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Contents

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Research aims and objectives: "Abattoirs and the Supply Chain"

This study was commissioned by The Prince's Countryside Fund to provide "actionable evidence" of the economic and environmental benefits of abattoirs across England, Northern Ireland, Scotland, and Wales, including island communities, in order to assist the release of statutory financial support for these operations.

Specific research objectives

1. To identify the place and context of small and local abattoirs in the wider red meat supply chain, including,
    a) The services and benefits small abattoirs offer to smaller farmer producers, (e.g., individual family farms, crofters, and other small-scale livestock producers).
    b) Farmers' attitudes toward (i) the value of the higher animal welfare, and (ii) the importance of the services offered by small abattoirs.
2. To examine the viability of smaller abattoirs in the UK, with particular reference to the economies of scale in the sector.
3. To provide evidence of abattoirs' economic and environmental benefits, with a focus on their value to the economy, and to consider how small abattoirs can best be supported to secure their long-term sustainability.
4. To review evidence of consumers' attitudes toward the so-called "credence attributes" linked to smaller abattoirs, such as (i) higher animal welfare, (ii) sustainability credentials and (iii) 'softer' attributes, such as taste, which may affect consumers' willingness to pay a premium for meat associated with local slaughter.
5. Consider the potential for smaller abattoirs to adopt a more collaborative approach, for example, between auction marts and smaller abattoirs, to provide local agricultural 'hubs'.
6. Consider measures that are available and which might be used to support the long-term sustainability of smaller abattoirs.
7. Identify the role of agricultural sector bodies (for example, AHDB, NFU, Natural England and National Parks, statutory bodies (e.g., LEPs)) to invest in regional projects for improving the viability of small and local abattoirs.

Key conclusions

[1] In August 2020, 213 abattoirs were licenced to slaughter red meat livestock species across the UK: their size and distribution is shown in Figure 1.1. Of the 213 abattoirs, 147 provided private kill services: the locations of these predominately but not exclusively smaller abattoirs are shown in Figure 6.3.

[2] For many years, economies of scale across the sector have been more important than economies of scope. As a direct result, the number of larger, more specialist abattoirs has increased and the number of smaller abattoirs has declined: thirteen smaller abattoirs, all of which offered private kill services, closed in the 20 months to August 2020.

[3] Without support to rebalance these economic forces, for example to help smaller abattoirs purchase species-specific specialist equipment and to simplify the regulations they operate under (perhaps using the "de minimis" derogations available to European abattoirs under EU Directive 853/2004/EC (European Commission, 2004: p 47)), smaller abattoirs will continue to close.

[4] There is evidence that the existing provision of private kill services fails to provide farmers with (i) competitive terms and conditions, (ii) effective price-competition and (iii) their preferred range of butchering services. Moreover, there is latent demand from farmers who would like to diversify into meat retailing - a barrier preventing them is the availability of private kill services.

[5] Evidence from a survey of abattoirs shows each provided private kill services for an average of 79 farmers each year. 41.2% of respondents to the farmer survey who use private kill services said there was no alternative abattoir they would use if the one they currently used closed.

[6] A large proportion (44.9%) of farmers with a private kill retail business said their meat retail enterprise was "essential to the viability of the farm", 20.5% or that it was "very important to the viability of the farm". Therefore, if the shrinkage in private kill service provision continues, it will impose considerable financial stress on many farm businesses across the UK.

[7] Closeness to the farm and abattoir animal welfare standards were key determinants of farmers' choice of abattoir for their private kill business. This allows farmers to take livestock to the abattoir in farm vehicles and provides first-hand opportunities to oversee the abattoir's operational procedures.

[8] The average distance livestock travel from farm to abattoir for private kill was 27.4 miles (45 kms). This is statistically significantly shorter than the distance travelled by livestock to larger, "commercial business" abattoirs. Consequently, the removal of the derogation currently given to drivers of livestock for journeys below 65km (EU 1/2005) would have a disproportionate impact on farmers who use the private kill services typically offered by small abattoirs.

[9] The majority of private kill retailer farmers (76.2%) finish and retail meat from rare and/or heritage breeds of cattle, sheep and/or pigs, and 86% of the surveyed abattoirs processed "problematic, rare and/or heritage breed livestock". Therefore, shrinkage in the provision of private kill services would reduce farmers ability to contribute towards conserving genetic diversity and species biodiversity, and maintaining iconoclastic, traditional, highly valued, distinctive rural landscapes, just at a time when agricultural policy is switching to paying farmers to produce public goods such as these.

[10] The variation that exists between abattoirs, in respect to business form, size, the type and location of the principal markets and businesses they supply, their integration into the supply chain, and location, for example with respect to each other, where livestock are finished and the border with the Republic of Ireland, makes it difficult to identify sector-wide, generic prescriptions for improving profitability.

[11] However, respondents had on average only 1.4 animal by-product waste removal companies they could choose from. This evidence supports a recommendation made by the APGAW (2020: p 38) that the Competition and Markets Authority should be asked to evaluate the competitiveness of the animal by-products waste collection market.

[12] Thirteen abattoirs supplied their own butcher shop(s). However, the benefits of this were mixed. Five reported that their abattoir cross-subsidised their butcher shop(s), but eight reported their butcher shop(s) cross-subsidised their abattoir, two of these stated that owning an abattoir was no longer essential to their retail business.

[13] A literature review shows that consumers make links between "local" food and positive credence attributes such as higher standards of freshness, quality, taste, food safety, animal welfare, and perceive it as more environmentally friendly. Restrictions on shopping imposed by Covid-19 regulations increased the use of independent, local butcher shops, but abattoir managers were divided about how they might retain this additional business after the pandemic has been controlled.

[14] However, there was some support among abattoir managers to develop a "local" meat brand to allow consumers to make informed purchasing decisions which reflect their support for local produce, supplied by local businesses, and which reflect their animal welfare preferences. But there are also models individual abattoirs could adapt to develop their own regional, locally produced meat brand.

[15] The findings confirmed that large abattoirs can be organised and manged to provide private kill services. It is, therefore, theoretically possible for a small number of larger abattoirs to replace the private kill slaughter capacity that would be lost should smaller abattoirs continue to close. However, besides the closure of the vast majority of smaller abattoirs this structure would imply, such a network would

- reduce the type and range of butchering services available,
- reduce price-competition between abattoirs,
- result in the closure of many farm-based retail enterprises, and
- further limit the number of farmers able to add value to their farm produce close to the source of its production.

It would also adversely affect the direct and indirect provision of public goods, including

- reduce emergency slaughter provision,
- reduce animal welfare standards by requiring livestock to
    - endure longer more complex journeys,
    - be transported in large-scale commercial transporters (rather than in farm vehicles),
    - which would increase mixing with livestock from other farms,
- reduce the provision of the environmental goods from land, including
    - carbon sequestration,
    - conservation of genetic diversity and species biodiversity,
    - reduce the use of conservation grazing and therefore limit habitat management options,
    - reduce the number of mixed livestock farms, and
    - adversely affect the distinctiveness of rural landscapes.

[16] A reduction in the provision of private kill services will therefore adversely affect local farmers, the ability to provide locally produced and regional foods, landscape character and regional distinctiveness. These changes would restrict economic growth in the rural economy and have adverse impacts on the rural and wider tourist sectors.

[17] A key lesson from consumer responses to Covid-19 is the importance of maintaining diversity in food supply chains. Helping to provide a buffer against future shocks is another key reason to support a nationwide network of small abattoirs which specialise in supplying locally produced food through local businesses.

Recommendations

[1] To develop a better understanding of the impacts of the closure of abattoirs on the services they provide, livestock levy bodies across the UK should collect additional information and provide up to date reports on:

- the number and location of abattoirs working in the UK at any time,
- the licences held by individual abattoirs,
- the total throughput of each abattoirs, by species,
- the abattoirs that provide private kill and emergency slaughter services, and the throughput of each of these services,
- rare and heritage breed slaughter capacity,
- the number of farmers using the private kill services in any month, and
- the number and type of livestock processed for private kill retail in any month.

These data can be used to monitor these market services and the provision of public goods by abattoirs across the UK.

[2] Food standard organisations and regulators should adjust their practices to take into account the difficulties their processes and procedures impose on smaller abattoirs. Examples of changes might include:

- ensuring official veterinarians are always sent to same abattoirs,
- reducing the time required to cancel Food Standard Agency (FSA) staff to help abattoirs avoid unnecessary costs,
- speeding up the introduction of common Food Chain Information procedures across all livestock species,[1] and
- applying the "de minimis" derogation to reduce the regulatory burden imposed on small abattoirs which supply meat locally.

[3] The UK Government and devolved Assemblies should acknowledge the contributions small abattoirs make to: the viability of farm businesses; higher animal welfare; the provision of public goods from land; enhancing rural distinctiveness; the size of the rural economy; and the rural and wider tourist sectors. These bodies should apply the arguments currently used to provide "public money for public goods" to farmers to provide public money for the public goods abattoirs directly and indirectly provide and support.

[4] Abattoirs on the Channel Islands (Guernsey, Jersey, Alderney and Sark) receive government finance in recognition of their essential contribution to farming on the islands and their importance to enhance animal welfare. The UK government and Devolved Assemblies should use the same reasons to support existing island abattoirs and to extend the network of island abattoirs to, for example, the Isles of Scilly, the Isle of Wight, Orkney and the Outer Hebrides and other particularly remote rural areas of the UK.

[5] Abattoirs should be supported to upgrade computer and recording systems. This will allow them to provide accurate and regular information about *inter alia* the number of farmers they provide private kill service for, the type of services demanded, the distance livestock travel from farm to abattoir and the means of transport used, and the abattoir's various and many contributions to the local economy.

[1] The Livestock Information Programme is examining the introduction of a single unified recording and reporting system for all livestock species (including goats and deer) along the lines of that used for pigs.

These data would be used to monitor the contribution each abattoir makes to animal welfare and the rural economy, and therefore could be used to support current and to justify future support payments, and to improve the services they currently provide.

[6] Financial support could be made available through the UK's Shared Prosperity Fund. This might involve capital grant schemes, along the lines, for example, of the Countryside Productivity Scheme. Local Enterprise Partnerships and some Local Authorities should also look at what financial support can be made available.

[7] The small abattoir sector should be supported, either by a government grant or by redirecting a proportion of the slaughter levy, to establish a fully financed small abattoir advisory group. This body, which might be built upon existing small abattoir support organisations, would need sufficient funding to enable it to provide expert technical assistance to small abattoirs across the UK on a range of issues, including, for example,

- the provision of bespoke financial and technical advice,
- the comparison of costs and prices charged for services offered,
- to help establish collaborative actions, for example, to establish joint input purchasing groups, facilitate increased co-operation with local businesses, and to establish a nationwide, or several regional "local" meat brands,
- to provide advice to those managers who wish to create a "local" meat brand independently from other abattoirs,
- to influence the research priorities of UK Research Councils and other funding bodies to, for example, prioritise research into the more productive utilisation of animal by-product waste, improving fridge efficiency, to develop more cost-efficient incinerators, and to explore the potential use of "smart labels" to enhance food and hide traceability along their respective supply chains,
- to help provide the industry participation many research bodies require as part of a successful research proposals, and
- to help establish mechanisms to support the market value of hides and fleeces.

[8] A key aim of any small abattoir advisory group would be to work with other stakeholders to help increase private kill retail business. For example, to work alongside

- the National Farmers Union to provide bespoke advice to farmers wishing to diversify into local added value meat retailing,
- with conservation grazing organisations to help conservation graziers increase the value of livestock principally used for habitat conservation and management, and
- with National Park authorities to develop regional "local" meat brands.

Chapter 1. The diversity of abattoirs in the UK

The Red Meat Industry Forum (RMIF) described red meat supply chains as

> "consisting of a number of coordinated businesses which have to efficiently convert a naturally variable raw material (livestock), which takes a long time to reach maturity, via a complicated production process, into a whole series of end products, which need to be kept in a chilled environment and which have a limited shelf life, amidst fluctuating demand" (RMIF, 2003).

Abattoirs form the cornerstone of this complex, time-sensitive supply chain. They are therefore part of the essential infrastructure that enables livestock farming to form the bedrock of the UK's agriculture sector. Their importance in this regard has been recognised in the Agriculture Bill which includes slaughtering as an "ancillary service" which makes abattoirs eligible to receive government funding (SFT, 2020).[2]

Figure 1.1 shows the location of the 213 abattoirs working in the UK in August 2020 and their estimated throughput (measured by Livestock Units/year). Table 1.1 shows the size distribution of these abattoirs (no throughput data were available from Northern Ireland). Some forty-five abattoirs had a throughput below 1k LSU/year, 43 between 1k and 5k LSU/year, and 63 between 5k and 30k/year. 44 had a throughput above 30k/year.

Table 1.1 Number of abattoirs licenced to slaughter cattle, sheep, pigs and/or goats in the UK (by LSU/year) in August 2020.*

Size, by LSU/year	England	Scotland	Wales	Northern Ireland	Total
Greater than 90,000	10	1	2	0	**13**
30,000 to 90,000	27	3	1	0	**31**
5,000 to 30,000	50	10	3	0	**63**
1,000 to 5,000	29	7	7	0	**43**
Less than 1,000	38	2	5	0	**45**
Throughput uncertain	5	0	0	13	**18**
Number of abattoirs	**159**	**23**	**18**	**13**	**213**
*. LSU are Livestock Units, they are calculated as: 1 cattle = 1 LSU, 2 pigs = 1 LSU and 5 sheep=1 LSU					
(Source: Christine Walsh, *pers. com.*).					

Table 1.2 summaries the diversity of abattoir businesses in the UK drawing on responses to telephone interviews with abattoir managers and industry stakeholders. It shows that abattoirs vary in many respects, for example, in the principal markets they supply, their size (throughput of livestock measured by livestock units), business form, integration into the red meat supply chains and location, with respect to each other, where livestock are farmed and the border with the Republic of Ireland.

[2] A brief overview of the principal practices and processes employed by abattoirs is presented in the Supplementary Appendix.

Figure 1.1. The location and size of <u>all</u> abattoirs in the UK (based on abattoirs working in August 2020). (GIS graphic provided by Jess Hepburn).

