991 and 2001. Between 2001 and 2015 the number of lambs slaughtered in Scotland remained relatively stable, fluctuating between 1.3 million and 1.5 million lambs. However, since 2015 numbers have fallen further to just over 1 million lambs in 2018 (a 70% decline since the 1995 peak).

Figure 4 Estimated annual Scottish prime lamb production and location of slaughter



Source: Own calculations⁹ based on Defra (2019) and Scottish Government 2018b

2.11 The proportion of Scotland’s prime lamb slaughtered in Scotland is affected not only by numbers processed in Scotland, but also changes in overall lamb production. With that in mind, Figure 4 shows that the proportion of prime lamb production slaughtered in Scotland peaked at over 90% in 1995 falling to 41% in 2017 (a data summary can be found in Appendix 2).

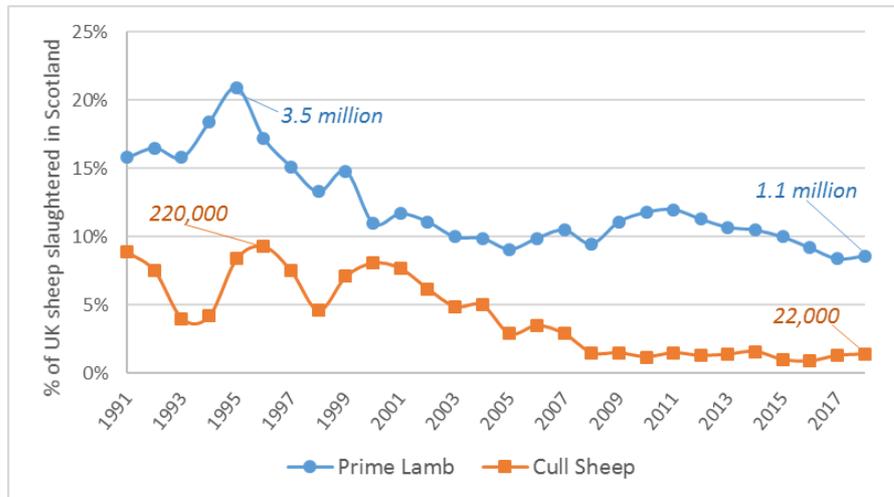
2.12 Scotland has accounted for about a fifth of the UK’s sheep population over the last 30 years¹⁰, but there has been a long term decline in the proportion of UK sheep slaughtered that occurs in Scotland (see Figure 5). The proportion of UK prime lambs slaughtered in Scotland fell from a peak of 21% in 1995 to only 8.6% in 2018. The proportion of the UK’s cull sheep slaughtered in Scotland fell from a peak of 9.3% (220,000) in 1996 to only 1.4% (22,000) in 2018. The importance of

⁹ The number of lambs each year was adjusted by the following year’s number of ‘other sheep over a year for breeding’ to represent ewe lambs retained for breeding stock.

¹⁰ In 1991 Scotland had 22.6% of UK sheep, falling to 19.5% in 2018. This reflects that the reduction in sheep production since the 1990s was not as large in England and Wales as in Scotland.

freshness and trust in correct use of halal slaughter method resulted in cull sheep processing moving to processors in northern and central England.

Figure 5 Scottish proportion of UK sheep slaughterings



Data source: Defra (2019)

2.13 At the start of the 1990's there were more abattoirs processing sheep in Scotland, and there has been considerable rationalisation of the sector in the ensuing years. Some of the major plant closures have included:

- The gradual closure of Local Authority owned “slaughter houses” significantly reduced the number of abattoirs across Scotland. Often located in the middle of towns close to the market, the undesirable purpose and odours from these plants compounded their demise along with their poor economics.
- In 1998 ANM Group closed their ‘Scotch Premier Meat Ltd’ Edinburgh abattoir that processed about 5,000 lambs per week for export. The closure was attributed to the loss of £450,000 a week beef supply contract for ASDA¹¹ highlighting the vulnerability of sheep processing to the beef trade in dual purpose abattoirs.
- In the 1990s Bathgate was the largest sheep processing plant in Scotland. Having postponed closure of its Bathgate facility in 2000 the ABP Food Group finally mothballed the plant in 2005. At this point it was processing around half a million prime lambs a year (about a third of lamb slaughtered in Scotland)¹².

¹¹ <https://www.fwi.co.uk/news/major-scottish-abattoir-and-meat-plant-close> and Pers Comm Brian Pack OBE, February 2019.

¹² <https://www.scotsman.com/business/companies/80-jobs-go-as-bathgate-slaughterhouse-closes-1-709722>

- In the early 2000's the disused Grants of Dornoch plant servicing the north-west Highlands was purchased by ANM Group's 'Scotch Premier Meats'¹³. The plant was closed in 2010 due to a challenging trading environment¹⁴.

2.3 Contributory factors

2.3.1 Low demand for local slaughter

2.14 Scotland has low per capita consumption of sheepmeat (2.2 kg per person per annum) compared to consumption in England and Wales (see Section 3.2). The precise amount and proportion of home produced lamb and mutton that is consumed in Scotland is unknown due to: (i) lack of publicly available data; (ii) inability to trace meat sales from Scottish sheep and lambs processed in England and Wales, and; (iii) GB wide meat supply chains (e.g. lamb slaughtered in Scotland could be sold to meat wholesalers / retailers based in England only to end up being sold to consumers back in Scotland through retail and catering outlets).

2.15 Analysis of production, slaughter, consumption and trade data suggests that in 2017 approximately only 7% of Scottish prime lambs were slaughtered and consumed in Scotland (i.e. as Scotch Lamb). The destination of lambs reared on Scottish farms (as well as cull ewes) are illustrated in Figure 6 and the main assumptions used to derive the figures are:

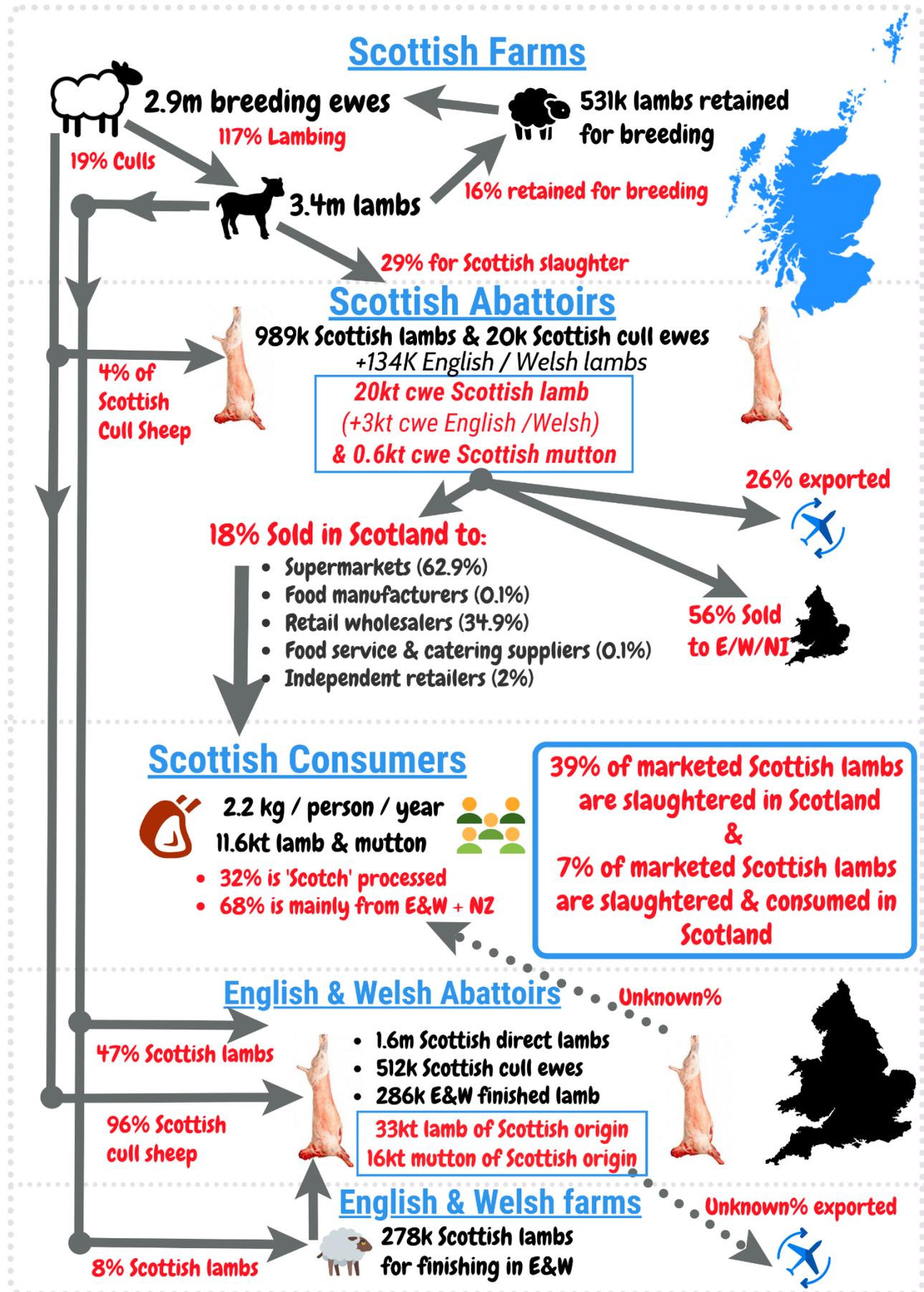
- Total prime lamb production in Scotland was estimated to yield 51,883 tonnes (cwe) based on an average carcass weight of 18kg.
- An estimated 20,000 tonnes (cwe) of Scottish reared lamb (average carcass weight 20.3kg) and 608 tonnes of mutton (average carcass weight 30.9kg) was estimated to be processed in Scotland.
- 3,725 tonnes (cwe) of processed lamb and mutton was estimated to be retained in Scotland¹⁵ for consumption (18% of production).
- 11,660 tonnes (cwe) of sheepmeat (mostly lamb) was consumed in Scotland with 32% coming from Scottish processors.
- Lamb processed and consumed in Scotland only accounted for 7% of marketed Scottish prime lambs. However, if all sheepmeat consumed in Scotland was of Scottish origin it would be the equivalent of 31% of prime lamb reared on Scottish farms and 58% of sheep meat processed in Scotland.

¹³ It was bought out of receivership from a Dutch company who had planned beef exports to EU prior to the BSE export ban.

¹⁴ <https://www.scotsman.com/business-2-15069/anm-shuts-meat-plants-with-loss-of-50-jobs-1-785858>

¹⁵ QMS (2018) estimate 18% of Scottish slaughtered lamb

Figure 6 Scottish Sheep Chain - 2017 Lamb Crop



2.3.2 The economics of sheep processing

2.16 Globally, red meat (and particularly sheep) processing notoriously returns low operating margins¹⁶. The labour requirement per kilogramme of carcass is high in comparison to pigs and beef because sheep are small animals with a low killing out percentage (KO%).¹⁷ For example:

- Pigs in the UK have a KO% of 72-80% (AHDB 2017).
- A typical Scottish steer weighing 700kg has an average 55 KO% yielding a 385kg carcass.
- At an average 44% KO%, a 46kg live lamb is needed to yield the average 20.3kg carcass in Scotland. However, the actual meat yield (i.e. less fat and bone) is generally around 53% of the carcass¹⁸ meaning just 10.8kg of edible meat per average Scottish lamb, and only around 7kg for a typical light finished hill lamb.

2.17 Lamb's low meat yield compared to beef and poultry (largely chicken) meat is shown in Table 1. The table highlights a range of other important parameters influencing the competitiveness of lamb and, along with lamb's high retail price, explains why relative consumption has changed since the early 1970's.

Table 1 How lamb compares to beef and poultry meat

	Poultry	Beef	Sheep
Annual per capita consumption – Scotland (2016) [UK] (2016) {UK} (1973)	28.0kg [31.6kg] {11.7kg}	20.8kg [16.8kg] {19.3kg}	2.1kg [4.9kg] {8.3kg}
Meat yield	35% (19% breast)	41%	24%
Eating quality	Bland but consistent	Fantastic to awful	Consistently good but “strengthens” through season
Production cycle	36 days	365-730 days	50-365 days
Feed Conversion Ratio (grain)	1kg live weight per 1.25kg grain	1kg live weight per 6kg grain	Similar to beef
Use of better genetics	Exceptional	Limited	Limited
Cost of production	Low	High	Moderate
Sensitivity to grain price	High	Very high	Limited
Supply chain efficiency	Highly co-ordinated	Disjointed	Disjointed
Carbon footprint (AgRECalc)	3 kg CO ₂ e / kg	40 kg CO ₂ e / kg	32 CO ₂ e kg / kg

Source: Various

¹⁶ The New Zealand sheep industry is an obvious country to benchmark against. However, their industry is in long term decline. Indeed, the economic viability of their processing sector has been an ongoing problem since the 1980's and pathways to counter the forces of decline and improve their competitiveness is detailed in reports such as: (e.g., GHD NZ Ltd, 2104; MIE, 2015).

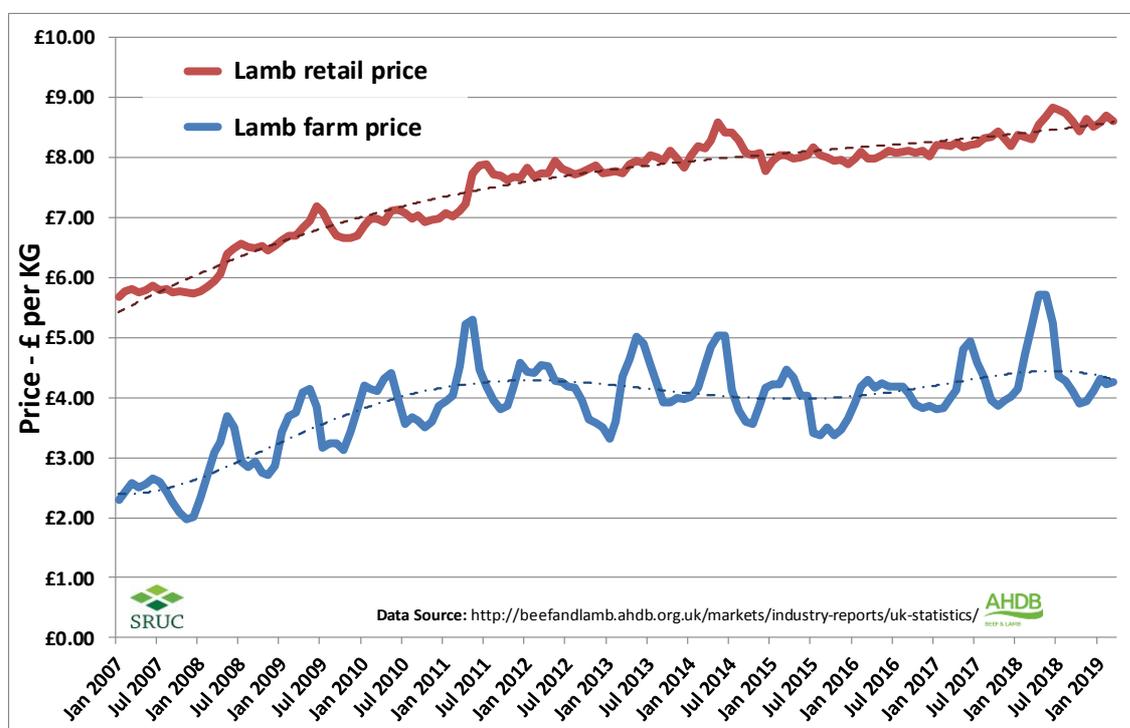
¹⁷ The KO% determines how much saleable carcass weight is obtained from the live animal.

¹⁸ Pers. Comm. Dr N. Clelland (SRUC), March 2019.

2.18 Lamb production is highly seasonal¹⁹ meaning most Scottish lambs are born between March and May. This creates two distinct problems for processors and producers:

- a) First, an oversupply of lambs available for slaughter from late June through to late November. Physical capacity to process this throughput is expensive given that for the rest of the year it is underutilised.
- b) Secondly, as a consequence of uneven lamb supply, farmgate price volatility is the other major problem. Given that UK supermarkets prefer to keep the retail price steady with periodic price promotions, the processors' margin can be severely squeezed. Figure 7 shows the relationship between the farm and retail lamb price for a "supermarket spec"²⁰ lamb since 2007 – where the seasonality of the farmgate price is clear (spring peaks and autumn troughs).

Figure 7 UK lamb average farm-retail price spread



2.19 Traditionally processors made money from “the 5th quarter”²¹. However, following the UK BSE outbreak in the mid 1990’s, imposed health regulations meant most of the leftovers from the lamb carcass suddenly became a waste removal cost to processors. Even the value of lamb pelts, which in the recent past ranged between £7-9 per skin, have become largely valueless in the past few years. Turkey and China were key markets for pelts but demand has been hit

¹⁹ Oestrus in sheep is generally triggered by shortening daylight of autumn.

²⁰ 16-20kg cwe with a limited fat covering (3L) and a conformation (shape) of R or better.

²¹ The 5th quarter is what remains of the lamb after the part sold for meat (carcass) is removed. It includes the pelt, organs (pluck), head, intestines, feet, etc.

recently by a combination of changing clothing and footwear fashions and tighter environmental regulations in China.

2.3.3 Competition from processors south of border

2.20 The low margin per lamb processed has driven the rationalisation of sheep processing into a small number of very large plants to exploit economies of scale. Of the three biggest processors in Great Britain (Dunbia, ABP and Kepak), only Kepak slaughter lamb in Scotland.

2.21 The concentration of the large abattoirs and cutting plants in England and Wales has historical reasons that remain relevant today. These primarily are:

- a) Proximity to a large customer base, reflecting: England's large population; its greater ethnic diversity, and; the higher incomes in the south-east.
- b) Proximity to the EU export market, especially the main ports for transporting product to the continent.
- c) A larger production base to draw lambs and sheep from throughout the year. The largest processing plants are: close enough to get lambs from south-west England in the spring; have access to the large main season production base in supply from Wales and England, plus also pull down "surplus" lambs from Scotland from mid-summer through the autumn. Finding sufficient "supermarket spec" on the shoulders of the season, particularly the spring, puts Scottish processors at a disadvantage to plants south of the border.

2.22 In addition to these supply and demand factors the availability of generous capital grant support for facilities may also have been a factor. Both the large plants at Dunbia, Llanybydder and St Merryn, Merthyr have benefitted from EU structural funding. The Merthyr plant was built in 1999 with a grant of over £6.5m and received a further £1.2m in 2010 and it is estimated that this plant operates well below its capacity of 2,400 cattle and 24,000 lambs per week "*despite drawing livestock from most of Wales and large parts of England and even Scotland*" (Kennard and Young, 2018).

2.23 Whilst these processors are large and dominate the GB sheepmeat market, it should be stressed that the seasonality of lamb production means that some overcapacity is a necessity to deal with peak periods. Therefore, these big processors typically depend on the (EU) export market during such periods. However it is an opportunistic market driven by exchange rates and, in future, a new trade arrangement.

2.3.4 Scottish processor focus on beef

2.24 The Scottish red meat industry focuses on beef, which is unsurprising given Scotland's international reputation for its beef. Scotch Beef enjoys a reputation that translates into a price premium that processors, producers and retailers benefit from. Welsh Lamb enjoys a similar premium reputation, whereas the name Scotch Lamb has limited impact beyond its home (Scottish) market.

2.25 Besides reputation, processors prefer beef for a number of other advantages. Specifically, better carcass balance and yield, more manufacturing options, and a lower (per kg) and more stable procurement cost for animals.

2.3.5 Labour availability

2.26 Processors highlight that finding staff to slaughter and process animals is challenging with staff turnover rates high. It is generally unattractive, repetitive hard work. For a decade and more, “*non-UK labour is of fundamental importance to the red meat supply chain is in the slaughter and processing sector...not only is non-UK labour important on the factory floor but it is also key in respect of veterinary inspection*” (QMS, 2017a). Most of the non-UK staff in abattoirs and cutting plants are of EU origin, meaning the UK's pathway to leaving the EU (Brexit) is disruptive on existing, and potential future staff. The Scottish Association of Meat Wholesalers estimated that 43% of meat processing sector workers come from the EU in 2017 with recruitment of local staff a sometime challenging due to perceptions of the nature of the work.²² Food Standards Scotland estimate that 98% of their official veterinarians are of non-UK origin, mostly the EU (QMS, 2017b).

2.27 In autumn 2018, it was reported²³ that staff shortages were leading to lamb processing challenges as processors prioritised throughput of cattle over lambs. Staffing problems, however, are common to meat processing globally. New Zealand and Australia also struggle with staffing issues. Automation of processes is now a priority in the processing industry to lift labour productivity (reduce staff numbers).

2.3.6 Regulatory burden for smaller abattoirs

2.28 The burden of regulation is cited as a major reason for the decline in smaller processors (Kennard & Young, 2019). The cost of compliance is proportionally larger for smaller firms with responsibility generally added to the small management force. By comparison, large processors have more scope to have dedicated compliance officers.

2.4 The response of Scottish processors

2.29 Faced with the adverse factors explained above, the Scottish sheep processing sector has evolved to achieve a competitive and stable position. In short, Scottish processors largely avoid the opportunistic trades in the commodity export market, instead focusing on domestic supermarkets and the niche, repeatable, premium export trade. The main Scottish processors completely avoid the cull sheep (mutton) market.

²² Pers Comm. SAMW Ian Anderson (former Executive Manager) Scottish Association of Meat Wholesalers October 2017.

