THE SCOTTISH RED MEAT SECTOR ECONOMIC IMPACT REPORT 2023

Report by Andrew Moxey, Steven Thomson, Kev Bevan

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E1. Red meat is a key element of Scotland's agri-food sector. On-farm production of beef cattle, pigs and sheep had an estimated value of c.£1.27bn in 2020, representing c.37% of total agricultural output. Farm labour associated with this production was c.31,000, deployed across more than 20,000 farm holdings.

ON-FARM

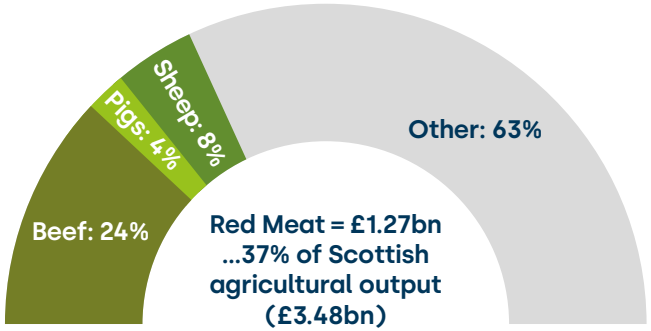
BREEDING HERD

413K
SUCKLER COWS
(-10.5%, 2012-21)

32K
SOWS
(+2.8%, 2012-21)

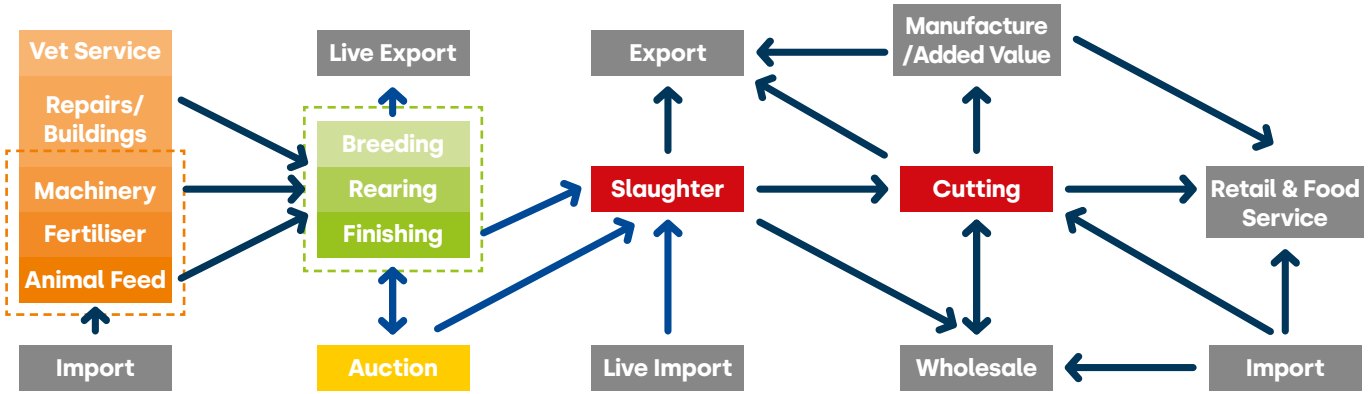
2.6m
EWES
(-2.2%, 2012-21)

FARMGATE OUTPUT*

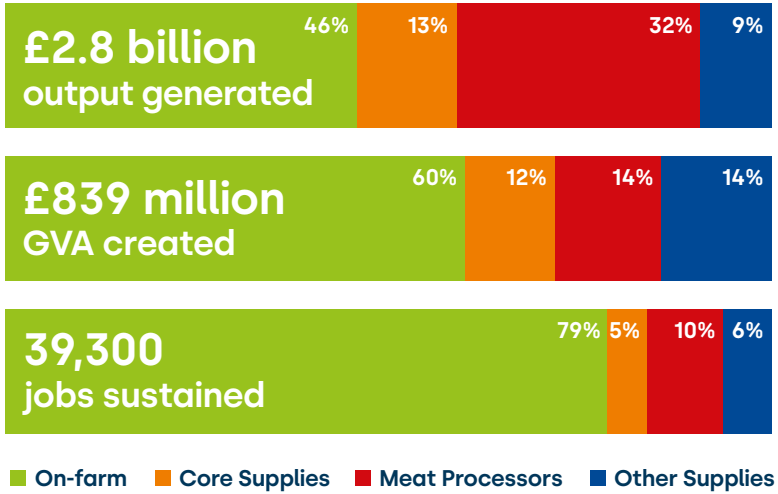


Economic Impact of Scotland's Red Meat Sector

SUPPLY CHAIN



ECONOMIC IMPACT*



ON-FARM
- 31,200 workforce
- £1.3bn output at £41k per worker
- £504m GVA at £16k per worker

CORE SUPPLIES
- 2,000 workforce
- £361m output at £179k per worker
- £98m GVA at £49k per worker

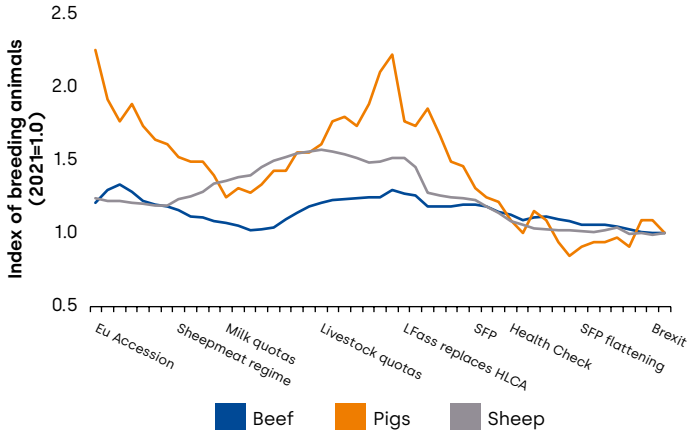
MEAT PROCESSORS
- 3,880 workforce
- £885m output at £228k per worker
- £119m GVA at £31k per worker

OTHER SUPPLIES
- 2,200 workforce
- £252 output at £114k per worker
- £118m GVA at £53k per worker

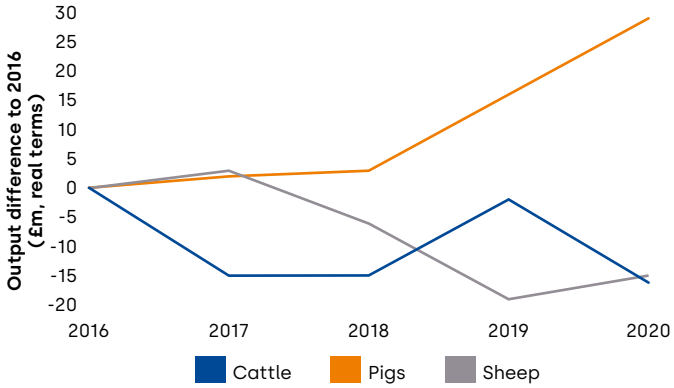
Created by: S. Thomson, A Moxey & K.Bevan (2023) *see report for specified dates for farmgate and multiplier economics

E2. Upstream suppliers and downstream abattoirs add to these figures, raising the estimated overall output of the Scottish red meat sector to c.£2.8bn in 2020, of which c.£0.8bn is GVA, and red meat employment to c.39,000. These values are summarised in the infographic above but are lower-bound estimates since downstream activity beyond abattoirs (e.g., food service, retailing) is not accounted for due to data limitations.

E3. However, as the graph below shows, June breeding livestock numbers of red meat species are at or close to their lowest level since 1973 when the UK joined what later became the European Union (EU). This decline reflects a number of factors, including changes to the nature of agricultural support and, more recently, market volatility following the UK's departure from the EU and events in Ukraine.



E4. Lower livestock numbers have led to lower ruminant red meat production on farms. For example, as the graph below shows, relative to the previous version of this report published in 2016, output has fallen (in real terms, adjusted for inflation) by c.£16m for cattle and by c.£15m for sheep but pig production is up by c.£29m. On-farm GVA from red meat production has declined by c.£14m and on-farm jobs for red meat production have reduced by c.550 farm jobs on a like-for-like basis with 2016.



E5. Lower livestock numbers also have implications elsewhere across the supply chain. For example, relative to the previous version of this report in 2016, throughput at Scottish abattoirs has fallen by c.10% for cattle and c.8% for sheep (pigs' volumes are about the same), leading to abattoir output and GVA declining (in real terms, adjusted for inflation) by c.£180m and c.£29m respectively. Real-terms output across the sector has fallen by c.£300m and Gross Value Added (GVA) by c.£100m over the same period.

E6. Significant numbers of Scottish livestock move to other parts of the UK for slaughter. For example, Scottish cattle moving directly to slaughter outwith Scotland in 2021 represented c.£65m of lost carcass output value and c.£10m of lost GVA; Scottish pigs represented c.£50m of lost output and c.£6m of lost GVA; and Scottish sheep represented c.£35m of lost output and c.£5m of lost GVA.

E7. Although retaining a proportion of these lost livestock for processing within Scotland would boost the economic contribution of the red meat sector, it would require overcoming peak capacity issues (especially for sheep) and appropriate supply-contracts with (especially) major retail buyers. However, economic performance could also be enhanced through improvements to on-farm efficiency and meeting market demands.

E8. For example, farm-level costs and productivity vary significantly, offering scope for improvement through the adoption of best practice (although care has to be taken over choice and measurement of metrics). Equally, higher prices could be achieved through better meeting abattoir specifications (which themselves could better reflect product traits valued by consumers). In both cases, the potential aggregate gains to GVA could be c.£20m or more.

E9. The scope and need for such improvements are noted in past and current industry strategies (e.g., Beef2020 and Beef2030), and indeed in the 2016 version of this report. However, the urgency for improvement has increased due to the evolving context within which the red meat sector operates.

E10. In particular, the Scottish Government's declaration of a twin climate and nature emergency coupled with new agricultural support arrangements outwith the Common Agricultural Policy (CAP) expose the sector to considerable uncertainty and new challenges. For example, it is widely anticipated that future agricultural support will be conditional upon meeting environmental targets, most notably in relation to greenhouse gas emissions. Improved production efficiencies will be needed to at least partially meet such targets.

E11. However, changes to agricultural support need to acknowledge potential effects along supply chains and across rural communities. This relates to food production and supply, employment, and incomes (as recognised by commitments to a Just Transition) but also to public good ecosystem services such as cultural heritage (e.g., landscapes, traditions, Gaelic language) and maintenance of habitats and biodiversity (e.g., semi-natural habitats, High Nature Value (HNV) farming) that are also underpinned by continued red meat production and consumption.

E12. Moreover, the concentration of production in rural areas means that the local economic contribution of red meat is greater than implied by national or even regional averages. For example, agriculture in remote rural areas accounts for around 34% of VAT or PAYE-registered businesses and about 18% of both employment and turnover, but less than 1% of each in urban areas. Consequently, the impacts of any changes to red meat production will be felt unevenly across Scotland.

E13. Of particular concern is the issue of critical mass. Different parts of the supply chain are reliant upon each other. For example, input suppliers need farms to sell to, just as farms need suppliers to buy from; processors need farms to buy from just as farms need processors to sell to. While transport linkages mean that different parts of the supply chain do not necessarily have to be geographically close to each other, transport costs eat into margins (particularly for bulky inputs and produce) and become prohibitive when geographical dispersion becomes too great. Once critical mass thresholds are breached, parts of local supply chains withdraw and the viability of remaining parts becomes compromised, leading to a potential domino effect as supply chains reconfigure and production relocates.

E14. The prospects over the next five years for the Scottish beef, pig and sheep sectors are dependent on a number of factors, some internal to the sectors and some external. In particular, beyond the domestic policy changes noted above, much depends upon market conditions and resulting input and output prices. For example, how quickly anticipated reductions in input costs from recent highs (especially for feed, fertiliser, and energy) materialise and how consumer demand evolves. The UK's new trading arrangements with the EU and Australasia may also become increasingly influential on market conditions over this period.

E15. Reflecting both population and per capita income growth, global demand for animal proteins is expected to grow over time, particularly in emerging rather than mature markets. While poultry accounts for a large share of this growth, there will be potential opportunities for Scottish red meat producers, either directly through exporting to emerging markets and/or through reduced competition in the domestic market if potential imports are diverted elsewhere.

E16. However, post-Brexit trade deals and global market volatility risk increased domestic competition from imports to the UK. Meeting this challenge will require continued efforts to lower Scottish production costs through efficiency improvements. However, it will also require marketing and branding to

differentiate Scottish produce on the basis of attributes other than price, such as production standards (including carbon footprint), authenticity and eating quality. Sharing of information and best practice together with investment and upskilling across the supply chain will be required to achieve this. QMS has a leading role to play in all of these areas.

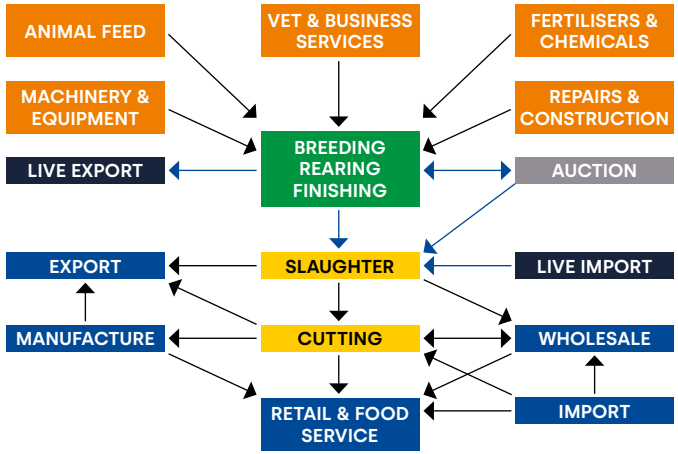
E17. The estimated values presented in this report are, as with the previous version in 2016, subject to various caveats, including differences in the most recent year for which specific metrics are published. As such, they should be treated as indicative rather than definitive estimates. For example, published data sources lack sufficient detail to fully represent all of the nuances of supply chains that encompass trade (both imports and exports) in inputs and outputs with other parts of the UK and further afield. Moreover, the values are lower-bound estimates since they neglect further downstream activities (e.g., manufacturing, catering, retailing) due to a lack of data. Exploration of opportunities to improve access to data availability would be welcome. Nonetheless, the analysis presented here is sufficient to illustrate the primary economic contribution of the Scottish red meat sector.

Introduction

1. This evaluation and assessment of the economic contribution of Scotland's red meat supply chain (beef, sheepmeat and pigmeat) to Scotland's economy nationally and regionally was commissioned by Quality Meat Scotland (QMS) to provide an update to the 2016 report,[1] to reflect changes in the political and operational environments of the sector.

2. The red meat supply chain encompasses on-farm production but also upstream provision of farming inputs and downstream processing of farm products, as shown stylistically in Figure 1. Evaluation of its economic contribution in terms of output, value-added and employment thus needs to consider the activities of, for example, animal feed suppliers, fertiliser (and other chemical) suppliers, vets, hauliers, auction marts and abattoirs plus equipment/machinery suppliers and maintenance/repair trades alongside the farm-level activities producing livestock.

Figure 1: Stylised representation of red meat supply chain[2]



3. Assessment of economic contribution requires information on the number and size of firms operating at particular points in the chain and the degree to which they are engaged primarily in red meat production or are also participating in other supply chains. For example, many farms have a mix of enterprises, some farm vets attend dairy and poultry animals and hauliers may transport other commodities. In addition, information on cost structures is also required if GVA is to be estimated.

4. The Scottish Government produces a number of statistical publications and supporting databases containing relevant information on the red meat sector. On-farm production of livestock is covered in most detail, notably through the Agricultural Census and the Total Income from Farming (TIFF) estimates, but information on upstream and downstream parts of the supply chain is also available via Input-Output (I-O) analysis for the wider economy. Drawing on these publications and databases, plus other information available via QMS, industry stakeholders and academic literature, this report presents an overview of the estimated size and structure of the red meat supply chain in Scotland.

5. Attention is restricted to the coloured portions of Figure 1, namely upstream suppliers (orange), livestock hauliers (blue arrows), farms (green), auction marts (grey) plus downstream slaughterhouses and cutting plants (yellow). Live imports and exports (black) are considered to the extent that they affect the flow of domestic livestock through the Scottish supply chain. In addition, beyond the 'core' supply chain illustrated in Figure 1, red meat production draws upon other inputs such as energy, machinery and construction which also generate output, value added and employment to be included in the analysis.

[1] https://s3.eu-west-2.amazonaws.com/quality-meat-scotland/documents/Publications/economic-contribution-of-scotlands-red-meat-supply chain.pdf

[2] Source: modified from Thankappan & Flynn (2006), Safefood (2008) and Webb (2008).