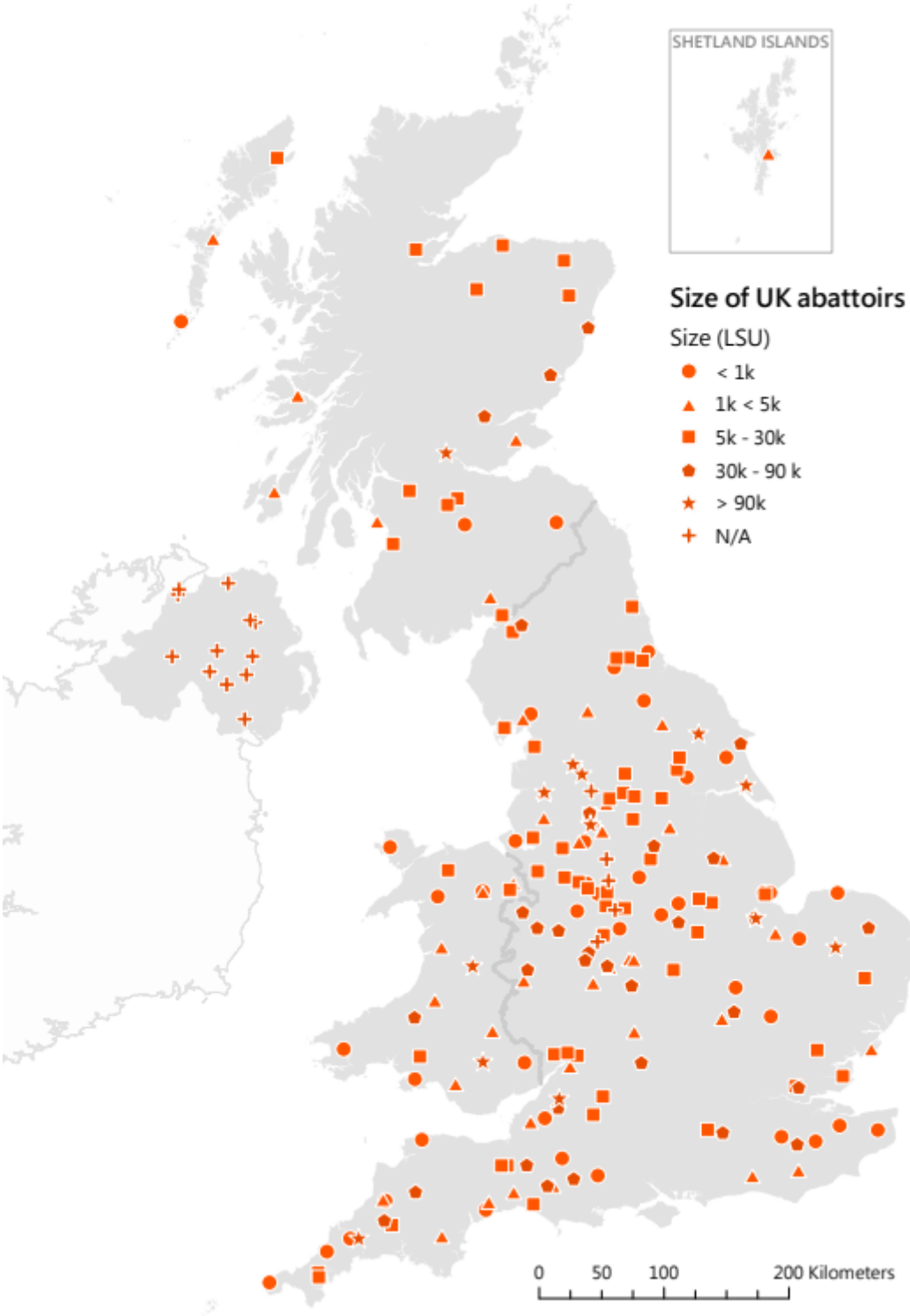


Table 1.2 The diversity of abattoirs in the UK.

Name of abattoir	Primary market	Business form	Size of abattoir (LSU/yr.)*	Abattoir			Comment	Meat customers**	Comments
				slaughter	butcher	Retail			
Case 1	Private kill	Community benefit societies	1-5k	2 days every 2 weeks	Up to 90%	Yes	Animal by-product sent to land fill	F, GP	Services farmers. Any profit has to be used for the benefit of the community
Case 2	Private kill and procurement	Private business	1-5k	3 days a week	Mostly – 5 days a week	Yes	Diversified into pet food sales	F, GP, LC	Some 200 farmers, the majority private kill, and sales through own shop(s)
Farmers Fresh, 2 abattoirs, at Kenilworth (Warwickshire) and Wrexham (Clwyd)	Exports (EU=70%, UK 25%, 5% Gulf states	PLC - with some 2,750 shareholders.	Able to slaughter 30K sheep/week (about 10% of weekly UK kill) Annual turnover £100m	full time	minimal	No	Moving away from dependency on export markets	WO, E	Takes orders and purchases livestock to supply those orders. 50% of throughput purchased from farmers, 50% purchased from livestock markets. Aims to support lamb prices across the sector.
Woodheads, abattoirs at Colne (Lancashire), Turriff (Aberdeenshire), Spalding (Lincolnshire)	Domestic	Wholly owned subsidiary of Wm Morrisons Supermarket	Colne, over 90k LSU/yr. (cattle sheep and pigs) Turriff, 5k-30k LSU/yr. (cattle & sheep) Spalding, over 90k LSU/yr., (cattle and pigs)	full time	full time	Yes	Directly owned by WM. Morrisons PLC as part of integrated red meat supply chain.	S (Wm. Morrisons Supermarket PLC)	Wm Morrisons PLC (which sells 100% British meat), which owns all the businesses from abattoir to supermarket, guarantees "full traceability of our livestock from farm to folk"
*. Data supplied by AHDB. **. F = farmers, GP = general public, LC = local catering firms, WO = wholesale only, S=supermarkets, E=export market									

Table 1.2 (continued) The diversity of abattoir in the UK.

Name of abattoir	**Primary market**	**Business form**	**Size of abattoir***	Abattoir			**Comment**	**Meat customers****	**Notes**
				slaughter	butcher	Retail			
Dalehead (Tulip) at Spalding	Retailer contracted abattoirs: sole suppliers of pork, and of cattle, veal and venison to Waitrose & Partners	Owned by Pilgrim's Pride (US company)	slaughter >90k LSU/yr. (pigs)	Full time	Full time	Yes	Vertically integrated to supply **pig** meat to Waitrose	S (Waitrose)	Formerly owned by farmer owned co-operative Danish Crown (over 6,400 farmer members). It was obliged to accept the animals supplied by its owners.
Dovecote Park, 2 abattoirs, at Stapleton and Skellingthorpe		Privately owned family business	Stapleton: 5k – 30l LSU/yr., (cattle). Skellingthorpe, 30k to 90k LSU/yr. (cattle	Full time	Full time	Yes	Contracted, vertically integrated, abattoir.	S (Waitrose) and FF (e.g., Burger King)	Engages farmers through the Waitrose Producer Group. Full traceability can "can establish the origin of all [Waitrose sold] raw materials and so documentation of suppliers names and batch codes"
Abattoirs licenced to slaughter TB stock	A small number of abattoirs are licenced to slaughter TB stock.	Unknown	Slaughter confirmed TB reactor cattle (work closely with FSA)	Yes	No	No	Special licence	Seven abattoirs are licenced by FSA to slaughter **confirmed** TB reactors, 3 are particularly dependent on this business. Each abattoir bids to FSA to slaughter each animal, but distance is an important consideration when placing cattle with an abattoir.	
Teaching abattoirs	2 for teaching only	Owned by universities	Attached to a university	No commercial work			Teaching is an important purpose	None	Support teaching of veterinarians.
	1 teaching and private kill service		Attached to a university	PK	standard cuts	No		PK	The PK business has increased following the closure of two close-by abattoirs.
*. Data supplied by AHDB *. F = farmers, GP = general public, LC = local catering firms, FF= fast food retailers, WO = wholesale only, S=supermarkets, E=export market									

Chapter 2. Economies of scale and economies of scope in the abattoir sector

This Chapter reviews trends in the number, size (measured by throughput) and specialisation of abattoirs in the UK through the lens of two powerful but countervailing economic forces: economies of scale and economies of scope.

2.1 Number of abattoirs in UK, Great Britain and member states

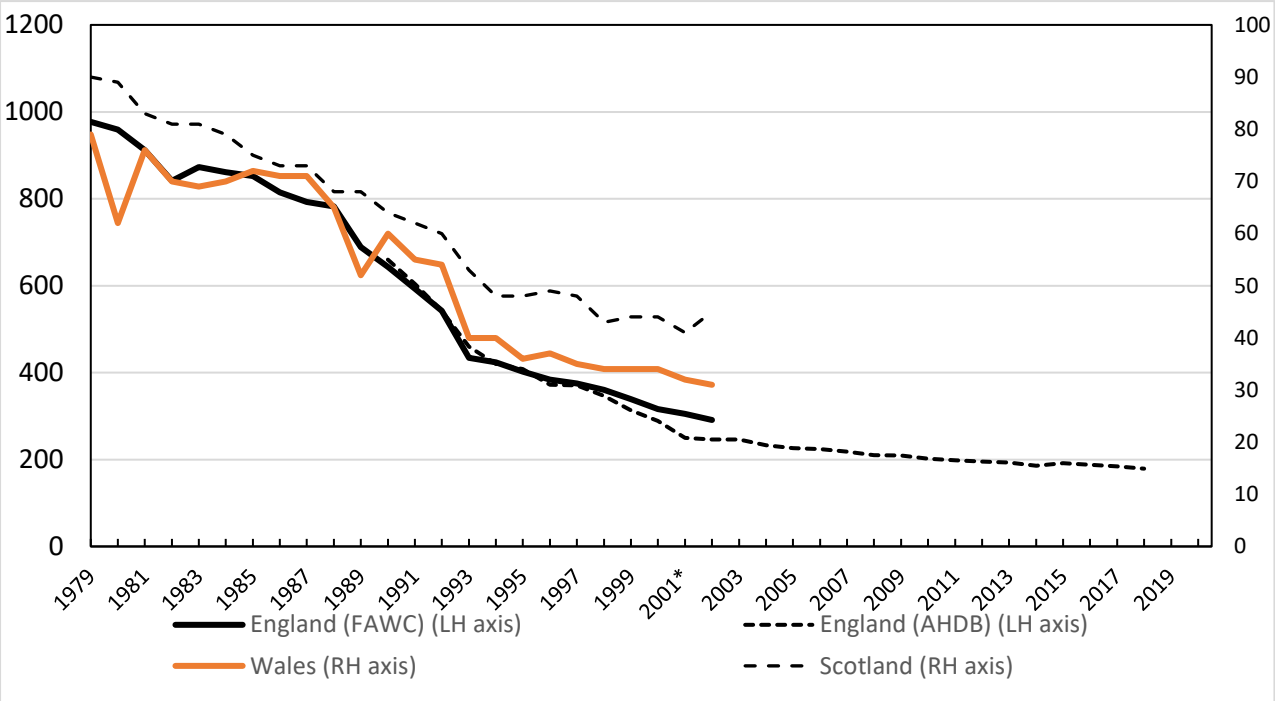
A Farm Animal Welfare Committee report (FAWC, 2003) states there were 1,146 licenced red meat abattoirs in Great Britain in 1979, but only 404 licenced in 2000 (a 65% reduction). It also states that there were 977 licenced abattoirs in England in 1978, but only 316 in 2001 (a 68% reduction). The change in the number of licenced abattoirs in Scotland and Wales over these years was of a similar magnitude (50%, from 90 to 44, and 57%, from 79 to 34).

Data for more recent years is harder to come by. Those presented in Figure 2.1 for England are not directly comparable to the earlier years because of a change in the classification of slaughterhouses during the outbreak of Foot and Mouth Disease in 2001. However, in 2000 there were 289 red meat abattoirs in England, by 2019 this number had fallen to 165 (43%) (AHDB, 2019a). Recent time series data for Scotland and Wales is not available. In January 2019 there were some 226 red meat abattoirs in the UK (Table 2.1). By August 2020, this had fallen to 213.

Table 2.1. Abattoirs licenced to slaughter cattle, sheep, pigs and/or goats (January 2019)

Country	Number of abattoirs (January 2019)
England	169
Wales	19
Scotland mainland	19
Scottish island	6
Northern Ireland	13
Total UK	**226**
Isle of Man, Jersey, Guernsey, Alderney and Sark	5
Total UK and island abattoirs	**231**
(Source: per com. AHDB)	

Figure 2.1. The number of abattoirs in England, Wales and Scotland (various sources). (The number of abattoirs in Scotland and Wales after 2002 is not available. *There were some changes to the classification of slaughterhouses during the outbreak of Foot and Mouth Disease in 2001).



(Source: (FAWC, 2003; their Table 1, p 5, AHDB, 2019a)).

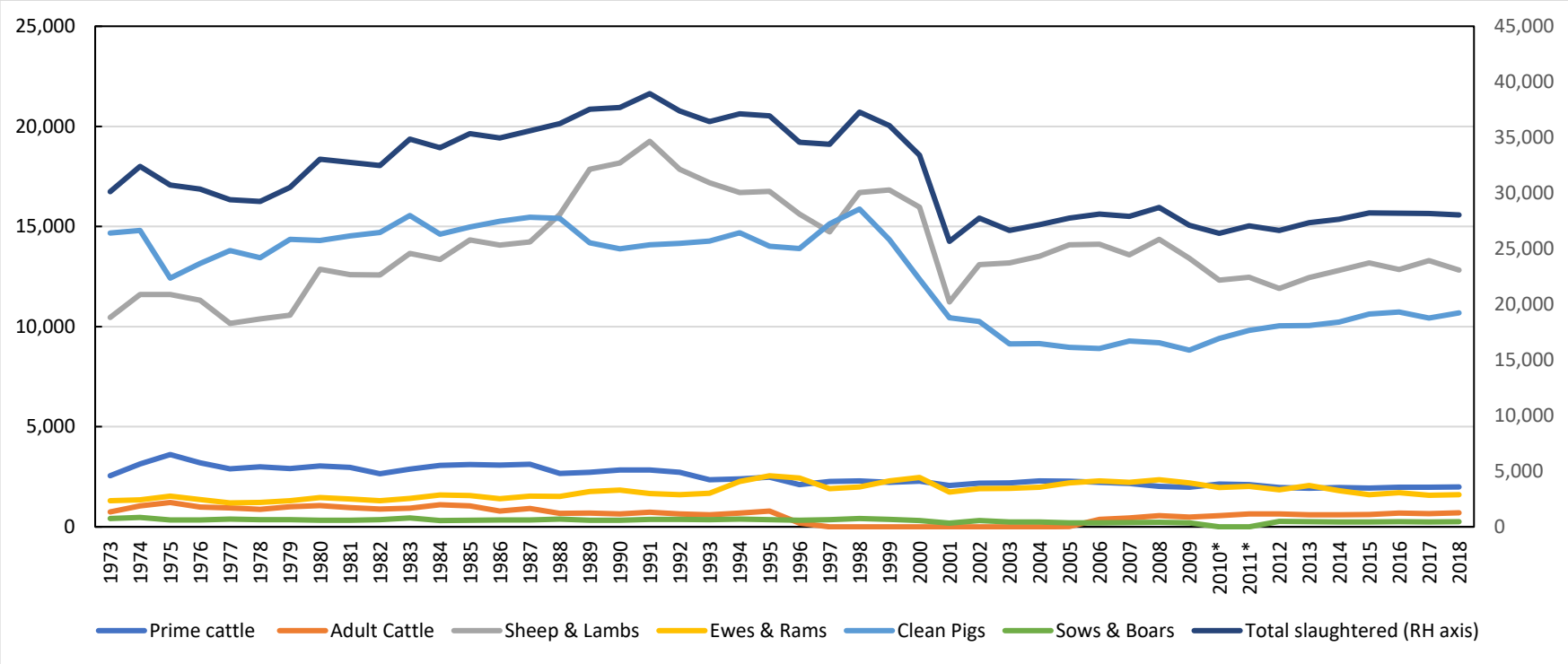
It is possible that the long-term reduction in the number of abattoirs is due to fewer livestock being brought forward for slaughter. These data are shown in Figure 2.2. The number slaughtered peaked in 1991 and then gradually decreased until 1998, before falling more steeply in the following four years. However, the total number slaughtered has remained relatively constant since 2002. Therefore, the closure of abattoirs in recent years has not been driven by a fall in the number of livestock slaughtered.