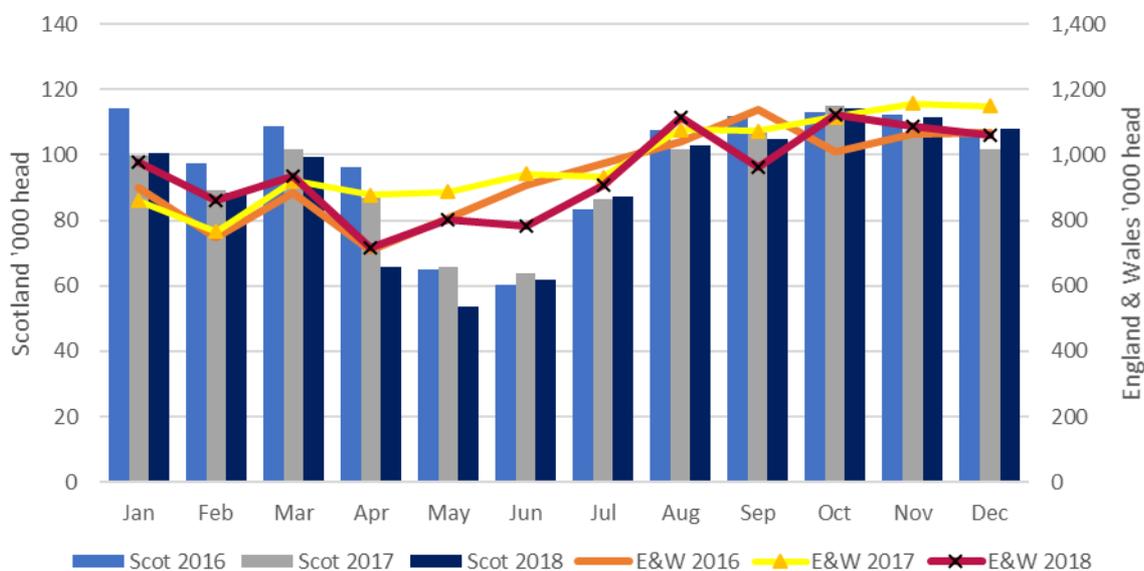
²³ <https://www.fwi.co.uk/business/markets-and-trends/meat-prices/abattoir-staff-shortages-threaten-christmas-price-rises>

2.4.1 Limiting overcapacity is an important goal

2.30 Analysis suggests that a key goal of Scottish lamb processors is to achieve a consistently high utilisation of processing capacity, thereby maximising the return on investment in plant, yards, machinery and labour. Unfortunately, this goal limits the number of Scottish lambs required. Figure 8 shows the relative uniformity of Scottish monthly lamb throughput in recent years, with the exception of the spring through early summer period – this simply reflecting the lack of early lambing sheep flocks in Scotland. The stability of the autumn throughput in Scotland implies that in the autumn months is when Scottish lamb supply naturally peaks, lambs surplus to the more measured needs of Scottish processors are purchased by English and Welsh processors for export to the EU.

2.31 For the significant number of Scottish lambs sold via livestock markets, if export demand is flat, this is reflected in lamb prices. For example, in autumn 2018, when export demand was low, farmers in Ayrshire that sold both deadweight and through the live ring, judged they were £4 per lamb worse off selling through the ring -the highest difference in many years. The worrying implication of a no-deal Brexit is that restricted access to the EU sheep market due to EU tariffs would hit Scottish sheep prices more than in England and Wales, where the big processors requirements are satisfied locally.

Figure 8 Monthly kill of lambs in Scotland compared to England & Wales



Data Source: Defra (2019)

2.32 The price implications for (smaller) light Scottish hill lambs are most significantly affected by Scottish processors' strategic focus on "supermarket specification" lambs. Essentially, the vast majority of these lighter lambs must be sold in England and Wales for slaughter. For example;

- In 2018 about 4,000 sheep (mostly lambs) were slaughtered locally in Shetland. However around 83,000 were lambs (mostly store lambs) and 7,000 sheep were sold off the islands. Most of the Shetland store lambs are

finished on farms in Aberdeenshire or the north of England with Dunbia, Preston being the main processor dealing with these sheep with Vivers buying some occasionally.

2.33 That processing overcapacity is less of a problem in Scotland stands in contrast to the likely situation in England and Wales, but also further afield. For example, a common conclusion from a number of major reports commissioned to address the red meat (lamb) processing problem in New Zealand was “*the inefficient use of meat plants resulting in poor utilisation and unnecessary cost*” (MIE, 2015²⁴). However, the MIE (2015) recommendations were never implemented, with outside (Chinese) investment, that provided better integration into the complex Chinese market, the key strategic option used by the New Zealanders.

2.4.2 Good relations with UK supermarkets

2.34 Drawing on industry and expert interviewees a picture of close abattoir and supermarket relations has been identified across Scottish sheep processors. It is noticeable that supermarkets generally market lamb under their own name. Some of the key relationships are:

- **Scotbeef** processes lambs for both **Marks & Spencer (M&S)** and **Aldi**. The relationship with M&S is well developed and was renewed in 2018. Not all of the lamb is sourced from Scotland, with Scotbeef getting lambs killed on contract in Wales. Indeed meeting the M&S specification in terms of fatness, conformation, size and provenance is more important than country of origin. It is notable that M&S aim to take all parts of the carcass and Scotbeef have developed added value products at its Queenslie, Glasgow plant.
- **Kepak** acquired 2 Sisters and with it **Tesco's** lamb contract. Kepak's Scottish plant supplies Scotch Lamb to Tesco's Scottish stores plus around half of Tesco GB's organic lamb needs. In addition, the Portlethen plant supplies **CostCo's** lamb.
- **Woodheads** is unique as it's a wholly owned subsidiary of **Morrisons'** supermarket. The Turiff plant slaughters around 9,000 lambs per week (of which just under 1,000 are for a third party). However, Morrisons Scottish stores retail only 1,000 to 1,500 lambs weekly depending on season (17 to 25 lambs per week per store). The Turiff plant also bones and processes most of the lambs killed at its Colne plant in Lancashire.

2.4.3 High value export markets

2.35 Exports of Scotch Lamb beyond the UK totalled around 6,200 tonnes in 2018. Until recently just one company accounted for almost all exports – Scotbeef – though product comes from both the Bridge of Allan plant and sister business Vivers' Annan site.

²⁴ Also see GHD NZ Ltd (2014)

- Vivers is a specialist exporter with 57% of its turnover coming from EU exports in 2017/2018²⁵. Vivers' focus is on selling carcasses to premium niche markets in Belgium, France and Italy served via ferry from Dover. This premium market is long established and is based on longstanding personal relationships. However, the lambs sourced for export are not uniquely Scottish meaning it is the reputation of Vivers, rather than the Scotch Lamb brand, that sustains this trade. In addition, Vivers does export some light lamb carcasses to Spain, usually for the Christmas festival. Again, the focus is on whole carcasses rather than further processed cuts.
- By comparison, exports from Scotbeef's Bridge of Allan plant are normally a by-product of its GB trade (carcase balancing). For instance, when large number of lamb legs are required for customers, surplus shoulders and loins may go for export.

2.4.4 Regulatory burden less of an issue for main processors

2.36 Generally, there were limited concerns regarding the regulatory burden from the key Scottish sheep processors. However, they all noted that compliance with regulations does come at a cost.

2.37 A notable positive comment was how Scottish devolution had improved the relationship between processors and regulators. Food Standards Scotland was well regarded and processor – regulator relations are now improved.

2.4.5 Reasonable margins

2.38 The natural presumption is that processing sheep is a very low margin business hence unattractive. As explained in section 2.3.2 the size and low meat yield of lamb, plus the seasonality of production, poses commercial difficulties for a processor. Pressure from supermarkets to compete on (shelf) price creates a challenge for processors given farmgate price volatility. There is, however, evidence to suggest that Scottish processors deal with this tough trading environment quite well. It seems, there is a reasonable margin in processing lambs given a well implemented business strategy.

2.39 To fully process a lamb carcass into packaged shelf ready cuts costs around £15 per lamb, so if adding in a profit of (say) £2, around £17 per lamb goes to the processor for a supermarket specification (16-20kg cwe) lamb.

2.40 Whilst typical red meat processing profit margins are about 1-2% profit margin^{26, 27} published accounts of specialist sheep producers suggest profit margins of 4-5% can be achieved. With lamb procurement costs typically accounting for

²⁵ Published accounts

²⁶ Though dated, Ferreira (2003) findings remain remarkably fresh and pertinent to today's situation here in Scotland. In that report, processor margins averaged 2.1%.

²⁷ New Zealand's biggest processor Silver Fern Farms reported a 1% profit margin in 2018 from \$2.4 billion turnover.

85%-90% of turnover other operating costs are minimised by: (i) working with established customers rather than searching opportunistic trades, and (ii) dealing primarily in carcasses or main carcass parts (shoulder, loin and rear legs) to reduce the need for expensive butchering and enable streamlining of operating processes.

2.41 Woodheads is part of Morrisons so its “profit margin” is internalised. The benefits of the Morrisons’ vertically integrated model, focusing on the supermarkets pig supply chain was reported by Bowman et al (2012). The opportunities provided by better supply chain integration are discussed in chapter 4.

2.42 How processors profitably adjust their kill capacity is critical to the economics of processing. It is understood that Kepak plans to double their throughput this year by putting on a second shift team. As such, the marginal (additional) costs of processing more lambs are: the procurement cost of lambs; labour cost; associated packaging materials, plus; greater wear and tear of equipment. The cost of skilled labour is particularly important. A recent example of the importance of using processing capacity efficiently comes from New Zealand. The profitability of New Zealand processor Silver Fern Farms was hit in 2018 by farmers retaining lambs to grow to heavier carcass weights thanks to good early summer rains.²⁸ However, the processing plants were manned-up to take the normal December throughputs. Farmers opted to get more value on their lambs at a cost to the dividend they receive through the ownership of their processor.

²⁸ <https://farmersweekly.co.nz/section/beef/view/grinch-hits-silver-fern-earnings>

3 The market for Scottish sheepmeat

3.1 Introduction

3.1 Of sheepmeat processed in Scotland, most is destined for market outlets outwith Scotland (Table 2). For example, although subject to some year-on-year fluctuations, for 2017 (the most recent data currently available) the rest of the UK accounted for over half of sales by value, exports beyond the UK for over a quarter and Scotland less than a fifth. This reliance on non-Scottish outlets reflects the relatively small domestic market, which is constrained by both the absolute size of the human population and by low per capita consumption of lamb (discussed further below).

Table 2 Estimated market destinations (by value) for Scottish abattoir sheepmeat

	Scotland		Rest of UK		Beyond UK	
	£m	%	£m	%	£m	%
2013	14.5	10.0	96	65.5	35.5	24.5
2014	18.0	12.0	94.0	63.0	37.0	25.0
2015	17.0	12.5	84.5	62.0	34.5	25.5
2016	10.5	9.0	75.0	65.0	30.5	26.0
2017	23.0	18.0	74.0	56.0	34.0	26.0

Source: QMS (various) – The Scottish Red Meat Industry Profile

3.2 It is important to recognise that sheepmeat is not a homogenous product, and that utilising the whole carcass (“carcass balance”) typically requires serving multiple markets with different products. For example, UK consumers purchasing through supermarkets have a preference for legs and chops. Moreover, variable demand and supply across the year means that the UK can be a net exporter at some times and a net importer at others.

3.3 The configuration of specific supply-chains is complex and varies across different processors, but supermarkets dominate Scottish market outlets, with retail wholesalers accounting for almost all other sales (Table 3). Within this, different Scottish processors have relationships with different supermarkets as detailed in section 2.4.2.

Table 3 Estimated market outlet shares Scottish abattoir sheepmeat

	Multiple retailers	Independent retailers	Retail wholesalers	Food manufacturers	Food Service/Catering
2013	62.7%	0.7%	29.9%	3.3%	3.3%
2014	61.3%	0.7%	30.7%	3.6%	3.6%
2015	63.6%	1.1%	29.0%	3.0%	3.3%
2016	60.0%	2.0%	32.0%	3.0%	3.0%
2017	62.9%	2.0%	34.9%	0.1%	0.1%

Data Source: Based on QMS (various) – The Scottish Red Meat Industry Profile. Adjusted in consultation with QMS to account for methodological changes

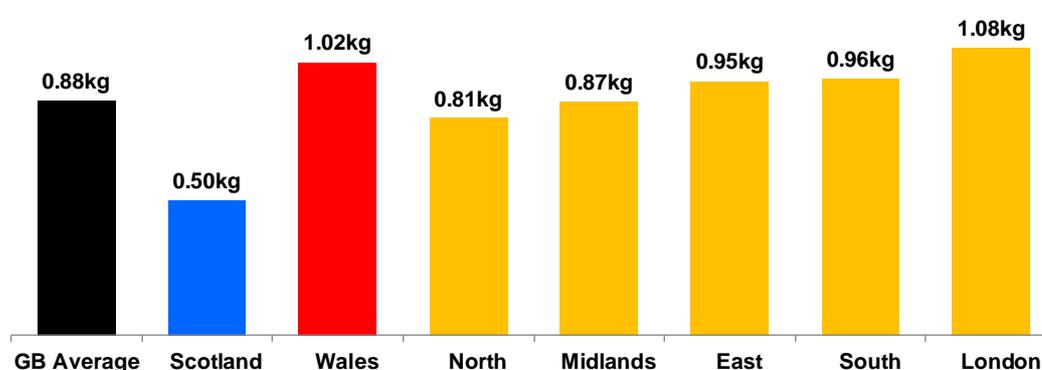
3.4 The long-term trend in sheepmeat consumption within Scotland and the UK is downwards, reflecting changing consumer preferences. For example, a shift towards poultry and ready-to-eat meals, but also reductions in overall meat demand and increasing interest in food provenance. These changes reflect a variety of factors, including changing demographics and incomes but also the evolution of relative prices for different meats.

3.5 For example, lamb is typically more popular with older consumers but also certain ethnic groups, and demand is often uneven through the year due to the timing of (religious) festivals. Importantly, these factors vary geographically, reflecting regional (and international) differences in demographics, cultures and incomes. The following sections explore these factors for different markets.

3.2 The home (Scottish) market

3.6 Relative to other parts of the UK, Scottish consumers eat considerably less lamb per head than consumers elsewhere (Figure 9): Scots have traditionally eaten more beef. Combined with a small human population, this constrains overall domestic demand and explains why markets beyond Scotland are important.

Figure 9 Annual average per capita purchases (kg) of lamb²⁹ by GB region - 2017



Source: Own elaboration based on Kantar Worldpanel data

²⁹ NB. only relates to fresh or frozen lamb purchased for home-cooking purposes

3.7 Perhaps intuitively, Scotch Lamb has a higher penetration in Scotland than the rest of GB. However, lamb with Scottish labelling still only accounts for 22% of overall sales for home cooking in Scotland compared with 48% being sourced from the Rest of the UK and 17% from New Zealand.

3.8 Sales of mutton within Scotland are negligible, reflecting both the demise of traditional mutton consumers but also the relatively low density of ethnic groups with greater preferences for mutton. At the last census, just 4% of the Scottish population defined themselves³⁰ as Asian, African, Caribbean or Black compared to 12% in England and Wales³¹. Although halal sheepmeat is available in Scotland, most Scottish cull sheep are slaughtered closer to more densely concentrated ethnic populations in England (but some of this product may subsequently be moved back to Scotland).

3.9 The dominance of supermarket and other retailers in domestic sales implies that relatively little sheepmeat from Scottish abattoirs is destined for food processing or catering purposes. Unfortunately, data on consumption of sheepmeat in meals prepared outwith the home is less readily available than for home cooking purposes – typically, different meats are not reported separately.

3.10 If per capita consumption patterns follow those for home cooking, processed and food-service demand may add perhaps a further 0.8kg to 1.1kg per head to give total per capita lamb consumption in Scotland of 1.3kg to 1.6kg. Aggregated across the Scottish population, this implies total domestic demand of about 6,800 tonnes to 8,500 tonnes of consumed meat, or approximately 9,000 to 11,350 tonnes CWE.³²

3.11 Estimated lamb consumption in Scotland is thus higher than the volume of sheepmeat produced in Scotland and sold in Scotland, implying some scope to increase home consumption of Scottish-produced sheepmeat. However, evidence suggests that food processing and food-service are highly price-sensitive and, with a few exceptions for high-end products, country of origin is relatively unimportant. This implies that higher returns may be more easily gained by targeting other markets.

3.12 Similarly, the research found that overall food-service lamb consumption in the public sector is low, at perhaps less than 50 tonnes per year. Hence, whilst promotion of domestically-sourced supplies within public sector procurement processes is often portrayed as important (indeed, recent efforts have boosted the

³⁰ <https://scotlandscensus.gov.uk/ethnicity-identity-language-and-religion>

³¹ <https://www.ethnicity-facts-figures.service.gov.uk/british-population/national-and-regional-populations/population-of-england-and-wales/latest>

³² These estimates follow discussions with AHDB and QMS. Available data on catering-consumption do not separate lamb from other meats, making it impossible to derive definitive estimates. This leads directly to the first recommendation made in this report (see later), to improve the measurement of lamb consumption.

share of Scottish lamb used within the Scottish public sector), other markets offer greater scope for increasing sales more dramatically.

3.3 The British market

3.13 At the UK level, total sheepmeat available for consumption is estimated to be around 300,000 tonnes CWE or around 225,000 tonnes as consumed.³³ Of this, over three-fifths is sourced from the UK but New Zealand accounts for over a fifth whilst less than 2% is of explicit Scottish origin – i.e. branded as Scotch Lamb (Figure 10).

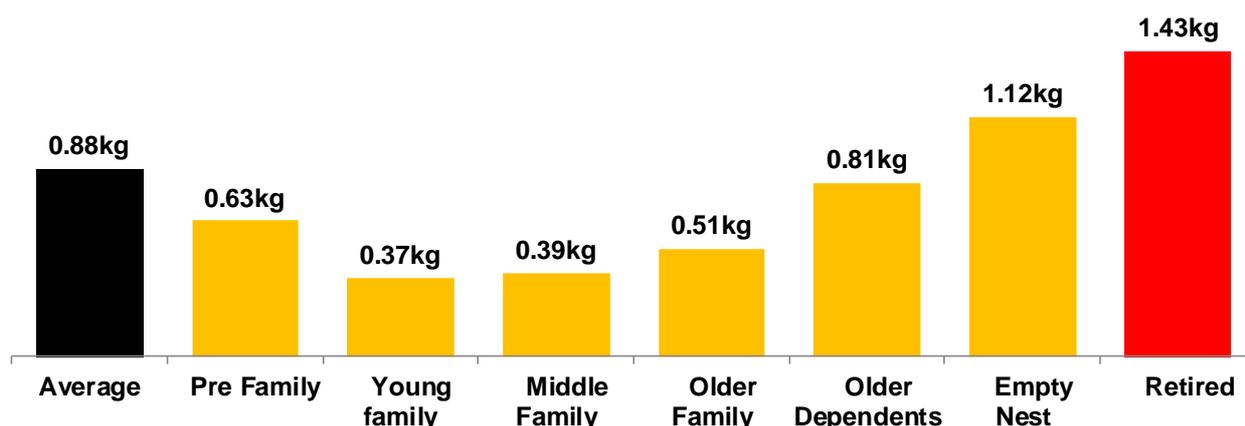
Figure 10 British lamb market by provenance



Source: Own elaboration based on Kantar Worldpanel data

3.14 Within this, there is some demographic variation in consumption patterns. For example, per capita consumption is notably higher for older groups (Figure 11) and some ethnic groups (Figure 12). The latter highlights the importance of the growing halal market.

Figure 11 Average per capita lamb consumption³⁴ (kg/year) by life stage

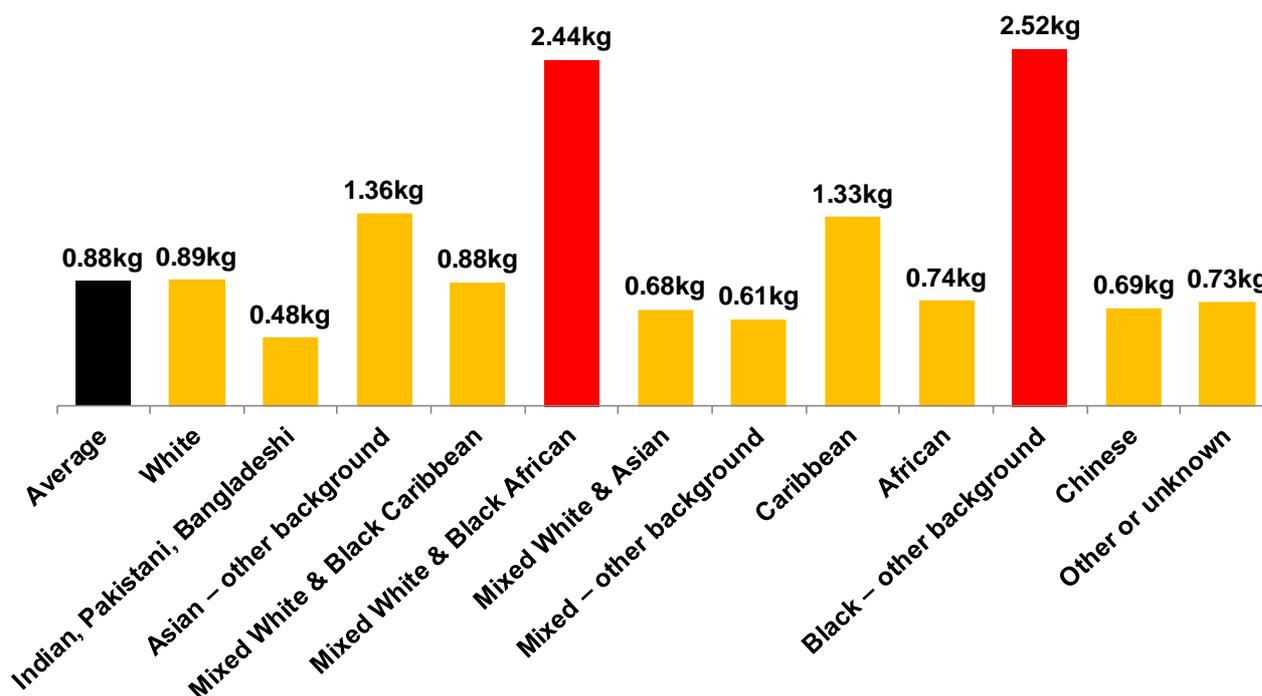


Source: Own elaboration based on Kantar Worldpanel data

³³ This conversion is approximate due to the presence of bones in some consumer products (e.g. chops) and adds to the difficulties in reconciling reported production and consumption totals.