6. Downstream linkages extend beyond meat processors to, for example, food manufacturers, caterers, and retailers (blue boxes in Figure 1). However, whereas livestock traceability information[3] provides an accurate indication of the utilisation of Scottish on-farm production for domestic primary meat processing, information on the extent to which secondary processing/ manufacturing firms or caterers and retailers are reliant on Scottish sourced-meat is less readily available. This reflects the complex nature of downstream sourcing patterns which mix domestic sources with imported materials from elsewhere in the UK or further afield. Consequently, although some commentary is offered, no attempt is made here to quantify downstream economic effects beyond meat processing and therefore figures presented here represent lower-bound estimates.

7. It is important to note that attempting to construct broadly comparable estimates across the whole supply chain entails recourse to various assumptions and further data manipulation. In particular, data are only available at an aggregate level and activities attributable to red meat have to be disentangled from other on-farm enterprises (e.g., dairy, poultry, arable) but also from other supply chains (e.g., pets, aquaculture) and account for imports and exports. Hence the findings presented, and the manner of their derivation, are illustrative rather than definitive, but are nonetheless offered as reasonable approximations.

8. This report is an update of a report published in 2016, itself an update of an earlier report from 2003.[4] Where possible, the same data sources and methodologies have been used but some changes to the methodology underpinning published statistics plus sampling variation in survey results mean that direct comparisons should be restricted to broad patterns rather than specific estimated values. Moreover, financial comparisons need adjusted for inflation, to express values in real terms. Nonetheless, the updated figures are adequate to illustrate the economic structure and contribution of Scotland's red meat sector. The assistance of Scottish Government RESAS staff in providing additional data is gratefully acknowledged, as is provision of maps by Dave Miller of the James Hutton Institute.

9. Section 1 focuses on livestock numbers and their distribution across different farm types and regions. Section 2 explores how physical production translates into economic output and value added at the farm-level with Section 3 then considering the wider supply chain. Section 4 extends the analysis to consider employment. Section 5 summarises the estimates for the economic contribution of the supply chain. Section 6 then considers the scope for improving performance across the supply chain, to increase value added and employment. Section 7 offers qualitative forecasts for red meat prospects over the next five years, identifying external drivers and opportunities for improvement. Section 8 provides conclusions.

[3] via ScotEID.

[4] See Doyle (2003) and https://s3.eu-west-2.amazonaws.com/quality-meat-scotland/documents/Publications/economic-contribution-of-scotlands-red-meat-supply chain.pdf

Section 1

Section 1: Livestock numbers

10. Livestock production is a fundamental component of Scottish agriculture, reflecting the abundance of grazing resources – a reflection of biophysical constraints and the land capability for agriculture.[5] However, cattle, pig and sheep numbers recorded in the 2021 June Agricultural Census were at or close to their lowest levels since EEC (Figure 2 and Table 1). Moreover, stocking densities in Scotland are not generally as high as in parts of England and Wales.[6]

11. Although other parts of the UK have also experienced changing livestock numbers, the rates of change differ slightly to those in Scotland (Table 2).

12. These trends in breeding numbers are a response to market pressures but also (for cattle and sheep) the switch away from coupled headage payments to (mostly) decoupled support payments. The steepest declines (especially for sheep) followed the introduction of the Single Farm Payment (SFP) in 2005 but the subsequent transition to the Basic Payment Scheme after 2014 also had an effect.

13. Relative to the previous version of this report published in 2016, breeding pig numbers are up slightly (although down from more recent years) but beef cow numbers are down by c.5%

Table 1: Breeding beef cattle, pig and sheep numbers in Scotland, 2012 to 2021[8]

Year	Cattle	Pigs	Sheep
2012	461,684	31,881	2,623,656
2013	446,939	28,784	2,616,166
2014	436,526	30,228	2,604,185
2015	436,766	30,834	2,588,174
2016	436,640	30,958	2,618,341
2017	432,812	32,044	2,660,856
2018	424,250	30,390	2,552,118
2019	417,383	36,164	2,568,018
2020	413,935	35,914	2,537,933
2021	413,444	32,773	2,565,429
2012-2021	-10.5%	+2.8%	-2.2%

[5] See: https://www.hutton.ac.uk/learning/exploringscotland/land-capability-agriculture-scotland

[6] See http://apha.defra.gov.uk/documents/surveillance/diseases/lddg-pop-report-sheep2020.pdf and http://apha.defra.gov.uk/documents/surveillance/diseases/lddg-pop-report-cattle2021.pdf

[7] Source: Derived from pers. comm. Scottish Government (2023), https://www.gov.scot/publications/economic-report-on-scottish-agriculture-tables-2020-edition/ and https://www.gov.scot/publications/abstract-of-scottish-agricultural-statistics-1982-2017/

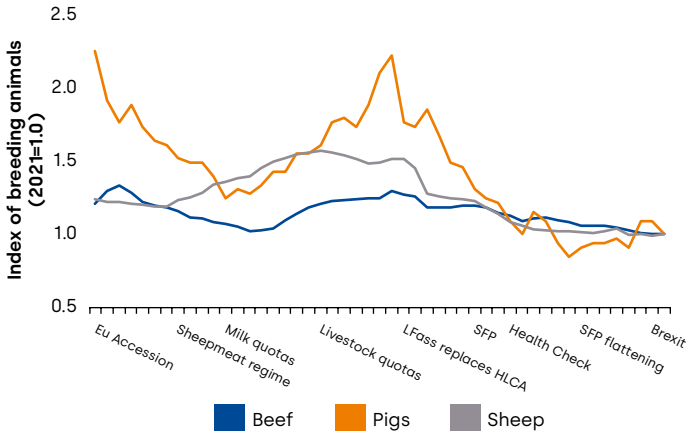
[8] Source: pers. comm. Scottish Government (2023) and https://www.gov.scot/publications/economic-report-on-scottish-agriculture-tables-2020-edition/

[9] Source: https://www.gov.uk/government/statistics/livestock-populations-in-the-united-kingdom

Table 2: Percentage changes in breeding animal numbers, 2012-2021, by UK country[9]

Country	Cattle	Pigs	Sheep
England	-14.3%	-24.1%	+7.9%
Northern Ireland	+2.0%	+34.9%	+8.2%
Scotland	-13.2%	-15.4%	-5.4%
Wales	-16.1%	-41.6%	+12.1%
UK	-13.3%	-18.6%	+6.1%

Figure 2: Breeding numbers over time relative to current position, with selected policy events[7]



and breeding sheep numbers by c.2%, continuing earlier trends.[10] Nevertheless, red meat production remains important and occurs throughout Scotland.

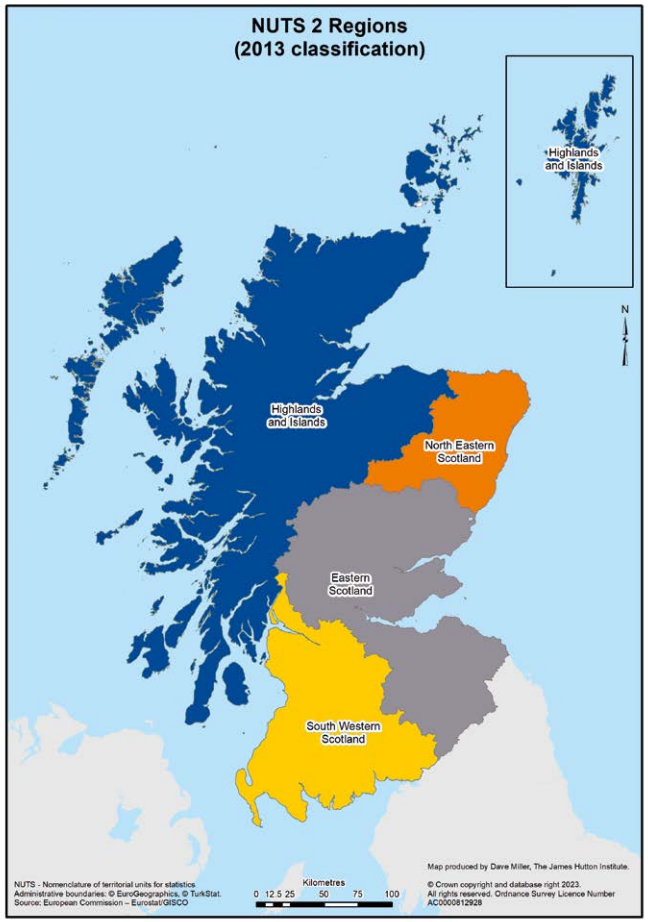
Regional distribution

14. Historically, agricultural statistics have been reported at the regional level using the map shown in Figure 3. The four regions shown are used here to present livestock numbers, but a different five-region split is used in later sections to present financial values.

15. On a regional basis for 2021, the South West had the highest share of breeding cattle (c.38%) and sheep (c.38%) in 2021, while the North East had the highest share of breeding pigs (c.61%) as shown in Figure 4. Stratification of the beef and sheep sectors means that calves and lambs are not necessarily reared on the holding of birth hence the regional distribution of non-breeding animals differs slightly from that of breeding animals – reflecting the spatial concentration of rearer and finishing units.

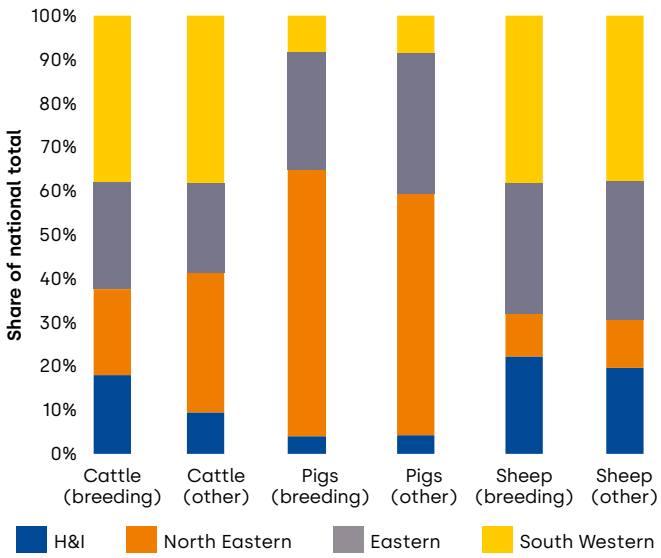
16. For example, in 2021 the share of non-breeding cattle found in the H&I (c.10%) was significantly lower than for breeding animals (c.18%) while the North East had a disproportionately large proportion of other cattle (c.32%) compared to breeding cattle (c.20%) that reflects its regional specialism in beef finishing. A similar, but less dramatic pattern was revealed for sheep, albeit the

Figure 3: Map of agricultural regions[11]



data used tend to reflect regional differences in lambing rates rather than capturing the autumn sales and purchases of store lambs, and hence under-represents seasonal movements. Pig production is characterised

Figure 4: Regional distribution of breeding and non-breeding animals in 2021[12]



by a degree of vertical integration and closer proximity between weaner and finisher units, but there is still a difference between breeding and non-breeding numbers in the North East and in the South East. Productivity improvements over time increase the ratio of non-breeding animals to breeding animals.

[10] NB. Due to within-year variation, results from the December Agricultural Survey (as used in the QMS Red Meat Industry Profile) give slightly different values but show similar patterns.

[11] Source: map supplied by Dave Miller of the James Hutton Institute.

[12] Source: derived from pers. comm. Scottish Government (2023).

Farm-type distribution

17. The structural distribution of livestock by farm type is also uneven. This reflects the co-existence of different activities on many farms (noting that farm type is based on the predominant[13] rather than an exclusive enterprise). For example, although the majority of beef cattle, pigs and sheep are found on specialist livestock farms, some are found on other farm types. Equally, specialist cattle, pig or sheep farms are not necessarily restricted to their specialism alone but can host other animal and crop enterprises.

18. Although the national beef breeding herd is concentrated on specialist cattle farms, beef cows are found on a variety of other farm types, albeit mostly in relatively small numbers (see Figure 5). In aggregate, the national beef breeding herd was distributed across c.8,400 holdings in 2021 – of which specialist LFA cattle and sheep holdings account for 70% of holdings and 72% of the cows. Non-LFA cattle and sheep holdings account for around 9% of the beef breeding herd, mixed holdings for over 14%.[14]

19. For other cattle (calves, bulls, finishing stock, etc.), the LFA cattle and sheep holdings accounted for 62% of holdings with such cattle but a lower share (47%) of actual animals in 2021. Non-LFA cattle and sheep holdings each accounted for around 20% of non-breeding cattle. This reflects the stratified movement of some animals from breeding holdings to finishing holdings. Dairy holdings accounted for around 5% of other beef cattle (almost all in the South West), although cross-bred calves and redundant heifers will also add to the overall finishing stock elsewhere (over 65k dairy-born animals are finished as beef animals per year).[16]

20. Overall, slightly more holdings (c.8,850) are involved in finishing than breeding but evidence from Thomson et al (2020) reveals heavy concentration within the finishing sector – c.53% of all prime cattle are finished by only 250 of the largest farms (with 82% accounted for by 20% of producers supplying abattoirs with prime cattle).

21. For breeding pigs, Figure 6 shows that although specialist holdings dominated in terms of pig numbers (61%) in 2021, mixed holdings also accounted for a high share (34%). Small numbers of pigs occur across almost all farm types; of the 482 holdings with breeding pigs, only 30% were classified as specialist pig holdings by the Scottish Government (but these account for the vast majority of pigs).

22. A similar picture emerges for fattening pigs with animals being found on almost all farm types but only in significant numbers on specialist units and mixed holdings.[17] More holdings (1,123) were engaged in fattening than breeding.

Figure 5: Distribution of breeding and other beef cattle, by region and farm type 2021[15]

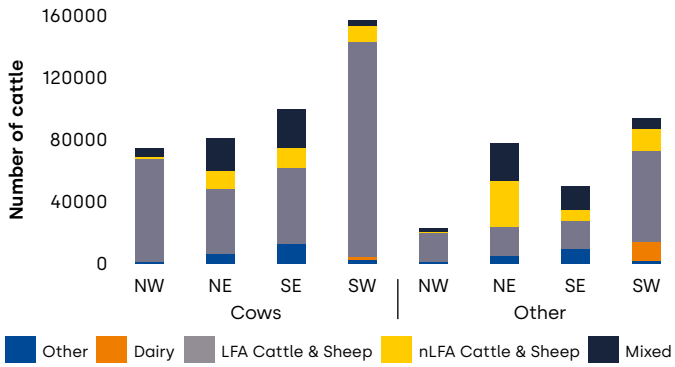
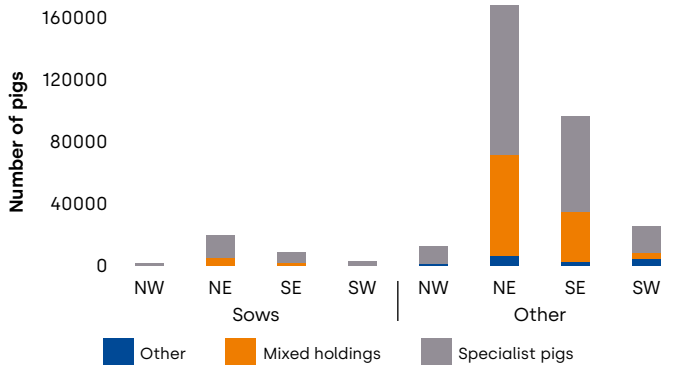


Figure 6: Distribution of breeding and other pigs, by region and farm type 2021[18]



[13] At least 66% of standard output must come from specified activities to be classified within that farm typology.

[14] It should be noted, however, that farm businesses can comprise more than one holding and therefore may not have the same farm type as an individual holding.

[15] Source: derived from pers. comm. Scottish Government (2023).

[16] https://pure.sruc.ac.uk/ws/portalfiles/portal/37065672/FinishingCattleFinalVAmendedFinishers.pdf

[17] Of these, most have significant arable land reflecting use of home-grown feed: over 80% of pigs on mixed holdings are on holdings with more than 100ha of cereals.

[18] Source: derived from pers. comm. Scottish Government (2023).

23. For sheep, although breeding ewes are found in small numbers across other farm types, LFA cattle and sheep farms dominate both in terms of holdings with ewes and actual ewe numbers in 2021 (Figure 7). The same was true of other sheep.

Size distribution

The size distribution of breeding herds and flocks is also somewhat uneven, with the majority of herds/flocks being small but collectively only accounting for a low proportion of total animals in contrast to the relatively few larger herds (particularly for pigs) and flocks which account for the majority of animals (Figure 8). For example, 60% of beef herds collectively accounted for just over 15% of beef cows, 60% of flocks account for less than 10% of ewes and 60% of pig herds account for around 2% of sows in 2021.