Table 2.2 shows the number of red and white meat abattoirs to have opened and closed between 2010 and 2017. New abattoirs have been built to replace some of those that have closed. However, separate data are not available for newly opened red meat abattoirs, or for the size of the newly opened or closed abattoirs.

Table 2.2. The number of red and white meat slaughterhouses which have opened and, by deduction, closed in recent years.

	E, S & W					**E & W**		
Year	2010	2011	2012	2013	2014	2015	2016	2017
Number of operating slaughterhouses	378	374	373	364	352	347	309	303
Opened	8	10	12	6	9	10	5	5
By deduction, the number closed each year	-	14	13	15	21	-	43	11
(Source: (FSA, 2017b) Information released under the Freedom of Information Act)								

Figure 2.2. The number of livestock slaughtered in the UK each year (thousand head). * Data for sows and boars in 2010 and 2011 are confidential.



(Source: (Defra, 2019f)).

2.2 Economies of scale and abattoir throughput

Figure 1 (page 11) of the All-Party Parliamentary Group for Animal Welfare's *The Future for Small Abattoirs in The UK* (APGAW, 2020) report shows the change in the number of abattoirs by size for Great Britain between 2001 and 2017.[3] The number of small and medium sized abattoirs (defined in the report as having a throughput below 5k LSU/year and between 5k and 30k LSU/year respectively) has declined, whilst the number of larger abattoirs (defined as having a throughput above 30k LSU/year) has increased.

Table 2.3 shows the share of livestock slaughtered in England in 2018 by size of abattoir. The seventy-one smallest abattoirs (48%) slaughtered 1.1% of cattle (an average of 285/year), compared with an average of 76,283 slaughtered by each of the largest 13 abattoirs.

A similar concentration is observed with sheep slaughtering. The 35 smallest abattoirs slaughtered 0.1% (an average of 401/year), compared with an average 380k slaughtered each year by the largest twenty-two abattoirs. The concentration of throughput in larger abattoirs is particularly noticeable in pig slaughtering (Table 2.4).

Table 2.4. Industry concentration in the slaughtering of pigs (2018 (England)).

	2018
Total number of abattoirs licenced to slaughter pigs	115
Average throughput (pigs/abattoir licenced to slaughter pigs)	78,435
Number of specialist pig abattoirs	14
Average throughput: specialist pig abattoir	533,223
Number of non-specialist pig abattoirs	101
Average throughput: non-specialist pig abattoir	15,395
(Source: (AHDB, 2019a))	

The growth and dominance of large abattoirs is evidence of economies of scale. Economies of scale refer to the reduction in the cost per animal slaughtered as the number of animals slaughtered increases. Economies of scale are typically present in businesses where fixed costs are a high proportion of total costs. Fixed costs, which include wages, rents, business rates, interest and bank charges, and building and equipment depreciation, do not vary with throughput. Therefore, as throughput increases, fixed costs per animal slaughtered fall until all available capacity is utilised. Variable costs, on the other hand, are costs which do vary directly with throughput.[4] Variable costs include, for example, animal by-produce waste removal charges, the slaughter levy[5] and Food Standard Agency (FSA) service charges.

[3] The data used in the APGAW report had been provided on a confidential basis, so it could not be shared with this research.

[4] It is noted that there can be a reduction in some variable costs per unit of throughput as throughput increases. For example, some, typically larger, businesses can often negotiate volume-related discounts on purchases.

[5] All abattoirs are required to pay a slaughter levy to the appropriate levy board on each animal slaughtered (providing the livestock have been farmed in the UK for at least two months after importation). This payment is made to the Agricultural and Horticultural Development Board (AHDB) in England, to Quality Meat Scotland (QMS) in Scotland, to Hybu Cig Cymru (HCC) in Wales and to Livestock and Meat Commission (LMC) in Northern Ireland. The levy charged may vary between countries.

Table 2.3. Total throughput and share of throughput by abattoir size and livestock species (England (2018 calendar year)).

	Cattle			**Sheep**			**Specialist pig abattoirs (defined as abattoirs in which 95% of livestock slaughtered are pigs)**				
Abattoir size (head)	No. of abattoirs	Total throughput	Share of throughput (%)	No. of abattoirs	Total throughput	Share of throughput (%)	Abattoir size (head)	No. of abattoirs	Total throughput /abattoir	Average throughput /abattoir	Share of throughput (%)
1-1,000	71	20,204	1.1	35	14,045	0.1	1-100,000	4	70,385	17,596	0.9
1,001-5,000	25	61,541	3.5	39	82,385	0.8					
5,001-10,000	17	118,463	6.7	18	139,329	1.4					
10.001-20,000	10	158,911	9.0	10	152,245	1.5					
20,001-30,000	4	98,154	5.5	8	191,200	1.9					
30,001-50,000	8	322,547	18.2	6	213,261	2.1					
>50,000	13	991,676	56.0	11	789,790	7.9					
>100,000				22	8,376,933	84.1	>100,000	10	7,394,737	739,474	99.1
Total	**148**	**1,771,496**	**100%**	**149**	**9,959,188**	**100.0**		**14**	**7,465,122**	**757,070**	**100%**
(Source: (AHDB, 2019d, AHDB, 2019a))											

By exploiting economies of scale, larger abattoirs have been able to reduce their slaughter fees (Kennard and Young, 2018: p 7). This puts smaller abattoirs under pressure to match their prices. However, in doing so, smaller abattoirs risk lowering their fees to the point where they fail to fully cover costs. If this persists, these businesses will close.

Therefore, many smaller abattoirs compete with larger abattoirs by offering bespoke slaughter and butchering services to farmers who reclaim the carcases and meat of animals finished on their farm to retail through their own outlets (so-called private kill retail farmers). Indeed, a recent report by the All-Party Parliamentary Group for Animal Welfare (APGAW) suggests small abattoirs are only commercially viable because of

> "the further processing" services they are able to offer" (APGAW, 2020: p. 30, s7.8).

However, the same reports states that

> "small abattoirs are unlikely to have the capital to provide facilities to develop added value potential" (APGAW, 2020: p. 30, s7.8).

2.3 Increased specialisation of abattoirs

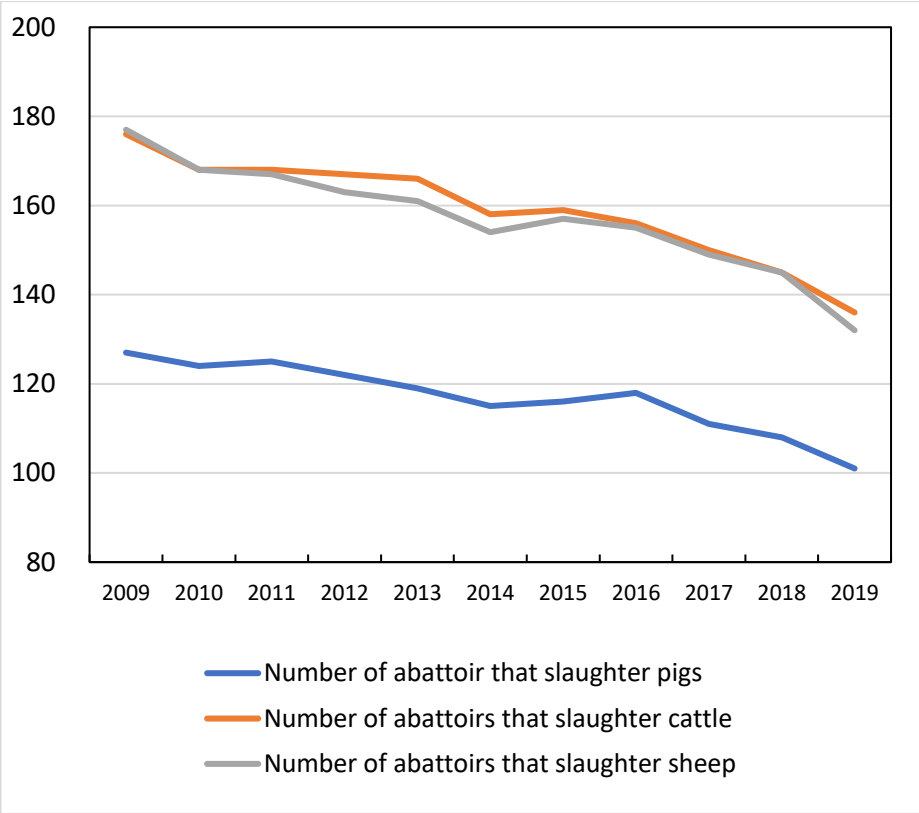
Data in Figures 2.3 and 2.3, and in Tables 2.5 and 2.6 illustrate the increase in the specialisation of abattoir. Figure 2.3 shows the gradual reduction in the number of abattoirs licenced to slaughter cattle, sheep and pigs in Great Britain since 2009. Figure 2.4 shows that this change is particularly noticeable in the number of abattoirs licensed to slaughter pigs in England.

The number of slaughter licences held by abattoirs in England in 2018 is shown in Table 2.5. The 179 abattoirs between them held 412 cattle, sheep and pig slaughtering licences, an average of 2.3 each, 2.7% fewer than in the previous year, as a result of abattoirs closing or giving up species specific slaughter licences.

Table 2.5 Number of abattoirs licenced to slaughter cattle, sheep and pigs in England, 2018

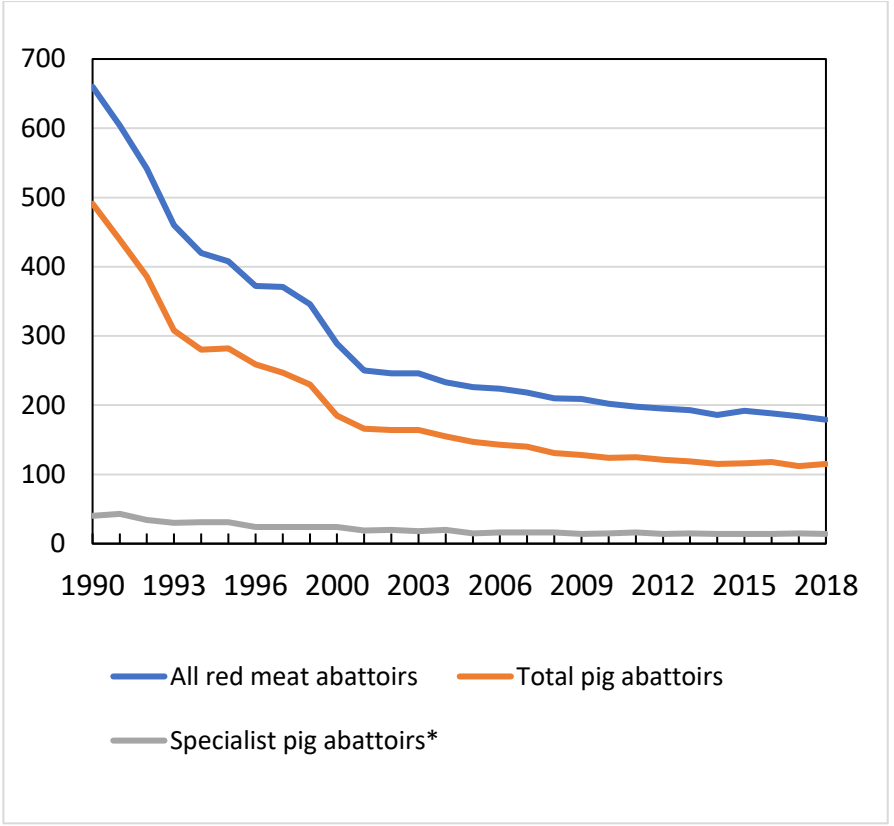
	2018	**Change on year (%)**
Killing cattle	148	-3.9
Killing sheep	149	-0.7
Killing pigs	115	2.7
Total number of abattoirs	**179**	**-2.7**
(Source: (AHDB, 2019d)).		

Figure 2.3 The number of abattoirs licenced to slaughter pigs, cattle and sheep (England, Scotland and Wales (2009-2019)).



(Source: AHDB (*pers. com.* Christine Walsh)).

Figure 2.4 The number of red meat abattoirs licenced to slaughter pig and specialist pig abattoirs in England (1990 to 2018), a specialist pig abattoir is defined as an abattoir where 95% of slaughterings are pigs.



(Source: AHDB (2019a)).

Table 2.6 shows the average number of slaughter licences held by abattoirs by size of abattoir. On average, smaller abattoirs hold more licences that than larger abattoirs which provides further evidence of the specialisation found in larger abattoirs. It also shows that smaller abattoirs have an economic need to retain the capacity to slaughter all three of the main livestock species produced in the UK. However, abattoirs with a throughput below 1k are struggling to justify holding the licences needed to slaughter all three livestock species.

Table 2.6 Number of species licences held by abattoir size (LSU/yr.) (England, Scotland and Wales (2019)).

Abattoir size (LU/yr.)	**Number of species licenced to slaughter**
<1k	2.75
1-5k	2.95
5-30k	2.48
30-90k	1.59
>90k	1.46
Size and species licence data is known for 206 abattoirs. No throughput data is available for abattoirs in Northern Ireland, and recently opened abattoirs will not have submitted annual throughput data (Source: own analysis of data supplied by AHDB (Christine Walsh, *per. com*)).	