³⁴ NB. only relates to fresh or frozen lamb purchased for home-cooking purposes

Figure 12 Average per capita lamb consumption³⁵ (kg/year) by ethnicity

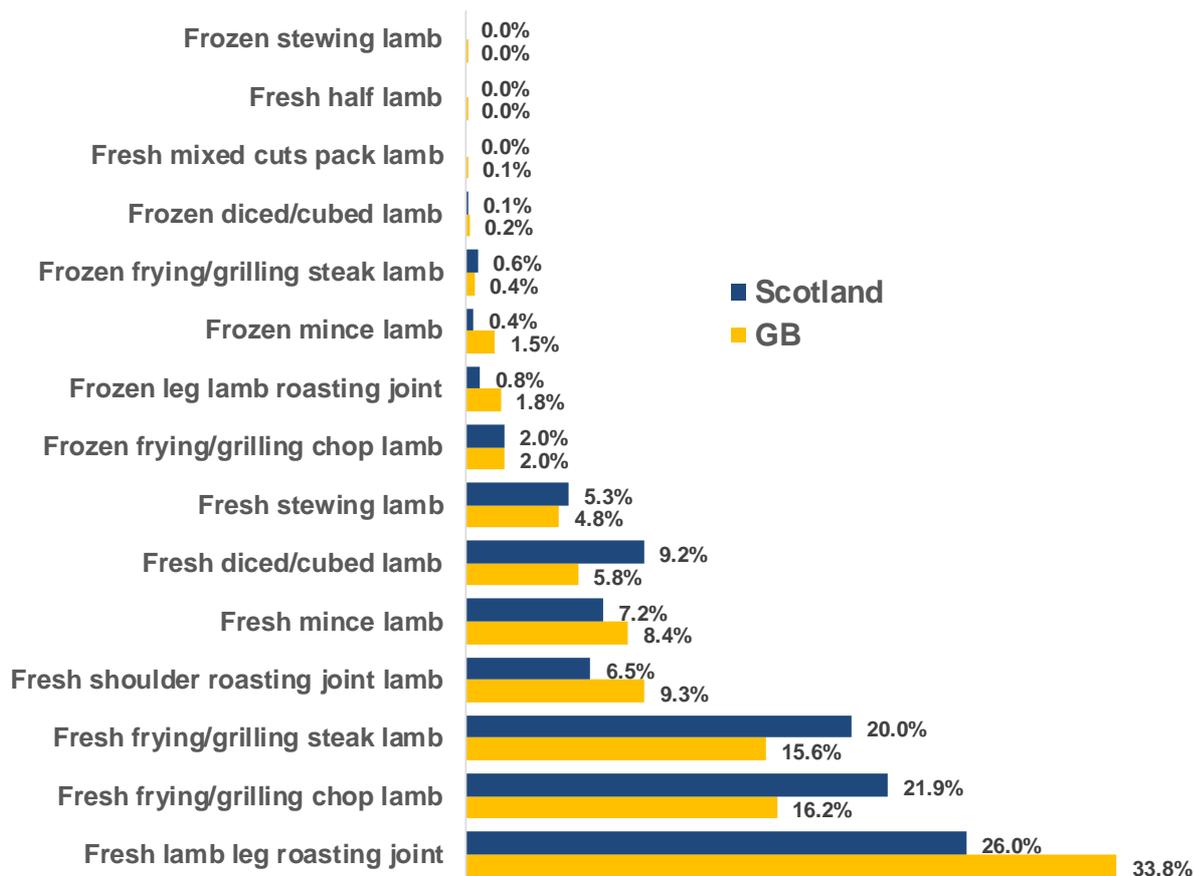


Source: Own elaboration based on Kantar Worldpanel data

3.15 Moreover, aggregate consumption figures mask the specific cuts of meat that are being consumed – which matters to processors having to balance overall utilisation of carcasses and find outlets for less popular cuts. Figure 13 shows the relative proportions (by value) of different cuts of fresh and frozen lamb purchased for home consumption. This reiterates that frozen lamb sales are minimal, with a preference for fresh cuts. Over a third of the GB lamb purchases for home consumption were for legs (26% in Scotland) with lamb chops (16%) and lamb steaks the next most common lamb purchase. In Scotland lamb chops (22%) and lamb steaks (20%) were a larger share of the market than for GB as a whole.

³⁵ NB. only relates to fresh or frozen lamb purchased for home-cooking purposes

Figure 13 GB vs. Scotland consumption shares of fresh & frozen lamb cuts



Source: Own elaboration based on Kantar Worldpanel data

3.16 Further analysis reveals that whilst Scotch Lamb accounts for 30% of Scottish household purchases of lamb chops/steaks it only accounts for 20% of fresh lamb leg purchases, with legs from the rest of the UK accounting for 48% of purchases and New Zealand legs (24%) having a larger share of the Scottish market than ‘Scotch’ (see Table 4). Furthermore the data illustrates the weak penetration that ‘Scotch Lamb’ has in the wider GB market.

Table 4 Origin of key lamb purchases in Scotland and GB, 2017

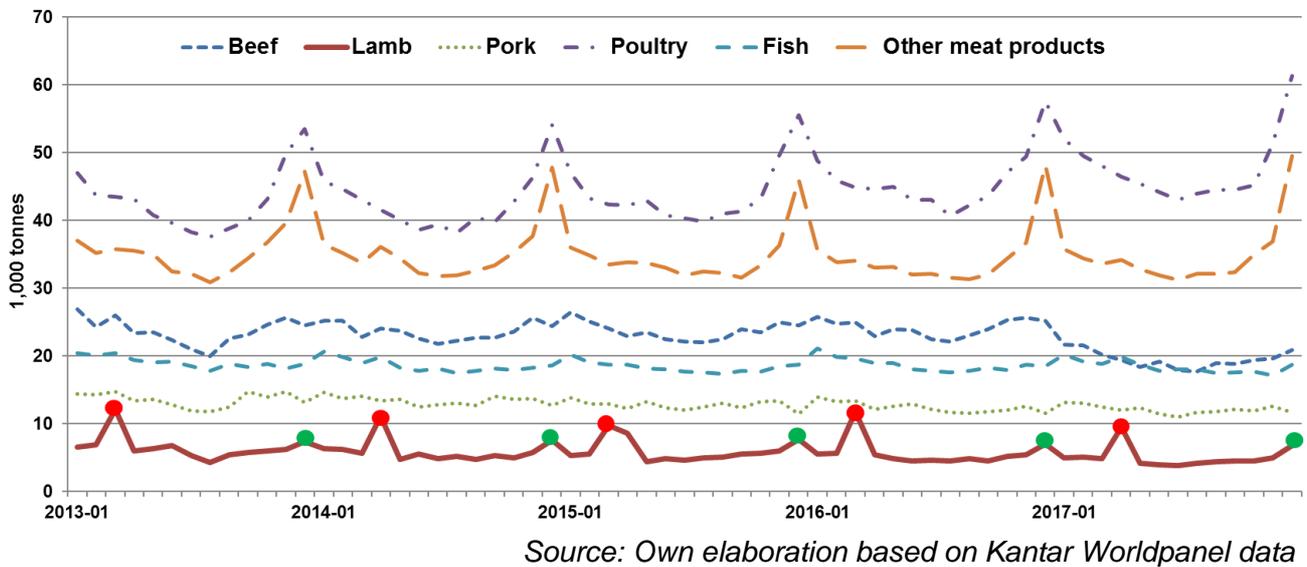
Origin of Product	Fresh frying/grilling chop or steak		Fresh leg or shoulder roasting joint	
	Scottish Market	GB Market	Scottish Market	GB Market
'Scotch'	30%	3%	20%	1%
Rest of UK	50%	72%	48%	63%
New Zealand	15%	20%	24%	26%
Other origin	6%	4%	8%	9%

Source: Own elaboration based on Kantar Worldpanel data

3.17 Figure 14 reveals that demand for lamb varies throughout the year, with a significant spike at Easter and a smaller spike in the New Year (the latter is much more pronounced for poultry and other meat products). Although not visible in the aggregate data, spikes also occur in the growing halal market segment to correspond with festivals marking the end of Ramadan (Eid al-Fitr) and during Eid

al-Adha, with the timing of both changing year-on-year. Figure 14 also highlights the relatively small share of overall meat demand (c.5%) accounted for by lamb.

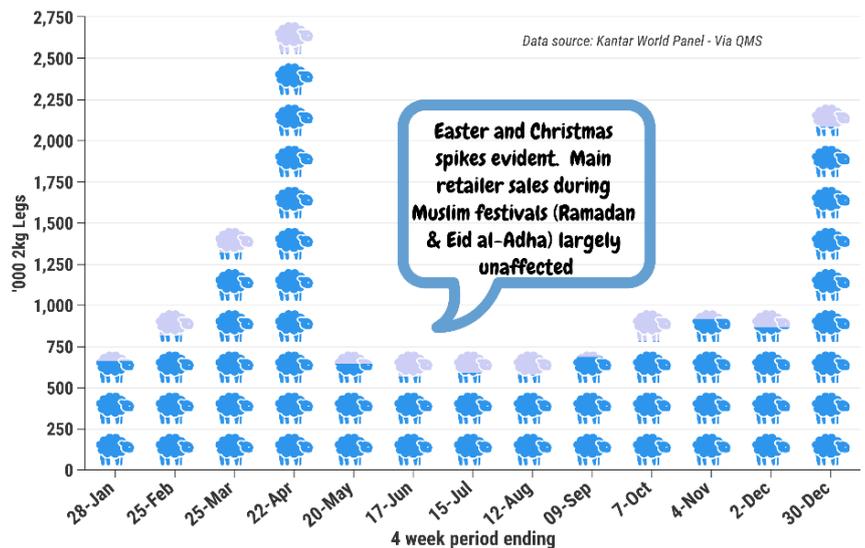
Figure 14 GB Meat expenditure shares



3.18 As with Scotland, figures on UK consumption via processed products or food-service are not readily available. However, if c.225,000t are consumed overall this implies total per capita consumption of around 3.3kg, and hence processing and food-service will account for approximately 2.4kg per head (approximately 3.2kg CWE).

Figure 15 Retail sales of 2kg legs of lamb in 4 week periods, 2018

3.19 Whilst Figure 14 demonstrates the seasonal peaks of sheepmeat demand it does not illustrate the importance that demand for legs of lamb play in these spikes. Estimates for the number of legs of lamb sold through supermarkets in a four week period (Figure 15) reveals the significant demand for legs of lamb during the Christian festival spikes of Easter and Christmas. This leads to a requirement for processors to find outlets for the remainder of carcasse (carcasse balancing) or for legs to be sourced from imports. It should be noted that Figure 15 fails to show increased lamb demand during Muslim festivals due to purchases generally being made through different retail outlets and preference for different cuts of lamb and mutton.



Source: Own elaboration based on Kantar Worldpanel data

3.20 The influence of prices and incomes on consumption can be estimated through elasticities, a measure of the responsiveness of demand to changes in prices or incomes. Analysis of Kantar World Panel data (see Appendix 3 for full table of elasticities) highlights that lamb demand is particularly sensitive to changes in its own price, much more so than other meats. For example:

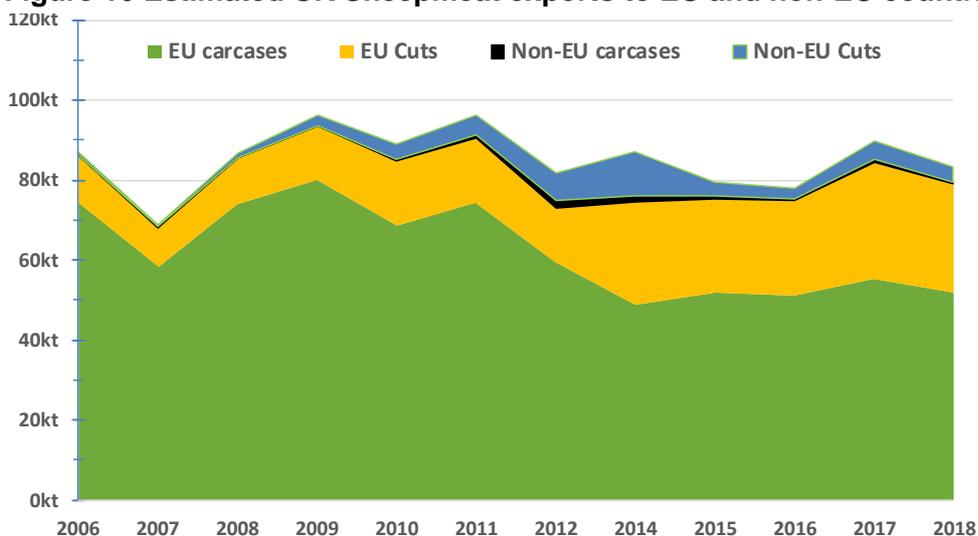
- **Lamb is the most sensitive meat to its own price:** a 10% rise in the price of beef would cause demand for beef to contract by 1.7%, but a 10% rise in the price of lamb would cause a 34.7% fall in lamb demand.
- **Lamb demand is impacted by price of other meats:** a 10% increase (fall) in beef prices would lead to 21% more (less) lamb consumption whereas a 10% increase (fall) in the price of lamb only increases (decreases) beef demand by 6%.
- **Demand for lamb is more sensitive to household incomes than other meats:** a 10% increase in income would (on average) lead to 15.2% more expenditure on lamb, whereas a 10% income rise would only increase expenditure on pork by 4.5%.

3.21 These elasticities suggest that price promotions and/or longer-term price reductions could stimulate demand, although it should be noted that higher lamb demand would lead to lower demand for other meats, including beef. As lamb demand is also responsive to income changes, it implies that rising incomes for Muslim consumers may contribute to growth in the halal market segment.³⁶

3.4 The Global Market

3.22 The vast majority of the UK's sheepmeat exports have consistently been to the EU (Figure 16), although there have been some exports to non-EU countries.

Figure 16 Estimated UK Sheepmeat exports to EU and non-EU countries



Source: AHDB UK sheep meat trade³⁷

³⁶ AHDB are due to release a report on the UK halal market later in 2019.

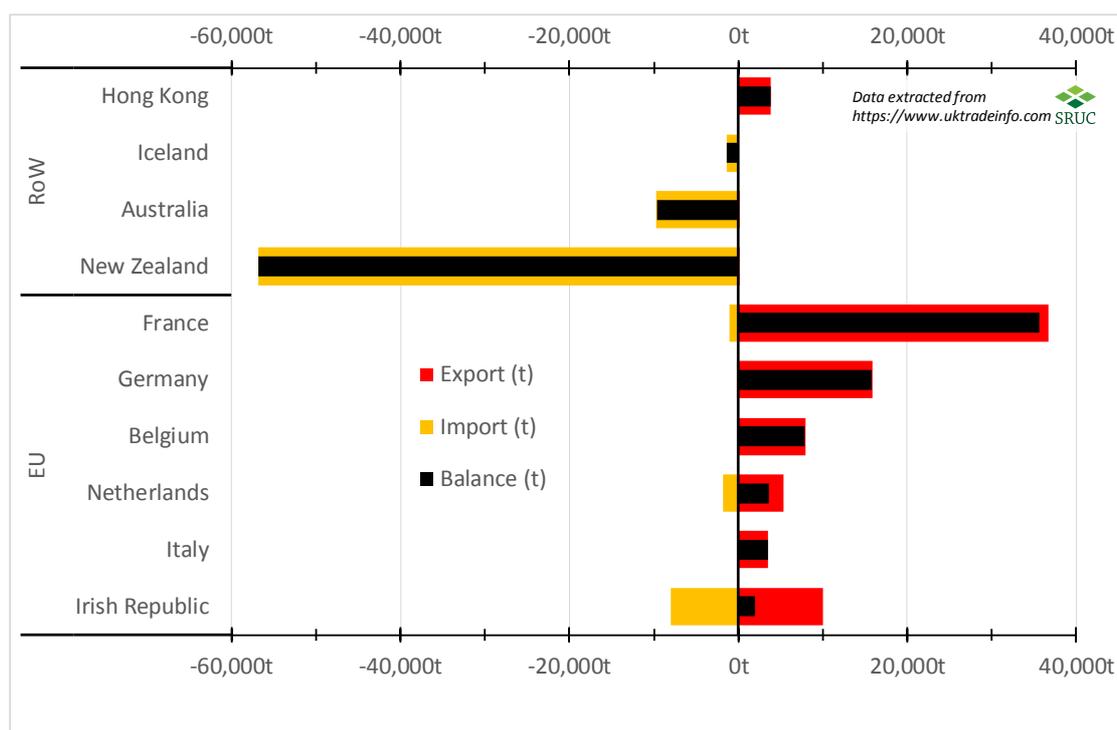
³⁷ Available at: <http://beefandlamb.ahdb.org.uk/wp-content/uploads/2019/07/UK-Lamb-Trade-May-2019.xlsx> Summary data are provided in Appendix 4.

3.23 Figure 17 shows the UK's main sheepmeat trade partners by volume of product whilst Figure 18 shows the value of that product³⁸ (see Appendix 5 for underlying data). In 2018, six countries (France, Germany, Ireland, Italy, Belgium and the Netherlands) accounted for 97% of the UK's exports destined for the EU and 90% of the UK's minimal sheepmeat imports from the EU. In 2018 non-EU countries (RoW³⁹) countries (New Zealand, Australia, Iceland and Hong Kong) accounted for 98% of the UK's imports from non-EU trade partners and 68% of UK exports beyond the EU.

3.24 Most of the UK's sheepmeat imports are tariff free and Figure 17 and 18 reiterate the reliance on New Zealand and Australia for sheepmeat imports. This is reflective of the generous tariff free quota (maximum volume of tariff free market access) bilaterally afforded to these countries.

3.25 The main RoW export market is Hong Kong that is dwarfed by the UK's EU export markets. In 2018 the principle EU markets were France, Germany and Belgium. The UK imports a small amount of sheepmeat from the EU, principally the Republic of Ireland, although that is more than balanced-out by UK exports there.

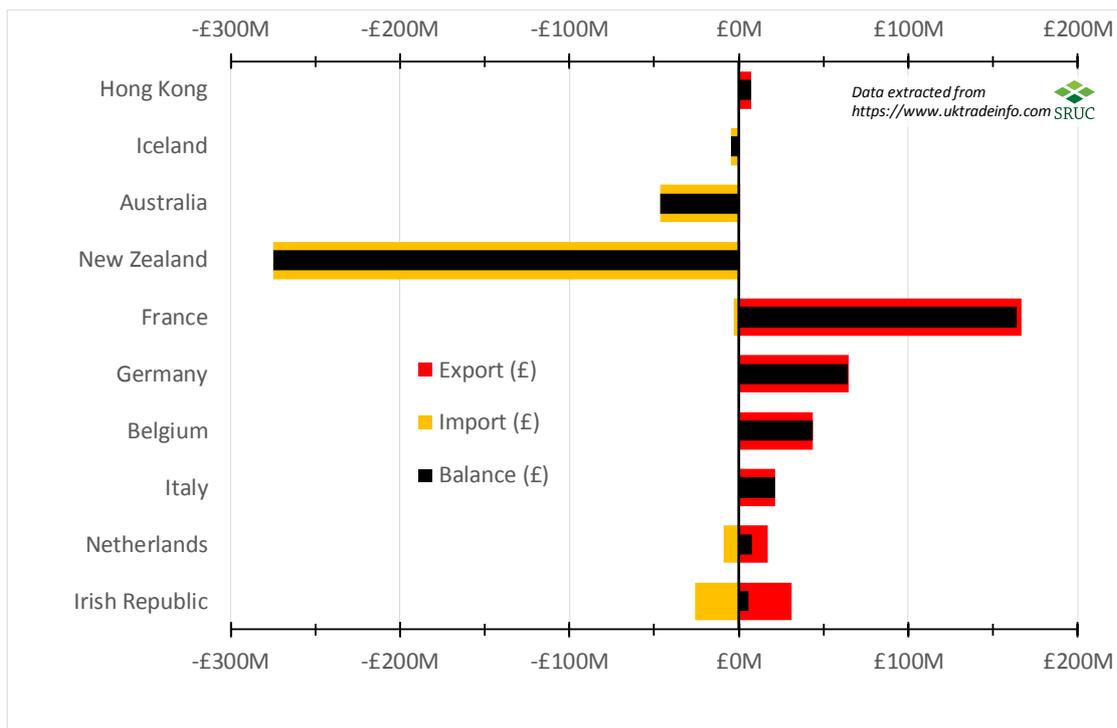
Figure 17 UK sheep meat trade (2018) main import and export markets by mass of product



³⁸ Based on HMRC Trade Statistics (<https://www.uktradeinfo.com>)

³⁹ Rest of the World

Figure 18 UK sheep meat trade (2018) main import and export markets by product value



3.26 Within the UK's sheepmeat trade, EU trade is approximately two-thirds carcasses versus one-third cuts, with the latter typically comprising items required to balance UK preferences for (especially) legs. Exports beyond the EU are almost entirely of cuts, again often as a result of carcass-balancing but typically achieving a relatively low price.

3.27 The trade data illustrates a very important point about the balance of sheepmeat product imported to the UK and what we export. It is clear that imports are made up of legs of lambs and other processed cuts, whilst exports are significantly dominated by half or whole carcasses of lamb and mutton.

3.28 Figure 19 shows imports and exports (and the net balance – *black bar*) of different sheepmeat products (see Appendix 5 for underlying data). The red bars indicate how the UK's EU exports are dominated by relatively unprocessed fresh/chilled lamb carcasses and half carcasses and fresh mutton carcasses and half carcasses. This contrasts with UK imports which are largely made up of fresh and frozen legs of lamb and other processed cuts.