Summary

24. To summarise, beef cattle, pigs and sheep are farmed widely across Scotland. Each species is found to some degree on all farm types, but in each case, numbers are concentrated on specialist holdings. Herd/flock sizes vary considerably, with small sizes being most common but accounting for a small proportion of animals relative to that found in fewer but larger herds/flocks. The distributions of breeding and finishing animals differ, with some farms (and by extension regions) hosting both equally but others favouring one or the other. Breeding and total livestock numbers have reduced significantly over the past decade.

25. Overall, red meat livestock are found on over 20,000 of the approximately 50,000 holdings in Scotland. Of these, over 14,800 are LFA specialist cattle and sheep holdings, around 2,700 non-LFA cattle and sheep holdings and nearly 300 specialist pig holdings, meaning that approaching one-third of all holdings are primarily engaged in producing animals for the red meat supply chain. This is similar to the position noted in the previous version of this report published in 2016.

Figure 7: Distribution of ewes and other sheep, by region and farm type 2021[19]

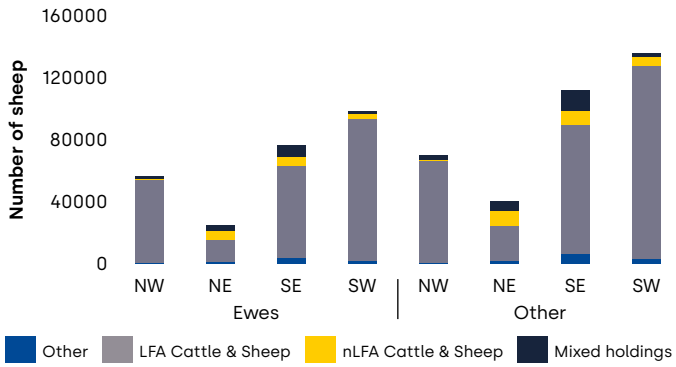
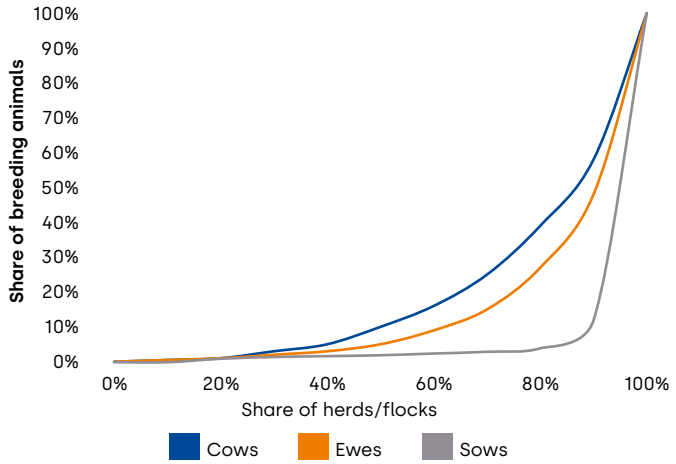


Figure 8: Cumulative distribution of breeding animals against cumulative distribution of herds/flocks, 2021[20]



[19] Source: derived from pers. comm. Scottish Government (2023).
[20] Source: derived from pers. comm. Scottish Government (2023).

26. This wide distribution of red meat production is even more pronounced if farm businesses rather than farm holdings are used as the unit of analysis (Table 3). Specifically, there are around 17.8k farm businesses in receipt of direct support payment, of which around 10.4k are LFA cattle and sheep farms and 1.2k are non-LFA cattle and sheep farms. This alone suggests that almost two-thirds of farm businesses are involved in red meat production, more once other farm types in receipt of payments under livestock envelopes are included.[21]

27. The next section considers how this structural and geographical prevalence of red meat production translates into economic output, value added and income for agriculture.

Table 3: Number of business recipients of payments through sectoral support envelopes by farm type, 2019[22]

Farm type	Beef envelope	Sheep envelope	All direct payments
Other	606	462	4,080
Specialist pigs	15	18	55
Dairy	602	141	621
LFA Cattle & Sheep	6,517	8,090	10,393
Non-LFA Cattle & Sheep	878	680	1,228
Mixed	1,058	732	1,473
Scotland	9,676	10,123	17,850

[21] This business-level analysis was not available in 2016.

[22] Source: https://www.gov.scot/publications/estimation-sectoral-cap-payment-envelopes-2019/documents/

Section 2

Section 2: Agricultural output, value added and income

28. Livestock numbers are physical measures of activity but need to be combined with prices to generate output values. Table 4 summarises output values (expressed in real terms using 2020 prices (deflated using Defra's agricultural price index) from the three species over the period 2012 to 2020 (the latest year for which figures are available).[23]

29. Year-on-year changes reflect a combination of price volatility and changing livestock numbers, with modestly rising prices (some of which may reflect improved quality as well as supply and demand interactions) partially counteracting falling headage numbers in recent years.

30. As a proportion of total agricultural output real value, the red meat sector's share has varied between c.36% and c.39% over this period, with cattle accounting for over two-thirds of this throughout.

Table 4: Real terms output values (£m, 2020 prices) and shares (%), 2012 to 2020[24]

Year	Cattle		Pigs		Sheep		Red Meat	All agriculture
	Value	Share	Value	Share	Value	Share	Share	Value (100%)
2012	£844m	27.1%	£89m	2.9%	£275m	8.8%	38.8%	£3,111m
2013	£808m	25.7%	£77m	2.5%	£266m	8.5%	36.7%	£3,141m
2014	£890m	26.5%	£95m	2.8%	£273m	8.1%	37.4%	£3,365m
2015	£863m	25.3%	£106m	3.1%	£279m	8.2%	36.6%	£3,412m
2016	£865m	26.0%	£110m	3.3%	£305m	9.1%	38.4%	£3,332m
2017	£850m	24.3%	£112m	3.2%	£308m	8.8%	36.3%	£3,499m
2018	£850m	24.5%	£113m	3.3%	£299m	8.6%	36.4%	£3,464m
2019	£863m	24.4%	£126m	3.6%	£286m	8.1%	36.1%	£3,536m
2020	£849m	24.4%	£139m	4.0%	£290m	8.3%	36.7%	£3,479m

[23] The Economic Report on Scottish Agriculture was last published by the Scottish Government in 2020 (for 2019 data), although a pers. comm. provided an extra year's data.

[24] Source: derived from pers. comm. Scottish Government (2023) and https://www.gov.scot/publications/economic-report-on-scottish-agriculture-tables-2020-edition/ and https://www.gov.uk/government/statistics/agricultural-price-indices

31. Relative to the previous version of this report published in 2016, red meat output is approximately the same in real terms – although a lower proportion of total agricultural output due to growth elsewhere (Figure 9). Within this, pig output is up by c.£29m but cattle output is down by c.£16m and sheep output is down by c.£15m. This is consistent with the trends in livestock numbers reported in Section 1.

32. Figure 10 reveals regional variation in the relative importance of red meat (e.g., higher [56%] in the Highlands and Islands where poorer land quality precludes other enterprises) and also the regional contribution to overall output (e.g., highest in Southern Scotland c.£500m and 43%). However, the contribution of store production is not fully captured by published regional data, thereby under-representing the output value of (especially) the Highlands and Islands.[25]

33. Whereas livestock numbers were presented using a four-way regional split, output values are presented using a newer five-way split as shown in Figure 11. Note: Confusingly, South Western Scotland is also known as West Central Scotland.

Figure 9: Summary of changes in output from livestock farming by species since 2016

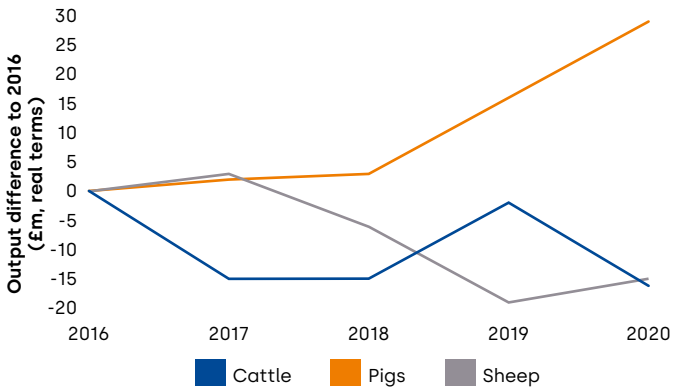


Figure 10: Regional red meat output (£m) and share (%) of total regional agricultural output, 2020[26]

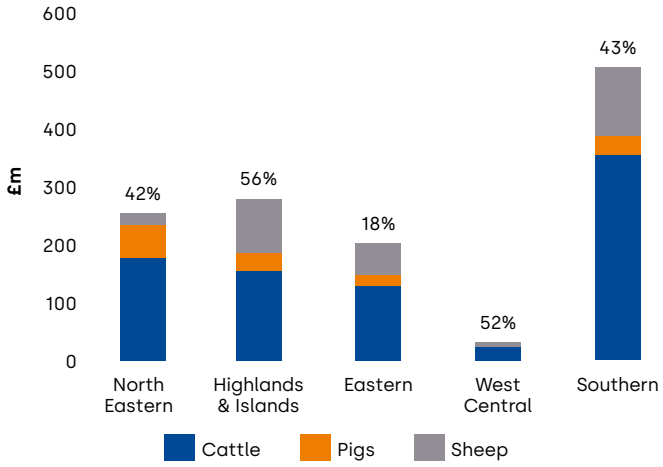
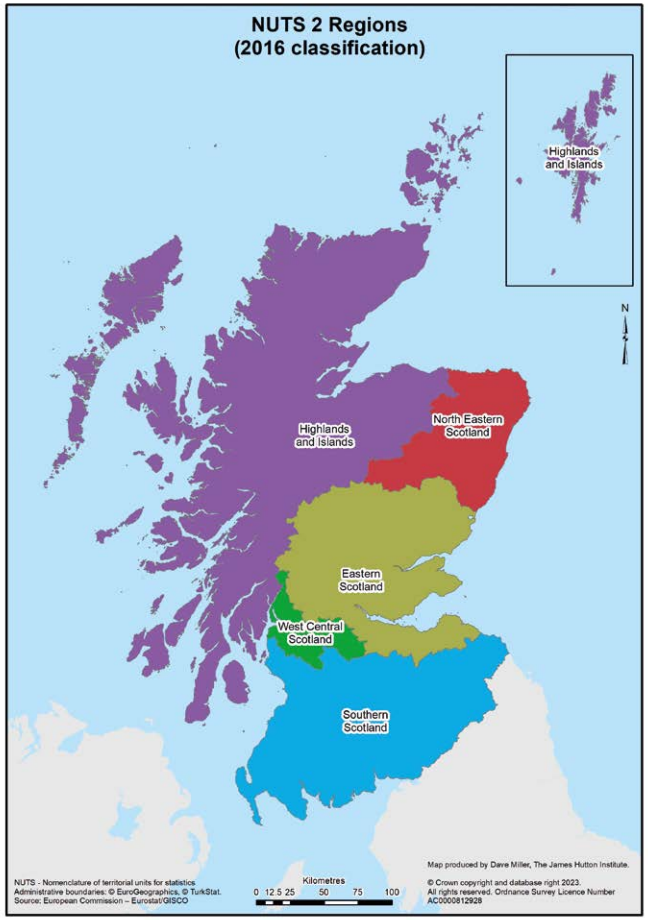


Figure 11: Map of five region-split of Scotland[27]



[25] This was noted previously in the 2016 report. In principle, regional store production could be better estimated using traceability data.

[26] Source: derived from pers. comm. Scottish Government (2023).

[27] Source: map supplied by Dave Miller of the James Hutton Institute.

Estimating value added

34. Although output levels are of interest, the act of production incurs costs which must be deducted to determine value added. For example, the consumption of intermediate inputs such as animal feed, energy and veterinary services must be accounted for to estimate GVA. Net Value Added (NVA) is then calculated by making further allowances for the consumption (depreciation) of fixed capital such as machinery, buildings, and breeding livestock.

35. Once such costs are considered, the estimated total output in 2020 of c.£3.5bn for all of Scottish agriculture equated to a GVA of c.£1.4bn and NVA of c.£0.9bn (excluding support payments). Including support payments raised NVA to c.£1.4bn and results in a TIFF estimate of c.£0.8bn.

36. Unfortunately, although red meat output is identified separately within the official statistics, the costs (and therefore value-added and income associated with red meat production) are not. This reflects the way that costs are recorded and reported on a whole farm basis rather than commodity or enterprise type, meaning that costs (particularly overhead costs) are not allocated to specific production activities.

37. However, it is possible to use some additional information and assumptions to estimate how costs are distributed across production activities, and hence to estimate value added and income for red meat production. Such estimates should be viewed as indicative approximations rather than definitive facts but are the best available in the absence of a specific survey exercise.

38. Table 5 presents estimates based on pro rata allocation by output shares. The results suggest 2020 GVA for on-farm red meat production of c.£500m, approximately the same (lower by C.£14m in real terms) as reported in the previous version of this report published in 2016. NVA and TIFF estimates are, however, lower – possibly reflecting changes in agricultural support payments, volatility in capital items costs and/or methodological changes underpinning published data.

Table 5: Estimated red meat output, value added and TIFF (£m), by region 2020[28]

	North Eastern	Highlands & Islands	Eastern Scotland	West Central	Southern Scotland	All of Scotland
Output	£256m	£280m	£204m	£32m	£507m	£1,279m
Input	£145m	£201m	£106m	£20m	£304m	£775m
GVA	£111m	£79m	£98m	£13m	£203m	£504m
Capital consumption	£46m	£75m	£49m	£9m	£148m	£329m
NVA	£65m	£4m	£49m	£3m	£54m	£175m
Support payments	£30m	£71m	£19m	£6m	£73m	£199m
TIFF	£62m	£15m	£27m	£3m	£56m	£163m

Summary

39. To summarise, red meat output has fluctuated over time as both prices and physical production levels have varied but remains an important component of the larger agricultural economy, accounting for over 36% of national farming output. Reflecting differences in farming structures, the relative economic importance of on-farm red meat production varies regionally, being lower in Eastern Scotland but higher everywhere else – most notably in the Highlands and Islands. The next section extends analysis to upstream and downstream portions of the supply chain.

[28] Source: derived from pers. comm. Scottish Government (2023).

Section 3

Section 3: Wider output and value added

40. The preceding two sections considered only on-farm production, drawing on the relatively detailed information collected through the Agricultural Census and the Farm Business Survey. However, neither of these extend beyond the farmgate.

Downstream meat processing

41. As highlighted in Figure 1, meat processing is a key component of the red meat sector. Within Scotland, 21 red meat slaughterhouses were licensed in 2023, of which 17 handled cattle, 16 sheep and 10 pigs. However, throughput is highly concentrated, with c.75% of cattle, c.95% of sheep and c.98% of pigs handled by (up to) the five largest abattoirs in each case.[29]

42. QMS reported output from red meat abattoirs of £885m in 2021.[30] This is approximately the same in nominal terms as estimated in the previous version of this report published in 2016, equating to a real-terms reduction of c.£180m (once inflation is accounted for). It compares with a 2019 figure (the latest year available) from the Scottish I-O table of c.£1,290m for all meat processing in Scotland, implying that red meat abattoirs account for c.70% of Scottish processing.

43. The remaining c.30% output reflects non-red meat (e.g., poultry, game) slaughterings plus, importantly, other secondary meat processing (e.g., cutting, mincing) by non-abattoirs, of which 66 were licensed in Scotland in 2023. Data on the specific red meat sourcing patterns of the latter are not readily available, but the I-O tables suggest that they take c.£50m (c.4%) of total Scottish abattoir output for further processing.

44. QMS further reports that output from red meat abattoirs was predominantly sold to multiple and independent retailers. This pattern has strengthened over time for beef and pigmeat but has shrunk slightly for sheepmeat where wholesale outlets have grown in relative importance (Table 6). However, food manufacturing and food service/catering have declined in relative importance for all three species – partly reflecting changes brought about from the Covid-19 pandemic and the move towards greater at-home eating.

45. However, only c.25% of abattoir output was actually sold within Scotland – the majority (68%) being exported to the rest of the UK and a smaller (7%) fraction being exported abroad (Table 7). This is approximately the same headline shares as in 2016 because the pattern of beef (which dominates overall) sales has remained relatively constant – yet

Table 6: Share (%) of first point of sale for Scottish abattoir output, by species and year[31]

Sector	Beef		Pigmeat		Sheepmeat	
	2016	2021	2016	2021	2016	2021
Multiple retailers	53%	69%	38%	61%	86%	65%
Independent retailers	9%	6%	28%	14%	2%	9%
Wholesalers	12%	10%	10%	9%	5%	23%
Food manufacturers	18%	7%	8%	6%	4%	2%
Food service/ catering	9%	6%	16%	9%	5%	1%

Scottish sales of sheepmeat have risen in relative importance as exports to the rest of the world have fallen (and possibly because of greater use of wholesalers) while pigmeat sales in Scotland have fallen in favour of sales to the rest of the UK.