2.4 Abattoir specialisation and seasonality of slaughtering

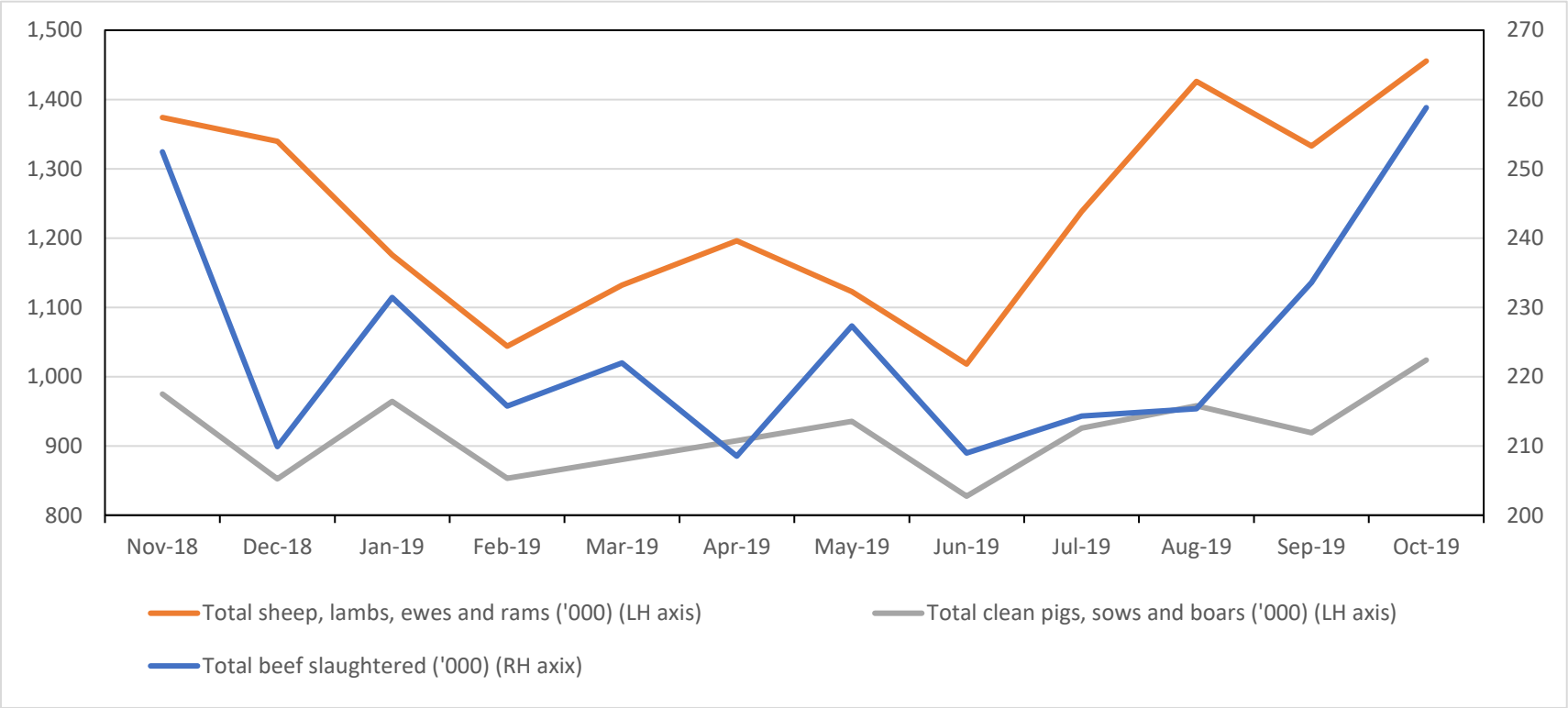
Figure 2.5 shows the seasonal variation in the number of livestock slaughtered in the UK. Although the annual number slaughtered has remained relatively constant since 2009 (Figure 2.2), there is considerable monthly variation: the difference in the number slaughtered between the highest and lowest months was 50,300, 437,300 and 196,400 for cattle, sheep and pigs respectively.

Managers need to manage this seasonal variation. For example, by holding sufficient capacity to slaughter all animals in the peak months. However, holding unused capacity for the remainder of the year increases fixed costs. International companies that own multiple abattoirs are also able to redirect livestock between abattoirs which helps to keep slaughter lines running at full capacity, but clearly this strategy is not available to owners of single abattoirs.

One reason why smaller abattoirs try to retain multiple slaughter licences is to help even-out the monthly variation in livestock ready for slaughter. However, this also imposes extra costs. For example, managers must remain informed about a wider spectrum of ever-changing, species-specific legislation. It also requires investment in specialist, species specific equipment and in additional staff training.

There is evidence that many smaller abattoirs struggle to access the capital needed to make these investments (APGAW, 2020: p. 30, s7.8). This is presumably one reason why fewer of the smallest abattoirs have managed to retain cattle, sheep and pig slaughter licences. However, these additional costs can be recaptured if consumers are willing to pay a premium for credence characteristics attached to meat, such as its provenance, whether it is produced locally and processed and sold through local businesses.

Figure 2.5 Monthly variation in number of livestock slaughtered in the UK (between November 2018 and October 2019 ('000)).



2.5 Conclusions

Structural change in the abattoir sector has been driven by two powerful countervailing economic forces. Economies of scale drive the increase in size of abattoirs, whereas economies of scope support abattoirs to use their infrastructure, equipment, staff and managerial skills to slaughter multiple livestock species. The data reviewed in this Chapter show that economies of scale have been the principal driver of structural change across the sector with the resulting increase in throughput and specialisation. In response to these pressures, small abattoirs have increasingly specialised in private kill slaughtering and in providing butchering services to private kill retail customers.

That economies of scale drive structural change was noted in a FAWC report published in 1983. That report (FAWC, 1983) referred to three possible impacts should the reduction in the number, increase in specialisation and geographic redistribution of abattoirs continue,

- an increase in the distance livestock have to travel from farm to market or to slaughter,
- a likely increase in the risk of farm animal welfare being compromised because of the longer and/or more complex journeys, and
- the redistribution of slaughter capacity may not allow the promoting and sourcing of food produced locally.

The data presented in this chapter show that the underlying trends of increased abattoir size, specialisation and geographic redistribution have continued since 1983. It is therefore likely the distances livestock travel from farm to slaughter, the increased risks of longer and more complex journeys to animal welfare, and a reduction in provision of locally produced food have also taken place.

Chapter 3. Red meat supply chains in the UK

3.1 Introduction

A telephone survey conducted between January 2019 and March 2020 was designed to compare the business models and practices of small and large abattoirs. The responses are summarised here and have also been used to help design the online survey of abattoirs that is reported in Chapter 5.

3.2 Survey methodology

The survey contacted 28 managers of abattoirs of various sizes and asked them to

- outline their abattoir's business model and its principal markets,
- explain how they manage the seasonal variation in the supply of livestock,
- outline the challenges they face, and
- give their views of the distinctive roles their abattoir plays in the red meat supply chain.

The interviews were supported by extensive internet searches, a literature review and additional telephone interviews with stakeholders, including spokespeople from The Sustainable Food Trust and The British Meat Producers Association (bmpa). This helped to contextualise and triangulate the responses received from abattoir managers. Contact details for abattoirs and the slaughter licences each held was initially available on the AHDB's eFoodChain map.[6] Additional data was supplied by AHDB.

3.3 Structure of abattoirs working in the UK (August 2020)

Twenty-three of the 28 interviewees managed abattoirs that had a throughput below 5k LSU/year, all offered private kill services. Five interviewees managed abattoirs with throughputs above 30k LSUs/year, and two worked for international companies that owned several abattoirs across the UK. Two of these five larger abattoirs offered private kill services. Therefore, responses were received from a cross section of abattoir sizes and businesses.

3.4 Comparison of survey findings

Key findings of the telephone survey are summarised in Table 3.2. The responses describe two separate and parallel red meat supply chains. One is low-volume, low-throughput which mostly serves local farmers and supplies local markets. The abattoirs in this supply chain typically have a throughput below 20k LSU/year. Though some may be larger, the majority are much smaller, many have a throughput below 1k LSU/year. The revenue these abattoirs earn are largely dependent on the slaughter fees and butchering charges for private kill services, though some purchase livestock to supply their own retail outlets and other local businesses.

The other separate and parallel red meat supply chain is characterised by its large-volume, large-throughput abattoirs. Abattoirs in this supply chain typically have an annual throughput above 30k LSU. Some are contracted to supply specific multiple retailers to order, typically sourcing livestock from the retailer's dedicated livestock farmer group. In 2018, the largest five multiple retailers sold 63% of meat in Great Britain, with only 3% retailed through independent butchers (AHDB, 2019d: their Figure 10.3, p 19). In the same year, multiple retailers sold 84% of pork and 85.7% of bacon by value, whereas butchers sold 7.9% and 3% respectively (AHDB, 2020c: Table 9.2, p 34). Some larger abattoirs also supply wholesale markets, but these are declining in importance, others specialise supplying markets overseas.

[6] This resource was withdrawn in June 2020 for updating.

Table 3.2 A comparison of the responses from the survey of small and large abattoirs.

	Small abattoirs	**Large abattoirs**
Company form	Sole traders, Partnerships, and Community Benefit Society	Public Limited Companies
Abattoir business structure	Single plant, containing all stages of the production line	Increasingly specialist, multi-site businesses, with separate stages often conducted in different plants, and own anaerobic digesters
Number of farmer suppliers	Relatively large number of farmer suppliers for size of throughput	Large number of farmer suppliers
Type of farmer	Small-holder, crofter, smaller mixed livestock farms	Increasingly work with dedicated supply groups, contracted to sell to retailers through specified abattoirs.
Interaction with farmers	Typically regular contact when livestock are delivered and meat collected	Farmers invited to open-days at the abattoir
Auditing process	Based on legislative requirements, e.g., Food Chain Information forms	Maintain detailed records and auditing
Relationship with FSA employees	Inconsistency in interpretation of regulations, limited knowledge of working practices of small abattoirs vis-à-vis larger abattoirs. Regular change in FSA personnel makes it difficult to develop a working relationship with official veterinarian	Concern of lack of sufficient official veterinarians after the UK has left the EU. Inconsistent interpretation of regulations
Staff	Multi-skilled staff, generally live locally	Staff trained to use particular equipment, many from overseas
Membership of assurance schemes	Smallest abattoirs not usually member of any assurance scheme	Meat purchasers typically insist abattoir are member of specific, specified assurance schemes
Scheduling of livestock delivery	Individual farmers phone the abattoir to books a delivery slot.	In-house, logistics and procurement team, employed by abattoir, and agents in the field arrange collection and delivery
Farm size	Typically smaller farms	Typically larger livestock farms, increasingly specialising in finishing prime stock
Managing seasonality of throughput	Work one or two days a week, and some close for a period after Christmas	Several possible strategies, depending on relative cost: close a/several production lines, reduce the hours worked/ production line, close the abattoir for a day or days, and redirect supply to another abattoir owned by the company
Principal customers	Dependent on private kill services and local food businesses	Typically supply large multiple retailers and/or wholesale and/or export markets
Challenges faced	Low profitability. Need to minimising costs. Retaining trained staff. Collapse in the value of hides and fleeces. Limited competition among animal by-product waste removal businesses. Impact of switch in farm support payments on the number of livestock farmers	Difficulty recruiting staff for overseas. Ban on the import or live animals. Tariffs and phyto-sanitary standards that may be imposed following decision to leave the EU. Impact of switch in farm support payments on the supply of livestock

3.4.1 A comparison of problems faced by large and small abattoirs

The survey found that different sized abattoirs face some similar and some different problems. For example, all expressed concerns about staffing issues, but for different reasons. Larger abattoirs expressed more concern about the availability of overseas workers and fully qualified official veterinarians, whereas smaller abattoirs had difficulty recruiting multi-skilled slaughtermen and when they had trained them, they had difficulty retaining them.

Managers of both large and small abattoirs expressed concerns about FSA working practices, but again for different reasons.[7] Smaller abattoirs complained of communication difficulties and language barriers and would like less rotation among FSA staff. They would also like to reduce the advanced notice time required to cancel FSA staff (FSA, 2020: p 11).[8]

Small abattoirs manage the delivery and slaughter of livestock to make most efficient use of FSA staff time to reduce FSA charges. But if they have few livestock booked in on any day, a shorter cancellation time would allow them to reschedule these livestock. However, as FSA staff are always present in larger abattoirs this is not a particular problem, but managers would like more consistent interpretation of regulations.

3.4.2 Comparison of management practices

Larger and smaller abattoirs adopt different approaches to managing a constant and stable supply of livestock. Because of their daily need for a large number of consistently sized livestock, larger abattoirs employ in-house logistic, planning and procurement teams. These teams often work with specialist procurement organisations/agents to purchase livestock from, generally, larger farms. The team uses its combined knowledge of livestock production systems and draw on their experience of the effect of seasonal weather patterns on grass growth, and thereby animal growth rates and breeding performance, to plan livestock delivery schedules a week or two, or longer, in advance. Managing a constant supply of consistently sized livestock is less bothersome for specialist pig slaughtering abattoirs because pig farms are typically large and use similar production systems.

Smaller abattoirs use more informal practices to manage the supply of livestock. In general, farmers contact the abattoir to arrange livestock deliveries. The smaller abattoirs provide private kill services, some exclusively so

> "[I am] 100% dependent on private kill. We have no other markets – all slaughtered stock are butchered with the meat returned to the supplying farmer or to a single butcher (this butcher purchases from farmers or marts to have animals slaughtered at the abattoir but does the butchering himself).[9] Private kill and private procurement are, essentially, the only services offered".

The smaller abattoirs accepted livestock from 20 to 400 farmers each year, though many were unsure of the exact number: most of the smaller abattoirs did not have a mailing database for their farmer customers. Most farmers transported small numbers of livestock in each visit to the abattoir in a farm vehicle, but some abattoirs offered a livestock pick-up service which collected livestock from individual farms or from collecting centres, (typically a local mart). About half offered a delivery service which returned the carcase/meat directly back to individual farmers or to a butcher shop, from where it could be collected.

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[7] Official controls in England are delivered by The Food Standard Agency Official, in Scotland by Food Standards Scotland, in Northern Ireland by the Department of Agriculture, Environment and Rural Affairs. Charges for pre- and post-mortem inspections are calculated on an hourly basis. Small abattoirs receive discounts on the basic fee.

[8] The FSA requires at least two full working days' notice (though some allowance is given for certain eventualities, for example, machinery breakdown.

[9] This service is sometimes referred to as private procurement or contract slaughter. For the purpose of this report no distinction is drawn between private kill and private procurement.

Although most farmers were local to the abattoir, an increasing number transported livestock from further afield, either because their local abattoir had closed or because the farmer valued the particular services the abattoir offers. Many smaller abattoirs also purchase livestock from local markets to supply orders.

Larger abattoirs have also adapted by specialising in the livestock they slaughter. Smaller abattoirs have typically slaughtered sheep, cattle, pigs and goats to help address seasonal variation in the supply of each individual species. This also allows them to provide a one-stop abattoir service to farmer and retailer customers. However, high costs had resulted in some ceasing to slaughter pigs. A respondent explained why,

> "[the abattoir] does not currently slaughter pigs. The cost of tongs (at £6k) is too high" (Case S17).

International companies which own several abattoirs can adjust throughput by redirecting cattle to specific abattoirs; closing processing lines in an abattoir; reducing the hours worked by individual processing lines; and/or closing an abattoir for a day or for several days a week, and/or for several weeks a year. The option chosen is partly dependent on their relative costs. However, the increased specialisation of livestock farms into breeding, rearing or finishing businesses has affected where livestock are finished and this has created problems for some smaller abattoirs. A lack of livestock was noted by managers of two island abattoirs where farmers increasingly sell livestock as stores rather than take them on to slaughter weight.

None of the smaller abattoirs slaughtered every day of the week. Several slaughtered only one day a week, some two and some on three days a week, with most increasing the number of days as Christmas approached. Many smaller abattoirs closed entirely for a month or two in the New Year, for example,

> "our abattoir slaughters two days every two weeks between January and July, then 3 days every 2 weeks between August and December".

The principal constraints to increasing throughput faced by most smaller abattoirs was the capacity of the butchery hall and the fridges (needed for hanging carcases) and, for some, falling consumer demand. The investments needed to comply with new regulations, such as the installation of CCTV, has absorbed capital that could otherwise have been used to improve efficiency by upgrading production lines, expanding fridge capacity and investing in infrastructure maintenance and improvements.

3.4.3 Competitiveness of smaller abattoirs

The price abattoirs can afford to pay for livestock depends in part on how well they can "balance the carcase". This refers to their ability to find markets for all cuts of meat and for the "fifth quarter" (offal, hides and fleeces). Indeed, the problem of finding markets for the entire carcase has been described as

> "the Holy Grail for all processors, large and small, as it enables a positive margin to be realised and keeps the business viable" (Scottish Association of Meat Wholesalers, 2019).