Figure 19 UK sheepmeat trade (2018) by product type and mass

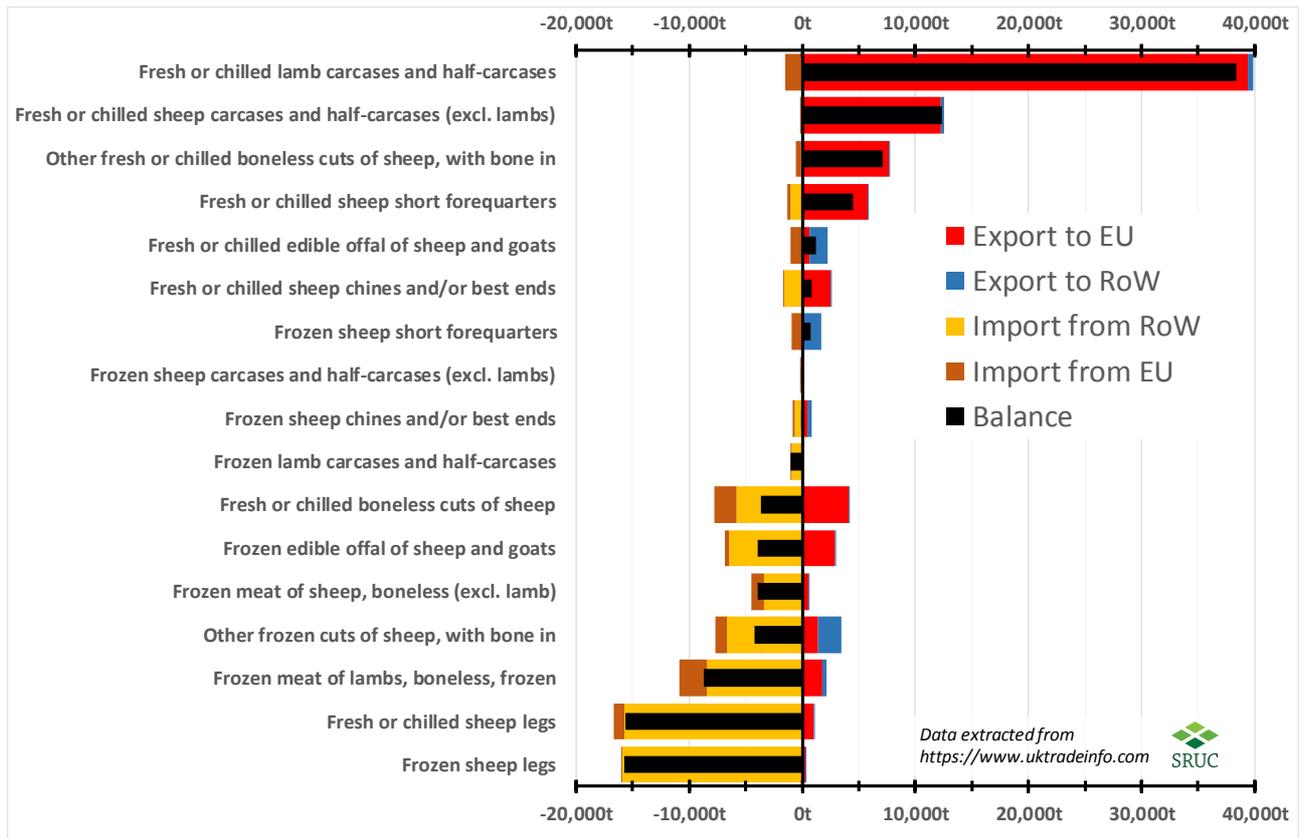
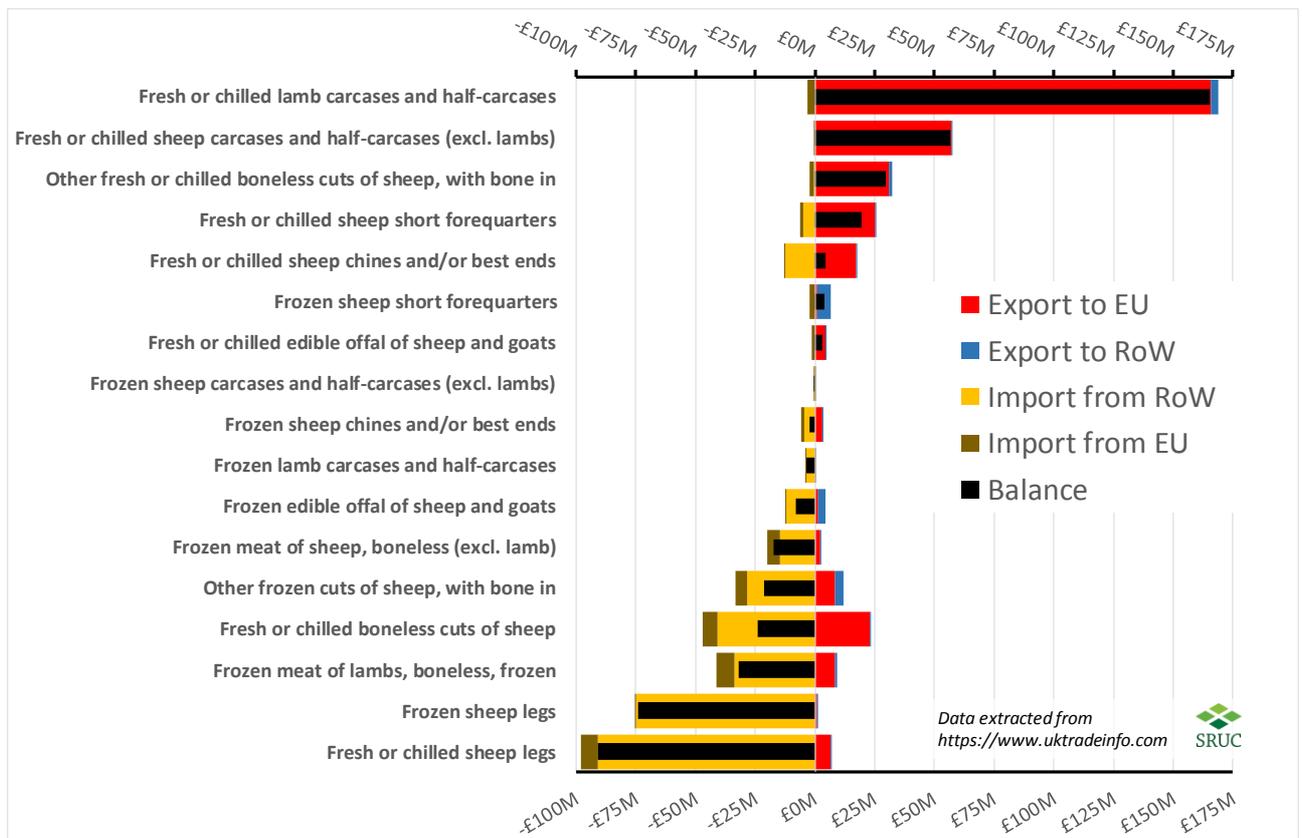
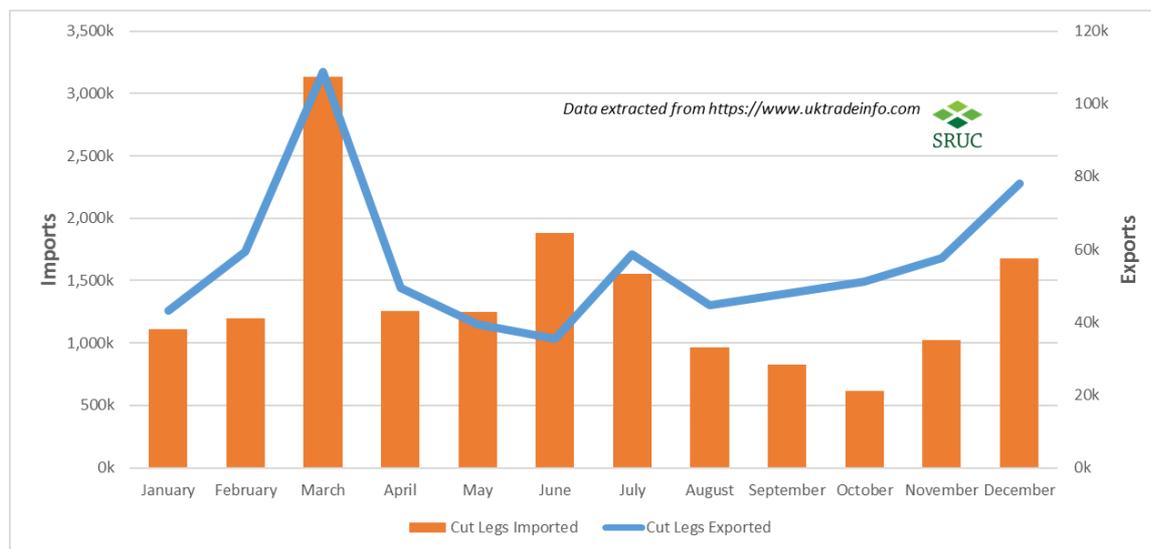


Figure 20 UK sheepmeat trade (2018) by product type and value



3.29 Despite the mass and value of the UK’s sheepmeat imports and exports being very similar – it is not as straight forward as some may think for the UK to satiate its own internal consumer demand. A simple illustration can be made for legs of lamb/mutton. Figure 21 shows the seasonal peaks (Easter, Ramadan, Eid al-Adha and Christmas) of demand for cut legs of lamb (both imports and exports) of cut legs of lamb/mutton. Whilst these follow similar patterns export volumes (1.3kt) are a fraction of imports (33kt) in 2018.

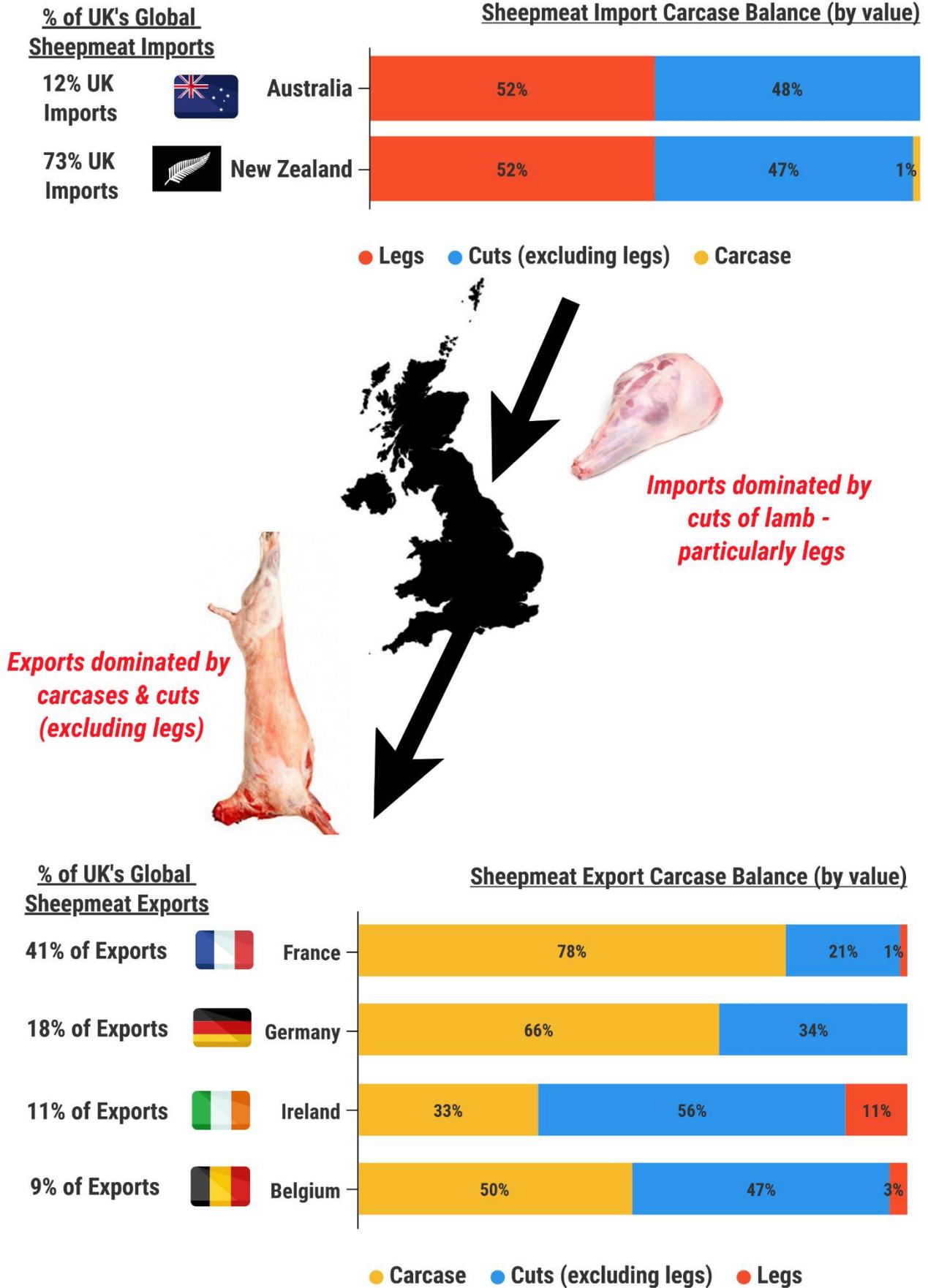
Figure 21 UK trade in legs of lamb/mutton 2018



3.30 Using a 2.5kg average weight for a leg of lamb and a 20kg average carcass (2 legs) weight it was estimated that the UK imported in the region of 13.3 million legs of lamb/mutton (mainly processed cuts) and exported in the region of 6.3 million legs of lamb/mutton (mainly on carcasses) – a net import requirement of around 7 million legs or 3.5 million sheep. It is difficult to see how this demand can be satiated from the internal market given the seasonality of demand compared to production and the significant issue of what processors would do with the remainder of the carcass (carcass balancing).

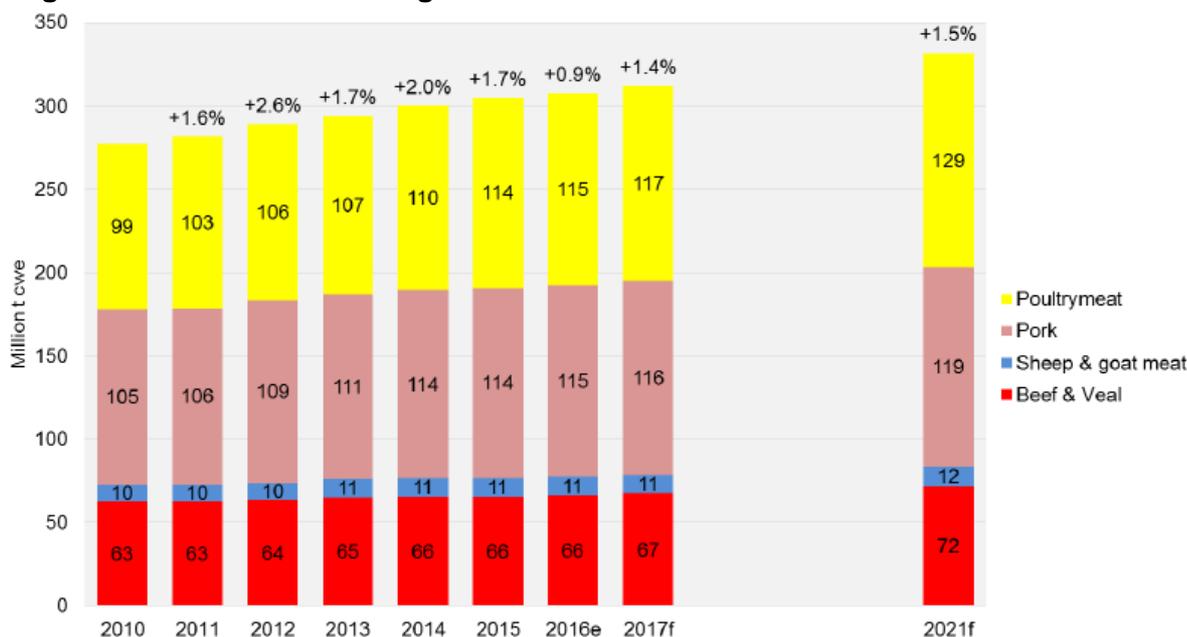
3.31 The key import and export trade relations, with details of the type of lamb products imported and exported are summarised in Figure 22, highlighting that what the UK exports and imports are not equivalent products.

Figure 22 UK sheepmeat trade summary



3.32 As in the UK, sheepmeat accounts for a relatively low share of overall global meat consumption and this is forecast to remain the case even as overall global demand increases (Figure 23).

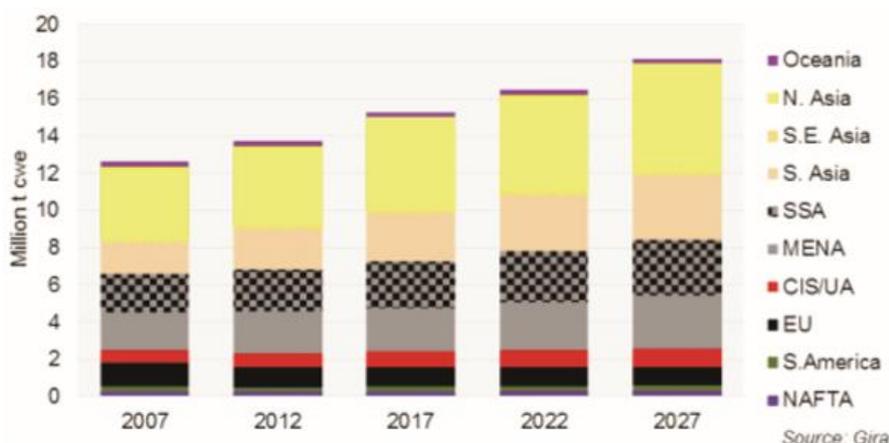
Figure 23 Past and Forecast global meat demand



(Source: Brown, 2017)

3.33 Moreover, the modest increase in overall sheepmeat consumption is unevenly distributed (Figure 24), with demand effectively flat in Europe and the Americas (which suggests little to be gained from any future trade deal with the USA) but increasing in Asia, Africa and the Middle East (highlighting, again, the importance of the growing halal market segment).

Figure 24 Past and Forecast Global Sheepmeat Demand



Source: Gira reported in LMC (2018)

3.34 Some parts of the EU are already exporting to these new markets. For example, Spain to the Middle East and North Africa (MENA). However, Australia and New Zealand also compete for these markets and almost totally dominate Asian markets (e.g. 32% and 67% respectively of Chinese imports of sheepmeat in

2017) meaning that there will be stiff competition for any Scottish processors seeking to enter them.

3.5 Implications of Brexit

3.35 Both directly through sales of whole carcasses and indirectly through the facilitation of carcass-balancing, the UK's exports of sheepmeat contribute to maintaining domestic prices. The heavy reliance on wider UK markets, and challenges inherent in expanding exports to the rest of the world, mean that Scottish sheep farmers and processors are significantly exposed to Brexit-related risks of trade disruption. These may take the form of import tariffs and/or non-tariff barriers imposed by the EU, and could severely depress domestic prices and threaten viability of the entire supply-chain.

3.36 The UK's decision to withdraw from the EU has significant risks for the UK sheep farming and processing sectors. Whilst future supplies may be affected by long term changes in agricultural support, the most immediate risk comes from EU tariff barriers if there is a no-deal Brexit. In such an instance the UK would leave the single market and customs union and would immediately revert to World Trade Organisation's Most Favoured Nation status.

3.37 EU sheepmeat tariffs work in two ways. Firstly, there is an *ad valorem*⁴⁰ tariff of 12.8% of product value. In addition, there is a fixed rate tariff that is expressed in Euros per volume of product – which range from €1.199 per Kg for *sheep short forequarters* to €3.118 per Kg for *boneless cuts of sheep*. Table 5 provides details of the full list of EU tariffs for each sheepmeat product. In addition it provides details of UK's 2018 EU export volume and value with an illustrative effective overall tariff rate⁴¹. It finally illustrates what the effective product price (and percentage reduction) would need to be in the UK for product to be delivered into EU at the average 2018 UK export price under a no-deal Brexit scenario where full EU tariffs were imposed.

3.38 Exchange rates effects can play a significant role in changing 'effective tariff rates' and no account is taken for potential changes in demand for UK lamb. Therefore, whilst this is not a forecast of future trade costs with the EU under a no-deal Brexit it illustrates the challenges that EU tariffs would bring to the Scottish (and wider UK) sheep export sector. Based on 2018 trade data:

- Overall the effective tariffs on sheepmeat would have been 48% of export value, ranging from 0% on offal to 68% for boneless cuts of mutton (note that tariffs are generally higher on more processed products)

⁴⁰ Proportional to product value

⁴¹ Using the 2018 average per kilogram value of sheepmeat cuts the 'effective tariff' is an implied overall tariff rate that expresses the value of total tariffs (ad valorem plus fixed rate tariffs) as a proportion of the 2018 average product value traded with the EU. It is dependent on the exchange rate due to the fixed rate tariff.

- On £356m of exports the tariff bill would have amounted to £171m.
- Overall if UK exports were to face tariffs and product was to be landed in the EU at the same delivered price as 2018 there would have needed to be a 51% price reduction in the UK for these export products (ranging from -67% for boneless mutton, -52% for fresh lamb carcasses / half carcasses, to -28% for frozen mutton carcasses/half carcasses).