[29] https://samw.org.uk/members-new/, https://s3.eu-west-2.amazonaws.com/quality-meat-scotland/documents/Publications/qms_red_meat_industry_profile_2022_wr.pdf

[30] https://www.qmscotland.co.uk/sites/default/files/qms_red_meat_industry_profile_2022_wr.pdf

[31] Source: derived from https://s3.eu-west-2.amazonaws.com/quality-meat-scotland/documents/Publications/qm2893_red_meat_industry_profile_0817_single.pdf, https://s3.eu-west-2.amazonaws.com/quality-meat-scotland/documents/Publications/qms_red_meat_industry_profile_2022_wr.pdf

Table 7: Share (%) of Scottish abattoir output by destination, by species and year[32]

	Beef		Pigmeat		Sheepmeat		All	
Destination	**2016**	**2021**	**2016**	**2021**	**2016**	**2021**	**2016**	**2021**
Scotland	23%	26%	66%	24%	13%	22%	23%	25%
Rest of UK	71%	68%	33%	76%	62%	65%	68%	68%
Rest of World	7%	6%	1%	1%	23%	13%	10%	7%

46. Again, these estimates are broadly consistent with Scottish I-O table figures for all meat processing (i.e., red, and white) which show a high level of exports to the rest of the UK (c.£925m) and abroad (c.£100m). However, the I-O tables also show significant imports, raising total supply of meat processing outputs within Scotland to c.£2,630m relative to Scottish household consumption of c.£1,585m.

47. The species-composition of meat processing exports and imports within the I-O tables is unknown, but exports will likely be predominantly of beef and sheepmeat (for which domestic production greatly exceeds domestic consumption) while imports will predominantly be of poultry and pigmeat (for which domestic consumption exceeds domestic production). However, given the complexity of (especially) retail supply chains and different market preferences for different cuts of meat, cross-border flows will occur in both directions for all species – indeed the majority of Scottish pigmeat (76%) is now sold into the rest of the UK. Similarly, over half of Scottish lambs are slaughtered outwith Scotland, yet some lambs are imported into Scotland for slaughter as are some carcasses for secondary processing.

48. Simultaneous imports and exports hinder quantification of the uniquely Scottish elements of supply chains. For example, secondary processors in Scotland may be importing red meat from outwith Scotland for further processing and for subsequent sale within Scotland and/or for export. Nonetheless, the QMS figure of red meat abattoir output of £885m may be taken as an indicative output estimate. Pro-rata, from the I-O table GVA estimate for all meat processing, this implies red meat processing GVA of c.£119m. Again, this is approximately equal in nominal terms to the value reported in 2016 but translating to a real-terms reduction of c.£29m.

49. In addition, beyond agriculture, meat processing also draws on other sectors of the economy for other input goods and services. For example, energy, haulage, and wholesalers. Pro-rata from I-O figures for all meat processing, Table 8 shows estimated Scottish red meat processing purchases from direct domestic suppliers (other than farms and abattoirs, to avoid double-counting) was c.£116m, with associated upstream GVA of c.£42m ('core' elements in bold).

Table 8: Estimated output and GVA (£m) of suppliers to red meat processing[33]

Sector	Output	GVA
Energy	£7.7m	£2.5m
Haulage	£10.2m	£5.8m
Retailers	£16.8m	£11.2m
Wholesalers	£36.7m	£6.3 m
All other sectors	£44.6m	£13.0m
Totals	**£116.0m (£47.0m)**	**£41.8m (£12.1m)**

[32] Source: derived from https://s3.eu-west-2.amazonaws.com/quality-meat-scotland/documents/Publications/red_meat_industry_profile_2016.pdf, https://s3.eu-west-2.amazonaws.com/quality-meat-scotland/documents/Publications/qms_red_meat_industry_profile_2022_wr.pdf

[33] Source: derived from https://www.gov.scot/publications/about-supply-use-input-output-tables/

Upstream inputs and services

50. Figure 1 also highlights the role of upstream suppliers of inputs and services, including auction marts. Around 30 livestock marts (some only seasonal) operated in Scotland in 2022 with a collective throughput of 2.7m animals (86% sheep, 14% cattle, <1% pigs) with throughput concentrated in the largest 10 marts, reflecting the small and/or seasonal nature of sites in more remote areas, notably the islands.[34]

51. Other identifiably 'core' parts of the red meat supply chain include livestock hauliers, farm veterinary services plus suppliers of animal feeds, fertilisers, machinery/equipment, and repair services. For example, industry sources suggest that in 2023 there were approximately 100 haulage firms with 250 vehicles registered for carrying livestock in Scotland, 200 veterinary practices registered for treating farm animals and 100 feed suppliers.[35]

52. Estimates of aggregate agricultural purchases of input and service supplies are published as part of the Scottish Government's TIFF calculations. For example, in 2020 (the latest year available), expenditure on animal feed was reported as c.£635m, fertiliser as c.£135m and veterinary services as c.£68m.[36]

53. However, not all of these inputs are sourced from within Scotland. For example, I-O table figures show that c.£543m of domestic animal feed production was supplemented by c.£597m of imported animal feed (but also that c.£165m was exported). Indeed, of total input usage by agriculture of c.£2.4bn, c.£1.0bn was imported in 2019.[37]

54. Moreover, the red meat sector only accounts for a proportion of total agricultural input use, which itself accounts for only a proportion of total input usage. For example, the dairy and poultry sectors also utilise animal feed, as do aquaculture and pet food. Similar considerations apply to other inputs, such as fertilisers, seeds, and veterinary services. Consequently, it is necessary to adjust the reported figures to estimate the red meat sector's share of expenditure on domestic inputs. Table 9 summarises such estimates derived pro-rata on the basis of agricultural and red meat output shares, with 'core' chain components highlighted in bold.

55. Summing down the column of estimated GVA arising from supplying farms producing red meat animals in Table 9 suggests GVA of c.£174m in 2019 to add to the previous on-farm GVA total of c.£504m. Of the additional £174m, around c.£86m is from 'core' parts of the supply chain such as animal feed suppliers, auction marts and vets.

Table 9: Estimated output and GVA (£m) of non-farm suppliers to on-farm red meat production, 2019[38]

Sector	Output	Red Meat GVA
Animal Feeds	£84.2m	£11.7m
Chemicals (inc. fert)	£37.1m	£8.6m
Haulage	£23.4m	£13.3m
Pharmaceuticals	£19.0m	£9.6m
Veterinary Services	£33.0m	£14.1m
Wholesalers	£117.3m	£27.9m
All other sectors	£182.8m	£87.8m
Totals	**£579.6m (£314m)**	**£173.6m (£85.8m)**

[34] Pers. comm. IAAS.

[35] Pers. comm. industry, academic and government analysts; also https://www.gov.scot/publications/preliminary-economic-assessment-veterinary-professions-value-scotland/pages/1/

[36] Pers. comm. Scottish Government (2023).

[37] See Combined Use and Industry by Industry figures in Scottish Input-Output Tables (2019) https://www.gov.scot/publications/about-supply-use-input-output-tables/

[38] Source: derived from https://www.gov.scot/publications/about-supply-use-input-output-tables/

56. Table 10 summarises these various results. Relative to estimates presented in the previous version of this report published in 2016, total output across the sector has fallen in real terms by c.£300m and GVA by c.£100m (i.e., although totals have risen in nominal cash terms adjusting for inflation shows that the real value of output has declined).

Summary

57. To summarise, as shown in Figure 1, the red meat supply chain extends both upstream and downstream from the farmgate. Information contained within I-O tables can be used to explore how output and GVA are generated by these different parts of the red meat supply chain.

58. The estimates are necessarily somewhat crude, requiring recourse to assumptions regarding how outputs and value added are attributed across broad categories of activities. Nevertheless, in the absence of more detailed sectoral surveys, the estimates give an indication of the overall size of the supply chain and the relative contribution of its component parts.

59. Including the wider supply chain adds to the on-farm output and GVA figures of £1,279m and £504m estimated in Section 2 to give overall estimates of £2,777m and £839m respectively. Within this, 'core' parts of the supply chain most commonly identified as part of the red meat sector – feed suppliers, fertiliser suppliers, pharmaceuticals, vets, farms, hauliers, auction marts and slaughterhouses – accounted for over 80% (£2,528m and £792m respectively) of the estimated additional economic output and value.

Table 10: Summary of estimated output and GVA across the red meat supply chain

	Core farm suppliers	Other farm suppliers	On-farm production	Core MP suppliers	Other MP suppliers	Meat processing	Total 'core'	Overall Total
Output	£314m	£183m	£1,279m	£47m	£69m	£885m	£2,528m	**£2,777m**
GVA	£86m	£88m	£504m	£12m	£30m	£119m	£721m	**£839m**

60. The upstream figures presented above exclude supplies to other parts of Scottish agriculture and to agriculture outwith Scotland. For example, animal feed supplied to Scottish dairy farms or any farms in England. Moreover, suppliers to agriculture also supply other sectors. For example, animal feed sold to aquaculture, fertiliser sold to forestry, construction, and repairs for multiple sectors. Consequently, the figures presented will under-estimate the total economic activity of Scottish input suppliers (as well ignoring that of suppliers based outwith Scotland).

61. Similarly, the figures presented necessarily under-estimate total downstream economic activity associated with on-farm production since activities beyond meat processing are not considered – and are very challenging to generate. As noted earlier, this is because explicit attribution of, for example, catering and retail activity to specifically Scottish supplies is not possible when using aggregate data on supply chains that span multiple sectors and/or countries. Equally, no account is taken here of further indirect economic activity amongst firms supplying firms that directly supply farms and processors.[39] Consequently, the figures in Table 6 should be regarded as lower-bound estimates relating only to the most readily identifiable unique parts of the Scottish red meat sector.

62. The next section considers employment associated with the estimated output and GVA figures.

[39] In principle, this could be estimated via multiplier analysis but disaggregating results to particular sectors is difficult and results are open to criticism of overclaiming and double counting: reporting lower-bound estimates for parts of the supply chain that can be identified and quantified with reasonable confidence is more appropriate and sufficient to highlight inter-connectedness and dependencies.

Section 4

Section 4: Employment

National on-farm employment

63. In terms of on-farm employment, livestock farming can involve the use of (permanent or casual) hired and/or (unpaid) family labour, in either a part-time or full-time role. These different types of labour are recorded in the agricultural census. However, many farms have a mix of enterprises and labour usage is not reported separately for each one. Consequently, aggregate labour usage figures provide only a crude guide to usage for specific enterprises.

64. For example, although it may be that all farm workers on a farm with any livestock will be involved (however trivially) with livestock at some point over a production cycle, given that many of the herds/flocks are very small and not on specialised holdings the majority of such workers will not be engaged primarily in livestock production. Similarly, while offering a better guide, restricting attention to only specialist holdings will still over-estimate the livestock-specific workforce since even specialist holdings can have non-livestock enterprises (and indeed non-farm enterprises) to which some labour is allocated.

65. Hence the presence of over 67,000 workers on all farms in 2021 (predominantly occupiers and their spouses with paid labour representing around one-third of the total) is an indicative headcount rather than a guide to actual labour usage. The equivalent figure for specialist red meat livestock holdings was around 30,000. Within this, the majority of workers were male, accounting for around 60%.

66. An alternative approach to estimating on-farm labour usage for specific enterprises is to use Standard Labour Requirements (SLRs). SLR coefficients represent an estimate of the labour typically required for a given activity and are derived from various sources, including surveys and economic models. Estimated total regional red meat SLRs by sector are shown in Table 11.

Table 11: SLR estimates of farm labour deployed on beef cattle, pigs and sheep, by region (2021)[40]

Species	NW	NE	SE	SW	Total
Beef cattle	1,901	3,011	3,084	4,574	**12,571**
Pigs	36	571	284	74	**965**
Sheep	3,676	1,864	5,431	6,730	**17,702**
Total	5,613	5,447	8,799	11,378	**31,238**

67. For comparison, the estimated total SLR-derived workforce for all of Scottish agriculture is c.60,000,[41] implying that just over half of on-farm labour usage is devoted to animals for the red meat sector. This proportion is comparable to the share estimated in 2016. Direct comparison of reported headline figures is hindered by a change[42] in the underlying methodology of published data, but accounting for this suggests that on a like-for-like basis on-farm labour usage associated with red meat production has reduced by c.550 farm jobs since 2016.

68. Agricultural labour usage is notoriously difficult to estimate due to the prevalence of self-employment and excessive working hours, as well as variation across farms. Indeed, agricultural employment reported in the I-O tables is approximately half that derived from the June Census.[43] Nonetheless, the latter is used here as a more sectorally-specific data source.

[40] Source: derived from pers. comm. Scottish Government (2023).

[41] SG ERSA C23 https://www.gov.scot/publications/economic-report-on-scottish-agriculture-tables-2020-edition/

[42] Specifically, updated SLR coefficients resulted in the total SLR for all Scottish agriculture increasing from c.45k in 2016 to c.60k in 2021. Consequently, like-for-like comparisons between 2021 and 2016 need to account for this methodological change i.e., the reported 2016 figure is now too low.

[43] This has profound implications for not only estimating size of the farm workforce, but also per head estimates of output and GVA. For example, a lower full-time equivalent job count raises GVA per job closer (albeit still lower than) other parts of the supply chain.

National employment beyond the farmgate

69. Beyond the farm-level, labour is also deployed on a range of activities throughout the wider red meat supply chain. For example, upstream in the manufacture of inputs such as animal feed, pharmaceuticals, and chemicals plus in advisory, haulage and veterinary services – and also in Scottish Government administration, and academic research. Equally, downstream usage of farm outputs creates employment, most notably in the meat processing sector.

70. Unfortunately, specific data on employment across the wider supply chain are not as readily available for agriculture. However, as with output and GVA figures, certain assumptions can be used with I-O data to derive estimates. The estimates summarised in Tables 12 and 13 are again somewhat crude but provide an indication of direct upstream and downstream employment.

71. Overall employment in sectors supplying farms was estimated as c.2,655, of which c.1,637 (61%) are within the 'core' supply chain. Employment in suppliers to processors was estimated at c.1,106 (41%), within which 'core' activities accounted for 375 (14%). I-O data further suggested that red meat processing itself employed around 3,875 people, although industry sources place this slightly lower at 3,100.

72. Table 14 combines the various employment estimates. Hence total employment associated with red meat production is estimated at approximately c.40k.

Table 12: Estimated employment in supply sectors to on-farm red meat production[44]

Supply sector	Red meat jobs
Animal Feeds	98
Chemicals (inc. fert)	57
Haulage	285
Pharmaceuticals	31
Veterinary Services	397
Wholesale	298
All other sectors	1,489
Totals	**2,655 (1,637)**

Table 13: Estimated non-farm employment in supply sectors to red meat processing[45]

Supply sector	Red meat jobs
Haulage	110
Wholesalers	275
All other sectors	721
Totals	**1,106 (375)**

Table 14: Summary of estimated employment across the red meat supply chain

Method	Core farm suppliers	Other farm suppliers	On-farm production	Core MP suppliers	Other MP suppliers	Meat processing	Total 'core'	Overall Total
SLR/I-O	1,637	1,489	31,238	375	721	3,875	37,125	**39,335**

[44] Source: derived from https://www.gov.scot/publications/about-supply-use-input-output-tables/

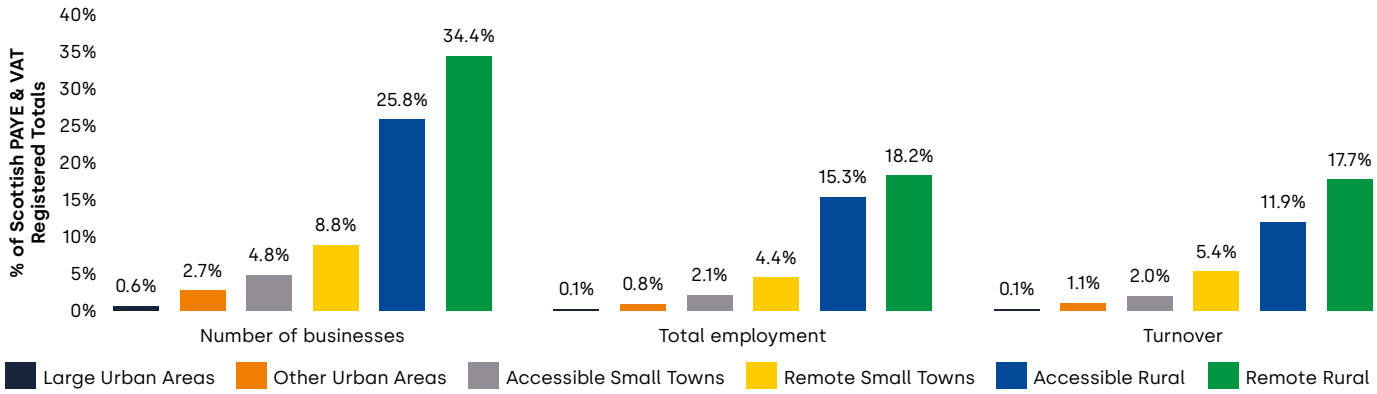
[45] Source: derived from https://www.gov.scot/publications/about-supply-use-input-output-tables/

Local employment

73. Although c.40k is a meaningful number of jobs, at the national level it remains an undeniably small percentage of overall employment (1.56% of 2.56m people in work in Scotland[46]). However, the nature of livestock production means that it is predominantly located in rural areas, meaning that local significance is much higher.