The higher throughput of larger abattoirs allows them to sell cuts and offal not taken on contract into domestic wholesale markets and/or overseas. They are also better placed to treat and store hides and fleeces (traditionally the most valuable parts of the fifth quarter) in sufficient quantity to export. The recent fall in the value of hides and fleeces means it is no longer cost-effective for smaller throughput abattoirs to do this, and the disposal of these products adds to their animal by-product waste removal costs. These economies of scale allow larger abattoirs to offer higher prices for livestock. An important reason why many smaller abattoirs have retained their own butcher shop is to help them to balance the carcase.

3.5 Barriers to supplying the red meat supply chains

Respondents to the survey identified barriers that prevented abattoirs supplying both low-volume and large-volume red meat supply chains. As mentioned above, the majority of larger abattoirs are directly contracted to supply a single multiple retailer. The contracts typically required the abattoir to process livestock supplied by farmers who are members of dedicated producer groups. This prevents smaller abattoirs from supplying the large-volume red meat supply chain (should they wish to do so). Perhaps for this reason, many abattoirs are not members of assurance schemes (FSA, 2019: this report does not provide information on the size of abattoirs which are members of assurance schemes).

Large abattoirs also face practical management and operational barriers to offering private kill services. For example, the different stages in processing carcases often take place in different plants and at different sites, so the trained staff needed to provide private kill services do not always work under the same roof, which poses logistical challenges. Moreover, deliveries from private kill customers generally involve small numbers of livestock, so large throughput abattoirs require many deliveries which increases their staffing and lairage costs. Moreover, it takes more staff time to keep the records necessary to identify and segregate the carcase and meat from specific animals so these can be returned to the farmer – an essential requirement of the private kill retail trade.

Therefore, private kill-related services add costs and can reduce abattoir throughput, which reduces efficiency and profitability. However, although it is difficult for larger abattoirs to offer private kill services, it is not impossible for them to do so. The managers of two larger abattoirs (with throughputs between 30k LSU and 90kLSU/yr.) have organised their abattoir to provide private kill services. But to do so, both managers had to choose not to supply multiple retailers.

3.6 Conclusions

The responses to the telephone survey describe two separate and parallel red meat supply chains. One is high-volume, supplied by high-throughput abattoirs which are typically contracted to a single multiple retailer. The other is low-volume, supplied by low-throughput abattoirs, which typically specialise in private kill services. There are considerable contractual and practical (management and operational) barriers which prevent abattoirs supplying both high- and low-throughput supply chains. In particular, private kill services impose higher livestock management, staffing, and carcase and meat recording costs on smaller abattoirs.

The slaughter fees smaller abattoirs can charge have come under increasing pressure from larger abattoirs, which can use their size to balance the carcase by supplying domestic and overseas markets. The recent fall in the value of hides and fleeces has made it uneconomic for smaller abattoirs to treat and store hides for sale: what was once a source of revenue has become an additional animal by-product disposal cost. One reason many smaller abattoirs have retained their own retail outlet is because it helps them to balance the carcase.

Under these financial pressures, smaller abattoirs need to control costs. Respondents consistently referred to their difficulties controlling animal by-product waste disposal charges (lack of competition between companies), Food Standard Agency arrangements (lack of flexibility), managing Food Chain Information paperwork (lack of consistency across livestock species), the cost of recruiting and training staff, and their difficulty retaining staff after they are trained.

In addition, many smaller abattoirs found financing the investments needed to continue in business difficult. In particular, the cost of complying with new rules and regulations, such as installing abattoir-wide CCTV coverage, absorbed capital that could otherwise have been used to increase efficiency by upgrading processing lines.

The responses received from the abattoir managers clearly varied by abattoir size. But there was also a good deal of variability in the response received from managers of smaller abattoirs, which perhaps reflects the variability within this group of businesses.

Chapter 4. Private kill provision and the viability of farm businesses

4.1 Introduction

This Chapter presents findings from an online survey of farmers in England, Northern Ireland, Scotland and Wales designed to understand how farmers select an abattoir(s). It was open to all farmers in the UK who sells a red meat livestock species for slaughter. Findings are presented by three user groups; large-scale commercial business (CB), smaller scale private kill retail (PKR) businesses, and farmers who use private kill services for home consumption (HC).[10] However, the particular focus is on farmer's use of private kill services. Therefore, respondents were asked about the potential impacts of the closure of abattoirs offering these services on the viability of their farming business, their farming system and on land use change.

Additional information in the Case Study Appendix for this chapter includes an introduction to "Agriculture of the Middle", and examples of retail marketing systems used by private kill retail farmers and conservation graziers. These case studies draw upon additional information gleaned from telephone interviews and responses to a second, more targeted, on-line survey.

4.2 Online survey of farmers: methodology

4.2.1 Survey design

An online survey was used to record how farmers select and use abattoirs. It was created using the programme 'Online Surveys'. The full survey comprised six main sections entitled: 1) 'your farm', 2) 'your private kill service for home consumption', 3) 'your interaction with abattoirs for commercial business', 4) 'your private kill retail business', 5) 'demographics' and 6) 'the impact of coronavirus'. All farmers answered sections 1, 5 and 6.[11]

Survey routing was employed to direct farmers through sections 2, 3 and 4 depending on their use of abattoirs. Specifically, in section 1, farmers were asked '*Do you use an abattoir 'private kill' service? Private kill refers to farmers who reclaim the carcasses of animals finished on their farm following slaughter*'. Farmers who indicated that they use private kill services for home consumption only (selected '*Yes, for home consumption only*') were directed to sections 2 and 3. Farmers who indicated that they do not use private kill services at all (selected '*No, I don't use a private kill service*') were directed to section 3. Farmers who indicated that they use private kill services to retail their own meat (selected either '*Yes, in order to retail my own meat' or 'Yes, both to retail my own meat and for home consumption')* were directed to section 4. The survey was piloted by two researchers with ten farmers and amended according to feedback regarding the wording and the range and appropriateness of questions.

4.2.2 Survey distribution

A total of 300 red meat producers from the UK completed the online survey during the period 14th April - 26th May 2020, though not all respondents answered every question. Forty relevant organisations were approached via email for assistance in promoting the survey. Those which did not respond after 4 weeks were contacted again. A total of 21 organisations agreed to share the survey URL via their newsletters, social media streams and mailing lists. Nineteen organisations either did not respond or declined to help promote the survey. Supplementary Appendix S4.1 presents a full list of the organisations approached.

[10] PKR is also a "commercial business", but we seek to draw a distinction shown in Table 4.4 between the use of abattoirs by larger scale commercial farmers and by smaller scale farmers - who are the predominant users of PKR services.

[11] The survey received internal ethical approval from the Human Ethical Review Committee at Newcastle University. Informed consent was obtained from all participants.

4.3 Demographic characteristics of the final sample

The majority of respondents were male (59% male; 39.3% female; 1.7% undisclosed) and were on average 53 years old (standard deviation 13.0, range 20–79 years). This is slightly younger than holders of farms in the UK (Defra, 2019a: p 23). Although circulated to farmers across the UK, 84% of respondents were based in England, 9.7% in Wales, 6% in Scotland, 0.3% in Northern Ireland. Roughly 45% of UK beef (AHDB, 2018c) and 50% of UK sheep (AHDB, 2018d) holdings are in England. Therefore, this sample is skewed towards English farmers and under-represents red meat farmers in the other UK countries.

There are a number of standards and certification schemes applicable to meat production, processing and retailing. Most schemes that cover production and processing have developed in response to demands from multiple retailers for independent verification rather than to perform the functions associated with inspections and other interventions by regulators (FSA, 2013). As all major multiple retailers use quality assurance as part of their food sourcing and supplier specifications, respondents were asked to list their membership of assurance schemes. Table 4.1 shows that roughly one third (36%, 108) of respondents were assured by one scheme, 8.7% (26) by two schemes, 3% (9) by three schemes, and one farmer (0.3%) was assured by four schemes. However, 46.7% (140) of respondents were not members of any scheme, 16 respondents (5.3%) declined to answer the question.

A FSA survey of slaughtering practices of the 248 abattoirs (228 in England and 20 in Wales) that slaughtered stock at any time between 29th January 2018 and 4th February 2018 found that 52% of the 185 red meat abattoirs did not belong to any assurance scheme, 28% belonged to the Red Tractor scheme and 17% were members of the British Retail Consortium scheme (Defra, 2019h). Therefore, there is a population of non-assured abattoirs through which non-assured farmers can process their livestock. However, the meat from these abattoirs cannot be retailed by multiple retailers.[12]

Table 4.1. Farmers membership to quality assurance scheme (some farmers were assured by more than one scheme.) (N=297 responses.)

Quality assurance scheme	Percentage (number)
No scheme	46.7% (140)
Red Tractor	36% (108)
Soil Association	7.7% (23)
Multiple retailer specific scheme	4% (12)
Farm Assured Welsh Livestock	4% (12)
Pasture for Life Association	3.7% (11)
Quality Meat Scotland	3.3% (10)
Organic Farmers and Growers (OF&G Organic)	2.7% (8)
Others, including Royal Society for the Protection of Cruelty to Animals (RSPCA), Organic Food Federation, Scottish Organic Producers Association (SOPA), and British Pig Association Pedigree Pork.	2.2% (7)

4.3.1 Farmers' use of abattoirs

Table 4.2 summaries the way farmers use abattoirs. Over half (61.7%) of respondents used private kill services to retail meat from their own livestock. A Defra survey of farm businesses (tax year 2018-2019) estimated that 10% (n=5,800) of English farmers "processed or retailed farm produce" (Defra, 2019c; Table C, p. 23). Defra cautions that these estimates are "influenced by sample composition", nevertheless it appears that farmers who retail their own red meat are over-represented in the sample. However, the oversampling of farmers who use the private kill services is appropriate because the restructuring and consolidation of abattoirs has the greatest impact on the provision of private kill services, so their responses are of greater interest to this research.

[12] The FSA study does not provide any additional information about the size or services offered by the assured and non-assured abattoirs.

Table 4.2. Farmers' use of abattoirs (N=300).

Response	Percentage (number)
For commercial business (CB) only	19.67% (n=59)
For commercial business (CB) and for home consumption (HC)	18.67% (n=56)
For private kill retail only (PKR)	8.67% (n=26)
For private kill retail (PKR) and for home consumption (HC)	26.66% (n=80)
For private kill retail (PKR) and for commercial business (CB)	6.00% (n=18)
For commercial business (CB), home consumption (HC) and for private kill retail (PKR)	20.33% (n=61)

The location of the 124 abattoirs used by the respondents is shown in Figure 4.1. Table 4.2 shows the complex way farmer used abattoirs. In summary, 28.3% used abattoirs for one purpose (either CB or PKR), 51.3% used abattoirs for two purposes, and 20.33% used abattoirs for three purposes. Although the majority of farmers (70.8%, n=223) used only one abattoir, 17.1% (n=54) used two, 3.5% (n=11) used three, and two farmers regularly used four abattoirs. 82 of the 124 abattoirs were used for PKR business, 26 of which were also used for CB. There is therefore a population of farmers who are unable to use a single abattoir for all their slaughtering and butchering requirements.

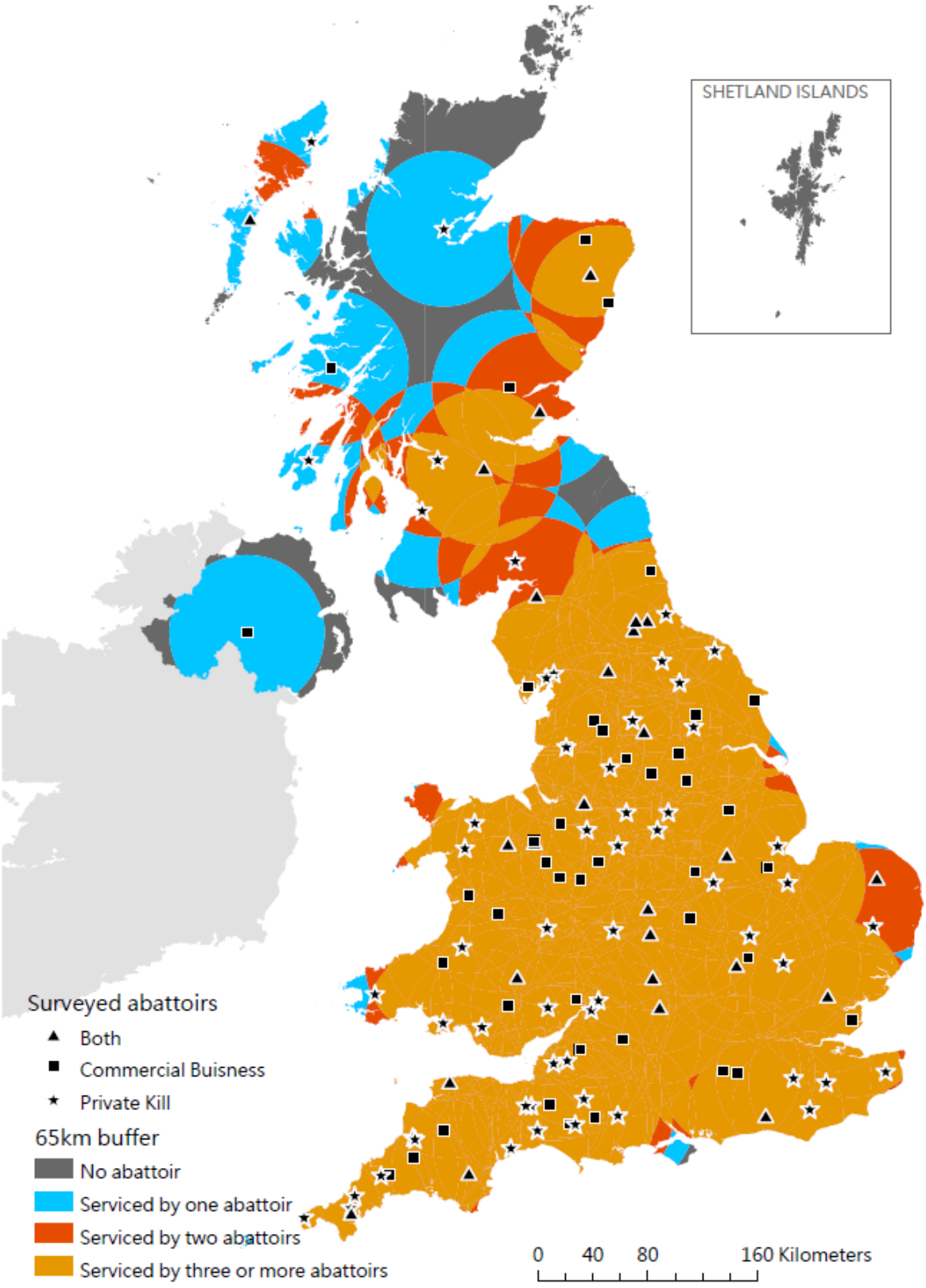
Table 4.3 shows that the abattoirs used for PKR were generally smaller than those used for CB. There is no information on the underlying population of abattoirs which offer private kill services (APGAW (2020: p 10)), but this finding confirms the view expressed in the APGAW report that experts,

> "widely agreed that these services [i.e. private kill] were offered mostly by small-medium sized abattoirs" (APGAW, 2020: p 10).