3.39 The effect of these tariffs (should a no-deal Brexit occur) are plain to see – with ramifications for processors, farmers and crofters with a reliance on the EU market. Sheep prices in the UK would adjust downwards, with potentially a significant glut of lamb and mutton in the UK (some live export – to Ireland – may start-up as live animals have lower tariff rates), although reduced prices coupled with exchange rate effects may mitigate some of the negative tariff impacts. If consumer prices were to fall as a result then the UK may look unattractive to New Zealand and Australian exporters (this is why New Zealand and Australia do not agree with the EU/UK split of tariff rate quotas for sheepmeat as they know the EU market will look more attractive under a no deal Brexit). However, the UK consumer preference for legs of lamb would mean that a minimum of 7m legs of lamb would still need to be procured

Table 5 UK 2018 Sheepmeat Exports to EU and cost and impact of tariff barriers

Code	Product	2018 Exports			EU Tariff				If to be landed in EU at pre-tariff price	
		Value	Mass	Value/Kg	Ad Valorem	Fixed (€/100kg)	Tariff Cost	Effective Tariff	Price /Kg	Price Cut
All EU Exports		£356.39m	81,231t	£4.39	12.8%	€174.71	£171.15m	48%	£2.14	-51%
Fresh or Chilled										
02041000	Lamb carcasses and half-carcasses	£165.80m	39,426t	£4.21	12.8%	€171.30	£80.96m	49%	£2.01	-52%
02042100	Sheep carcasses and half-carcasses (excl. lambs)	£57.16m	12,270t	£4.66	12.8%	€171.30	£25.91m	45%	£2.41	-48%
02042210	Sheep short forequarters	£25.24m	5,818t	£4.34	12.8%	€119.90	£9.40m	37%	£2.64	-39%
02042230	Sheep chines and/or best ends	£17.41m	2,534t	£6.87	12.8%	€188.50	£6.45m	37%	£4.20	-39%
02042250	Sheep legs	£6.70m	1,041t	£6.43	12.8%	€222.70	£2.91m	43%	£3.47	-46%
02042290	Boneless cuts of sheep, with bone in (excl. carcasses and half-carcasses, short forequarters, chines and/or best ends, and legs)	£30.89m	7,641t	£4.04	12.8%	€222.70	£19.01m	62%	£1.35	-67%
02042300	Boneless cuts of sheep	£23.11m	4,094t	£5.64	12.8%	€311.80	£14.25m	62%	£1.88	-67%
02068099	Edible offal of sheep and goats	£4.40m	2,946t	£1.49	0.0%					0%
Frozen										
02043000	Lamb carcasses and half-carcasses	£0.04m	12t	£3.19	12.8%	€128.80	£0.02m	48%	£1.54	-52%
02044100	Sheep carcasses and half-carcasses (excl. lambs)	£0.10m	18t	£5.39	12.8%	€90.20	£0.03m	28%	£3.87	-28%
02044210	Sheep short forequarters	£0.75m	192t	£3.89	12.8%	€90.20	£0.25m	33%	£2.55	-35%
02044230	Sheep chines and/or best ends	£3.05m	486t	£6.28	12.8%	€141.70	£1.00m	33%	£4.15	-34%
02044250	Sheep legs	£0.99m	243t	£4.09	12.8%	€167.50	£0.49m	49%	£1.95	-52%
02044290	Cuts of sheep, with bone in (excl. carcasses and half-carcasses, short forequarters, chines and/or best ends, and legs)	£8.18m	1,412t	£5.80	12.8%	€167.50	£3.14m	38%	£3.46	-40%
02044310	Meat of lambs, boneless,	£8.79m	1,842t	£4.77	12.8%	€234.50	£4.95m	56%	£1.88	-61%
02044390	Meat of sheep, boneless (excl. lamb)	£2.44m	649t	£3.75	12.8%	€234.50	£1.66m	68%	£0.97	-74%
02069099	Edible offal of sheep and goats	£1.35m	606t	£2.22	0.0%					0%

Trade Data extracted from <https://www.uktradeinfo.com>

Exchange rate ONS average for 2018 <https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/timeseries/thap/mret>

4 Opportunities to grow sheep processing in Scotland

4.1 Drawing on the literature review and data analysis, but also more directly from the practitioner insights offered by industry and expert interviewees, this Chapter focuses on what can be done to increase the number of sheep processed in Scotland. This is addressed by:

- Going back to first principles to understand the economics of red meat processing. Specifically, the importance of building competitiveness through uniqueness.
- Identifying the markets to target based on market analysis plus stakeholder input.
- Sifting through the options available that could potentially be introduced or encouraged to improve the competitiveness of Scottish lamb processing and, by implication, lift the value of the sector to the Scottish economy.

4.1 Improving competitiveness

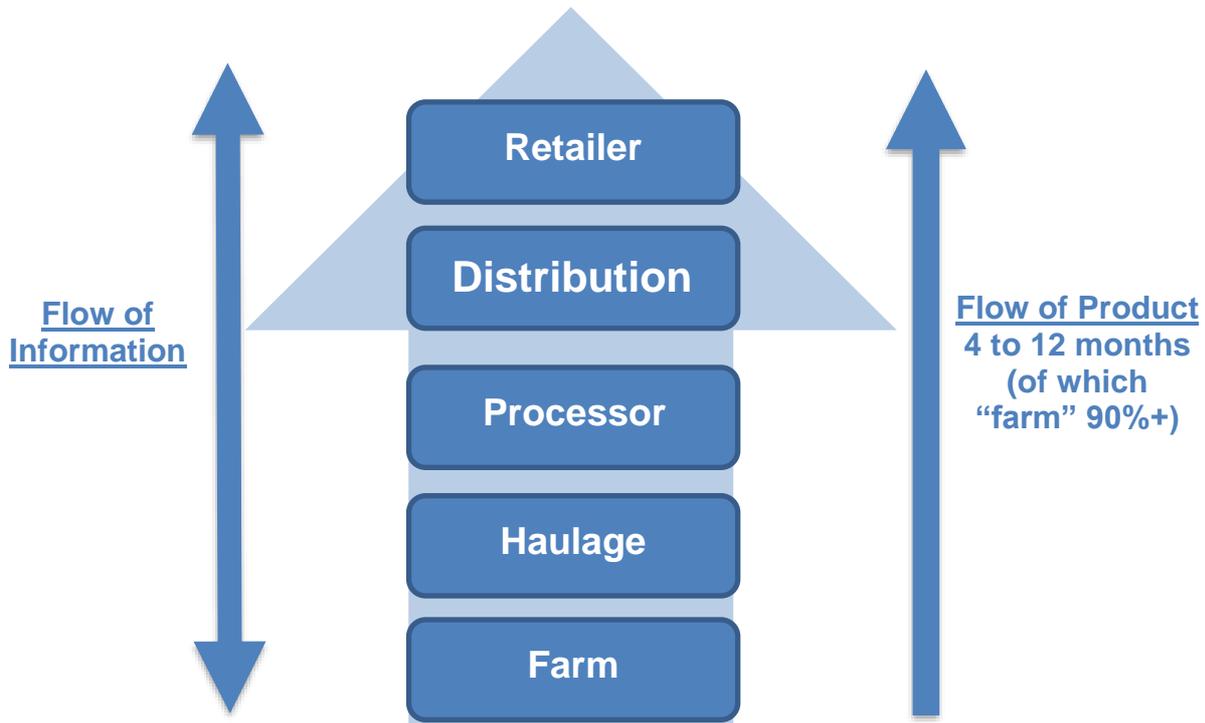
4.2 Historically, the red meat sector was horizontally structured in that producers sold animals at live markets where processors and butchers bought them largely “as seen”. The animals were then sent to the local slaughterhouse for killing and processing into carcasses. The carcasses were then transferred or sold onto butchers or wholesalers for disassembly into cuts for retailing. There was little formal linkage in the four to five stages between the farm and the fork. However, butchers would generally seek out stock at the markets from farmers based on previous positive experience.

4.3 As consumers switched to buying most of their meat from supermarkets in the 1980’s, or via the food service outlets like McDonalds, a new more vertically arranged model with less stages emerged in the meat sectors. In particular, slaughterhouses or abattoirs moved to buying more stock directly from producers and also processing it ultimately into the priced packs that are “shelf-ready”.

4.4 This change drove massive rationalisation of the meat industry with processing concentrating to exploit size economies. Today the UK meat industry is characterised by a small number of retailers and processors, but still a large number of primary producers.

4.5 In the past 40 years the meat industry has shifted from farmers competing with processors who in turn compete with retailers, to one where retailers seek to align with a processor who in turn draws on a broad hinterland of producers to provide a distinct value chain. So, for example the M&S lamb value chain (Scotbeef) competes against the Tesco lamb value chain (Kepak). Figure 25 captures the components of such lamb chains and highlights how information flows as well as product. It also notes that most of the time (usually 4 to 12 months) between birth and slaughter is spent on-farm.

Figure 25 Illustrative value chain for lamb



4.6 Critically, value chains are driven by what the consumer values and are likely to be most successful if they target precise demands of:

- a) Cost.
- b) Convenience.
- c) Taste.
- d) Method of production (provenance).

4.7 Griffith⁴², when discussing the Australian red meat industry, stressed that there is a trade-off between value-chains that focus on being responsive to customer needs and those that focus on supplying at the lowest possible cost. He offered the following checklists as which approach best fits strategically;

a) Price sensitive consumer

- i. More of them
- ii. Always a market – demand uncertainty lower
- iii. Minimal assurance standards
- iv. Little scope for rewards for quality
- v. Best strategic fit is low cost supply

b) Quality sensitive consumer

- i. Fewer of them
- ii. More risk – demand uncertainty higher
- iii. More exact assurance standards – higher cost

⁴² The economics of the red meat industry (2015). Griffith.

- iv. Greater scope for rewards for quality
- v. Best strategic fit is responsive to consumer needs

4.8 Porter's work (Magretta, 2012), upon which the concept of value-chains was developed, emphasises that the long-term success of an organisation is best served by competing to be unique rather than simply "being the best" of the bunch (on cost). Porter developed the five forces framework to help visualize the competition for profits at work in an industry. Table 9 below summarises a five forces analysis of the Scottish sheep processing industry.

4.9 Based on this analysis, some Scottish sheep processors do demonstrate value-chain thinking. Essentially all three major processors have strategically chosen not to compete in the opportunistic export trade or mutton market, preferring instead to lock into more predictable value-chains with the multiple retailers. For example:

- a) Scotbeef has value chains with M&S and Aldi, while sister firm Vivers has long running relationships with mid-sized retailers in France, Italy and Belgium.
- b) Kepak works closely with Tesco (including organic) and Costco.
- c) Woodheads is particularly interesting for it is completely integrated with its parent company Morrisons hence reducing its value chain to just two stages – retail/process and production.

4.10 However, owing to the collective strategy of the Scottish sheep industry to lock into predictability, its requirement for lambs is met by less than 50% of the potential Scottish lamb crop. That is, over half of Scottish lambs typically move through more opportunistic value-chains based in England and Wales.

4.11 Moreover, although relationships with retailers appear to be good, relationships with primary producers appear to be less so with a high degree of short-termism and a general absence of information sharing and trust.

Table 6– Five Forces Competitive Analysis for Scottish sheep industry

Bargaining power of suppliers	Reducing power of suppliers
<p><u>Negligible</u></p> <ul style="list-style-type: none"> - A large number of sheep farmers so effectively no one-to-one bargaining. - Lamb sales are a major part of most sheep farmers' total income limiting their bargaining power. Plus, once lambs are finished, they go overfat quite quickly so the option of retaining stock is limited. - Even procurement agents that supply large numbers of lambs to processors, do so on a fee basis rather than attempt to negotiate on price. Such agents extend from dealers, through mart companies to procurement co-ops that run under the Farm Stock (Scotland) Ltd umbrella. - Nevertheless, the farmgate lamb price is set by open market forces. At times where raw supply can't match demand then processors have no power to influence price in their favour. - Processors can have difficulties getting the specification of lambs they need (fat levels particularly important) because other processors with different customers can set the price grid more laxly. 	<p><u>Limited need at present</u></p> <ul style="list-style-type: none"> - Vivers also buys from England to maintain the specification/quality of lamb they need. - To maintain lamb availability in late season processors do have farmers they consistently work with, but it is not a formal relationship, more one of trust developed over years. - Even a soft Brexit may reduce export demand, further undermining suppliers bargaining position. - If lamb prices fall too far owing to Brexit, the Scottish breeding flock could contract sharply. Processors may then need to collaborate more with producers especially for early and late season lambs. Processors may look to encouraging specialist lamb finishing farms to cover lamb supply in these periods. Most beef processors already operate this approach to better organise cattle procurement via a select group of finishers they can work with.
Bargaining power of buyers	Reducing power of buyers
<p><u>Significant but constrained</u></p> <ul style="list-style-type: none"> - British supermarkets dominate the lamb marketing channel accounting for around half of the British lamb crop with a further third exported. - There are few supermarkets and there is intense competition between them on price. That the supermarkets make little margin on lamb might imply that they could improve their bargaining position by threatening to reduce the shelf space allocated to lamb. - However, shoppers expect supermarkets to stock lamb so they do. The sentiment from processors is that the supermarkets do not squeeze processors too hard on price, because they are aware of the low margins from lamb processing and the fact that there are now so few processors, meaning that switching, is more difficult. - Supermarkets do, as standard practice, periodically tender out their lamb contracts, so a processor's demand for lambs could be adversely affected if a contract is lost. - Morrisons is unique in that it has integrated back into processing to improve its value chain. - Export demand only directly affects Scotbeef/Vivers and is possibly more influenced by currency changes than the strength of the buyer. - Poor lamb pelt prices are more a consequence of low demand for wool products and tighter environmental laws in countries where pelts processed. 	<p><u>Limited scope or intent</u></p> <ul style="list-style-type: none"> - The relationship between processors and supermarkets is mature and reasonably stable. Further collaboration (including working closer with producer groups) to strengthen these ties, seems the most promising future development. - In theory, developing branded lamb products would increase processor power. But the retailers brand (e.g. M&S lamb) is the only branding pursued. - Putting more effort into developing volumes and value into the food service is an option. However, because of the carcass balance problem, meeting the supermarket demand for lamb and focusing more on beef appears Scottish processors' priority.

Threat of new entrants	Reducing threat of new entrants
<p><u>Negligible</u></p> <ul style="list-style-type: none"> - An unattractive sector to enter because of the low economic returns from lamb processing. Apart from Vivers, the other processors are more focused on beef. - It is difficult to foresee further major changes in Scottish lamb processing given that the recent takeover of 2 Sisters by Kepak has brought stability to the red meat processing sector. - A bad Brexit and a sustained drop in the farmgate lamb price over the medium term would result in a large drop in the Scottish and British breeding flocks, triggering further rationalisation of the lamb processing sector across Britain. 	<p><u>Not an issue</u></p>
Threat of substitutes	Reducing threat of substitutes
<p><u>Significant from other meats</u></p> <ul style="list-style-type: none"> - Lamb has become the most expensive meat generally available and consumption levels have fallen to very low levels partly as a result. Purchases of lamb have become very dependent on supermarket price discounting and a favourable exchange rate. - The generic Scotch Lamb brand is weak so often Scottish lambs are simply sold under the British lamb label. - Beef is a less risky meat for processors to work with (better meat yield, more manufacturing options, cheaper animal cost, etc.) further reducing the processing of lamb. 	<p><u>Some opportunities</u></p> <ul style="list-style-type: none"> - Cost of lamb set by open market forces so a bad Brexit could drop procurement cost sharply (especially in the glut period), though if allowed to play out would eventually lead to lower production and some stabilisation in the price of lambs. - There may be an opportunity to help farmers lower their cost of production through better technical performance (feeding, breeding, health management) and larger flocks (lower per unit labour, machinery and overhead usage). - Working with producers to help add value to lamb cuts (e.g. better meat yields, provenance). - While limited scope to develop standalone brands, there should be opportunity to help retailers develop their own label brands (e.g. Tesco, M&S). - Better supply chain collaboration to achieve efficiencies (e.g. data sharing, volume contracts, haulage / fuel savings).
Rivalry among competitors	Reducing threat of rivals
<p><u>Significant</u></p> <ul style="list-style-type: none"> - Within Britain lamb processing dominated by three Irish owned processors of which only Kepak kills lambs in Scotland. Because of their size (and probable debt levels) allied to the high fixed cost structure of processing, these companies must compete hard for lambs to reduce unit costs. - New Zealand lamb processors also offer stiff competition as effectively NZ lamb competes on an equal footing given that imports are well within the current Tariff Rate Quota. - Scotbeef (including Vivers) is particularly vulnerable given its size and despite being debt free. 	<p><u>Mitigation strategies evident</u></p> <ul style="list-style-type: none"> - Scotbeef avoids the opportunistic export market. Indeed, it mitigates the impact of New Zealand competition by actually cutting and packing NZ product to serve key customer M&S. Likewise, to service M&S' requirement for home produced lamb, it subcontracts part of the kill to an abattoir south of the border. - Though Vivers is a significant exporter in terms of its turnover, it focuses on servicing customers with which it has established a strong reputation for delivering quality lamb. - Woodheads is part of Morrisons so benefits from vertical integration.

4.12 A good example of putting supply chain thinking into practice in the red meat industry is provided by Silver Fern Farms. The New Zealand processor started a major seven year Primary Growth Partnership project with the New Zealand

government in 2010. An overview of the Farm^{IQ} project that aimed to create a demand driven integrated value chain can be found in Appendix 6.

4.2 Prioritising markets

4.13 As reported in Chapter 3, sheepmeat consumption in the UK is in long-term decline, reflecting a shift in consumer preferences towards (in particular) chicken and to more processed and food service products. Within this, there are regional and demographic variations – most notably very low per capita consumption in Scotland and a growing halal market segment in the UK, EU and globally.

4.14 Internationally, overall meat demand is forecast to grow and, although a minor component of this, so too is demand for sheepmeat. Again, there are regional and demographic variations in this – most notably more rapid growth in parts of Asia, the Middle East and North Africa as both population numbers and income levels increase.

4.15 Most of the output from Scottish processors is already sold to the rest of the UK or within the EU, and given the small domestic market any significant increase in throughput will similarly have to be sold outwith Scotland.

4.16 However, different markets, even within a given country can vary in terms of consumer preferences and regulatory requirements. For example, halal consumers are not ethnically or culturally homogeneous and their preferences for particular types and qualities of meat⁴³ or slaughter methods are not uniform⁴⁴, and will change over time. Similarly, whereas fresh and frozen cuts for cooking in the home once dominated, food service consumption is now at least as important in many markets.

4.17 The global demand for halal sheepmeat is likely to continue to rise, and it's importance as a market for sheep meat continues to grow within the UK, Europe and globally. Phil Hadley of AHDB explained that "*the Muslim community, both in the UK and overseas, is growing at a faster rate than the population in general, therefore the relative importance of this market is only likely to increase*" adding that the Muslim population already account for approximately 20% of English sheepmeat consumption⁴⁵. Figure 26 shows the projected proportion of Muslims amongst European countries by 2050 – although under a no-deal Brexit more global halal markets may become increasingly attractive.

⁴³ For example: Muslims of north African and middle eastern origin tend to favour lamb, whilst those from Bangladesh, Pakistan and India tend to favour mutton. Therefore French and German Muslims have higher demand for lamb compared to the UK Muslim population where demand for mutton remains high (pers comm. Rizvan Khalid - Euro Quality Lamb - June 2019).

⁴⁴ One processor estimated that 15% of the UK halal market demanded non-stun product (pers comm. Rizvan Khalid - Euro Quality Lamb - June 2019)..

⁴⁵ <https://www.foodmanufacture.co.uk/Article/2017/03/15/Halal-food-is-a-bigger-market-for-the-UK-than-China>

Table 7 Scottish sheepmeat market opportunities (assuming a soft Brexit)

Markets	Priority	Current Product type	Comment
Scotland	Low	Predominately fresh legs, chops and steaks.	Lowest per capita consumption of sheepmeat within UK and relatively small population combine to limit size of Scottish market. Public sector procurement symbolically important but trivial in volume terms. Possibly some scope to displace non-Scottish lamb in food-service sector, but (with exception of high-end niche) very price-sensitive.
Rest GB - London	Medium	Predominately fresh legs, chops and streaks.	Per capita consumption of sheepmeat is higher elsewhere in the UK, notably in London, reflecting demographic and cultural differences (including the halal market). This, combined with larger population size, explains greater reliance on UK outwith Scotland. Scottish-branded sheepmeat currently has little market penetration, implying scope for improvement.
EU - France - Belgium - Germany - Med	Medium	UK exports split approximately 66:33 between carcasses and primal cuts, with Scottish exports believed to be in similar proportions.	France currently accounts for around half of all of UK sheepmeat exports, with Germany, Italy and Ireland (in that order) accounting for almost all other exports. Light lambs largely restricted to Mediterranean. Halal market underpins forecast modest overall growth in EU demand, and provides some future opportunities (subject to post-Brexit arrangements).
Non-EU - North America - N.Africa - Asia (China, India)	Low	UK exports beyond EU are currently small, but mainly comprise cuts rather than carcasses.	Forecast growth in demand for sheepmeat is concentrated in northern Africa, the Middle East and Asia (demand in EU and North America is forecast to be relatively flat). Recently announced access to India and Japan are welcome, but per capita consumption is often small and prices are often much lower than in EU. Moreover, such markets are currently dominated by supplies from Australia and New Zealand ⁴⁷ helped by preferential trade agreements (e.g, NZ-China FTA) and may be difficult to break-into. Three years of trying to access the Canadian market highlights the difficulties of realising gains even once market access has been granted.

⁴⁷ See <https://www.mla.com.au/prices-markets/market-news/archived/2018/chinas-sheep-cycle-driving-global-markets/> for China's import share.

4.3 Opportunities to improve competitiveness

4.3.1 Market R&D

4.20 Industry and stakeholder interviewees indicated that there is limited co-ordination between the processors and pan-industry bodies such as QMS and Scotland Food & Drink. By comparison, competitor countries, like Ireland and New Zealand, appear to put more focus and resource into co-ordinating market development. This is almost certainly driven by these countries recognising their position as being very export dependent owing to their small home markets. Co-ordination in developing export markets also appears to be greater in countries like the US and Canada (grains) and Denmark and the Netherlands (pigmeat).

4.21 The impression is that the whilst the Scottish beef industry is distinctly Scottish, and views all markets outwith Scotland as 'export' potential, no such distinction applies with the Scottish sheep industry. While this may be deemed understandable owing to the ease with which thinking switches to the British level, this lack of clarity may reduce the potential of Scotch Lamb in the important English, especially London, market.

4.22 All of the Scottish lamb processors have strong relationships with the UK supermarkets. As a result, processors will understandably be guided by the market research and development activities of these highly competitive firms who are well attuned to retail consumer needs.