74. For example, whereas agriculture, forestry and fishing accounted for less than 1% of employment in urban Scotland, they represent 12% in Accessible Rural areas and 15% in Remote Rural areas.[47] Moreover, within these averages there will be pockets of even higher concentration – Figure 12 highlights the greater relative share[48] of businesses, jobs and turnover accounted for by agriculture as rurality increases. To an extent, input suppliers and processors will also be predominantly located in rural areas.

Figure 12: Urban-Rural distribution of agricultural activity[49]



75. Of course, much depends on how tightly a local boundary is drawn (e.g., all jobs on an individual farm may relate to livestock, less will do so at a parish level) and on the availability of alternative employment opportunities, but the significance of red meat employment at the local level will be higher than implied by the headline national figures alone.

Summary

76. To summarise, estimation of employment arising from red meat production has to disentangle it from labour usage in other on-farm enterprises and from other closely related supply chains. At the farm-level, this was attempted using SLR coefficients. For upstream and downstream sectors, output shares were used to apportion employment reported in the I-O tables for suppliers and processors, adjusted to account for imports and exports and sense checked by various industry sources.

77. The estimates are necessarily somewhat crude, requiring recourse to various assumptions. Nevertheless, in the absence of more detailed sectoral surveys, the estimates indicate the overall level of employment across the supply chain and the contribution of component parts, with perhaps around 40k jobs being involved in total, of which approaching a quarter are not on-farm.

78. As with output and GVA estimates, the figures presented exclude employment attributable to Scottish input suppliers selling to other parts of agriculture and allied sectors, both within and outwith Scotland. this may at least partly explain why the sum of estimated upstream employment in Table 14 is somewhat less than the figure of c.8,000 cited by some industry sources for all upstream input supply activities.[50]

79. Similarly, again, because further downstream employment in, for example, catering and retail employment are not considered, the figures presented should be regarded as lower-bound estimates. Moreover, the significance of red meat employment at the local level will be greater than implied by the national figures.

[46] ONS Business Register and Employment Survey (2021) accessed through NOMIS.

[47] Source: derived from https://www.gov.scot/publications/rural-scotland-key-facts-2021/documents/

[48] Estimated from firms registered for VAT and/or PAYE, which will exclude some micro-businesses in agriculture but also other sectors.

[49] Source: https://www.gov.scot/publications/businesses-in-scotland-2022/

[50] Derived from an unpublished report of the Farming and Food Production Future Policy Group.

Section 5

Section 5: Other economic contributions

80. The preceding sections have described the contribution of red meat production in terms of market output, GVA and employment. However, the economic contribution of agriculture and livestock extends beyond these to include other non-market effects too.

81. For example, as the primary land use in most of Scotland, livestock grazing exerts a significant influence over the appearance of landscapes and their suitability as habitats for biodiversity.[51] Unlike livestock, neither of these can be traded in markets but do nonetheless have economic value as public goods contributing to wellbeing and supporting tourism activities.[52] Indeed, a large proportion of Scotland is regarded as covered by HNV farmland, with semi-natural habitats dependent on continued grazing management.[53]

82. While landscapes and habitats are not the primary output from red meat production, they are a by-product (a positive externality) that will be diminished if red meat production were to reduce in parts of Scotland. Moreover, while alternative (imported) supplies of food might conceivably be available, the place-specific nature of landscapes and habitats means that imported substitutes are not feasible.

83. As such, either some landscapes and habitats would be lost along with red meat output if farming declined, or alternative management practices would need to be put in place at a separate cost. For example, conservation grazing or mowing. This point is acknowledged implicitly in stated government and NGO policy preferences to retain farming and crofting as the primary form of land management.

84. Equally importantly, red meat production features prominently in other aspects of cultural heritage beyond landscape features. For example, continuity of land use patterns and traditional management practices provide cultural connections to earlier generations while experiences and capabilities are part of what defines a sense of place. The latter contributes to local community Identity and cohesion but also extends to meeting the expectations of visitors, whether tourists or returning former residents, for how rural areas should look and feel.

85. Similarly, by virtue of representing a significant share of the rural workforce (see Figure 12) and working outdoors, farmers and crofters are relatively visible in rural communities. In addition, courtesy of machinery, buildings, and land they often play a key role in emergency responses (e.g., clearing snow, flood responses) and are often active participants in local community activities.

86. Although often neglected in discussions of ecosystem services,[54] cultural heritage is a recognised category delivering intangible but life-enriching and life-affirming benefits.[55] Indeed, public perceptions often identify aspects of cultural heritage more readily than more scientifically objective services such as climate and water regulation.[56]

[51] e.g., see Milne and Osoro (1997), Erikson (2022), Mancilla-Leytón et al. (2022).

[52] While tempting, attributing all rural tourism GVA and employment solely to agriculture is disingenuous since other features also attract visitors e.g., castles, lochs, family lineage, festivals. Rather than inviting criticism for overclaiming, the qualitative association between agricultural landscapes and tourism is merely noted here.

[53] https://www.environment.gov.scot/our-environment/state-of-the-environment/ecosystem-health-indicators/condition-indicators/indicator-4-farming-and-nature/, https://www.scotlink.org/files/policy/PositionPapers/LINKFileNote4HNVFarming.pdf

[54] The framework now used to describe how society benefits from the natural environment, distinguishing between provisioning services (e.g., food and timber production), regulating services (e.g., climate stability, flood management), supporting services (e.g., soil formation) and cultural (e.g., amenity, heritage). See Haines-Young and Potschin (2018).

[55] e.g., see Fish et al. (2016), Haines-Young and Potschin (2018), Nowak-Olejnik et al. (2022).

[56] e.g., see Leroy et al. (2019), Tindale et al. (2020), Bernard et al. (2023).

87. Moreover, the cultural significance of red meat also extends to its consumption. For example, dietary preferences are intrinsically linked to notions of national and regional Identity, and indeed are used to promote food-tourism.[57] This relates to sensitivities around freedom of culinary choice but also to maintenance of traditions and inter-generational connections.[58]

88. While food consumption patterns do change over time (e.g., poultry accounts for an increasing share of meat consumption), overt policy interventions to directly influence dietary choices are rare.[59] This gives an indication that the cultural value of food is recognised politically, if not necessarily articulated in such terms.

89. Similarly, the contribution of continuity of land use and management practices to cultural identity and a sense of place is acknowledged in debates around the viability and vibrancy of rural economies and communities. For example, current sensitivities around local community rights under large-scale afforestation or rewilding of upland areas driven by external investment.[60]

90. Again, cultural habits and dispositions can and do evolve over time, but Just Transition principles recognise that if change occurs faster than the natural speed of generational renewal then land managers and rural communities may need additional support to adapt to change. This relates to rebuilding human capital (e.g., skills for new enterprises) but also social capital (e.g., new business relationships) and cultural capital (e.g., norms and values), highlighting that ecosystem services are not simply dependent on natural capital.

91. Quantifying the economic value of landscapes, habitats and intangible cultural heritage is difficult. As public goods, they are not valued directly by markets and hence do not generate observed market prices. Non-market valuation techniques can be deployed but are subject to various assumptions and data constraints. Moreover, the counterfactual value of alternative scenarios is hard to specify for comparison. For example, whether existing landscapes or communities could be maintained by other means or indeed whether, over time, different forms might be equally valued.[61]

92. Nonetheless, it is apparent that the economic contribution of red meat production extends beyond measurable output, GVA and employment to include other important public good elements relating to habitats, landscapes, and wider cultural heritage element.

93. These additional elements amplify the need to consider how changes to agricultural production affect not only those directly involved on-farm but also others in the supply chain and wider rural communities. Equally, they widen the basis upon which productivity and efficiency need to be measured to account for externalities (both positive and negative).

94. One possible way to frame the underpinning importance of red meat production (or agriculture more generally) to Scotland is to regard it as a foundational sector. Foundational sectors are often characterised by apparently low productivity, profitability and incomes yet provide mundane or backbone goods and services that other parts of the economy rely upon.[62]

95. For example, health and social care can be regarded as foundational since they contribute to a healthy workforce for other sectors but also more generally to social wellbeing. Yet they are characterised by inherent public good values and challenges to raising market productivity.

[57] e.g., Food Toursim Scotland – https://foodanddrink.scot/helping-business/other-resources/publications/food-tourism-scotland/ and Regional Food Tourism Ambassadors – https://foodanddrink.scot/helping-business/services/growth/grow-regionally/regional-food-ambassadors/ and Regional Food Fund – https://foodanddrink.scot/our-industry/news/supporting-scotland-s-local-food-and-drink-recipients-of-the-regional-food-fund-announced/

[58] e.g., see Brulotte and Di Giovine (2016), Edwards (2019), Ranta and Ichijo (2022).

[59] e.g., see Durbach (2020), Lang (2020), Sievert et al (2021).

[60] e.g., see Robbie and Jokubauskaite (2022), Scottish Government (2022), Mcintosh (2023).

[61] e.g., see Ready and Navrud (2002), Speed et al. (2012), Brouwer et al. (2013).

[62] e.g., see Bowman et al. (2014); Froud (2022), Hansen (2022). Also https://iuk.ktn-uk.org/materials/foundation-industries/

96. Agriculture has similar foundational characteristics in that many of its economic contributions are public goods (e.g., landscapes, culture), its market outputs sustain economic activity elsewhere (e.g., along agri-food supply chains and in remote rural areas), and yet it too suffers from persistent apparent low productivity and profitability (e.g., low farm incomes).

97. Applying standard economic prescriptions to foundational sectors unavoidably causes disruption not only to those directly employed in the sector but also to other parts of the economy dependent upon the foundations.

98. This is not necessarily a reason to forgo opportunities to improve how a foundational sector performs, but it is a reason to consider carefully what the consequences of enforcing change may be and how displaced workers and communities can be helped to transition in a just manner.

Section 6

Section 6: Scope for improving performance and critical mass

99. Options to improve performance to maintain competitiveness and critical mass include retaining more livestock for processing in Scotland, increasing technical and marketing efficiency to improve margins and adjusting the structure and conduct of the supply chain. Improving performance would increase contributions to output, GVA and employment and could also benefit public good provision in the form of habitat, landscape, and cultural heritage contributions.

Competitiveness and critical mass

100. Irrespective of the current economic contribution of the red meat sector, there is always room for improvement and this section briefly considers some ways that this might be achieved. Improved performance is important in terms of maintaining competitiveness and critical mass, thereby sustaining economic contributions.

101. Critical mass relates to the minimum level of activity necessary to maintain the viability of each part of the supply chain and therefore the whole chain. That is, there is co-dependence between different parts of the chain and all need to be present for the whole to function. For example, input supply firms need farms to sell to and farms need input suppliers to buy from; farms need processors to sell to and processors need farms to buy from.[63]

102. To an extent, individual parts of supply chains do not need to be in close physical proximity to maintain activity levels since physical inputs and outputs can be transported and many services can be accessed remotely. Hence, for example, some inputs are already sourced from, and some Scottish livestock are already processed outwith Scotland. Moreover, critical mass thresholds are not fixed but can change over time as new technologies and/or ways of configuring supply chains become available.

103. However, not all services (e.g., veterinary care) can be delivered off-site and transport costs eat into margins. Beyond some point, once firms become too geographically sparse, parts of the supply chain effectively withdraw from some areas. Once this happens, there is a risk of a cascading, domino effect on other parts of the supply chain.[64] Remoter areas are more vulnerable to such effects given their distance from alternative input supply sources and market outlets.

104. Maintaining critical mass requires attention to the efficiency with which individual parts of the supply chain operate but also to how supply chains are configured. Specifically, overall productivity depends upon both managing the physical means of production (e.g., land, livestock) but also co-ordinating the use of intangible resources such as information and branding across supply chains to maximise and share total returns.[65]

Retaining more livestock in Scotland

105. A proportion of finished Scottish livestock are slaughtered outwith Scotland. In addition, a smaller number of animals are also finished outwith Scotland. These movements of live animals to other countries potentially represent missed opportunities for retaining further value-added and employment within Scottish supply chains. Table 15 presents the numbers of animals moving to England and Wales, together with throughput at Scottish abattoirs, highlighting the significant additional numbers that could be processed in Scotland if more livestock were retained).

[63] e.g., see Dhillon and Derr (1974), Lynch and Carpenter (2003), Nousaine and Jolley (2013).

[64] The historical demise of sugar beet production and some poultry production in Scotland following the withdrawal of processing facilities are examples of how loss of critical mass can occur.

[65] e.g., see Kohls and Uhl (2002), Balezentis et al. (2023), Ivanov et al. (2023).

Table 15: Approximate numbers of Scottish red meat animals moving (including proportion of direct slaughter moves) (2021)[66]

	Moving to England and Wales		Within Scotland
	To Slaughter	To Other	To Slaughter
Cattle	43k (10%)	69k	397k (90%)
Pigs	325k (53%)	589k	293k (47%)
Sheep	288k (22%)	612k	1,021k (78%)

106. Processing additional volumes in Scotland would depend on processors' ability to find market outlets and on physical capacity (e.g., killing lines, chill storage). The latter is likely to be a constraint during seasonal peaks, particularly for sheep. Nevertheless, given that domestic volumes have declined in recent years, there is likely to be sufficient existing headroom to cope with some increase. However, much would also depend on securing appropriate supply-contracts with domestic retailers or new export outlets – neither of which will be easy to achieve.

107. Nonetheless, the potential gains are significant and can be estimated, albeit crudely, from published QMS data.[67] For example, Scottish cattle moving directly to slaughter outwith Scotland in 2021 represented c.£65m of lost carcass value and c.£10m of lost GVA, Scottish pigs represented c.£50m of output and c.£6m of GVA, and Scottish sheep represented c.£35m of output and c.£5m of GVA. Including animals not moving directly to slaughter (e.g., moving to be finished and then slaughtered) would further boost these values. While repatriating all of these livestock would be unrealistic, doing so for a proportion could meaningfully add to domestic output and GVA.[68]

Technical and marketing efficiency

108. Various information sources highlight variability in the performance of on-farm red meat production. For example, the Gross Margin for suckler cows can differ by several hundred pounds between top and bottom quartile herds while sheep margins can differ by £50 or more.[69] Raising bottom performers to the average level would improve the position of those individual farmers but also increase the overall GVA of the sector.[70]

109. In most cases the better results for higher performers reflect a combination of lower costs and higher physical outputs and/or higher prices for better meeting market specifications: a persistently high proportion of livestock do not meet optimal abattoir specifications, thereby suffering relative price penalties.[71] All of these can be influenced through best management practices.

110. The aggregate effect of raising performance depends on what proportion of total output is currently accounted for by bottom performers. Although often characterised as quartiles, this proportion relates to farms not overall production, and since smaller enterprises account for a small share of total output, care has to be taken with scaling results up. Nevertheless, it is possible to explore possible aggregate outcomes using some simple pro rata calculations, as summarised in Table 16.

[66] Pers. Comm. QMS and ScotEID (2023).

[67] Specifically, page 39 of https://www.qmscotland.co.uk/sites/default/files/qms_red_meat_industry_profile_2022_wr.pdf allows derivation of output value per head of livestock, which can be multiplied by the livestock counts in Table 15 above. I-O tables imply that meat processing GVA is, on average, c.13.5% of output.

[68] Although employment gains would also be realised, their magnitude is less certain since it is not clear how closely tied processing employment is to throughput and, moreover, productivity improvements have reduced jobs per unit of output over time. Indeed, the latter point applies more widely and output or GVA growth is unlikely to be matched by equivalent employment growth.