Table 4.3. Farmers' use of abattoirs for private kill retail (PKR) and for commercial business (CB) by abattoir size (measured in livestock units (LSU) slaughtered per year).

Number of LSU slaughtered per year	Number of abattoirs used <u>only</u> for their PK service	Number of abattoirs used <u>only</u> for commercial business (CB)	Number of abattoirs used for <u>both</u> PK and commercial business (CB)
<1k	23	1	2
1-5k	16	4	11
5-30k	16	13	10
30-90k	1	18	3
>90k	0	6	0
Total	**56**	**42**	**26**

Figure 4.1. The geographical coverage of abattoirs used by survey respondents (assuming a 65km buffer). (Graphic provided by Jess Hepburn).



4.4 Findings from the survey

4.4.1 Distance from farm to abattoir

Figure 4.2 shows the average distance livestock are transported from farm to abattoir for CB, PKR and HC purposes (see Chapter 6, Figures 6.1 and 6.2 for additional details on journey distances). The journey from farm to abattoir was significantly longer for CB (59.4 miles/95 kms) than for PKR (27.4 miles/45 kms) and HC (24.6 miles/40 kms) ($F=20.30$, $df=2$, $p<0.001$). The range was also larger, with standard deviations of 69.2 miles, 27.2 miles, and 16 miles for CB, PKR and HC respectively. These results are broadly consistent with the findings of (APGAW, 2020) that,

> "the range of distances was much larger for large abattoirs, so many animals end up travelling very long distances" (APGAW, 2020: p 1).

However, the closure of abattoirs offering PK services is leading to longer journeys for PKR farmers. For example, a PKR farmer on Orkney said the closure of the island abattoir now required livestock to undertake the following journey.

> 'I load them into my cattle box, they then have to go on TWO boat journeys lasting 3 and a half hours before someone collects my cattle box and drives them to the abattoir'. (Farmer of 14 mixed species LSU per year).

Figure 4.2. Mean distance to abattoirs used for private kill retail (PKR) (n=183 respondents), commercial business (CB) (n=103 respondents) and home consumption (HC) (n=54 respondents). (Different letters indicate a statistically significant difference as indicated by a one-way ANOVA analysis with post-hoc LSD tests with a Bonferroni adjustment applied for multiple comparisons.)

Transport to slaughter is covered by detailed legislation because animal movements provide a substantial threat to animal welfare due to fluctuating internal temperatures, the need for adequate ventilation, and the possible lack of food, water and rest, which are all exacerbated by the journey length (Miranda-de la Lama et al., 2014, Weeks, 2008, Gallo et al., 2018). Furthermore, stress prior to slaughter leads to increased incidence of pale, soft, exudative (PSE) and dark, firm, dry (DFD) meat, thus, reducing meat quality (review article by Adzitey and Nurul (2011), and transport is considered to be the primary cause of stress prior to slaughter (Weeks, 2008, Edwards et al., 2010, Gallo et al., 2018). These risks are significantly reduced for livestock slaughtered locally.

Therefore, these data provide empirical evidence that a well distributed network of small abattoirs providing private kill services significantly reduces the average and range of journey distances travelled by livestock. Consequently, the network of smaller abattoirs contributes to meeting the Government's objective of reducing travel time from farm to abattoir (APGAW, 2020: p1), an objective that is also

supported by FAWC (2019: p 39). The APGAW (2020) report also states that achieving this objective will contribute to *improved* animal welfare which,

> "could be recognised in some way in future support for animal welfare as a public good in the Agriculture Bill" (APGAW, 2020: p 2).

Current regulations require anyone transporting cattle, sheep, pigs, goats, horses and poultry over 65km for economic purposes to hold a Certificate of Competency (CoC) (Eurpean Commission, 2004). A CoC holder receives formal training in *inter alia* the use of appropriate and improved husbandry when handling, loading and unloading livestock; are taught to recognise when animals are fit for travel; and to understand the impact of road conditions, acceleration and braking on livestock (FAWC, 2019). Therefore, all drivers of transporters used for CB will certainly need to hold a CoC. However, as the average distance the majority of drivers of livestock for PKR and HC is 27 miles (45 kms), many of these farmers may not. FAWC (2019) has expressed concern that this derogation (applied by EU 1/2005 Regulation) may adversely impact on the animal welfare standards, and recently recommended that

> "anyone who owns or transports livestock, poultry or horses (regardless of distance/ duration) should have a transporter authorisation and Certificate of Competence" (FAWC, 2019 recommendation 100: p 42).

These findings show that the removal of this derogation for journeys less than 65km would have a disproportionate impact on farmers who use the private kill services typically offered by smaller abattoirs.

4.4.2 Throughput for each route to market

Table 4.4 shows the average and total number of livestock units (LSU) processed for PKR, CB and HC each year. Independent sample t-tests show that the average number of LSU slaughtered for CB was significantly greater than the average number slaughtered for PKR ($t=2.2$, $p<0.05$) and HC ($t=1.3$, $p<0.05$). As would be expected, the average number of animals slaughtered for PKR significantly exceeded those slaughtered for HC ($t=3.0$, $p<0.01$).

Table 4.4. The mean number of livestock units (LSU) slaughtered for private kill retail (PKR) business (n=177), commercial business (CB) (n=103) and home consumption (HC) (n=55) per farmer each year. ((1 Livestock unit = 1 cattle, 5 sheep, 2 pigs, 5 goats or 3 deer) ± standard deviation, range (min-max) and total. The number of farmers to specify keeping each species for each purpose is in the parentheses.)

Species	**Private kill retail business mean (n, SD, range)**			**Commercial business mean (n, SD, range)**			**Home consumption mean (n, SD, range)**		
	Mean LSU ± Std (number)	**Range**	**Total**	**Mean LSU ± Std (number)**	**Range**	**Total**	**Mean LSU ± Std (number)**	**Range**	**Total**
Cattle	16.0 ± 45.8 (117)	1-460	1,872	173.8 ± 518.7 (77)	0.5-4,350	13,383	2.3 ± 4.0 (22)	0.5-20	51
Sheep	11.0 ± 20.8 (112)	0.4-120	1,232	94.1 ± 108.0 (64)	0.4-557	6,022	0.9 ± 0.5 (38)	0.2-2	34
Pigs	18.5 ± 34.3 (76)	0.5-200	1,406	5,735.4 ± 14,877.8 (14)	1-52,000	80,296	1.6 ± 1.1 (16)	0.5 – 5	26
Goats	1.0 ± 0.7 (12)	0.2-2	12	10.2 ± 17.1 (3)	0.3-30	31	0.5 ± 0 (1)	N/A	0.5
Deer	-	-	-	8.7 ± 11.3 (2)	0.7-16.7	17	-	-	0
All	**27.6 ± 62.7 (177)**	**0.60-490**	**4,522**	**969.4 ± 5659.3 (103)**	**0.3-52,000**	99,749	**2.0 ± 2.9 (55)**	**0.2-20.5**	111

4.4.3 Farmers' choice of abattoir

Table 4.5 present the factors farmers use when choosing an abattoir. Respondents were offered options suitable for CB and PKR services, but these options needed to be tailored for each service because, for example, livestock carcasses slaughtered for CB are not reclaimed by the farmer. Therefore, an option such as "How important is total assurance to get own animals and offal back" is not relevant. However, respondents were also invited to state "other reasons" to allow them to give a full response.

Table 4.5 shows that farmers select animal welfare standard of abattoir, closeness to farm and slaughtering fees as important to both CB and PKR services. Though in each case, it was more important to farmers selecting abattoirs for their PKR business.

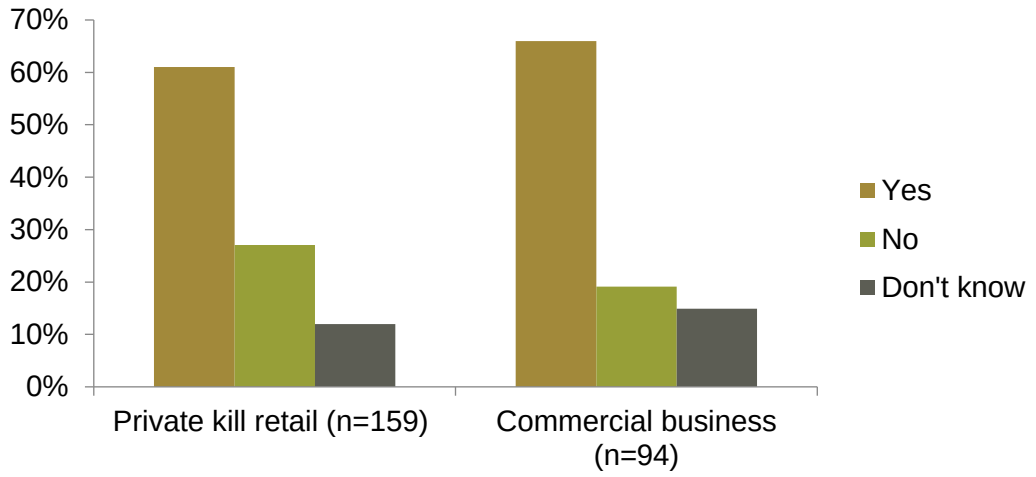
Other factors that were important to PKR farmers related to personalised services the abattoir offered, including absolute confidence in getting back meat and offal from their own livestock and the range of butchering services available. Butchering fees were mentioned as important by only a small number of respondents. On the other hand, a quarter of CB farmers had no choice in the abattoir they used. Those able to choose were motivated by the promptness and value of payments, the accuracy of carcase grading and the promptness of return of carcass information.

Table 4.5. Responses to the questions: (i) 'What factors affect your choice of abattoir for your private kill retail business?' *(n=185 farmers answered this question) and (ii)* 'What factors affect your choice of abattoir for your commercial farm business?' *(n=194 answered this question).*

Factor	**% of private kill retail farmers (number)**	**% of commercial business farmers (number)**
Animal welfare standards of abattoir	73.5% (136)	52.1% (101)
Closeness to farm	70.3% (130)	57.2% (111)
Slaughtering fee	19.5% (36)	13.9% (27)
Other, specified no choice	3.2% (6)	2.1% (4)
Other: include, QA standards, slaughter specific species	2.7% (5)	1.5% (3)
Total assurance to get own animals back	86.5% (160)	N/A
Total assurance to get own offal back	37.8% (70)	N/A
Type of butchering services offered	30.8% (57)	N/A
Butchering fee	13% (24)	N/A
Other: including delivery of carcase back to farm, quality of butchery, small family run abattoir, slaughters multi-species, slaughters OTM livestock	4.8% (9)	0
Accurate carcass grading	N/A	29.4% (57)
Dictated by meat purchaser	N/A	24.2% (47)
Prompt payments	N/A	33.0% (64)
Prompt return of carcass information	N/A	28.9% (56)
Value of payments	N/A	33.0% (64)
Other: include, provide a local livestock collection centre, use own abattoir, a requirement of their milk contract for culled cows.	0	2% (4)

Respondents were specifically asked whether the number of abattoirs they could choose from affected the terms and conditions they were offered. The majority of both PKR and CB farmers believed it did (Figure 4.3). A chi square test of homogeneity revealed that PKR farmers and CB farmers responded in a comparable way (Pearson chi-square = 3.1, df = 3, $p>0.05$). This shows that farmers believe the existing abattoir network already fails to provide effective price-competition for the services they require.

Figure 4.3. Responses to the question: 'does a lack of choice between abattoirs mean the terms are dictated to you?' *(N=159 private kill retail (PKR) respondents and N=94 commercial business (CB) respondents*.)



Sub-samples of eighty-two PKR farmers (51.6%) and of fifty CB farmers (53.2%) elaborated their response to this question with additional comments presented in Table 4.6.

Table 4.6. Additional comments made by a sub-sample of farmers to the question: 'Does a lack of choice between abattoirs mean the terms are dictated to you? Please elaborate with comments if you wish'. *(N= 82 PKR farmers and 50 CB.)*

Comment	**% private kill retail (PKR) respondents (n)**	**% commercial business (CB) respondents (n)**
Happy with abattoir relationship	36.6% (30)	8% (4)
Use the only abattoir available for their farm business	31.71% (26)	16% (8)
Forced to transport animals over long distances	15.9% (13)	14% (7)
Unhappy with the hanging / butchering services available	14.6% (12)	N/A
Unable to choose the days/ times of bookings	8.5% (7)	6% (3)
Non-competitive prices	N/A	20% (10)
Cannot access the private kill services needed to retail own meat	N/A	26% (13)
Others, including abattoir's QA requirements, livestock age slaughter restrictions, no carcass delivery service, unhappy with animal welfare standard.	14.6 (12)	18% (9)

Satisfied PKR farmers commented on the wholesome, personalised service with high animal welfare standards offered by their abattoir. For example,

> 'We like the nature of the work at [abattoir name] with animal welfare paramount. We don't spend 18 -24 months rearing our sheep to the best standards for their last few hours to be very stressful.' (Farmer of 4 sheep LSU per year).
>
> 'Very good and efficient service. Animal welfare of utmost priority. Top job performed.' (different farmer, also of 4 sheep LSU per year).

However, a small proportion of PKR farmers did not have access to their preferred hanging/butchering services, and some complained about the inconvenient restrictions on the day and time when they could deliver livestock.

When asked a directed question about the choice of abattoirs for their PKR business, 32% (26 farmers) said they had no choice. Typical responses included,

> '[abattoir name undisclosed] is small family run abattoir with high welfare standards. No other similar near us. If it closed, we would stop farming!' (Farmer of 1.2 sheep LSU per year).
>
> 'I value very highly our small local abattoir, we take our animals, know our butcher really well, it feels as wholesome as an abattoir can! There is integrity through the whole process from arrival, care, attention, efficiency and pride in maintaining an exceptional standard - this keeps me in the business. I would struggle to stay in the beef business if our abattoir closed or became too expensive to use.' (Farmer of 6 cattle LSU per year).
>
> 'They are a really good place to deal with, but if they were not, I'd still have little choice but to deal with them!' (Farmer of 38 mixed species LSU per year).

A smaller proportion of CB farmers were happy with the services provided by their abattoir. 20% (of 50 respondents) were unhappy with the terms of their contract because of the prices they received (a response that is not applicable to PKR farmers who do not sell their livestock to the abattoir). The following comments highlight some of the reasons given for the lack of satisfaction,

> 'Farmers don't tend to work together on these issues, so meat buyers have total control of price.' (Farmer of 100 sheep LSU per year).
>
> 'Lots of slaughterhouses will only kill cull cows if they are farm assured. If you're not then the price paid is lower or they won't take them at all. If you are a small producer it doesn't always make economic sense to be farm assured but then you find yourself struggling to market cull cows and are often forced to take a price that doesn't reflect the market.' (Farmer of 38 mixed species LSU per year).

Importantly, 16% (8) of this sub-sample of CB respondents said they had no access to abattoirs that could provide a PKR service. This shows there is a population of CB farmers who would like the opportunity to add value to their produce by retailing their meat locally but are unable to do so.