4.23 However, this dependence on the supermarkets, plus the secondary status of lamb behind beef at the processors, means that there is little incentive to look at developing more niche markets in either the premium or cost-end of the food service sector. The market for public sector purchasing of lamb is so small and competition so strong from other cheaper, more versatile meats, that the big processors understandably avoid it.

4.24 The motivation by processors to look further at the potential of the halal market is also low. Kepak can satisfy this market from their plants south of the border. While Woodheads requirement for halal meat is met by another processor. Scotbeef and sister company Vivers' have sufficient halal certification for their current customer base.

4.25 While it was unfortunately not possible to speak directly with Vivers about their market R&D, the impression is that it is well honed and based on the personal touch. Vivers has been working with continental customers for decades and has developed a very successful export trade based on the strength of these relationships backed up by quality lamb (though not all sourced from Scotland). Kepak has indicated an intention to increase throughput at it recently-purchased plant at Portlethen, specifically targeting export markets (using contacts and knowledge from other parts of the wider Kepak organisation).

4.26 Given that it is the processors that have the actual product and the supply contracts, QMS cannot directly influence market development. Rather, it has to

work in partnership, exploring opportunities and facilitating contact between processors and new buyers. To this end, it undertakes a range of market development activities within the UK and abroad.

4.27 For example, international trade shows to promote Scotch lamb and discussions with foreign government officials and potential buyers to identify and address regulatory requirements (e.g. certification, labelling etc.). To pool resources and seek synergies with other Scotch sectors (e.g. beef, salmon, and whisky), these activities are often conducted alongside SFD. Similarly, some activities are undertaken in association with AHDB.

4.28 In addition, QMS seeks dialogue with Scottish processors and other parts of the supply-chain through regular and ad hoc meetings to identify market opportunities. However, there appears to be little interest across most processors to significantly increase production to satisfy new markets. This appears to reflect a degree of apparent contentment (if not complacency) with the relative security and stability of current supply contracts with supermarkets (both in the UK and abroad).

4.29 There are new market opportunities in the UK and abroad (and Brexit may already necessitate their development). However, different markets can have markedly different consumer preferences and regulatory requirements, meaning that exploiting them requires considerable and sustained effort – which Scottish processors may not be able and/or willing to expend (even with support from QMS and/or Government).

4.30 For example, processors may lack the confidence and capacity (skills and time) required to gather information on export markets and to establish necessary new contacts and contracts. Moreover, they may face difficulties in accessing capital to finance investments, and/or in recruiting appropriately skilled labour to increase production. Hence there appears to be little ambition amongst Scottish processors to seek new markets to absorb any additional production.

4.31 QMS will also be influenced by processors' desire to defend and grow markets for Scotch Beef, the flagship Scottish red meat product, and by a need to develop pigmeat markets. Moreover, uncertainties around Brexit are adding to processors' inertia: until future trade arrangements are known, there is little perceived merit in trying to pursue a particular market development strategy.

4.3.2 Product development

4.32 Lamb is not as versatile as other meats, especially chicken and beef, which limits the opportunities to manufacture lamb-based products. Essentially a lamb carcass comprises; (rear) legs, loins and shoulders and the meat yield is low relative to other species.

4.33 The main product demanded is legs either for roasting whole or halved, alternatively cut into leg steaks with the lamb shank sold separately. That leaves the processor having to find outlets for the loins and shoulders. Shoulders are more easily moved as they can be manufactured into rolled shoulders or diced. The loins will then go into chops with double loin chops coming from the rear end of

the loin and racks from the shoulder end. Lamb racks are popular especially with the restaurant trade. However, they are costly and time consuming to butcher and, critically, they account for only a very small part of the carcass. So, availability of racks is effectively set by the demand for legs and not vice versa.

4.34 Product development is also constrained by pricing. Lamb is expensive so whole legs, or packs of chops or leg steaks, have to meet price points acceptable to customers. Supermarket spec lambs largely fall within the 16-20kg cwe range. That means lower demand for light and heavy-weight lambs.

4.35 Butchers typically prefer a bigger carcass as they can add value through butchering into more novel, modern cuts. Unfortunately, butchers, especially in Scotland, typically sell less than two lambs per shop a week. Often, they will buy parts of a carcass from processors when the likes of legs are on promotion at supermarkets. Shoulders bought at a discount, for instance, can be butchered into profitable value-added products.

4.36 By comparison, owing to the small size of light lamb carcasses, there is little scope to butcher into value-added products. Similarly, there is little demand for mutton from gimmers or older sheep.

4.37 Farmgate lamb price volatility is a further major hurdle to processors investing substantially on developing added value lamb products. Such products must be price competitive with other meats. Not only are the farmgate prices of other species lower (per kg) than lamb, the price levels are more stable through the year. Hence, processors will naturally favour adding value to meats that they can more confidently budget. Critically, for Scottish processors, the cattle price is more stable and the manufacturing options far greater than lamb.

4.38 Yet there are notable examples of value-added lamb products produced by Scottish processors. For example, Scotbeef supplies lamb for M&S with a requirement from M&S to use the whole carcass. Hence, Scotbeef developed a high value lamb shoulder “cook in the bag” meal based on the sous-vide cooking technique.

4.39 Morrisons also harvests the full lamb carcass, using intensive butchering to yield valuable cuts like neck fillets. As a consequence, Woodheads lamb buying spec is a little heavier than the other supermarkets. The processor noted that a specific problem with lamb is that consumers do not like it cold, thereby meaning lamb has no presence in the deli counter. Importantly, Woodheads Turiff plant cuts and butchers most of the lambs killed at their sister plant in Lancashire, thereby bringing jobs to north-east Scotland.

4.40 Scotbeef also gains from cutting and packing work for M&S in that it processes M&S’ New Zealand lamb products. In terms of risk, and predictability, taking on such contracts makes more business sense than dealing with winter finished Scottish lambs that vary widely in quality and, often, price.

4.41 Although production is often reported in terms of number of animals or carcass weight, meat yield is actually the relevant metric. Increasing meat yield

would allow processors to consistently cut and pack products that attract consumers without incurring additional costs in sorting and trimming variable carcasses. While producers presenting lambs at the correct level of finish will minimise the excessive fat levels that put consumers off buying the likes of chops, using better genetics that give consistently good sized eye muscles should be an ongoing priority. Better exploitation of genetics is covered fully in section 4.3.6.

4.42 Equally, raising the demand for lamb through improved eating quality is also important. Lamb already displays some advantages over other meats in terms of consistency of eating quality, and building on its taste, succulence and tenderness may offer opportunities for offsetting its cost disadvantage. Again, more on how to improve this trait is detailed in section 4.3.6.

4.3.3 Pricing

4.43 The farmgate price of lamb is determined largely by lamb availability, which changes markedly through the year owing to the extreme seasonality of lambing. Consequently, even though the farmgate lamb price moves consistently between seasons, processors have to contend with a base product that has a seasonal range bigger than for other meats. Price volatility is at its worse in late winter/spring because of the low number of hogs and lambs available and the timing of religious holidays (e.g., Easter) that spike demand.

4.44 Lambs are also expensive largely as a consequence of their low meat yield. Table 8 illustrates that in September 2018 per kg of lean meat a lamb was around 20% more expensive than beef last autumn, a time when the farmgate price of lamb is at its lowest and cattle generally highest. The table also shows how the extraordinary high late winter prices last year hit the economics of lamb processing.

Table 8 Comparison of relative beef and sheep (2018) costs

	Steer Sept '18	Lamb Sept '18	Lamb Apr '18
Gross value (£)	£1,583	£73	£100
Slaughter weight (kg/wt)	700kg	44kg	46kg
Meat yield (%)	41%	24%	23%
Meat yield (kg)	287kg	10.6kg	10.6kg
Farmgate price of meat (p/kg)	551p	691p	943p

Own Calculations

4.45 On the other hand, processors' customers, specifically supermarkets, like to keep shelf prices stable apart from promotional periods when prices are heavily discounted. The supermarkets always run such campaigns at Christmas and Easter. Unfortunately, Easter falls in the spring, a time more suited to New Zealand than Scottish lamb production. The main supermarkets have also been competing

heavily on price in recent years owing to the growing influence of the deep discounters Aldi and Lidl.

4.46 There seems little chance of supermarkets moving away from this pricing policy. Certainly, there appears little pressure from processors for a change. Processors know well in advance about promotions so can plan accordingly, which helps them achieve carcass balance. Demand amplification⁴⁸ is no longer the problem it was 20 years ago, which is welcomed by processors.

4.47 Importantly, the supermarkets tend to fund these promotional periods themselves. Given the extremely high cost of lambs last Easter, the supermarkets would have been selling lamb at a significant loss. That means they look to regain margin when lambs are cheapest between July and December.

4.48 A further issue that would arise from lowering the retail price of lamb during the glut period is the impact it would have on demand for other meats (via cross-price elasticity). In short, such price moves would have knock on effects for other meat supply chains too, thereby creating scheduling problems.

4.49 Although Scottish processors might appear less exposed to the EU than elsewhere in Britain, they cannot escape the adverse impact of a hard Brexit. If punitive tariffs are applied, the farmgate lamb price is predicted to drop by around 40% to maintain current export levels. If the farmgate price did not fall to “clear the (export) market”, extra supply would collapse the price on the GB market. Whether this will lead to the development of a parallel market with lambs destined for the home market achieving markedly better farmgate prices than lambs sent for export, is moot.

4.50 Lamb demand is sensitive to price. Only where consumers put a higher value on traits like convenience, taste or provenance does price become secondary. For this reason, Beef and Lamb New Zealand has recently rebranded New Zealand lamb under a *Taste Pure Nature* banner and has targeted the “conscious foodies” of California with its first major promotional campaign⁴⁹.

4.51 Regarding the economics of pursuing superior eating quality, New Zealand processor Alliance has developed a number of branded lamb products that can extract premium returns from select market places. Particularly relevant is the Ashley brand that has been targeted at top restaurants in central London.

4.3.3 Promotion

4.52 Per capita consumption of lamb is lower in Scotland than in the rest of the UK. This reflects a long-standing domestic consumer preference for beef, with more

⁴⁸ The tendency in any multistage process for production orders received by each upstream process to be more erratic than actual production or sales at the next downstream process.

⁴⁹ NZ Farmers Weekly, 19/5/19 edition.

recent trends towards lower overall meat consumption and a switch towards chicken further depressing domestic lamb consumption.

4.53 Short-term promotional campaigns, either through price reductions and/or targeted awareness raising, may have some short-term impact but sustaining higher (or even just slowing the rate of decline in) domestic per capita consumption would require permanent shifts in consumer preferences – which is hard to achieve.

4.54 Efforts to increase the penetration of lamb in, for example, school menus as a way of combatting apparent demographic consumption trends are laudable but will be mitigated by other influences on consumption. Moreover, given regulatory constraints on nutritional composition, more lamb on school menus necessarily means less of other meats.

4.55 Ultimately, even a sustained increase in domestic per capita consumption would be unlikely to provide a significant additional outlet for Scottish producers. For example, raising domestic demand by 1,000t (against 24,000t of processed output) would require about a 9% increase in per capita consumption – which will be extremely challenging to realise. This highlights the importance of, whilst not neglecting the domestic market, targeting outlets which may be more responsive and rewarding.

4.56 Individual processing companies may engage in their own promotional activities, but more generic promotional campaigns have long been used for agricultural commodities and are a feature of competitor countries such as Eire and New Zealand. Typically, Country of Origin (CoO) features are emphasized, either targeting ex-pat or historical ties to the exporting country and/or particular production attributes such as animal welfare or environmental credentials.

4.57 However, evaluations of the effectiveness of promotional campaigns indicate that demonstrable effects are often difficult to discern amongst myriad other influences on consumption (e.g. incomes, demographics), and that interactions with other markets need to be considered (e.g. substitution effects between different meats). In addition, the distribution of gains is not necessarily uniform, despite all producers being typically subject to a levy to fund the campaign (Kinnucan, 1996; Crespi, 2003; Alston et al., 2001).

4.58 Nevertheless, although not apparently reported in relation to lamb in Scotland or indeed the UK, empirical studies of generic promotion in Australia and the USA suggest that it can have a sustained impact, but also that effectiveness is highly variable and context-specific (e.g. Piggott et al., 1995 & 1996; Beverland & Lindgreen, 2002; Ghosh & Williams, 2016; Williams et al., 2018).

4.59 This highlights the need for promotional efforts to be based around a sound understanding of target markets, evolving consumption patterns and interactions with new technologies in processing, packaging and delivery rather than simply budget availability, (e.g. Baron et al., 1971; Russel et al., 2005; Pethick et al., 2011; Font-i-Furnols et al., 2011; Bernués et al., 2012; de Andrade et al., 2016). This suggests a need for further research but also dissemination of existing insights into different markets.

4.60 Comparisons across different countries of levy rates and levy body expenditure on specific activities, such as lamb promotion, are hampered by a lack of detail and definitional differences in reported figures. Nevertheless, it appears rates and expenditure are broadly similar across Great Britain. By contrast, levy rates in Eire are lower yet expenditure is higher thanks to a significant level of direct funding from central government to Bord Bia. Matching Irish promotional activities would require steeper levies and/or direct finding from the Scottish Government, neither of which will be easy to achieve without a clear strategic rationale and long-term vision for the sector.

4.3.4 Regulations

4.61 Interviewees expressed limited complaints about regulations specific to the sheep sector. Nevertheless, key concerns were:

- a. the devaluing of sheep returns associated with the need to split carcasses under TSE regulations;
- b. the high cost of veterinary inspections and the new requirement for CCTV installation, which is a particular concern to smaller plants with lower throughputs to spread such overhead costs across; and
- c. further changes to transport regulations (driver hours) due this summer, which are likely to reduce distances sheep can be hauled. This may benefit processors, but may harm farmers through lower lamb prices.

4.62 The regulation of sheep slaughter in Scotland and Britain is a particularly thorny issue. Considerable confusion and ignorance exists on all sides of the argument over slaughter by “cutting the throat”. A minimum requirement of accessing Muslim markets in Britain, the EU and globally is confidence in the treatment of the animal and its meat thereafter (mixing in storage is a key concern). Critically, the animal must only be made unconscious and not killed by the stun process. Electric stunning is therefore compatible with halal, at least for some Muslim consumers (but halal is not a homogeneous nor static market).

4.63 Shatnawi and Al-Essa (2017) highlight how the New Zealand sheep industry demonstrated the compatibility of electric stunning with halal slaughter in the 1980’s. Based on these Massey University trials, the New Zealand government developed a robust regulatory framework based on all sheep being halal stunned killed. Without the option of conventional bolt stunned slaughter, the chances of subsequent mixing with non-halal meat in the supply chain are effectively eliminated. So clarity and uniformity of approach means complete trust by Muslim buyers globally in the provenance of New Zealand sheepmeat.

4.64 The picture is very similar in Australia where decades of supplying sheepmeat to international halal markets gives them a very strong reputation as a source of halal products. The Australian Government and Australian Islamic Organisations work together to “*enforce the best practices of production standards, which have contributed to the worldwide recognition that Australia’s*

*Halal program is amongst the most rigorously enforced Halal system in the world.*⁵⁰

4.65 The dilemma in Scotland and Britain is that achieving the same high level of confidence in halal, requires regulating that all processors move to stunned halal slaughter. So besides banning non-stunned halal slaughter, it means also banning bolt stunned slaughtering and introduction of slaughter by throat cutting in all abattoirs including small ones. Without such uniformity, the potential mixing of halal with non-halal product undermines confidence. Euromonitor Research (2015) highlight the issue of trust as one reason many Muslim's still prefer local halal butchers: *"Supermarkets lose on trust because, in many instances, they fail to clearly label halal products as such or explain the slaughter method. For example, imported New Zealand lamb from halal abattoirs sold in UK supermarkets has not been labelled as halal."*

4.1 Given the small number of sheep processors in Scotland, it could be argued that Scotch Lamb could gain a competitive advantage by enforcing stunned halal in all Scottish plants. However, there are legitimate concerns that the non-Muslim population could react negatively to moving fully to halal slaughter: also for reasons of ignorance, but not the same ones⁵¹. The status quo may therefore persist unless there is clear evidence that the current mix of conventional and halal stunned processors are losing out on market opportunities.

4.2 The preference of some buyers for sheepmeat coming from single-species (sheep only) plants was raised by some stakeholders. Only one of Scotland's sheep plants (Vivers) would qualify. It is difficult to envisage any other Scottish plants specialising solely in sheep for reasons explained at length earlier. That is, the known costs and risks far outweigh any potential market opportunities.

4.3 Regarding the broader regulatory framework provided by the single market, that the UK is currently still in the EU means that the Scottish sheep industry is operating largely under the same regulations as competing EU countries (Ireland, France and Spain). Even New Zealand has to comply with certain regulations to export lambs into the EU. But Brexit may mean that Scotland, as part of the UK, exits the single market and the common regulatory framework that entails.

4.4 The worse-case scenario (a "no deal" exit) is that the Scottish sheep industry effectively becomes a third-country at the end of October. That would place the Scottish sheep industry in the same trading position as New Zealand (though without the market access New Zealand enjoys through a Tariff Rate Quota [TRQ]).

4.5 Setting aside the TRQ, losing the regulatory benefits of being part of the EU single market will add costs to the Scottish sheep industry. Of course, given the

⁵⁰ <https://halalfocus.net/australia-a-global-leader-in-production-of-halal-beef-lamb/>

⁵¹ The press play a major role in influencing attitudes towards halal slaughter, with some negative views promoted. For example: <https://www.express.co.uk/news/uk/934454/bbc-countryfile-halal-meat-slaughter-islam-muslims>

likelihood of WTO tariff rates abruptly ending UK sheep exports, concerns about having the appropriate paperwork to get Scottish lamb from Dover to Calais probably becomes a non-issue.

4.6 If fully outwith the regulatory (and trade) protection afforded by being part of the EU single market, regulatory cost will become a bigger issue as the industry competes in the global marketplace. SG Heilbron Economic & Policy Consulting (2018) assessed how regulatory cost compliance affected the competitiveness of Australian beef processors against the beef processors of the USA, Brazil and Argentina. They reported that just over half of the cost advantage enjoyed by these countries over Australia came from lower costs for labour, energy and export inspections and that these were directly caused by lighter regulations or, in the case of export inspections, government covering the cost. There is, however, perhaps some comfort in that the USA, Brazil and Argentina are not sheepmeat exporters.

4.3.5 Technology and logistics

4.7 A lack of technology was not flagged-up as a specific issue by processors. Yet the need for cutting edge technology is being driven by forces beyond the control of Scottish processors. Specifically:

- a. The need to boost labour productivity given the reduction in European workers following the Brexit vote.
- b. The competitive advantage that new technology affords lamb processors in other countries and processors of competing meats.

4.8 Moreover, if Scottish sheep processors are to pursue export markets beyond nearby Europe, significant investment in chill technology will be needed. As McDermott et al explained in their 2008 report, controlled atmosphere packaging (Captech) greatly improved the competitiveness of New Zealand lamb in distant markets through improving both food safety and eating quality (maturation). Today, using chill technology, chilled New Zealand lamb generally has a longer shelf-life in French supermarkets than imported British lamb. The proportion of New Zealand lamb exported as chilled (compared to frozen) has grown significantly since the report was written.

4.9 The following examples provide an overview of what new technologies competitors are investing in.

- a. **Robotic cutters** – ANZCO, a private New Zealand lamb processor, has recently replaced five-man operated bandsaws with a Scott Technology⁵² automated deboning machine that improves meat yield and shelf-life as well as labour productivity. For example, the greater accuracy of the machine means an extra 5mm of meat is added to high value French rack from the low value flap.

⁵² Demonstration of Scott Technology. <https://www.youtube.com/watch?v=KhZ2jl-exBs>

- b. **PrimeXConnect** – ANZCO has also installed an on-line trading platform to provide a digital link with customers around the world. Chandler (2017) examined the potential of PrimXConnect in Australia in detail...
- c. **eASDs** – an electronic Animal Status Declaration has just been introduced by farmer owned New Zealand processor Alliance. The technology improves supply chain efficiency by allowing farmers to book livestock in online.
- d. **Automated factory** – 2 Sisters Scunthorpe chicken plant is one of the most advanced meat processing plants in the world thanks to robotic technology.
- e. The Australian Meat Processor Corporation developed a budgeting tool to help its red meat processors assess the **cost-benefit of installing new technology** (SG Heilbron Economic Policy & Consulting,2014). This work was matched funded by the Australian government.

4.10 However, as evidence that innovation is occurring in Scotland, Kepak recently announced a major investment to improve processing efficiency at its sheep and cattle processing plant at Portlethen. The investment was aided with SRDP grant funding of £1.6m.

4.3.6 The right raw product (lambs)

4.11 The variability of lambs, especially out-of-season, limits the development of value-chains built on consistency through the year. This is largely a consequence of the biological constraints of the breeding ewe meaning most Scottish lambs are born in March and April. This results in the lamb value chains being more “production push” than “demand pull”. Relative to other meat value-chains, the contrast is most stark with chicken which has achieved year-round consistency of the raw product.

4.12 The lamb chain is also disadvantaged by the still largely traditional relationship between most producers and processors. This is a reflection of thousands of farmers and a small number of processors (the relationship between retailers and processors appears more balanced though power rests with the former).

4.13 Moving toward a more demand-pull value chain where producers have a clearer “line of sight” with the ultimate consumer is preferable. Thanks to their pivotal position in the supply chain, Scottish processors are central to making this happen. The following opportunities – to improve the quality of lambs available to them by sending better signals to producers – all involve the active participation of processors.

4.14 The farmer sees a lamb: the consumer sees a cut of meat with, for some buyers, a method of production they like. Helping farmers produce a lamb that in turn delivers a packet of lamb meat the consumers wants, requires a pricing system that sends the right signals regarding:

- Meat yield.
- Eating quality.
- Provenance.

The EUROP grading system⁵³ which all but Vivers⁵⁴ use, only measures the first trait, and is done subjectively.