[69] e.g., see https://s3.eu-west-2.amazonaws.com/quality-meat-scotland/documents/Publications/qms_cattle_and_sheep_enterprise_2022.pdf, https://www.gov.scot/publications/scottish-farm-business-income-annual-estimates-2021-2022/documents/

[70] Gross Margins calculations are not identical to GVA calculations but are sufficiently similar to be used as such for the illustrative purposes of this section.

[71] see https://s3.eu-west-2.amazonaws.com/quality-meat-scotland/documents/Publications/qms_cattle_and_sheep_enterprise_2022.pdf

Table 16: Illustrative GVA gains potentially achievable through improving enterprise gross margins

	GM/hd gain	Share of national herd/flock improved		
		10%	25%	33%
Cows	£50	£2.1m	£5.2m	£6.8m
	£100	£4.1m	£10.3m	£13.6m
	£150	£6.2m	£15.5m	£20.5m
Sows	£50	£0.2m	£0.4m	£0.5m
	£100	£0.3m	£0.8m	£1.1m
	£150	£0.5m	£1.2m	£1.6m
Ewes	£10	£2.6m	£6.4m	£8.5m
	£20	£5.1m	£12.8m	£16.9m
	£30	£7.7m	£19.2m	£25.4m

111. For example, if one-third of Scottish suckler cows improved their Gross Margin by £150/hd, overall beef GVA would increase by over £20m,[72] equivalent to about 3% of GVA for the whole core red meat supply chain; if 10% improved by £50, GVA would rise by about £2.1m, 0.3%. Similar overall gains could potentially be made for sheep, but for pigs the total impact is lower due to the smaller national herd size.

112. The figures are illustrative of the order of magnitude of potential gains available, and assume all other things remain equal. Realising them would be challenging but could be attempted through a mix of on-farm efficiencies[73] and better matching of outputs to market demands. For example, average calving rates across the beef herd could be improved as could the proportion of carcasses meeting required specifications. Marketing specifications could also be updated to better reflect product traits valued by consumers. For example, eating quality, provenance and carbon footprint.

113. Data on the technical and marketing efficiency of other parts of the supply chain are not as readily available as for farm-level production. Nevertheless, operational cost savings of only 1% would equate to c.£8m across core suppliers and processors, representing perhaps 5% of their GVA.

114. Processors could also increase GVA through improved carcass utilisation, finding new market outlets and developing new products. However, many market segments (e.g., catering, food manufacturing) are price sensitive and fiercely competitive. In addition, the demand for different (primal) cuts from a carcass is seldom balanced. For example, UK demand for pork loin exceeds that for leg cuts which exceeds that for shoulder cuts – meaning that meeting demand for any one specific cut inevitably leads to either excess or deficit with respect to the other cuts. As a result, different cuts are likely to be simultaneously imported and exported.[74] Nevertheless, the seeking of new market opportunities is an essential aspect of achieving and retaining competitiveness.

Structure and conduct

115. The third approach to improving performance relates to how the supply chain is organised in terms of the number and structure of firms, the relationships between them and the business strategies that they pursue. In particular, the degree to which information is shared along the chain, the extent to which firms act independently or collaboratively and whether production is focused on adding value or minimising costs.

[72] This could be through less efficient producers improving their own performance or by them exiting the industry and other, more efficient, producers expanding.

[73] However, care is needed in defining and measuring efficiency metrics. For example, carbon emissions expressed per head of livestock give a different impression to those expressed per kg of marketed product.

[74] e.g., see https://ahdb.org.uk/news/consumer-insight-beef-cuts-opportunities-and-consumer-views, https://ahdb.org.uk/pork/consumer-insight-gb-household-pork-purchases, https://ahdb.org.uk/lamb/consumer-insight-gb-household-lamb-purchases

116. Historically, both domestically and internationally, red meat production has been characterised by independent firms interacting through short-term commercial transactions. This led to the prevalence of large numbers of small firms, the central role of auction marts in selling live animals and the dominance of spot markets for commodity meat. This structure maintains individual firm's flexibility and the opportunity to seek the best prices on any given day, but also incurs exposure to supply and demand uncertainty which can hamper business planning and divert resources to risk management rather than productive uses.

117. For example, reliance on spot markets rather than forward contracts or vertical integration means that processors are not guaranteed their desired volume of throughput on any given day and often have to devote time and effort to sourcing additional supplies and/or holding larger than desired inventory stocks. Equally, farmers' overall financial performance can be highly dependent on prices achieved on only a few discrete occasions throughout the year, again hindering budget planning and increasing exposure to risk.

118. Recognition of the effects of volatility and risk on overall performance have led to greater interest in closer interactions between different parts of the supply chain to identify where costs can be reduced, risks managed better and value-added by better meeting market needs. However, achieving such chain re-organisation is not easy since it involves changing the nature of interactions, from short-term transactions to longer-term relationships.

119. In turn, this requires a cultural shift – a change in attitudes – to achieve mutual trust and greater openness with respect to information sharing. Shifting from a strategy of undifferentiated commodity production with a focus on cost control to a value-added, market focused strategy also requires a cultural shift.

120. In the UK, various initiatives have attempted to promote change, most notably through value-chain analysis. For example, case-studies for the Red Meat Industry Forum[75] identified opportunities to save 2-3% of supply chain costs. If replicated in Scotland, this equates to perhaps £30m of savings, implying an increase in GVA of around 5% for the core chain.[76]

121. However, the scope for achieving such change in beef and lamb supply chains is constrained by their fragmented structure – even if prevailing attitudes to change mellow, co-ordination between a large number of firms would be challenging. Seasonality of supply and of demand also makes management more complex than in chains with more constant throughput volumes. For example, the peak of spring-born animals does not match the demand profile for beef and lamb through the year.

122. Consideration of supply chain relationships should also extend to upstream suppliers, without whom farms and processors would be unable to function. For example, the future availability of veterinary and haulage services for red meat animals is key to continued production activities. Yet tighter regulatory controls on livestock haulage (e.g., biosecurity cleaning relative to grain or milk haulage) and higher margins for small animal veterinary practices may reduce the willingness of firms to service the red meat sector. This suggests that moves towards formal longer-term relationships to lock-in security of service supply may be as applicable to upstream suppliers as between farms and processors.

[75] Red Meat Industry Forum For Butchers, Farmers And Trade | RedMeatIndustryForum.org.uk, https://samw.org.uk/2019/08/13/carcase-balance-what-does-it-mean/

[76] This is not necessarily additive to the potential gains already noted above since the options for cost savings are likely to overlap to an extent.

Enhancing wider economic contributions

123. Although improving the measurable economic contribution of the red meat sector in terms of output, GVA and employment is an important objective, the influence of production on public good provision also matters. In particular, livestock farmers play important roles in rural communities and production systems impact upon habitats, landscapes and cultural heritage and are a source of water and air pollution.

124. On-farm production has a readily apparent influence on landscapes, affecting their overall appearance and the presence (or absence) of specific features and habitats. This is particularly important in HNV areas where farming practices support semi-natural habitats and biodiversity.

125. Equally, farming is a source of pollutant loading to water and air. For example, nitrogen and phosphate losses to water bodies and greenhouse gas emissions to the atmosphere. Reducing the latter is a key government policy target and is likely to drive changes in farming.

126. Ensuring appropriate management to enhance positive effects (e.g., habitats) while reducing negative effects (e.g., emissions) requires land managers to understand what is required and be able to undertake it. This implies a need for access to relevant information but also to sufficient incentives.

127. As noted by, for example, the Famer Led Groups,[77] there are win-win opportunities in terms of best practices that improve farm profitability as well as enhancing public good provision. For example, increased on-farm efficiency can lower production costs and reduce emissions. In such cases, the provision of information, advice and training may be sufficient, although financial incentives will also help.

128. Public policy has a clear role to play here but private sector drivers are also relevant given that downstream parts of the supply chain are increasingly setting and pursuing their own environmental targets, particularly with respect to Net Zero.[78]

129. However, not all environmental targets are achievable through win-win options alone and trade-offs will be unavoidable. For example, a degree of land use change will be required. This creates a tension between different ecosystem services, notably provisioning (i.e., food) and cultural (e.g., heritage) vs. regulating (e.g., climate) that can only be resolved politically through policy decisions and adherence to Just Transition principles.

130. For upstream suppliers and downstream processors, environmental impacts are less visible than the (positive) landscape effects of on-farm production and are generally restricted to the (negative) effects of pollution. For example, emissions to air and water from using fossil fuels and other chemical inputs plus generation of waste materials. As such, enhancing environmental performance often aligns with technical efficiency and cost savings. For example, adopting and maintaining modern buildings and equipment (e.g., vehicles, refrigeration equipment) to reduce energy and water usage plus improving efficiency to reduce waste.[79]

Summary

131. The scope for improving performance across the red meat sector has been articulated previously in numerous reports over the past two decades. As such, issues facing the sector and potential remedies to problems are familiar.

[77] https://www.gov.scot/policies/agriculture-and-the-environment/farmer-led-climate-change-groups/

[78] e.g., see Baker et al. (2023).

[79] Conversely, some regulations may impose costs. For example, restrictions on drivers' hours, pensions auto-enrolment and use/disposal of offal and SRM material.

132. The central analysis and recommendations in recent reports such as Beef2030 (2023) and Provenance and Profit: A Strategy for the Scottish Pig Industry (2018) echo those of Beef2020 (2015) and the Strategic Review of the Scottish Pig Industry (2008).[80]

133. Specifically, notwithstanding that Brexit and the declaration of the twin climate and biodiversity crises have altered the market and policy context, the need to focus on competitiveness through improving productivity has long been recognised, as have the challenges of respecting environmental constraints.

134. Addressing such needs requires action on several fronts, notably through spreading best practice and innovation, better meeting market demands, and improving co-ordination across supply chains. Hence suggested routes to sectoral improvement include retaining more livestock for processing in Scotland, raising on-farm efficiencies and increasing sharing of information and best practice across the supply chain.

135. Such approaches offer potential gains in terms of output, GVA and employment but also in many cases offer win-wins in terms of also enhancing public good provision. For example, increased on-farm efficiency in resource use can reduce pollutant loadings while maintaining aspects of cultural heritage.

136. However, attaining and sustaining improvements is extremely challenging given fragmentation across the sector, competing policy objectives, and the influence of external factors. The next section briefly reviews prospects for change over the next five years.

[80] https://s3.eu-west-2.amazonaws.com/quality-meat-scotland/documents/Publications/beef_sector_strategy_2030_-_summary_final.pdf, https://www.gov.scot/publications/beef-2020-review-report/, https://foodanddrink.scot/helping-business/other-resources/publications/provenance-and-profit-a-strategy-for-scotlands-pig-industry/, https://www.dropbox.com/s/hid322ogw47261g/Strategic%20review%20of%20the%20Scottish%20pig%20industry%20Aug%2008.pdf?dl=0

Section 7

Section 7: Forecasting five-year prospects

137. The prospects for Scotland's red meat sector are dependent on various factors. As highlighted in Section 6, some (at least in principle) can be addressed by the sector itself. For example, how the supply chain organises itself to share information and best practice, what proportion of animals are retained for processing within Scotland, and how efficiently animals are produced.

138. However, external factors also exert significant influence. For example, market prices evolving in response to the emergence of new technologies, changes in consumer preferences and exposure to competition. The latter is largely a function of government policy, with post-Brexit trade deals raising the prospect of increased red meat imports to the UK putting downward pressure on domestic prices.[81] Export opportunities will also occur, with the New Zealand's Meat Industry Association pointing to potential competition from UK beef in Japan when the UK joins the Asian-Pacific trading block.[82]

139. Government policy in relation to future agricultural support payments and reducing greenhouse gas emissions from agriculture is also a significant potential driver of change. Emissions associated with red meat production account for over half of agricultural emissions and analysis suggests that meeting target reductions will be challenging.[83]

140. Yet the Scottish Government has reiterated commitments to supporting domestic food production, particularly in light of recent (and future anticipated) global market volatility and food security concerns, and meeting emission reduction targets through simply offshoring of production is at least implicitly acknowledged as essentially self-defeating.[84] Hence much depends on specific policy details and the nature of future conditional support.

141. Quantifying the relative influence of these different internal and external factors is difficult. However, some qualitative analysis of the five-year prospects for Scottish beef, pigs and sheep is offered below, including a summary of published quantitative assessments and consideration of positive and negative influences.

Overview

142. Reflecting both population and per capita income growth, global demand for animal proteins is expected to grow over time, particularly in emerging rather than mature markets. While poultry accounts for a large share of this, there will be potential opportunities for Scottish red meat producers, either directly through exporting to emerging markets and/or through reduced competition in the domestic market if potential imports are diverted elsewhere. However, post-Brexit trade deals and global market volatility risk increased domestic competition from imports to the UK.

143. Meeting this challenge will require continued efforts to lower Scottish production costs through efficiency improvements. However, it will also require marketing and branding to differentiate Scottish produce on the basis of attributes other than price, such as production standards, authenticity and eating quality. Sharing of information and best practice together with investment and upskilling across the supply chain will be required to achieve this.

[81] e.g., see https://ahdb.org.uk/trade-and-policy

[82] NZ Farmers Weekly, 24/4/23.

[83] e.g., see https://www.gov.scot/publications/disaggregating-headline-smart-inventory-figures/, https://www.climatexchange.org.uk/research/projects/marginal-abatement-cost-curve-for-scottish-agriculture/ and https://www.theccc.org.uk/publication/scottish-emission-targets-progress-in-reducing-emissions-in-scotland-2022-report-to-parliament/

[84] e.g., see https://www.gov.scot/publications/next-step-delivering-vision-scotland-leader-sustainable-regenerative-farming/documents/ and https://www.gov.scot/publications/scottish-government-debate-delivering-scottish-governments-vision-agriculture-through-agricultural-reform-route-map-ministerial-statement/

144. Further challenges are also likely as a result of changes to agricultural policy support measures. In particular, reductions in the level of funding and/or imposition of additional conditionality requirements relating to biodiversity, air and water quality, and (especially) Net Zero targets are anticipated. Such changes may further squeeze production viability or indeed directly constrain production.

Summary of published assessments[85]

145. At the global scale, meat demand is projected to grow during this decade at approximately 1% per year. This is slower than in the previous decade but would still represent a significant cumulative increase to 2031. Within this, approximately one-fifth of the annual gain is attributable to rising per capita consumption (driven by rising income levels) and the rest to actual population growth.

146. Most of the growth is forecast to occur in low and middle-income countries where both income levels and population size are expected to increase most rapidly. Meat demand in existing high-income countries, such as the UK, is anticipated to grow more slowly due to more muted per capita and population growth.

147. Similarly, increased meat production to satisfy higher demand is also forecast to be predominantly located in low and middle-income countries. Production growth in high-income countries in Western Europe and North America, for example, is expected to be constrained by competing demand for land and increasingly stringent environmental regulations.

148. Within this aggregate picture, poultry is projected to account for c.45% of growth in global meat consumption and production, pork c.38%, beef and veal c.12% and sheepmeat 5%. Western Europe's expected contribution to production rises slightly for poultry but declines for pork and beef and is stable for sheepmeat.

149. UK-level projections to 2030 (albeit pre-dating the conflict in Ukraine) are broadly consistent with this global assessment. In particular, modestly increasing consumption of poultry and pork but declining or stable beef and sheepmeat consumption against modestly increasing poultry production and stable pork production but declining sheep and (especially) beef production. The UK will remain a net importer of all meat other than sheepmeat (although Scotland is a net exporter of beef as well as sheep).

150. Global market prices are expected to remain volatile but will continue their long-term downward real-terms trend in response to increasing productivity and competition. However, regional variation is likely and where local production is falling, prices will be higher.

151. Again, UK-level projections are broadly consistent with the global assessment for prices. For example, poultry and pork prices are forecast to remain relatively stable, beef prices to rise and sheepmeat prices to fall.

What does a favourable beef forecast look like?