The responses draw some clear distinctions between the experiences of farmers according to the supply chain use. However, there is evidence from both PKR and CB farmers that the existing abattoir network fails to provide: effective price-competition, the services they would prefer (e.g., butchering and transport arrangements), and prevents farmers starting up a PKR enterprise.

4.4.4 Farmers visits to abattoirs for private kill retail business.

Table 4.3 shows that 185 farmers use private kill services to retail **meat from** their own farm **finished livestock**. PKR farmers or their staff visited abattoirs an average of 13 times each year, (range from 0 to 100, standard deviation 17). Most PKR farmers (91.9%, n=170) transported their finished animals to the abattoir using a farm vehicle. Only 6.5% (12) used an outside transport business, and 3.2% (6) shared these duties with neighbouring farmers. One farmer used an abattoir livestock collection service.

The visits by PKR farmers provide opportunities for farmers to inspect the abattoir's operating procedures and processes, and to assess the skills and attitudes of manager and staff. Therefore, they provide an additional level of scrutiny over the abattoir's compliance with animal welfare and meat hygiene standards.

4.4.5 Retail outlets used by PKR farmers

Table 4.7 summarises the retail outlets used by PKR farmers; Table 4.8 shows that the majority (52%) use more than one outlet.

Table 4.7. Farmers use of retail outlet in their PKR business (N=183).

Retail outlet	Percentage (number)
Box scheme	50.8% (94)
Own farm retail shop	29.2% (54)*
Online sales	29.2% (54)*

Sell to catering businesses	20% (37)
Sell to retail businesses	18.4% (34)
Markets	14.1% (26)
Sell to friends and family	11.4% (21)
Informal direct sales	5.4% (10)
Others, including, Festivals, Own café/restaurant, Own bed and breakfast enterprise, Other, specified word of mouth, Other, specified to private buyers, tourists staying at own farm campsite, and direct to butchers.	15% (28)
*. Twenty of the 54 farmers used both farm shop and online sales.	

Table 4.8. The number of outlets used by farmers in their PKR business (N=183)

Number of outlets	Percentage (number) of farmers to use
1	48.09% (88)
2	25.14% (46)
3	15.30% (28)
4, 5 or 6	11.22% (21)

Box schemes are the most used retail outlet, with 29% retailing through a farm shop and the same percentage retailing on-line. The 54 farmers who sold red meat online also sold through box schemes (33), their farm shop (20), at markets (15), to catering companies (14), at festivals (5). They have therefore aligned their business to take advantage of the

> "enormous structural changes in e-commerce and digital technology that have transformed the retail landscape since the Food Security Review of 2009" (AHDB, 2018b: p 1).

This has allowed the farmers to take advantage of the market created by

> "lifestyle changes and [consumers] more fluid attitudes to shopping, [which] have led to some key behavioural shifts around where and how we shop" (AHDB, 2018a).

These trends have driven online sales, as indicated by an AHDB report published in 2018 which stated that

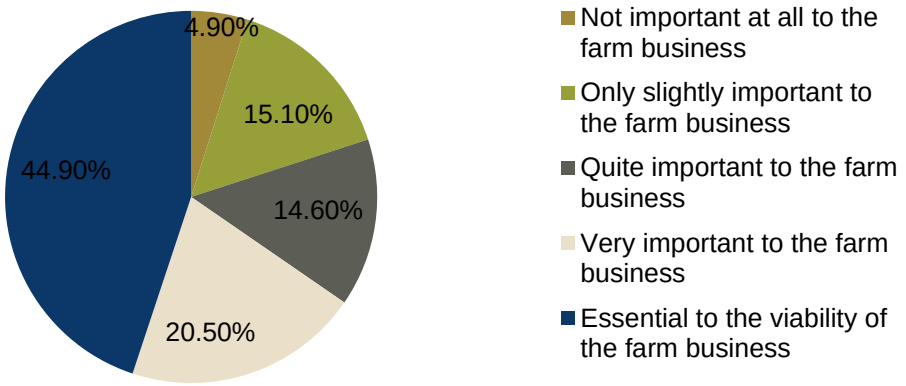
> "According to the Office for National Statistics (ONS), internet sales as a percentage of total retail sales rose from just 3.4 per cent in 2007 to more than 16 per cent in 2017" (AHDB, 2018b: p 1).

It is not known what proportion of sales respondents to this survey made through each of their retail outlets.

4.4.6 The importance of PKR to the viability of the farm business.

Figure 4.4 shows that 44.9% of respondents said their PKR business was "essential" and 20.5% "very important" to the viability of their farm business. The 121 who said their PKR business was essential or very important sold over 4,100 livestock through their PKR business each year (an average of 21.8 LSU/farmer).

*Figure 4.4. Responses to the question: '*How important is the private kill retail business to the viability of your farm business?' (N=185).



These responses are supported by Table 4.9 which shows a consistent pattern between these responses and the percentage of livestock sold through the PKR business each year. Moreover, farmers who described PKR business as "essential" sold almost their entire annual production through their own retail outlets.

4.4.7 Rare breeds of livestock sold through PKR business.

Most PKR farmers (76.2%, n=141) sell what the respondent would classify as a rare or heritage breed of livestock. Table 4.10 show the species of rare and/or heritage breed sold by the 134 farmers who supplied details and Table 4.11 shows the number of different breeds sold (Supplementary Appendix S4.3 provides a list of all the breeds supplied by respondents).

Table 4.9. The number of LSU sold through the entire farm business per year and the number sold through the private kill retail (PKR) business each year, by the importance of the private kill retail business to the viability of the farm. (The number of farmers to specify keeping each species is in parenthesis).

Importance of PKR business	Species	Total LSU sold through the business each year ± Std (n)	Total LSU sold through PKR business each year ± Std (n)
Essential to the viability of the farm business (N=83)	Cattle	27.1, ± 61.60 (62)	24.0, ± 61.36 (62)
	Sheep	20.5, ± 31.85 (52)	17.1, ± 27.84 (52)
	Pigs	28.8, ± 43.59 (43)	26.2, ± 42.06 (42)
	Goats	1.5, ± 0.72(8)	1.2, ± 0.70 (8)
Very important to the farm business (N=38)	Cattle	18.4, ± 21.61 (27)	10.8, ± 11.99 (27)
	Sheep	27.0, ± 44.3 (22)	8.7, ± 13.30 (22)
	Pigs	14.1, ± 13.92 (14)	12.5, ±13.78 (14)
	Goats	0.3, ± 0.14 (2)	0.4, ± 0.40 (2)
Quite important to the farm business (N=27)	Cattle	40.0, ± 68.74 (14)	3.5, ± 2.53 (14)
	Sheep	48.2, ± 73.83 (16)	4.7, ± 3.11 (16)
	Pigs	9.5, ± 10.83 (6)	5.3, ± 4.04 (6)
	Goats	0.80, ± N/A (1)	0.4, ± N/A (1)
Only slightly important to the farm business (N=28)	Cattle	46.9, ± 57.38 (13)	3.4, ± 2.02 (13)
	Sheep	37.0, ± 81.39 (16)	2.2, ± 2.24 (16)
	Pigs	30.5, ± 74.18 (11)	3.3, ± 2.88 (11)
	Goats	1.2, ± N/A (1)	0.4, ± N/A (1)
Not important at all to the farm business (N=9)	Cattle	-	-
	Sheep	61.0 ± 73.84 (5)	20.0 ± 8.17 (5)
	Pigs	1 ± N/A (1)	1 ± N/A (1)
	Goats	-	-
TOTAL	Cattle	28.7, ± 55.5 (116)	16.1, ± 45.9 (116)
	Sheep	30.0, ± 53.23 (111)	11.0, ± 1.98 (111)

	Pigs	24.4, ± 43.89 (75)	18.3, ± 34.38 (75)
	Goats	1.3, ± 0.76 (12)	1.0, ± 0.69 (12)

Rare and native breeds are premium products which often can only be slaughtered at small abattoir because small abattoirs are more willing to adapt to meet the breed's specific requirements (APGAW, 2020: p 26). For example, large scale abattoirs are generally unable to adapt their high-throughput systems to scald and remove the thick coat of outdoor-reared pigs. Rather they have to skin the animals for the carcasses to pass post-mortem inspection and this reduces the saleable value (APGAW, 2020: p 26). This point is confirmed by a farmer who sells 9.2 (mixed species) LSU per year,

> 'Our small local abattoir is entirely suited to small producers of rare breeds. These small abattoirs are essential if rare breeds are to continue as it is mostly difficult or inappropriate to take these breeds to large operations.'

Table 4.10. Rare and/or heritage species farmed (N=134).

Species	Number of farmers
Cattle only	20.20% (39)
Sheep only	19.40% (26)
Pigs only	16.42% (22)
Cattle and sheep	11.19% (15)
Cattle and pigs	10.45% (14)
Sheep and pigs	6.72% (9)
Sheep, pigs and cattle	6.72% (9)

Table 4.11. The number of rare and/or heritage breeds kept by farmers and the number of farmers keeping each species (N=134).

Species	Number of rare/heritage breeds farmed	Number of farmers farming these species
Cattle	22	77
Pigs	12	54
Sheep	34	59

Just over a third (35.1%) of farmers who farm rare/heritage breed farm more than one rare/heritage species (Table 4.10). Therefore, small abattoirs need to retain their multi-species slaughter capacity if they wish to provide an all-inclusive service to their PKR farmer customers. However, the throughput of some rare breeds – such as longhorn cattle - may be too small for abattoirs to justify the purchase and maintenance of specialist equipment needed for their slaughter.

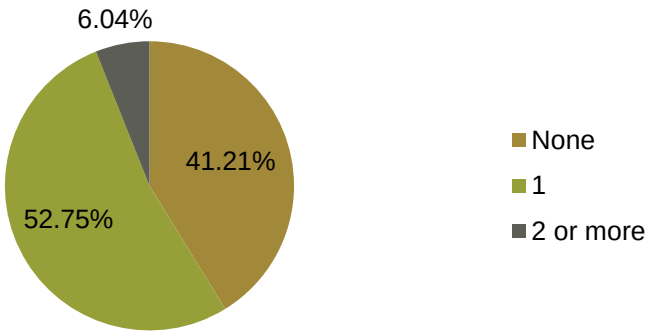
Therefore, a well distributed network of small abattoirs is critical for the conservation of genetic and habitat diversity, species biodiversity and enhanced rural landscapes. The provision of these public goods will therefore be compromised by further reductions in the shrinkage in private kill provision provided by the network of small abattoirs. The importance of conserving rare and heritage breeds is recognised in Chapter 1 of the Agriculture Bill (House of Commons, 2018), which states,

> 'The Secretary of State may give financial assistance for or in connection with any one or more of the following purposes —…(g) conserving native livestock, native equines or genetic resources relating to any such animal', (House of Commons, 2018).

4.4.8 The impacts of the closure of abattoirs providing PK services.

Figure 4.5 shows that 75 (41.2%) of the 182 respondents have no alternative abattoir they would be prepared to use for their PKR business **IF** the abattoir they currently used was to close.

Figure 4.5. Farmers response to the question: 'IF your abattoir closed, how many alternative abattoirs exist that you would you be prepared to use to continue your private kill retail business?' (N=182).



These 75 (41.2%) PKR farmers who had no alternative abattoir sold a similar number of LSU each year as farmers with one alternative abattoir, but considerably more than those had 2 or more alternatives they would be prepared to use.

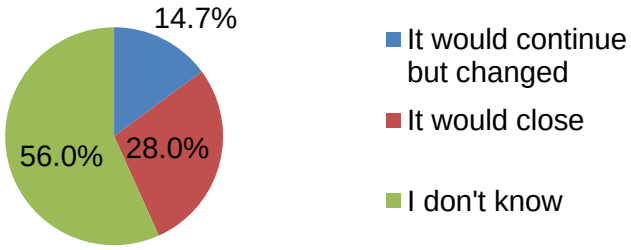
Table 4.12. Number of LSU sold through the PKR business per year by number of alternative abattoirs.

Number of alternative abattoirs	Total LSU
No alternative abattoir (N=75)	46.4
One alternative abattoir (N=11)	50.2
Two or more alternatives (N=96)	17.3

Farmers without a viable alternative abattoir (75, 41.2%) were asked in more detail about the impacts the closure would have on their farm business, farming system and land use. Figure 4.6 shows the impact on the retail business from PKR farmers of these farmers. There was considerable uncertainty, for which many reasons were given, reflecting the difficult issues this hypothetical question raises. for example,

> 'We need an abattoir with an organic licence. None of the other abattoirs nearby have one. Would we travel 4 hours to get one? We could put our stock on a lorry but could we get our carcasses back? Or would one of the other abattoirs decide to get a licence?'.

Figure 4.6. Farmer's response to the question: 'IF your abattoir closed, what would happen to your retail business?' (Farmers with no alternative abattoir were asked this question (N=74)).



However, 28% of the 75 farmers said they would have to close their PKR business. On average, these farmers finished 47.3 of LSU each year (min 0.8 - max 506.7, std 107.8), of which an average of 36.7 LSU were sold through the private kill retail business (min 0.6 – max 490.0, std 105.2). The examples of the mark-up PKR farmers can charge presented in Appendix 2, Case studies 2 and 3, show that the closure of these businesses would have a substantial reduction on farm revenues.

Additional comments show why farmers would not use any abattoir but the one they currently use.

'Our whole ethos is animal welfare. End of life care is as important as the rest. I do not have sufficient confidence in any alternative to use their services whether it be in terms of animal welfare or ensuring that I receive back my own carcasses' (farmer of 28 mixed species LSU per year).

'There are 2 other organic abattoirs 40 miles away, however one has poor traceability the other we have had contaminated carcasses sent back' (farmer of 7 mixed species LSU per year).

'We have the choice of another abattoir at a similar distance, but we do not trust their animal welfare standards and [we have heard] reports that you do not get your own animal back' (farmer of 38 mixed species LSU per year).

Figure 4.7 shows a high degree of uncertainty as to the impacts of the closure of the abattoir on land use. Roughly one quarter of respondents (22.7%) would "decrease their grassland area". For example,

'We would probably cut back livestock numbers and let a lot of the grazing' (farmer of 19 mixed species LSU per year).

'Would stop grazing and silage so grassland would become wild and overgrown' (farmer of 10 cattle LSU per year).

Figure 4.7. Farmer's response to the question: 'IF your abattoir closed, how would it affect your land use?' (Farmers with no alternative abattoir were asked this question (N=75)).