4.15 The Australians and New Zealanders have, and continue to develop, more sophisticated feedback (grading) systems operating in some of their plants. Regarding meat yield, Pearce's (2016) technical guide, written for the Australian lamb and meat supply chain, is essential reading. Most Scottish lambs will yield around 53% of the carcass weight (Clelland, pers comm). That is, if the average carcass weight of Scottish lambs was 20.3kg last year, the average lean meat yield was 10.8kg with the rest of the carcass being either fat or bone.

4.16 Perhaps more important than the overall carcass yield, is where the lean meat is in the carcass (e.g. bigger eye muscle in chops). Some New Zealand processors are understood to provide feedback to primary producers on lean tissue yields for the three main parts of the carcass: shoulders, loins and back legs. This helps farmers produce lambs from which more high value cuts can be sold.

4.17 The New Zealanders are using carcass data to calculate indexes for meat yield that can be used by farmers to select rams that are positive for this trait. As shown by the dramatic increase in chicken breast yield over the past 60 years, the commercial benefits of getting the genetics right provide real competitive advantage.

4.18 However, capturing this data on the slaughter line requires sophisticated grading systems like VIAscan. No Scottish lamb processors have this technology. ABP has it in England, but the company is not using it commercially.

4.19 Instead ABP is encouraging the use of better rams through paying a premium where farmers use Easy Rams (New Zealand genetics). Previously, 2 Sisters in Wales (now Kepak) paid a small premium for where Innovis bred rams were used.

4.20 While such technology can help improve meat yield, simply pushing for a higher meat yield has trade-offs with the other traits. Eating quality and the production method can both be adversely affected by selecting for heavily muscled lambs;

⁵³ The EUROP system grade on fatness (from too lean 2, 3L, 3H to 4 overfat) and conformation (EUROP with E at the most shapely/muscular end of the scale). The preferred "supermarket spec" is generally at least R3L in the 16-20kg cwe weight band.

⁵⁴ Vivers have simplified the EUROP system into one of three grades (one = best) based on fatness, conformation and carcass weight.

- a. Where meat yield percentage reaches the high 50's⁵⁵, the lower level of intra-muscular fat (IMF) lowers eating quality.
- b. Heavily muscled lambs increase lambing difficulty. Not only harming animal welfare, but also increasing labour demands at lambing time increasing the cost of production.⁵⁶

4.21 Bonny (2018) explains how the Meat Standards Australia (MSA) are developing a star graded system based on a combination of factors including; breed, meat yield, carcass weight and intramuscular fat to better predict eating quality. Bonny cites work by Tighe et al (2017) that finds that Australian consumers are willing to pay 1.43 and 1.90 times more for 4- and 5-star quality, relative to lamb graded 3-star.

4.22 As suggested in section 4.3.2, the New Zealanders are putting more effort into breeding lambs that score consistently highly on eating quality to win premium markets where taste drives demand. New Zealand lamb processor Alliance is building high value sheep products based on consistently high eating quality backed up with a natural production process (provenance). Te Mana lamb⁵⁷, with its high omega fat levels, is perhaps the best-known brand. The Silere brand⁵⁸ is also interesting as it has converted the notoriously slow growing Merino sheep into a virtue by emphasising how this results in better tasting meat. Both these brands are available in the UK.

4.23 The efforts of another New Zealand processor – Silver Fern – to develop a consumer driven value chain were mentioned earlier and detailed in Appendix 6. This processor now has a grading system in place to reward producers for delivering animals that produce meat of exceptional eating quality for which consumers will pay premium prices. Development of this system gave rise to a spinoff whole farm management information system called FarmIQ.

4.24 SRUC is currently leading research that uses carcass measurements to breed sheep that produce lamb that can be sold for a premium. The BBSRC funded work⁵⁹ involves the Texel breed society and processor ABP.

4.25 Exploiting the genetic potential of sheep is greatly improved if feedback from commercial animals can be linked to sire. Scotland's EID system provides a linkage platform that even the Australasians do not have (yet): it should be exploited.

⁵⁵ To achieve a 60% yield requires an extremely well-muscled breed like a Texel.

⁵⁶ New Zealand sheep are notably easier lambled because of their body shape than British sheep, allowing for far bigger flocks, thereby lowering their cost of production.

⁵⁷ <https://temanalamb.com/>

⁵⁸ <https://www.silere.co.nz/home/>

⁵⁹ Carcass trait phenotype feedback for genomic selection in sheep. BB/P005098/1
<https://gtr.ukri.org/projects?ref=BB%2FP005098%2F1>

4.26 Producing lambs to meet (and grow) consumer demand for M&S lamb is the headline goal of a SRDP KTIF financed project⁶⁰.

- a. The main objective is to produce meat of consistently high eating quality. The three-year trial involves Scotbeef taste testing lambs from flocks to identify management actions (covering; feeding, breeding, health and handling) that can be developed into a blueprint for use by Scottish sheep farmers and processors.
- b. EID has been identified as a key enabling technology. To date, despite all lambs and sheep requiring EID tags for compliance reasons, this cost has not been turned into an advantage. This data could be used to improve day-to-day management (e.g., selection of lambs for slaughter) as well as drive long term genetic and health benefits. Scotland's traceability system – ScotEID – provides a platform for exploiting improvements in the national flock that other countries do not have.
- c. The project's final objective is to look at options for better matching the supply of lamb with demand. Alternative pricing mechanisms and specialist finishing units are being explored.

4.27 This KTIF project followed on from an earlier QMS funded project⁶¹. The project took a "lean thinking" approach to identify bottlenecks and inefficiencies in the supply chain which added cost and ultimately reduced margins for each link in the chain.

4.28 Two of the Scottish processors are active in supply chain initiatives. Scotbeef (as discussed in para 4.72) provides M&S lamb supply in Scotland. Woodheads (Morrisons) has also started a Next Generation Producer Group to help farmers better understand the full supply chain and what customers want.

4.3.7 Processor ownership

4.29 One option raised by the project Steering Group was that of a producer owned processor. In principle, a farmer-controlled processor has merit. However, practicalities tend to outweigh principles.

4.30 The main problem is that farmers generally attach greater value to what they get for their product (e.g. milk, lambs, and cattle) rather than the margin from processing the product. As a result, investment in processing and marketing is typically starved as the producer-controlled board overpays for stock. Attempts to be less generous on livestock procurement are often met with producers selling

⁶⁰ Building resilience into Scotland's lamb supply chain. Farm Stock (Scotland) Ltd, SRUC, SAOS and Scotbeef Ltd. <https://ec.europa.eu/eip/agriculture/en/find-connect/projects/building-resilience-scotlands-lamb-supply-chains>

⁶¹ Adding value to the Scottish sheep sector: Farm Stock (Scotland) Ltd pilot study (2013). SAC Consulting, SAOS & SMAS. https://www.sruc.ac.uk/downloads/file/1715/adding_value_to_the_scottish_sheep_sector_farm_stock_scotland_pilot_study

elsewhere even if they are owner-members. Without throughput, processing losses soon mount, compounding the problem.

4.31 Evidence for this phenomenon is offered by ANM closing the “Highland Lamb” Dornoch plant in 2010. Even countries with a greater tradition of farmer-controlled businesses are struggling to make money from red meat processing. New Zealand now has just one wholly producer-owned processor in the form of Alliance. Silver Fern Farms, the biggest processor in New Zealand, sold half of its business to Chinese company Shanghai Mailing a couple of years ago. The deal reduced debt, provided investment funding and gave the firm direct access to the important Chinese market.

4.32 Private rather than publicly owned firms dominate the red meat processing industry globally. The American firm Cargill, for instance, had a 2018 turnover of \$115 billion and operates in 66 countries (poultry in the UK). The three major lamb processors in the UK are privately owned Irish firms: ABP, Dunbia and Kepak.

4.33 As noted in the Five Forces analysis, one important option used to lift competitiveness is to vertically integrate back into processing. Retailer Morrisons has done so with Woodheads. In the US, Cargill runs feedlots buying in store cattle for finishing thereby achieving a greater match of cattle availability with retail demand.

4.34 Perhaps most interesting is American supermarket CostCo’s total integration of its poultry supply chain. It judges that by also running the production stage, it can gain an advantage over its competitors.

5 Conclusions & Recommendations

5.1 The Scottish sheep processing sector has contracted massively since 1995. Then, 3.5 million lambs were slaughtered in Scotland compared to just 1.1 million lambs in 2018. For cull sheep the number has dropped from 210,000 to about 22,000 over the same period.

5.2 A combination of factors explain this decline, including changing consumer preferences, the small domestic market and distance from other markets.

5.3 Sheepmeat processing in Scotland is, however, profitable with a main focus on supplying supermarkets, both within Scotland and elsewhere. This market is competitive but reasonably predictable and stable, and relationships between processors and buyers appear to be good.

5.4 However, if processing volumes were to increase significantly, processors would have to find new market outlets, principally outwith Scotland. Yet few processors have ambitions to do so, citing a range of inhibiting factors.

5.5 Nevertheless, there are opportunities for market development that could be pursued if a market-oriented, value-chain approach was adopted by an industry with the right mind-set working collaboratively with partners and government.

5.6 The following recommendations are offered:

1: Seek better measurement of actual lamb consumption and supply routes, particularly for processed and food service market segments. UK sheepmeat consumption surveys focus on fresh/frozen cuts of meat for consumption in the home, yet the majority of lamb consumption is apparently of processed products and via catering services. This contributes to imperfect understanding of evolving consumer preferences and market dynamics.

2: Seek greater transparency and consistency in the presentation of volume data, ideally with an agreed measure of saleable meat. Presentation of Scottish (and UK) sheepmeat production and consumption uses a variety of volume metrics, including headage, carcass weight equivalent (CWE) and saleable meat. This hampers reconciliation of estimates from different data sources and can lead to confusion, but also hinders a market orientation focus on consumer preferences.

3: Promote a value-chain approach, combining cost efficiencies with market orientation and good information flows. Establishment of good working relationships through the open sharing of information, the adoption of appropriate technology and a clear focus on consumer preferences has been shown to deliver improved profitability along meat supply-chains. As such, a value-chain approach is relevant to increasing domestic processor throughput by addressing cost-efficiencies, product and packaging innovation, and marketing. Moreover, developing and supplying new markets requires coordinated action across all parts

of the supply-chain, including primary producers, processors, manufacturers, retailers, food service providers, levy boards and Government.

4: Explore options for addressing seasonality in farm production and achieving carcase balance through product and market development.

Extending the time period over which sheep are available for slaughter would mitigate the peak-supply problem. Equally, balancing utilisation of all parts of the carcass would be aided through new products and/or new markets. (It is, however, acknowledged that there are practical obstacles to all of these).

5: Publicise, to industry members, the strategic importance of sheepmeat sales outwith Scotland, highlighting that (given the small size of the Scottish market) any increase in processors' output has to be matched by market development elsewhere. Market share for Scotch lamb is highest in Scotland, but low per capita consumption and a small population limit the size of the domestic market. This means that Scottish sheepmeat production is already predominantly sold outwith Scotland, and any significant increase in production will mostly have to be sold to the rest of the UK or abroad.

6: Review prioritisation of strategic target markets for promotional campaigns, either solely by QMS and/or jointly with other bodies (including other sectors). Promotional campaigns within Scotland are highly visible to Scottish primary producers and processors, but ultimately have less potential for growth than targeting other geographies (e.g. public sector procurement of lamb in Scotland may be symbolically important, but is trivial relative to overall production volumes: c.50t vs. 24000t). Continued collaboration with other levy bodies (e.g. AHDB) may be desirable for exports beyond the UK, and tie-ups with other sectors (e.g. Scotch Whisky) may have some potential. (It should, however, be noted that increases in lamb consumption inevitably mean reduced consumption of another meat, which may include Scotch beef or pork).

7: Explore further the specifics of particular halal market segments. Lamb's share of overall meat consumption is relatively low, and declining relative to (e.g.) chicken. However, the halal market segment is growing, both in the UK (particularly England) but also the EU and abroad. As such it represents a possible priority target. However, it is not an homogeneous nor a static market, with different and evolving preferences that vary with geography and demography. Combined with halal certification being somewhat fragmented and contested, and controversies around the use of non-stun slaughter for some halal segments, this implies that development and servicing of halal markets may not be straightforward.

8: Offer support to processors to encourage them to develop new export markets. Scottish sheepmeat processors with currently stable (and profitable) supply contracts appear to have little ambition to increase production for export markets. However, advice/training, capital grants and export guarantees might help to overcome perceived barriers such as lack of (language/marketing) skills and exchange rate or payment default risks. Assistance with maintaining a skilled cutting-room workforce may also be relevant. Given the current dominance of the EU as an export market, Brexit adds some urgency to new market development –

although it is important to recognise that other markets are often highly competitive (e.g. Middle East and China already dominated by Australia and New Zealand) and offer lower prices than the EU.

9: Review allocation of funding between production and market development activities. Across the UK, red meat levy rates and the share of levy bodies' funding allocated to market development are fairly consistent (although comparisons are not necessarily straightforward). However, Bord Bia in the Republic of Ireland has lower levy rates yet higher funding due to significant direct grants from government. Post-Brexit, it may be that a small proportion of funding currently directed towards Scottish primary producers would be better allocated to market development efforts. This would, however, require a clear strategic intent and rationale.

References

- Alston, J.M., Freebairn, J.W. & James, J.S. (2001) Beggar-Thy-Neighbor Advertising: Theory and Application to Generic Commodity Promotion Programs. *American Journal of Agricultural Economics*, Volume 83, Issue 4, Pages 888–902,
- APHA (2017) Livestock Demographic Group: Sheep population report – livestock population density maps for GB. Available at <http://apha.defra.gov.uk/documents/surveillance/diseases/lddg-pop-report-sheep1117.pdf>
- Baron, P.J., Cowie, W., Hughes, D.R. & Lesser, D. (1971) Measuring attitudes to lamb, *European Journal of Marketing*, Vol.5(2), pp.36-44
- Bernués, A., Ripoll, G. & Panea, B. (2012) Consumer segmentation based on convenience orientation and attitudes towards quality attributes of lamb meat. *Food Quality and Preference*, Vol.26(2), pp.211-220
- Beverland, M. & Lindgreen, A. (2002) Using country of origin in strategy: The importance of context and strategic action. *Journal of Brand Management*. Volume 10, Issue 2, pp 147–167
- Bonny, S., O'Reilly, R., Pethick, D., Gardner, G., Hocquette, J-F. & Pannier, L. (2018). Update of Meat Standards Australia and the cuts based grading scheme for beef and sheepmeat. <http://creativecommons.org/licenses/by-nc-nd/4.0/>
- Bowman, A., Froud, J., Johal, S., Law, J., Leaver, A. and Williams, K. (2012) Bringing Home the Bacon: from trader mentalities to industrial policy. CRESC Report, University of Manchester. Available at: <http://hummedia.manchester.ac.uk/institutes/cresc/sites/default/files/Bringing%20home%20the%20bacon.pdf>
- Brown, R. (2017) Outlook for European meat value chains – in a global context, and related to environmental sustainability. Gira Meat Club presentation to Hungarian meat industry conference, May 9th 2017. Available at: <http://repo.aki.gov.hu/2654/1/Richard%20A%20Brown.pdf>
- Chandler, M. (2017) Supply chain automation in the Australian red meat industry. Meat and Livestock Australia Limited. Available at: <https://www.mla.com.au/download/finalreports?itemId=3573>
- Clelland, N. (2019). Personal Communication
- Crespi, J. (2003) The Generic Advertising Controversy: How Did We Get Here and Where Are We Going? *Applied Economic Perspectives and Policy*, Volume 25, Issue 2, Pages 294–315

Defra (2019) Monthly UK statistics on cattle, sheep and pig slaughter and meat production. URL: <https://www.gov.uk/government/statistics/cattle-sheep-and-pig-slaughter>.

Defra (2019b) Results of the 2018 FSA survey into slaughter methods in England and Wales. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/778588/slaughter-method-survey-2018.pdf

Euromonitor Research (2015) Doing Business in the Halal Market: Products, Trends and Growth Opportunities. Available at: http://go.euromonitor.com/rs/805-KOK-719/images/WP_Halal-Market_1.4-0715.pdf

Ferreira, W.N. (2003) Analysis of the meat processing industry in the United States. Extension Economic Reports 112915, Clemson University, Department of Agricultural and Applied Economics. Available from: <https://ideas.repec.org/p/ags/cuaexr/112915.html>

Fuseini, A., Wotton, S.B., Hadley, P.J., and Knowles T.G. (2017) The perception and acceptability of pre-slaughter and post-slaughter stunning for halal production: The views of UK Islamic scholars and Halal consumers. *Meat Science*, 123 (2017), pp. 143-150 Available at: <https://doi.org/10.1016/j.meatsci.2016.09.013>

Font-i-Furnols, M., Realini, C., Montossi, F., Sañudo, C., Campo, M.M., Oliver, M.A., Nute, G.R. & Guerrero, L. (2011) Consumer's purchasing intention for lamb meat affected by country of origin, feeding system and meat price: A conjoint study in Spain, France and United Kingdom. *Food Quality and Preference*, Vol.22(5), pp.443-451

GHD NZ Ltd (2014). The Size of the Prize NZ Export Meat Industry Reform. A report prepared by GHD NZ Ltd for the Meat Industry Excellence Group (MIE), August 2014. 76pp.

Ghosh, S. & Williams, G. (2016) Generic Advertising of U.S. Lamb. *Journal of International Food & Agribusiness Marketing*, Vol.28(4), p.373-393

Kinnucan, H. (1996) A note on measuring returns to generic advertising in interrelated markets. *Journal of Agricultural Economics*, Volume 47, Issue1-4, Pages 261-267

Livestock and Meat Commission (2018) LMC Quarterly Issue No. 25. July 2018. Available at: <https://www.lmcni.com/site/wp-content/uploads/2018/07/July-2018-web.pdf>

Locke, R. and O'Connor, J. (2017) Available at: <https://www.mla.com.au/globalassets/mla-corporate/prices--markets/documents/trends--analysis/other-reportanalysis/sheepmeats-unique-global-position.pdf>

Magretta, J. (2012). Understanding Michael Porter: The essential guide to competition and strategy. Boston, Mass: Harvard Business Review Press

Meat Industry Excellence (2015). Red meat industry - Pathways to long-term stability. Sheepmeat's unique global position. Meat and Livestock Australia – Market Information. Available at: <https://www.nbr.co.nz/sites/default/files/Meat-Industry-Report-Final.pdf>

McDermott, A., et al. (2008). The key elements of success and failure in the NZ sheep meat industry from 1980-2007. Research Report No. 308, AERU, Lincoln University.

Moxey, A. (2016) An Assessment of the Economic Contribution of Scotland's Red Meat Supply Chain. A report for QMS. Available at: <https://www.qmscotland.co.uk/sites/default/files/economic-contribution-of-scotlands-red-meat-supply-chain.pdf>

Pearce, K. (2016) Improving Lamb Lean Meat Yield (2016). Available at: https://www.sheepcrc.org.au/files/pages/publications/publications/industry-publications/5_Lean_Meat_Yield_Manual_-_Feb16.pdf

Pethick, D.W., Ball, A.J., Banks, R.G. & Hocquette, J.F. (2011) Current and future issues facing red meat quality in a competitive market and how to manage continuous improvement. Animal Production Science 51(1) 13-18.

Piggott, N., Chalfant, J., Alston, J. & Griffith, G. (1996) Demand Response to Advertising in the Australian Meat Industry American Journal of Agricultural Economics, Volume 78, Issue 2, Pages 268–279.

Piggott, R.R., Piggott, N.E. & Wright, W.E. (1995) Approximating Farm-Level Returns to Incremental Advertising Expenditure: Methods and an Application to the Australian Meat Industry. American Journal of Agricultural Economics, Volume 77, Issue 3, Pages 497–511

Quality Meat Scotland (2017a) Importance of Migrant Labour to Scottish Red Meat Industry. Quality Meat Scotland press release 20th June 2017. Available at: <http://www.qmscotland.co.uk/news/importance-migrant-labour-scottish-red-meat-industry>

Quality Meat Scotland (2017b) Migrant labour and the Scottish red meat sector - a Brexit discussion paper. Brexit Briefing Paper 2. Available at: http://www.qmscotland.co.uk/sites/default/files/brexit_migrant_labour_discussion_paper_pdf_final.pdf

QMS (2018) The Scottish Red Meat Industry Profile (2018 Edition). Available at: https://www.qmscotland.co.uk/sites/default/files/scottish_red_meat_industry_profile_2018_edition.pdf

Quality Meat Scotland (2017c) The Scottish Red Meat Industry Profile (2017 Edition). Available at: https://www.qmscotland.co.uk/sites/default/files/qm2893_red_meat_industry_profile_0617_lr.pdf

Quality Meat Scotland (2016) The Scottish Red Meat Industry Profile (2016 Edition). Available at: https://www.qmscotland.co.uk/sites/default/files/red_meat_industry_profile_2016.pdf

Royal Society of Edinburgh (2008) Committee of Inquiry into the Future of Scotland's Hill and Islands. Available at: <https://www.rse.org.uk/inquiries/the-future-of-scotlands-hills-and-islands/>

Russell, B.C., McAlister, G., Ross, I.S. & Pethick, D.W. (2005) Lamb and sheep meat eating quality — industry and scientific issues and the need for integrated research. Australian Journal of Experimental Agriculture 45(5) 465-467.

SAC (2008) Farming's Retreat from the Hills. Available at: https://www.sruc.ac.uk/download/downloads/id/28/farmings_retreat_from_the_hills_full_report.pdf

Scottish Government (2018a) Abstract of Scottish Agricultural Statistics 1982 to 2017. Available at: <https://www2.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubAbstract/Abstract2017>

Scottish Government (2018b) Results from the June 2018 Scottish Agricultural Census. Available at: <https://www.gov.scot/publications/results-june-2018-scottish-agricultural-census/>

Sepúlveda, W., Maza, M. & Mantecón, Á. (2010) Factors associated with the purchase of designation of origin lamb meat. Meat Science, Vol.85(1), pp.167-173

Shatnawi, K., Al-Essa, E. (2017) Establish halal market access, New Zealand an example. Social Sciences. Vol. 6, No. 6, pp 169-173.