152. Strong farmgate prices with input costs back down to pre-Covid levels and maintenance of net government support. Consequently, a national level of beef production no lower than current levels with limited numbers of prime and cull cattle lost to processors outwith Scotland, resulting in a healthy Scottish beef processing sector producing high value Scotch Beef.[86]

[85] Taken from https://www.oecd-ilibrary.org/agriculture-and-food/oecd-fao-agricultural-outlook-2022-2031_f1b0b29c-en, https://fapri.missouri.edu/wp-content/uploads/2023/03/2023-Baseline-Outlook.pdf, https://www.afbini.gov.uk/sites/afbini.gov.uk/files/publications/2020%20to%202030%20UK%20and%20EU%20Baseline%20Briefing%20Book%20FAPRI%20UK%20Project.pdf, https://agriculture.ec.europa.eu/data-and-analysis/markets/overviews/market-observatories/meat_en

[86] https://s3.eu-west-2.amazonaws.com/quality-meat-scotland/documents/Publications/beef_sector_strategy_2030_-_summary_final.pdf

Factors external to the Scottish beef industry which could make this forecast happen

i. **Reductions in input costs**. Unprecedented spikes in input costs, most notably fertiliser and feed, are expected to ease.

ii. **Strong consumer demand** from British consumers, underpinned by incomes rising strongly as economic growth and inflation returns to long-term levels. This would offer opportunities for greater penetration of the UK market and higher farmgate prices.

iii. **Growing global demand** for beef. Specifically, the Asia-Pacific (including Chinese) market continues to grow on the back of the region's return to strong economic growth. As a result, South American, Australasian, and North American beef industries focus on exports to this region, lifting global prices and diverting potential UK imports. Moreover, potential export opportunities to this region for Scotch Beef resulting from the UK joining the Pacific free trade pact (Comprehensive and Progressive agreement for Trans-Pacific Partnership [CPTPP]).

iv. **Limits to beef production** in the rest of Britain, EU and overseas caused by government policy and weather constraining competition. In particular, English beef production curtailed by phasing out of the Basic Payment Scheme (BPS) and limited exploitation of dairy beef production systems, Irish beef production reduced by policies enforced to help meet the Irish Republic's tough emission reduction targets, and recent drought conditions further cutting the United States beef herd. Australian production base has grown over the past couple of years, and thanks to favourable (wet) weather, a return to more normal drier conditions might be expected to at least check future growth in Australian beef production.

v. **Sterling remaining relatively weak** against competitor countries providing import protection and support for competitive pricing in export markets. On the downside, a weak currency would keep input costs above levels that would exist with a stronger pound.

vi. **Limited market penetration by artificial meat products**. Demand for plant-based meat substitutes has eased, while the technology to produce cell-based (precision fermentation) beef is still not yet at the necessary scale to achieve economic viability within this forecast period.

Factors internal to the Scottish beef industry that could help make this forecast happen

i. Delivering **premium Scotch Beef products** consistently. Producing cattle that deliver high eating quality requires a grading system that rewards farmers for combining the best genetics with proven feeding, health, and handling protocols. Likewise, to encourage farmers to produce cattle of high provenance with credence attributes consumers are willing to pay for, a system to encourage and assure best environmental and welfare practice is needed.

ii. **Improving productivity at the farm level** to both improve financial margins and lower the carbon footprint of Scottish suckler beef production. Estimates of the cow efficiency metric indicate that many Scottish farmers have plenty of scope to introduce practices necessary to lift productivity.[87] Where, however, the primary role of sucklers is delivering environmental outcomes like biodiversity improvement or landscape management, productivity targets may require suitable adjustment. Ensuring that the high environmental provenance of offspring from such herds is captured at the point of slaughter is critical.

iii. Significantly increasing the proportion of **Scottish born dairy beef cattle** being reared, finished, and processed in Scotland. Besides encouraging the development of integrated dairy beef systems which limit the loss of Scottish born dairy calves to England, such bio-secure systems might procure valuable animals from nearby milk fields like Cumbria.

[87] https://pure.sruc.ac.uk/en/publications/structure-and-efficiency-of-the-scottish-beef-herd-cattle-tracing

iv. Retaining a **strong network of processors and markets** in Scotland to ensure that the full value of Scotch Beef is captured for the Scottish economy. Providing a strong, year-round production base is critical. Labour availability and support for investment in technologies that lift productivity and value creation, are also important.

v. **Upskilling**. Recruitment, training, and retention of staff across the supply chain is fundamental to driving the sector forward. Staff shortages undermine production and processing capacity, and skills gaps undermine attempts to improve efficiency and meet market demands. Sharing of information and best practice across the supply chain could help to address these constraints, as could encouragement for generational renewal.

What negative factors could adversely affect the beef outlook?

i. A **lowering of net public support** to Scottish beef farmers from 2025. The current loss of beef cows from the Scottish herd against a backdrop of strong cattle prices and unreformed area and coupled payments suggests that Scottish farmers are already adjusting to unfavourable margins. A reduction in direct support under anticipated conditionality and public goods orientated schemes would (especially if greenhouse gas targets are paramount) place further pressure on beef margins.

ii. **Greater beef supply from the rest of Britain**. Paradoxically, this outcome could occur under diametrically opposed scenarios. First, English beef supply may remain above expectations suggested above if public goods schemes are more supportive of beef production or the phasing out of BPS is halted (e.g., following election of a new UK government in 2024). Alternatively, second, continued removal of the BPS could both accelerate the liquidation of English suckler beef production boosting short-term beef supply while also incentivising development of lower-emission dairy beef supply chains.

iii. **Greater beef supply from Ireland**. Irish beef supply would be expected to rise in the short-term if emissions reduction became the priority as breeding stock are liquidated. In the Republic, DNA tagging allied to the widescale take up of Teagasc trialled best practice dairy beef systems may, however, partly offset any decline in suckler beef.

iv. **New supply from non-EU imports** into the GB market. Import of Australian beef under the new trade deal may start in 2023. Although the Australian beef industry currently has a range of markets closer to home in the Asia-Pacific region, potential geopolitical problems with China may result in the strategic decision to diversify exports to the British market. While the tonnage in initial years will be limited, it is likely to be directed at the high value end of the British market that Scotch Beef also targets. New Zealand is also targeting high value markets, so they may also start sending beef exports to the UK within this forecast period. New trade deals with South American beef producing countries are unlikely to impact in the short-term.

v. The **EU revisiting the trade deal** if imports of third-country beef (and sheepmeat) undermine internal EU cattle and sheep prices as explained in the previous point. The Irish beef industry feels particularly threatened by the UK's deals with major non-EU meat producing nations.

vi. **Increased competition from chicken meat**. Most of the beef carcase is processed into minced beef which competes directly with chicken meat especially for income pressed consumers. If cereal prices return to lower historical levels, chicken production becomes more competitive. What happens in Ukraine will influence cereal prices.

vii. **Increased English demand for Scottish cattle**. The declining production in England of suckler-bred cattle and (temporary) differential Quality Assurance requirements have stimulated increased demand from English buyers for Scottish animals. If this demand remains high and movements to England increase, the critical mass of the Scottish beef industry will come under pressure.

viii. **Low uptake of best practice** by producers. QMS costings strongly suggest that most Scottish producers are not leaving a positive net margin and rely on using at least part of their support income to cross-subsidise their cattle enterprises.[88] Against the likelihood of area and coupled support becoming less post 2025, lifting productivity will be essential to sustain the cattle production base. The new QMS run monitor farm programme will be judged by how successfully it spreads best practice.

ix. **Processor rationalisation** in Scotland. If the production base of the Scottish beef industry ebbs away for reasons described above, downsizing of the beef processing sector is inevitable. Excess capacity at remaining plants may be sufficient, but any (further) loss of volume to plants in England will reduce the value of the industry to the Scottish economy and farmgate prices for Scottish cattle.

What does a favourable forecast for pigs look like?

153. Pig production is notoriously more cyclical than beef or sheep, fluctuating relatively rapidly in response to market pressures. Having risen slightly from historic lows in recent years, Scottish production has contracted again. A favourable forecast would reverse this, possibly resuming the stated objective of doubling its output by 2030,[89] approximately returning the sector to its position 20 years ago (see Figure 2).

Factors external to the pig industry which could make this forecast happen

i. **Consumers eating more pigmeat**. UK per capita consumption of pigmeat has risen slightly in recent years after an extended period of gentle decline. This compares to more marked declines in consumer preferences for beef and lamb (albeit that poultry is the main growth sector). In principle, this offers increasing (relative) market opportunities for Scottish pig producers.

ii. **Lower carbon intensity**. The lower emissions intensity of pigmeat relative to ruminant red meat may further encourage (some) consumers to switch (although poultry has an even lower intensity). Equally, government policy could favour pig production for similar reasons. Either case would, at least in principle, offer increased opportunities for pig production.

iii. **Continued access to nearby export markets**. Most Scottish pigmeat is exported to England, either as live animals for slaughter or as processed products (although a proportion may return for consumption). This would be expected to continue. However, although a small proportion of total production, exports to the EU are important both as an outlet for specific products (e.g., carcass balancing, cull sows) not favoured by domestic consumers but also as a more general release valve to avoid depressing domestic prices through excess domestic supply. Post-Brexit arrangements have not been frictionless, but the recent Windsor Framework agreement is expected to ease trading relations.

iv. **Growth of non-EU export markets**. Although non-EU export markets are currently limited, their projected growth may still benefit the Scottish pig sector by reducing the availability of imports into the UK as third countries prioritise growth markets elsewhere and/or by offering potential safety-valve releases for domestic over-supply. For example, until access was rescinded, exports to China during its African Swine Fever outbreak directly benefited the Scottish sector.

v. **Decline in EU production capacity**. African Swine Fever and recent market volatility has affected pig production capacity across the EU.[90] For example, even Denmark has experienced a shrinking breeding herd. This potentially reduces exports to the UK and/or opens possibilities for Scottish export to EU markets.

[88] https://s3.eu-west-2.amazonaws.com/quality-meat-scotland/documents/Publications/qms_cattle_and_sheep_enterprise_profitability_2021_final.pdf and https://ahdb.org.uk/beef-cost-of-production-benchmarks/beef-stores

[89] https://www.scottishpigs.coop/uploads/6/2/2/5/62259177/dis_sfd_pig_strategy_brochure_1.pdf

[90] https://www.frontiersin.org/articles/10.3389/fvets.2020.00634/full

vi. **The weakness of the pound**. The competitiveness of Scottish exports is strongly correlated with exchange rate movements. Post-Brexit, the weakness of Sterling against the Euro (and other international currencies) should bolster Scottish producers' ability to export (and to compete against imports).

Factors internal to the Scottish pig industry that could help make this forecast happen

i. **Supplying pigmeat products that consumers want**. Scottish pig production is unlikely to be able to compete with imports on price alone, but there is scope for market segmentation. Further development of the Specially Selected Pork brand offers potential opportunities for distinctiveness and premium pricing.

ii. **Lowering the cost of production**. Input costs are anticipated to ease back from recent record highs caused by global market volatility. This is particularly important for feed and energy. However, being competitive within the British, EU and global marketplace will depend on lowering the costs of production further. Although significant gains have been made over the past 10 to 15 years, domestic efficiencies still lag behind comparator EU countries. This includes metrics such as feed conversion and piglets per sow, but also product quality and consistency.

iii. **Upskilling**. Recruitment, training, and retention of staff across the supply chain is fundamental to driving the sector forward. Staff shortages undermine production and processing capacity, and skills gaps undermine attempts to improve efficiency and meet market demands. Sharing of information and best practice across the supply chain could help to address these constraints.

iv. **Retaining sufficient processing capacity within Scotland**. Processing capacity for pigs within Scotland is highly concentrated and closures (permanent and temporary) have proven highly disruptive over the past decade or so. While the reality of vertically integrated cross-border production systems mean that the Scottish pig industry must remain committed to supplying contracted pigs for slaughter in northern England, ensuring that sufficient supply is available to maintain viable Scottish slaughtering capacity is also vital.

What negative factors could adversely affect the pig outlook?

i. **Input prices remain high**. Spikes in input costs, particularly feed and energy, have severely damaged profitability. If input prices do not ease as expected, production will continue to shrink rather than grow.

ii. **Consumption not recovering**. Covid-19 induced changes in working patterns, leading to reductions in catering demand for pigmeat. Subsequently, inflation and stagnant wages have squeezed consumer incomes and prompted further changes in food purchasing habits. Both trends have dampened demand for pigmeat, and macroeconomic forecasts suggest that recovery may be slow – implying low growth in domestic demand.

iii. **New free trade agreements increase imports**. Post-Brexit trade deals have already raised concerns about increased imports of cheaper pigmeat produced to different standards. Even where third countries appear to be currently focused on other export markets (e.g., China), trade flows can change relatively quickly and the potential for heightened import competition is significant.

iv. **Insufficient processing throughput in Scotland**. A significant proportion of Scottish pigs are already slaughtered outwith Scotland. This risks lower farmgate prices through incurring higher transport costs but also through constraining throughput (and hence economies of scale) at Scottish plants.

v. **Labour shortages at farm and processing levels**. Post-Brexit and post-Covid labour shortages are affecting many agri-food supply chains, including pigmeat. This potentially effects on-farm production and processing, both of which require adequate numbers of appropriately skilled staff to operate. While labour saving technologies are emerging, they can require significant capital investments which are difficult to justify for smaller-scale enterprises. Insufficient recruitment and retainment will limit scope for expansion.

vi. **Net Zero and other environmental targets**. Scottish pig production has a lower emissions intensity and lower total emissions level than ruminant red meat. Nevertheless, it is not immune to scrutiny from government or downstream buyers and lenders as they pursue Net Zero targets. Equally, other environmental targets such as air and water quality or biodiversity indices also feature increasingly in government policies and supply chain requirements. Consequently, it is possible that pig production will be constrained and/or subject to higher regulatory costs in future.

What does a favourable forecast for sheep look like?

154. A repeat of the 2021 lamb season would please most Scottish sheep farmers. Unfortunately, as the 2022 season unfolded, the unsustainable nature of the excellent previous year became apparent. A favourable forecast must be based on a robust demand for lamb and mutton (and wool) to balance and organise supply. That, however, may mean a lower level of high season lamb prices than has been enjoyed in 2021 and 2022.

Factors external to the Scottish sheep industry which could make this forecast happen

i. **Consumers eating more lamb**. Lamb consumption has been in long-term decline in both the British and EU markets, with the drop precipitous in 2022. The high retail price of lamb, due in large part to supply disturbance caused by Brexit and Covid in 2020/21 and drought in 2022, collapsed demand. But demand side factors have reinforced that collapse, particularly the squeeze on consumer incomes and a lack of promotions by supermarkets. The question is: how much do retail lamb prices need to drop to reinvigorate consumption and how will this transmit to the farmgate price? This, of course, is against a backdrop of anticipated stagflation limiting income growth.

ii. **Continued good access to nearby export markets**. England is the Scottish sheep industry's most important market. It is also where many Scottish lambs, and almost all Scottish culls, are slaughtered. Retaining frictionless access to the English market is therefore crucial. While access of Scottish and British lamb to the EU market is not as frictionless as before Brexit, the lack of tariffs and limited paperwork of the new trading arrangement has meant that the EU remains important in balancing the seasonality of British lamb and mutton production. The recent signing of the Windsor Framework is expected to improve UK-EU trading relations, which could result in lower EU border checks if it leads to the EU accepting equivalence of standards, recognition the EU grants to New Zealand. It is unclear whether the UK Government will continue to apply effectively unchecked access to EU (mainly Irish) sheepmeat imports to the GB market.

iii. **China remaining a key importer of Australasian sheepmeat**. That New Zealand has greatly underused its non-tariff access to the UK and EU markets over the last decade is largely thanks to the growth in the Chinese market. The reopening of the Chinese market from Covid restrictions will help, though the recovery in Chinese pigmeat production is slowing import demand for imported animal protein, including sheepmeat.

iv. **Continued decline in the New Zealand sheep flock**. The New Zealand sheep flock dropped to historic low levels as land moved into dairy production. That levels of exports have to date remained sizeable is thanks to a remarkable rise in per ewe productivity and declining New Zealand domestic consumption over the past 30 years. Looking forward, however, those beneficial forces may not offset a further erosion in the production base driven by farms being bought for tree (carbon) planting, a potential emissions tax from 2025 and, like here, declining on-farm labour.

v. **The weakness of the Pound**. The Scottish sheep industry is very exposed to currency values because of the importance of sheepmeat trading across frontiers. The relationship between the Euro and Pound is particularly important. Forecasting how that might change over the next five years is impossible to call given the negative forces overhanging both currencies. The same is true for the Sterling-Kiwi Dollar relationship. Whereas the stronger basis of the Australian economy points to a continuation in the long-term weakening of the Pound against the Australian Dollar, which is helpful to our sheep industry.

Factors internal to the Scottish sheep industry that could help make this forecast happen

i. **Supplying sheepmeat products that consumers want**. The meat yield from a sheep carcase is low so maximising its value is critical. Reinforcing its reputation for eating quality by delivering products that consistently eat well is obviously important. Likewise, some consumers place high value on how lamb and mutton are reared, slaughtered, and delivered. The Muslim population is a major and growing segment of the market, yet it is the New Zealanders (and Australians) that have acted most decisively to reassure that population of Halal standards. The New Zealanders are also working harder to target the high-income consumer that is prepared to pay a green premium for lamb.

ii. **Growing export markets to established and new trading partners**. Only around one out of five Scottish lambs are consumed in Scotland. Marketing efforts should reflect the reality that the Scottish sheep industry is a significant exporter.[91] Treating the English market as domestic is confusing: it is the key export market for live sheep and processed sheepmeat. The EU is also very important, though how much Scottish lamb is exported as British is unclear. As for markets further afield, the ambition to diversify the customer base should be assessed.

iii. **Lowering the cost of production**. Input costs are anticipated to ease back from recent record highs caused by global market volatility. Nevertheless, being competitive within the British, EU and global marketplace will depend on lowering the cost of production. Getting more from grazed pasture has been advocated for years, but progress has been limited. Scaling up to deliver a step change in labour productivity is also important especially given the growing labour shortages facing the industry.

iv. **Finishing more lambs on Scottish arable farms**. A return of the 'golden hoof' into arable areas would help the industry's contribution to Scotland's Net Zero targets. Not only can it enhance the green credentials of Scotch Lamb, but it would also reduce the cost of production. Such systems, however, need rigorous trialling to establish best practice protocols.

v. **Retaining sufficient processing capacity within Scotland**. The economics of lamb processing are challenging and driven by scale. Retaining critical mass at the production level is obviously important in retaining the current processing capacity. But so too is helping the competitiveness of the industry. Ensuring that the new rural policy regime retains funding programmes to drive processor and supply chain efficiency should be a priority.

[91] e.g., see https://www.gov.scot/publications/assessment-opportunities-retain-increase-sheep-lamb-processing-scotland/documents/

What negative factors could adversely affect the sheep outlook?

i. **Consumption not recovering from the recent sharp decline**. How the UK retail trade price lamb on the shelf in the next year will be central to per capita consumption levels. The worry is that retailers may limit the drop in the retail price to recover margin from a widening farm-retail price spread. Without an offsetting improvement in exports to the EU, the farmgate price of lamb could revisit levels in late summer/autumn not seen in a few years.

ii. **Australia taking significant advantage of the new free trade agreement with the UK**. China is Australia's biggest sheepmeat export destination. Potentially that could stop overnight for geopolitical reasons. Under the terms of the new UK-Australia trade deal, duty-free access to the big British sheepmeat market will rise significantly within the forecast period. Presumably this would be targeted at the UK's off-season including Easter which would be expected to adversely affect store lamb finishing systems and hence undermine the store lamb trade in the preceding autumn. The recent announcement that the Australian Government is banning live export of sheep may also mean more Australian chilled product seeking markets.

iii. **Further loss of processing capacity in Scotland**. The net farmgate price of Scottish lambs and culls is generally lower than the British average owing to more than half of all Scottish lambs and almost all culls being slaughtered south of the border (and hence incurring additional transport costs). Not only does distance to processors add cost, but it also means that Scottish lambs killed south of the border cannot qualify as Scotch Lamb. Welsh Lamb can be slaughtered in registered English plants and further processed in Scottish plants and still carry the Welsh Lamb brand. Loss of processing capacity north of the central belt is the biggest concern given the distance to abattoirs in England and Wales.

iv. **Labour shortages at farm and processing levels**. Scottish lamb processors are not alone in struggling to recruit and retain labour. The New Zealand sheep industry faces the same challenge, which is driving automation of processing lines, which is a very capital-intensive path that requires significant size economies to justify. Similarly, declining farm labour may also cut the breeding base going forward unless a step change in productivity occurs.

v. **Net Zero and other environmental targets**. The anticipated inclusion of environmental targets and conditionalities in future agricultural support payments (and indeed private sector contractual requirements) will pose challenges to sheep production both in terms of margins but also competition for land against carbon credits from, for example, afforestation.

Section 8

Section 8: Overall summary and conclusions

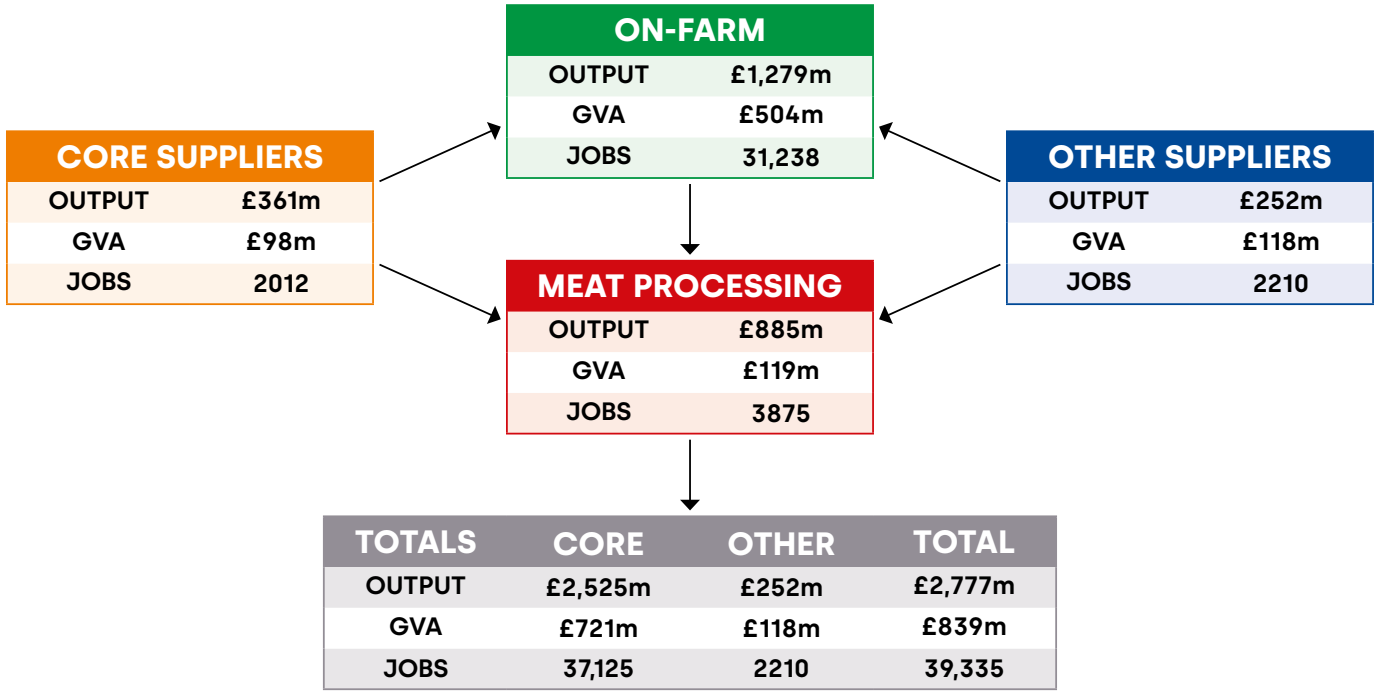
155. The red meat supply chain encompasses on-farm production but also upstream provision of farming inputs and downstream processing of farm products. Evaluation of its economic contribution thus needs to consider the activities of, for example, animal feed suppliers, vets, hauliers, auction marts and abattoirs alongside the farm-level activities producing beef cattle, pigs, and sheep.

156. Official data for agriculture and the wider economy can be used, with some assumptions, to estimate the economic contribution of the red meat supply chain to Scottish output, value added and employment.

157. Although caveats and assumptions accompany them, Figure 13 summarises the estimated output, value added and employment levels arising from different parts of the Scottish red-meat supply chain. The 'core' elements of farms and meat processors contribute the most, but input suppliers (both core and non-core) are also important.

158. The accuracy of the estimates presented is difficult to verify due to data limitations and all figures should be viewed as indicative. However, comments received from industry stakeholder/analysts suggest that the figures are not unreasonable. Moreover, they are broadly comparable with previous studies undertaken for QMS.[92]

Figure 13: Summary of estimated output, GVA and employment across the red meat supply chain



TOTALS	CORE	OTHER	TOTAL
OUTPUT	£2,525m	£252m	£2,777m
GVA	£721m	£118m	£839m
JOBS	37,125	2210	39,335

[92] See Doyle (2003), Moxey (2016).

159. Linkages beyond the farmgate need to be acknowledged in the design of changes to agricultural policy, to address knock-on effects along supply chains and across rural communities. This relates to food production, employment, and incomes (as recognised by commitments to a Just Transition) but also to public good ecosystem services such as cultural heritage (e.g., landscapes, traditions) and maintenance of habitats and biodiversity (e.g., semi-natural habitats, HNV farming).

160. Moreover, the concentration of production in rural areas means that the local economic contribution of red meat is greater than implied by national or even regional averages. For example, agriculture in remote rural areas accounts for around 34% of VAT or PAYE-registered businesses and about 18% of both employment and turnover, but less than 1% of each in urban areas. Consequently, the impacts of any changes to red meat production will be felt unevenly across Scotland.

161. Of particular concern is the issue of critical mass. Different parts of the supply chain are reliant upon each other. For example, input suppliers need farms to sell to just as farms need suppliers to buy from; processors need farms to buy from just as farms need processors to sell to. While transport linkages mean that different parts of the supply chain do not necessarily have to be geographically close to each other, transport costs eat into margins and become prohibitive when geographical dispersion becomes too great. Once critical mass thresholds are breached, parts of local supply chains withdraw and the viability of remaining parts becomes compromised, leading to a potential domino effect as supply chains reconfigure and production relocates.

162. Estimation of the relative contributions of different parts of the supply chain adds further support to previous analysis of how overall sectoral outcomes could potentially be enhanced. In particular, there is scope to increase performance through retaining more livestock within Scotland for processing, through raising the average efficiency of farms and through greater information sharing and co-ordination along the supply chain.

163. The prospects over the next five years for the Scottish beef, pig and sheep sectors are dependent on several factors, some internal to the sectors and some external. Much depends upon market conditions and resulting input and output prices. For example, how quickly input costs (especially for feed, fertiliser, and energy) subside from recent highs and how consumer demand evolves.

164. Reflecting both population and per capita income growth, global demand for animal proteins is expected to grow over time, particularly in emerging rather than mature markets. While poultry accounts for a large share of this, there will be potential opportunities for Scottish red meat producers, either directly through exporting to emerging markets and/or through reduced competition in the domestic market if potential imports are diverted elsewhere.

165. However, post-Brexit trade deals and global market volatility risk increased domestic competition from imports to the UK. Meeting this challenge will require continued efforts to lower Scottish production costs through efficiency improvements. However, it will also require marketing and branding to differentiate Scottish produce based on attributes other than price, such as production standards, authenticity and eating quality. Sharing of information and best practice together with investment and upskilling across the supply chain will be required to achieve this. QMS has a leading role to play in all these areas.

166. Further challenges are also likely because of changes to agricultural policy support measures. In particular, reductions in the level of funding and/or imposition of additional conditionality requirements relating to biodiversity, air and water quality, and (especially) Net Zero targets are anticipated. Such changes may further squeeze production viability or indeed directly constrain production.

167. The process of deriving these estimates has highlighted several weaknesses in official data. For example, the representation of heterogeneity in farming systems, the calculation of import flows, the aggregated nature of I-O sectors and the frequency and sampling intensity of relevant surveys. Data on cross-border flows within the UK of inputs to and outputs from Scottish agriculture are particularly weak, effectively making it impossible to discern the strength of downstream linkages beyond abattoirs. Hence exploration of opportunities to improve access to data collection would be welcome, particularly with respect to cross-border flows of inputs and processed products.

168. Nevertheless, official data remain the most comprehensive available and seeking to improve them and/or supplement them with additional primary data is likely to be disproportionately expensive and would reduce comparability with analysis of other sectors.

169. Consequently, although the estimates presented here could be refined, they are indicative lower-bound estimates of the measurable economic contribution of the red meat sector and are sufficient to reinforce the need to consider interactions and dependencies along supply chains.

170. In reality, the economic contribution is likely to be larger than shown here due to downstream activities beyond meat processing. For example, a proportion of food manufacturing and retailing currently utilises domestically produced red meat and therefore extends the sector's reach in terms of domestic output, GVA and employment. Similarly, firms supplying farms and red meat processors will themselves purchase inputs from other firms, again extending the sector's economic reach.

171. However, detailed information on the purchasing patterns of food manufacturers and retailers is not readily available due to the complexities of supply chains that span multiple countries and products. The same applies to secondary suppliers. Moreover, current purchasing patterns do not necessarily imply dependence since alternative imported sources are available and supply chains can be reconfigured.

172. These uncertainties mean that quantifying further contributions is difficult and open to criticism of overclaiming about the importance of domestic red meat production. Hence reporting lower-bound estimates while noting the likelihood of additional contributions is the approach adopted here.

173. Similarly, measurable output, GVA and employment figures neglect other important economic contributions arising from public goods associated with red meat. These include landscapes, habitats, and cultural heritage. The latter arises from both production and consumption, with continuity and tradition having strong influences on cultural identities and a sense of place – both of which are central to rural communities.

174. Again, although not quantified here, these additional forms of economic contribution reinforce the importance of linkages within and between different parts of supply chains and rural economies. Changes to red meat production have implications for livelihoods and quality of life both within and beyond the farmgate, and Just Transition principles state that these need to be accounted for.

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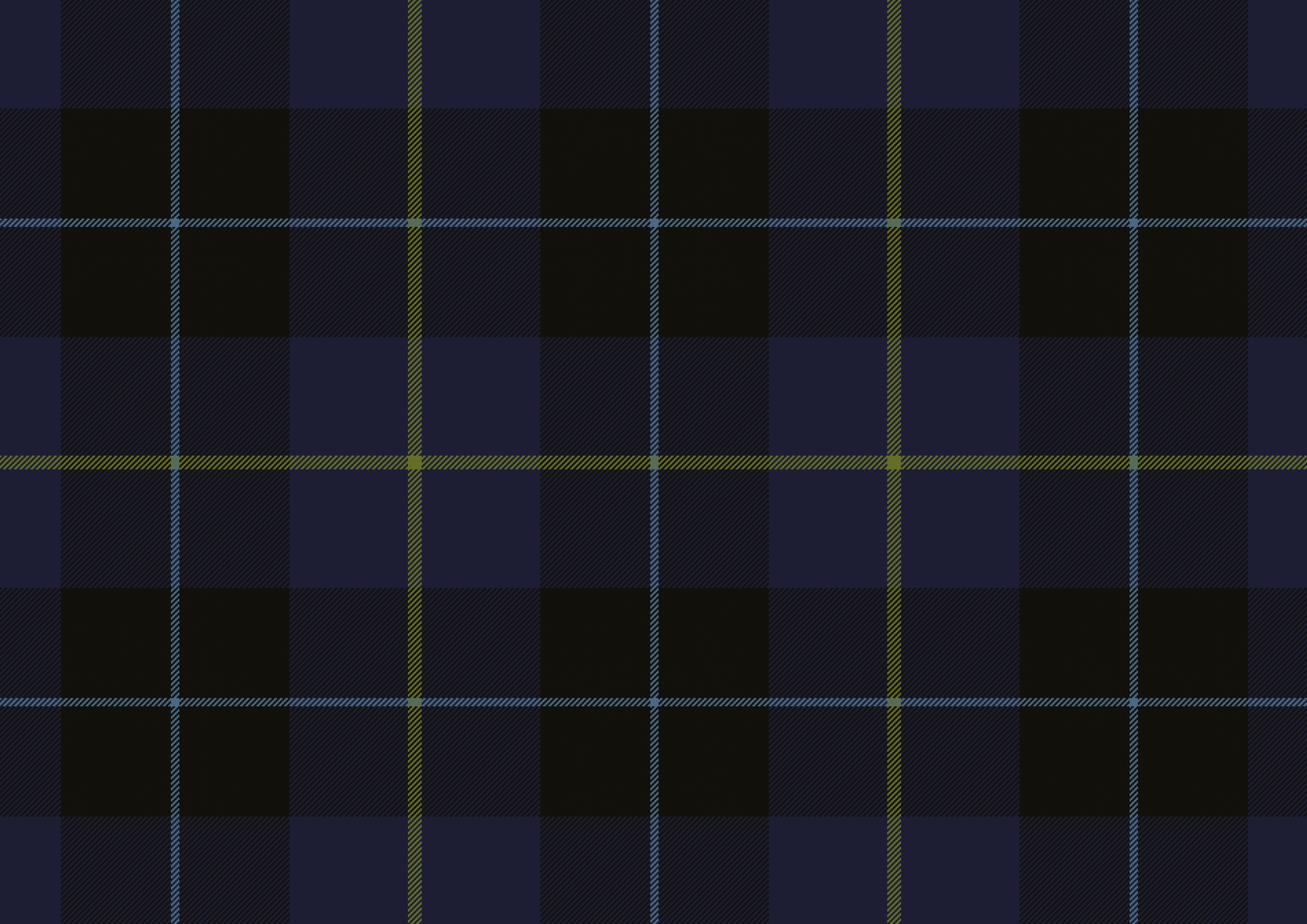

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