SG Heilbron Economic & Policy Consulting (2018) Analysis of regulatory and related costs in red meat processing (2017). Report for Australian Meat Processor Corporation. Available at: https://www.ampc.com.au/uploads/FINAL_Cost%20to%20Operate%20Report%20Oct%202018.pdf

SG Heilbron Economic & Policy Consulting (2104) A predictive model and tool design for firm level cost benefit assessment of the purchase and implementation of new processing technologies. Available at: [https://www.ampc.com.au/uploads/cgblog/id200/2013_1028_Final_Report_\(2\).pdf](https://www.ampc.com.au/uploads/cgblog/id200/2013_1028_Final_Report_(2).pdf)

Thomson, S., Barnes, A., Bell, J., Hill, G., Logan, R. and Keiley, D. (2016) Changing Land Management- Scottish Agriculture. In Rural Scotland in Focus 2016 Edition. Available at:
https://www.sruc.ac.uk/download/downloads/id/3188/section_1_changing_land_management_rsif_2016_pages_8-112.pdf

Thomson, S., Holland, J., Waterhouse, T. and Morgan-Davis, C. (2011) Response from the Hills: Business as Usual or a Turning Point? Available at:
https://www.sruc.ac.uk/download/downloads/id/57/response_from_the_hills_business_as_usual_or_a_turning_point.pdf

Tighe, K., Cacho, O., Mounter, S., Villano, R., Ball, A., Pethick, D. (2017) Determinants of consumer willingness to pay for quality-graded Australian sheep meat. *Animal Production Science*, <http://dx.doi.org/10.1071/AN15873>

Williams, G., Capps, O. & Hanselka, D. (2018) U.S. National Economic Contribution of Generic Food and Agricultural Product Advertising. *Journal of International Food & Agribusiness Marketing*, Vol.30(2), p.191-210

Appendix 1 - Methodology

The methodology followed for this project comprised three main strands: a review of academic and grey literature; analysis of industry statistics; and contacting or interviewing industry experts and stakeholders.

The literature review drew on the research team's prior knowledge of relevant material, but was supplemented by internet searches of academic, government and industry sources. Google and Google Scholar were the main search engines used, but use was also made of Web of Science and AgEconSearch plus direct searching of specific websites hosted by industry bodies. Given the scope, budget and lifespan of the project, no attempt was made to follow a formal systematic literature review protocol, but search terms revolved around key words including: lamb; processing; supply-chains; value-added; demand; consumption; procurement; and, marketing.

Statistical analysis was mainly of published, aggregate data available from various government or industry sources. However, privileged access to some abattoir-specific data (not presented in the final report) helped to provide analytical context for the research team, and access to detailed consumption data in the Kantar database allowed statistical analysis of specific aspects of lamb demand.

Table 9 below lists industry experts and stakeholders contacted for information, with the summary questions forming the basis of email enquiries or telephone/face-to-face discussions appended below.

Table 9 Industry experts and stakeholders contacted for information.

Organisation	Person	Email	Verbal
AHDB	Awal Fuseini	√	√
AHDB	Duncan Wyatt	√	
APUC	Andy Anderson	√	
Brakes	Chris Boyle	√	
Campbell Prime Meats	Iain Brown		√
Caledonian Marts	Ali Logan	√	√
Defra	Janet Carr	√	
Expert	Brian Pack OBE		√
EQL	Rizvan Khalid		√
Farmer	David Girvan	√	√
Farmer	Jamie Tweedie	√	√
Farm Stock (Scotland) Ltd	Jonny Williams	√	√
IAAS	Andrew Wright		√
Kepak (retired Jan'19)	Alan McNaughton	√	√
Kepak	Frank Clark	√	√
McCaskie Butchers	Nigel Ovens	√	√

Mclays Foods	John Mclay		√
MoD	DESLD-DFPMailbox@	√	
Morrisons	Samantha Trick	√	√
NHSS	Loraine Hartley	√	√
NSA/ farmer	John Fyall	√	√
QMS	Stuart Ashworth		√
QMS	Carol McLaren	√	√
QMS	Iain Macdonald	√	√
QMS	Tom Gibson	√	√
SAMW	Martin Morgan	√	
Scotbeef	Bill McKinnon	√	√
ScotEID	Support@	√	
Scotland-Excel	Lynsey Gordon/Lesley Richards	√	√
SPS	Tammy Paterson	√	
Taste Shetland	Ronnie Eunson	√	√
United Auctions	George Purves	√	√
Waitrose	Duncan Sinclair	√	√
Woodheads	Richard Henderson	√	√

Questions to buyers and sellers engaged in public procurement and food-service supply-chains:

- What rules have to be followed in terms of using Scottish suppliers? (e.g. preference for Scottish, but subject to some price/quality/reliability criteria?)
- Are contracts with actual producers (e.g. abattoirs) or intermediaries (e.g. Brakes)? And for how long (e.g. seasonal, menu-planning period)?
- What scope is there for substitution if (e.g.) prices change? Both between products (e.g. Scottish chicken rather than Scottish lamb) or suppliers (e.g. Scottish vs. rUK)?
 - And who makes decisions about substitutions? Is lamb actually specified, or just meat?
- Do you have any data (e.g. last five years) on actual annual volumes of lamb (and ideally which cuts) have been procured, and within this how much of it was Scottish?
- Do you have any views on how volumes might change in the future? (e.g. “peak lamb” leading to overall decline in favour of chicken, increase in Scottish lamb share of total lamb?)
- Is “Scottish” important to all customers? Or is it more a case of either the right quality and/or price rather than Scottish specifically? And does this vary with cut?
- How easy is it for you to source specific cuts or quality of Scottish lamb, and/or other requirements (such as halal)?
- Has the share of Scottish lamb changed as a proportion of the total lamb that you supply? Do you think it will change in future?

- Overall lamb consumption appears to be declining – do you see this from your customers? (e.g. are they switching to other meats)
- Do you have any views on how the demand for all lamb and for Scottish lamb might change in the future?
- How does lamb compare to other meats in relative volume terms?

Structure Interview with processors re opportunities

What markets are important? Under a soft compared to hard Brexit? (especially interested to hear thoughts on export market potential)

Markets	Priority (1 to 3 where 1=low)	Product type	Comment
Scotland			
Rest GB <ul style="list-style-type: none"> • London 			
EU <ul style="list-style-type: none"> • France • Belguim • Germany • Med 			
Non-EU <ul style="list-style-type: none"> • North America • N.Africa • Asia (China, India) 			
Halal (in all of above)			
Light lambs (all of above)			

How could market identification, research and development be improved?

- Better market research by own firm?
- Better market research at industry level (QMS, AHDB)? (cf. Bord Bia)
- Is lack of funding an issue? How could this be overcome?
- Is language/culture an issue?
- Would improving staff skills help?
- Better collaboration with other levy bodies (eg, B&LNZ)
- Better collaboration with other processors (ie, co-opetition)
- Better collaboration with other industries (eg, Scotch whisky, fish)

Could products be made more attractive to increase demand?

- Would new cuts better suited to modern living (convenience) help?
- How could government help with New Product Development?
- Could increasing focus on eating quality lift sales?
- How important is provenance?

How important is pricing?

- Does heavy price promotion help or hinder consumption and your work flow?
- Would everyday low pricing be better?

Would better promotion of our lamb help?

- Could our generic (Scotch Lamb) promotion be better? If yes, how?
- Any scope to work with retailers and producers to improve “own brands”?

How are regulations affecting your business?

- Ones relating to labour?
- Traceability?
- Animal welfare (eg, CCTV)?
- Health & safety
- Certification? Are too many bodies a problem?

Is the cost and ease of haulage, handling and processing limiting our competitiveness?

- How limiting is the availability of skilled labour?
- Would investment in new processing technologies help?
- Any issues with livestock or product transportation (eg, containerisation)?
- How could the availability of the right raw product (ie, lambs) be improved?
- Would lower seasonality help your business? If so, how might this be achieved?
- Should a better lamb payment/grading system be introduced?
- Why can the Australians and Kiwis find markets for heavyweight lambs?
- How could better genetics be encouraged?
- Is eating quality an issue? If so, options for improvement?

Appendix 2 – Summary data

Table 10 Selected sheep production and slaughter data

Year	Scottish Sheep Population					Lambs killed in Scotland	
	Breeding Ewes	Lambs	Lambing %	Ewe lambs replacement	Lambs for slaughter	Lambs	% Scottish lambs
1991	4.0m	4.9m	123%	0.81m	4.1m	3.05m	74%
1992	4.0m	4.9m	122%	0.81m	4.1m	2.96m	72%
1993	4.0m	4.8m	121%	0.84m	4.0m	2.72m	68%
1994	3.9m	4.7m	119%	0.82m	3.9m	3.07m	79%
1995	3.9m	4.6m	120%	0.82m	3.8m	3.49m	91%
1996	3.8m	4.6m	121%	0.86m	3.7m	2.68m	72%
1997	3.8m	4.7m	123%	0.91m	3.8m	2.22m	59%
1998	3.9m	4.8m	124%	0.89m	3.9m	2.22m	56%
1999	3.9m	4.7m	122%	0.82m	3.9m	2.48m	63%
2000	3.7m	4.5m	120%	0.75m	3.7m	1.76m	48%
2001	3.3m	3.9m	118%	0.80m	3.1m	1.32m	43%
2002	3.2m	3.9m	120%	0.78m	3.1m	1.46m	47%
2003	3.2m	3.8m	121%	0.81m	3.0m	1.32m	43%
2004	3.2m	3.8m	120%	0.75m	3.1m	1.35m	44%
2005	3.1m	3.8m	121%	0.73m	3.1m	1.28m	42%
2006	3.0m	3.7m	122%	0.71m	3.0m	1.44m	48%
2007	2.9m	3.7m	126%	0.67m	3.0m	1.43m	48%
2008	2.8m	3.5m	125%	0.64m	2.8m	1.36m	48%
2009	2.7m	3.4m	126%	0.66m	2.7m	1.48m	54%
2010	2.6m	3.3m	124%	0.66m	2.6m	1.45m	56%
2011	2.6m	3.3m	126%	0.67m	2.7m	1.49m	56%
2012	2.6m	3.3m	125%	0.66m	2.6m	1.34m	51%
2013	2.6m	3.1m	119%	0.63m	2.5m	1.33m	54%
2014	2.6m	3.3m	126%	0.70m	2.6m	1.34m	52%
2015	2.6m	3.2m	125%	0.70m	2.5m	1.32m	52%
2016	2.6m	3.3m	127%	0.67m	2.6m	1.19m	45%
2017	2.7m	3.4m	128%	0.63m	2.8m	1.07m	39%
2018	2.6m	3.1m	123%	0.61m	2.5m	1.05m	41%

Year	UK slaughter lambs		UK cull sheep	
	UK Lambs	Scottish share	Cull Sheep	Scottish share
1991	19.3m	16%	1.7m	8.9%
1992	17.9m	17%	1.6m	7.5%
1993	17.2m	16%	1.7m	4.0%
1994	16.7m	18%	2.3m	4.2%
1995	16.7m	21%	2.5m	8.4%
1996	15.6m	17%	2.4m	9.3%
1997	14.7m	15%	1.9m	7.5%
1998	16.7m	13%	2.0m	4.6%
1999	16.8m	15%	2.3m	7.1%
2000	16.0m	11%	2.5m	8.1%
2001	11.2m	12%	1.7m	7.7%
2002	13.1m	11%	1.9m	6.2%
2003	13.2m	10%	1.9m	4.9%
2004	13.5m	10%	2.0m	5.0%
2005	14.1m	9%	2.2m	2.9%
2006	14.1m	10%	2.3m	3.5%
2007	13.6m	11%	2.2m	2.9%
2008	14.4m	10%	2.3m	1.5%
2009	13.4m	11%	2.2m	1.5%
2010	12.3m	12%	2.0m	1.2%
2011	12.5m	12%	2.0m	1.5%
2012	11.9m	11%	1.8m	1.3%
2013	12.4m	11%	2.1m	1.4%
2014	12.8m	11%	1.8m	1.6%
2015	13.2m	10%	1.6m	1.0%
2016	12.8m	9%	1.7m	0.9%
2017	13.3m	8%	1.6m	1.3%
2018	12.8m	9%	1.6m	1.4%

Source: Data extracted from Defra (2019) and Scottish Government (2018a, 2018b and own calculations

Appendix 3 – Elasticities

Table 11 Estimated own-price, cross-price and income elasticities⁶²

	Beef	Lamb	Pork	Poultry	Fish	Other	Income
Beef	-0.17	0.60	0.34	-0.13	0.57	-0.13	0.56
Lamb	2.11	-3.47	0.63	-0.37	1.30	-0.90	1.52
Pork	0.96	0.51	-0.05	-0.13	0.57	-0.58	0.45
Poultry	-0.15	-0.09	-0.06	-0.11	0.02	0.05	1.16
Fish	0.60	0.40	0.21	0.05	-0.19	-0.31	0.60
Other	-0.19	-0.25	-0.23	0.04	-0.34	-0.09	1.64

Source: Own elaboration based on Kantar Worldpanel data

⁶² A positive value shows that demand changes in the same direction as (e.g.) price, a negative value that it changes in the opposite direction; a bigger value indicates a greater degree of responsiveness.

Appendix 4 – Historic Export Summary

	Non EU			EU		
	Total	Carcases	Cuts	Total	Carcases	Cuts
2006	0.8kt	0.2kt	0.6kt	86.3kt	74.4kt	11.9kt
2007	0.7kt	0.1kt	0.6kt	68.1kt	58.4kt	9.7kt
2008	1.2kt	0.1kt	1.2kt	85.6kt	74.1kt	11.5kt
2009	2.5kt	0.1kt	2.4kt	93.6kt	80.1kt	13.5kt
2010	4.1kt	0.1kt	4.0kt	84.9kt	68.7kt	16.2kt
2011	5.8kt	0.7kt	5.1kt	90.6kt	74.3kt	16.2kt
2012	8.8kt	1.9kt	6.9kt	73.0kt	59.5kt	13.5kt
2014	12.5kt	1.6kt	10.9kt	74.6kt	49.0kt	25.6kt
2015	4.0kt	0.7kt	3.3kt	75.3kt	51.7kt	23.6kt
2016	3.3kt	0.4kt	2.9kt	74.9kt	51.1kt	23.8kt
2017	5.4kt	0.7kt	4.7kt	84.4kt	55.3kt	29.0kt
2018	4.1kt	0.5kt	3.5kt	79.1kt	52.0kt	27.1kt

Source

Appendix 5 – Trade data

Table 12 UK sheepmeat trade by key countries (2018)

Region	Country	Mass			Value		
		Export (t)	Import (t)	Balance (t)	Export (£)	Import (£)	Balance (£)
EU	Irish Republic	9,990t	-7,955t	2,035t	£31M	-£26M	£5M
	Italy	3,479t	-22t	3,456t	£17M	-£9M	£8M
	Netherlands	5,342t	-1,769t	3,573t	£21M	£0M	£21M
	Belgium	7,941t	-42t	7,899t	£44M	£0M	£44M
	Germany	15,894t	-156t	15,738t	£65M	-£1M	£64M
	France	36,682t	-1,005t	35,677t	£167M	-£3M	£164M
RoW	New Zealand	23t	-56,855t	-56,832t	£0M	-£275M	-£275M
	Australia	25t	-9,699t	-9,674t	£0M	-£47M	-£47M
	Iceland	0t	-1,360t	-1,360t	£0M	-£4M	-£4M
	Hong Kong	3,817t	0t	3,817t	£7M	£0M	£7M
ALL EU		82,137t	12,204t	69,934t	£359M	£43M	£316M
ALL RoW		5,655t	69,404t	-63,750t	£15M	£332M	-£317M
ALL TRADE		87,792t	-81,608t	6,184t	£374M	£375M	-£1M

Data extracted from HMRC's Trade Info (March 2019)

Table 13 UK sheepmeat trade by mass 2018

<i>(- represents imports)</i>	Export to EU	Export to RoW	Import from EU	Import from RoW	Balance
Frozen sheep legs	243t	61t	-102t	-15,927t	-15,726t
Fresh or chilled sheep legs	1,041t	0t	-1,008t	-15,711t	-15,678t
Frozen meat of lambs, boneless, frozen	1,769t	373t	-2,468t	-8,441t	-8,767t
Other frozen cuts of sheep, with bone in	1,412t	2,016t	-1,057t	-6,621t	-4,249t
Frozen meat of sheep, boneless (excl. lamb)	522t	26t	-1,093t	-3,376t	-3,921t
Frozen edible offal of sheep and goats	2,932t	23t	-356t	-6,514t	-3,914t
Fresh or chilled boneless cuts of sheep	4,091t	27t	-1,965t	-5,854t	-3,701t
Frozen lamb carcasses and half-carcasses	12t	3t	-65t	-983t	-1,034t
Frozen sheep chines and/or best ends	484t	305t	-185t	-684t	-80t
Frozen sheep carcasses and half-carcasses (excl. lambs)	18t	67t	-65t	-69t	-48t
Frozen sheep short forequarters	192t	1,457t	-905t		744t
Fresh or chilled sheep chines and/or best ends	2,534t	4t	-71t	-1,641t	826t
Fresh or chilled edible offal of sheep and goats	606t	1,592t	-1,007t		1,191t
Fresh or chilled sheep short forequarters	5,818t	44t	-327t	-1,019t	4,516t
Other fresh or chilled boneless cuts of sheep, with bone in	7,637t	66t	-467t	-97t	7,141t
Fresh or chilled sheep carcasses and half-carcasses (excl. lambs)	12,270t	291t	-239t		12,322t
Fresh or chilled lamb carcasses and half-carcasses	39,426t	463t	-1,511t		38,379t
All	82,137t	5,655t	-12,204t	-69,404t	6,184t

Data extracted from HMRC's Trade Info (March 2019)

Table 14 UK sheepmeat trade by mass 2018

<i>(- represents imports)</i>	Export to EU	Export to RoW	Import from EU	Import from RoW	Balance
Fresh or chilled sheep legs	£6.7M	£0.0M	-£6.8M	-£91.1M	-£91.1M
Frozen sheep legs	£1.0M	£0.2M	-£0.5M	-£74.8M	-£74.1M
Frozen meat of lambs, boneless, frozen	£8.4M	£1.0M	-£7.4M	-£33.9M	-£31.9M
Fresh or chilled boneless cuts of sheep	£23.1M	£0.2M	-£6.6M	-£40.6M	-£23.9M
Other frozen cuts of sheep, with bone in	£8.2M	£3.8M	-£4.9M	-£28.2M	-£21.2M
Frozen meat of sheep, boneless (excl. lamb)	£2.2M	£0.1M	-£5.1M	-£14.7M	-£17.5M
Frozen edible offal of sheep and goats	£1.3M	£3.1M	-£0.3M	-£12.2M	-£8.0M
Frozen lamb carcasses and half-carcasses	£0.0M	£0.1M	-£0.2M	-£3.7M	-£3.8M
Frozen sheep chines and/or best ends	£3.0M	£0.5M	-£1.1M	-£4.7M	-£2.3M
Frozen sheep carcasses and half-carcasses (excl. lambs)	£0.1M	£0.2M	-£0.4M	-£0.2M	-£0.3M
Fresh or chilled edible offal of sheep and goats	£4.4M	£0.0M	-£1.2M		£3.2M
Frozen sheep short forequarters	£0.7M	£5.8M	-£2.4M		£4.1M
Fresh or chilled sheep chines and/or best ends	£17.4M	£0.0M	-£0.4M	-£12.5M	£4.5M
Fresh or chilled sheep short forequarters	£25.2M	£0.4M	-£1.3M	-£4.9M	£19.3M
Other fresh or chilled boneless cuts of sheep, with bone in	£30.9M	£1.4M	-£2.1M	-£0.4M	£29.8M
Fresh or chilled sheep carcasses and half-carcasses (excl. lambs)	£57.2M	£0.3M	-£0.7M		£56.8M
Fresh or chilled lamb carcasses and half-carcasses	£165.8M	£2.9M	-£3.3M		£165.3M
All	£358.9M	£15.0M	-£43.0M	-£332.1M	-£1.3M

Data extracted from HMRC's Trade Info (March 2019)

Appendix 6 – New Zealand Farm^{IQ}

Table 15 New Zealand Farm^{IQ} project summary

Project name	Objective of project
Programme management and key indicators	To ensure that projects and sub projects all work toward achieving the key performance indicators. These indicators will be a measure of the successful implementation of the programme as a whole.
Market analysis	To develop capability to identify and understand markets which are willing and able to pay a premium for quality products and develop products to meet their individual specifications.
IT and database	To be a catalyst for the establishment and operation of a data collection and analysis mechanism able to support animal specific performance analysis.
Genetics	To develop new genetic and genomic capabilities to enable the identification, isolation, and selection of desired animal traits to improve the ability to produce products to customer/consumer specification.
Processing	To put in place the necessary traceability infrastructure and develop new technologies and capabilities to enable meat yield and quality information to be collected during processing.
Farm productive capacity	To drive improved on-farm production and performance through best practice production systems, capturing data (both farm and animal centric) and aligning this with the integrated value chain.

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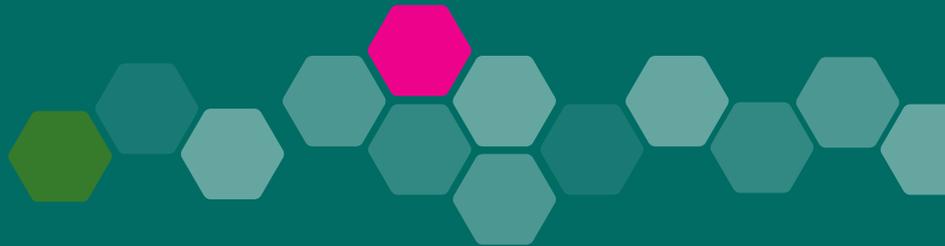
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