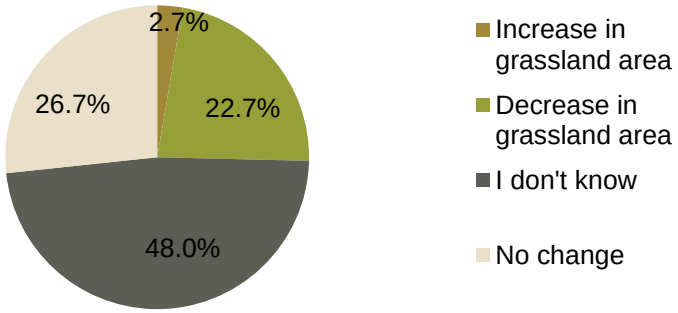
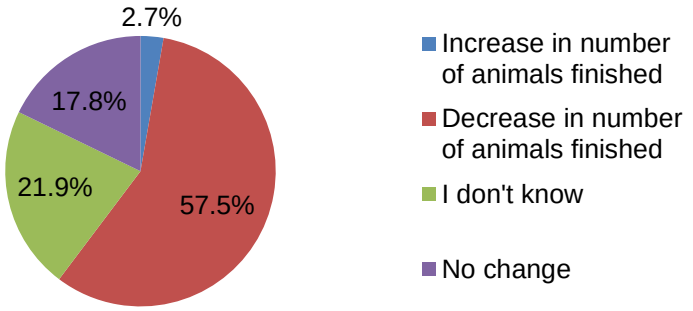


Figure 4.8 shows that if the abattoir closed a majority of farmers would reduce the number of livestock finished on the farm.

Figure 4.8. Farmer's response to the question: 'IF your abattoir closed, how would it affect your livestock finishing enterprise?' (Farmers with no alternative abattoir were asked this question (N=73)).



However, responses were complex and diverse, reflecting the variability in livestock farming systems. For example, three farmers said they would continue to finish livestock using a large processor, though one somewhat reluctantly,

'We would reluctantly send our livestock into a larger processing abattoir and lose our "story" (farmer of 20 cattle LSU per year).

Nine farmers would sell their livestock as stores. For example,

'We would probably sell cattle as stores and give up sheep and direct selling. (farmer of 28 mixed species LSU per year)

Seven farmers said they would cease rearing livestock altogether, for example,

'Without an abattoir, [we] would wind the farm down' (farmer of 8.2 mixed species LSU per year).

'We would probably sell and give up farming' (farmer of 28 mixed species LSU per year).

Figure 4.9 shows that the majority of participants would also reduce the size of their breeding herd/flock. Thirteen farmers specified that they would stop producing certain species altogether, for example:

'I may stop sheep and just do cows as fewer trips as 1 cow = 5 sheep in a field' (farmer of 7 mixed species LSU per year).

'I'd probably give up farming pigs, and re-sow the outdoor pig pens for grazing' (farmer of 38 mixed species LSU per year).

Figure 4.9. Farmer's response to the question 'IF your abattoir closed, how would it affect the size of your breeding herd / flock?' (Farmers with no alternative abattoir were asked this question (N=74)).

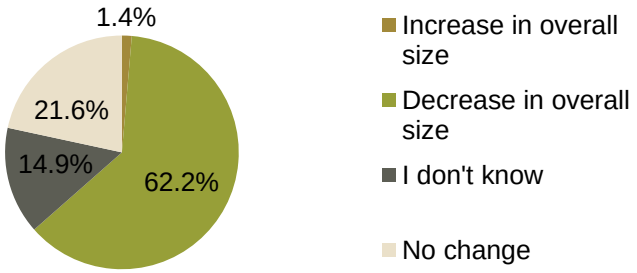


Figure 4.10 shows that 30% of respondents who had no alternative abattoir would stop producing rare and/or heritage breeds (Figure 4.10). For example:

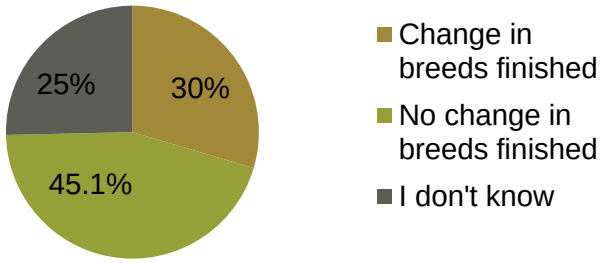
'[I would change to] more continental breeds as better price and yield. Natives less desirable' (farmer of 50 cattle LSU per year).

'Wouldn't keep pedigree Red Ruby Devon's if no private kill option as live price is undervalued' (farmer of 50 cattle LSU per year).

'Move away from native breed which we celebrate in our own meat boxes to more commercially acceptable' (farmer of 38 mixed species LSU per year).

'If we kept going, we would have to supply the supermarket chain which means higher volume lower quality breeds' (farmer of 250 mixed species LSU per year).

Figure 4.10. Response to the question: "IF your abattoir closed, how would it affect the breeds of livestock that you finish on the farm?' (Farmers with no alternative abattoir were asked this question (N=71)).



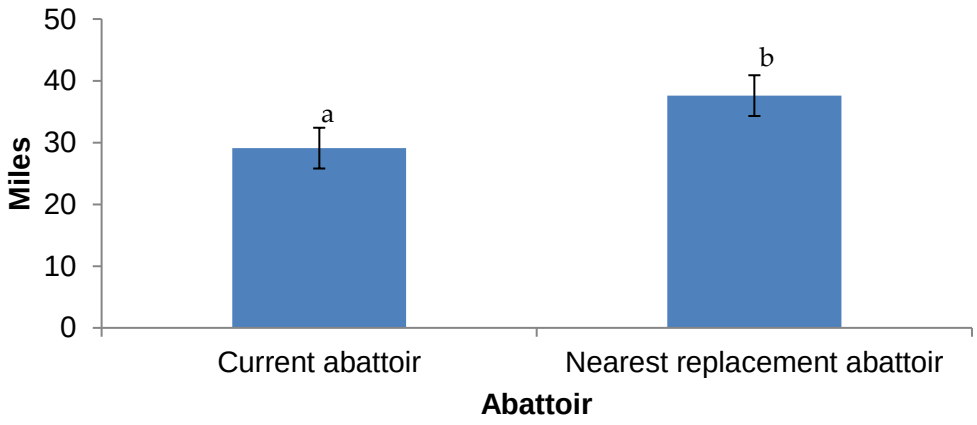
However, the majority of respondents (58.5%, 107) did have an alternative abattoir they would be prepared to use and thus would be able to continue their PKR business. Nevertheless, switching would have adverse impacts of the majority of these farmers (98/107). Table 4.13 lists these undesirable consequences. For example, 29% said it would increase their costs.

Table 4.13. Responses to the question: 'What effects would changing abattoir have on your private kill retail business?' *(Farmers with at least one alternative abattoir were asked this question (N=102)).*

Impacts of changing abattoir	Number of farmers to specify
Increased costs	29.4% (30)
Transport livestock over greater distances	26.5% (27)
Reduced abattoir services available	19.6% (20)
Reduced animal welfare	16.7% (17)
Become economically nonviable	14.7% (15)
Reduced meat quality	12.8% (13)
Uncertain of impacts	8.8% (9)
No impact	8.8% (9)
Others, including lack of trust regarding the return of own carcasses, inability to produce certain breeds or species, loss of organic labelling, and forced to use halal abattoir.	10.8% (11)

Figure 4.11 shows that switching abattoirs would result in a significantly longer journey (a paired sample t test shows p<0.001, t=3.95, SE=2.15).

Figure 4.11. The number of miles to the principal abattoir currently used and to the alternative abattoir (Farmers with at least one alternative abattoir were asked this question, (N=107)). Columns with different letters significantly differ (p<0.001).



Therefore, all but nine of the 185 farmers who use private kill services reported that the closure of the abattoir they currently used would have adverse impacts on their farm and/or PKR business.

If the abattoir they currently used was to close PKR farmers would be faced with considerable question marks about whether and how they would continue the PKR enterprise. However, the survey provides evidence that the continued shrinkage of private kill provision threatens the viability of farms and would result in changes to livestock production systems and land use. The changes include a reduction in the area of grassland, and in the number and breeds of rare breed livestock farmed. These changes would adversely affect the farmers' ability to provide the environmental public goods, such as the conservation of genetic diversity and biodiversity associated with rare native breeds, and greenhouse gas sequestration, that forms the rational underpinning farm support payments under Environmental Land Management System (ELMS) after the withdrawal of basic payment scheme payments.

4.4.9 Government support for private kill retail businesses

Table 4.14 reports farmers' opinions about the assistance they believe would best support their PKR business. Supporting private kill provision provided by the network of smaller abattoirs received overwhelming backing. The responses were typically motivated by the perceived benefits of small and local abattoirs for animal welfare, the environment and food traceability. For example,

> 'I believe it is essential we keep red meat supply chains local. It's good for welfare and it's better for the environment and it's good for food traceability' (farmer of 34 mixed species LSU per year).
>
> 'We don't spend 18-24 months rearing our sheep to the best standards for their last few hours to be very stressful' (farmer of 4 sheep LSU per year).
>
> 'Would dearly love a more local abattoir that has high animal welfare at its core' (farmer of 46 mixed species LSU per year).

Specific support included funding of new small abattoirs. The importance of this was expressed by a smallholder farming on Orkney who sold 2.4 sheep LSU per year,

> 'A local abattoir in Orkney. We don't need any more than that. It can only happen though with significant public funding - in the same way that schools are provided for benefit of community & parents don't have to build, staff and run the schools themselves. We've got the butchery skills in Orkney, we've got a product where demand (when we could produce our mutton) greatly exceeded supply and the price people were happy to pay could give young new entrant farmers a profitable business, while securing the future of this breed of sheep in an environment very similar to their native St Kilda.'

Farmers were also clearly aware of the challenges small abattoirs face, including their view that the regulatory burden was too high, and their higher FSA inspection fees and waste disposal costs. Typical responses included,

> **'**Small abattoirs are under tremendous pressure to survive. Their kill costs are more than the big ones. They need help in any way possible. We need MORE small local abattoirs, not less' (farmer of 30 cattle LSU per year).
>
> 'Reform regulations surrounding small abattoirs to make them proportional to the risks. Small abattoirs and home kills producing a much more restricted and identifiable product should not have to conform to the same regulations as a very high throughput super abattoir' (farmer of 470 mixed species LSU per year).

Table 4.14. Responses to the question: 'What government support would most help your farm's private kill retail business?' *by the number of alternative abattoirs available if their current abattoir closed down. (All farmers with a private kill retail (PKR) business were asked this question (n=145)).*

Response	Number of alternative abattoirs			Total (n=145)
	None (n=56)	1 (n=78)	1 or more (n=11)	
Support small, local abattoirs	73.2% (41)	66.7% (52)	63.6% (7)	69.0% (100)
Fund mobile abattoirs	25% (14)	11.5% (9)	18.2% (2)	17.2% (25)
Fund new small abattoirs	14.3% (8)	18.0% (14)	9.1% (1)	15.9% (23)

Reduce red tape for small abattoirs	14.3% (8)	14.1% (11)	18.2% (2)	14.5% (21)
Reduce regulatory costs for small abattoirs	8.9% (5)	6.4% (5)	36.6% (4)	9.7% (14)
Advertisement / transparency about benefits of these businesses	0%	7.7% (6)	9.1% (1)	4.8% (7)
Fund the development of local processing facilities (e.g., butchery and hanging facilities)	7.1% (4)	2.6% (2)	0%	4.1% (6)
Reduce costs of vet inspection	1.8% (1)	5.1% (4)	0%	3.5% (5)
Subsidise PK retail businesses	0%	6.4% (5)	0%	3.5% (5)
Others, including allow home kill to be sold, fund the recruitment / training of new slaughterhouse staff, eliminate 30-month rule for heritage breeds, support heritage breeds, support small abattoirs' capacity to process multiple species and support tanneries	12.5 (7)	11.5 (9)	0%	11% (4)

4.4.10 The latent demand for PK services

115 of respondents (38.34%) did not use private kill services (Table 4.3). Nineteen (16.5%) of these farmers had had PKR businesses at some time in the last 10 years. The reasons they had closed these enterprises included: (i) the challenge of carcass balancing (4), (ii) it had become too time consuming (4), (iii) it had become non-viable (in an unspecified way) (4), and (iv) because the local abattoir closed (n=1).

However, twenty-one (18.3%) of the 115 farmers were either "extremely" or "very" interested in starting a PKR enterprise (Figure 4.12) - ten of these farmers already used private kill services for their home consumption. Table 4.15 shows the potential supply from these farmers.

Figure 4.12. Responses to the question: 'Do you currently have any interest in diversifying your business to sell your own meat?' *(N=115).*

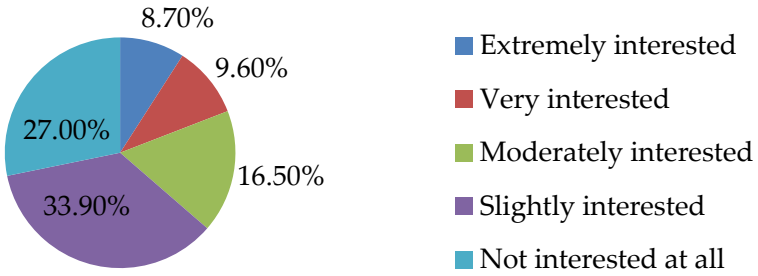


Table 4.15. The number of LSU produced annually by farmers who are either "extremely" or "very interested in diversifying their business to sell their own red meat" (N=21). The number of farmers to keep each species is displayed in the parenthesis.

Species	Mean ±Std (n)	Range
Cattle	85.74 ± 132.79 (17)	3-500
Sheep	78.91 ±107.74 (14)	1-300
Pigs	7.60 ± 10.05 (5)	1-25
Total	123.82 ± 169.09 (21)	1.6 - 640

However, access to appropriate abattoir facilities was the primary barrier, for example,

> 'I would be very interested in selling home produce but slaughter facility for pigs is too far' (farmer of 272.5 mixed species LSU per year).
>
> 'I would love to find a way to meaningfully access my end market. The difficulties in finding a user friendly and local home kill or even intermediate butchery service are overwhelming… I am

envious of the farmers down south who have much greater choice of abattoirs' (farmer of 640 sheep LSU per year).

4.4.11 Demand for mobile abattoirs

Twenty-five farmers supported the introduction of mobile abattoirs, 21 farmed in England, 2 in Scotland and 2 in Wales. These farmers produce an average of 38.28 LSU/year (Table 4.16), but the number varied between species. This comment was made by a farmer who retailed 7 mixed species LSU per year,

> 'License mobile killing units, where they either go from farm to farm (though not really practical if only a few animals) but more sensibly going to local locations, well-advertised among farmers / small holders and then animals are booked in, killed in the unit and then delivered to / collected by local butcher, or collected by farmer for own butchering. This would reduce animal transport times and also carbon footprints.'

Therefore the findings add support to a recent study by Menzies et al. (2020) into the viability of a mobile abattoir service in Scotland. In their study over 90% of over 600 responses supported mobile abattoirs, for reasons principally,

> "related to animal welfare (reducing the haulage distances) and the desire to create more local meat sales businesses" (Menzies et al., 2020: p 49).

Table 4.16. The mean ± standard deviation number of LSU produced annually by farmers who expressed demand for mobile abattoirs. (N=24 provided LSU information). The number of farmers to keep each species is displayed in the parenthesis.

Species	**Mean ± Std (n)**	**Range (minimum and maximum)**
Cattle	13.21 ± 20.20 (19)	1- 80
Sheep	19.57 ± 38.78 (14)	4- 120
Pigs	27.82 ± 51.46 (14)	1 – 200
Goats	1.40 ± 1.04 (3)	0.2-2
Total	38.28 ± 84.88 (24)	1-370

4.5 Conclusions

The survey found that that the majority of respondents (70.8%, n=223) used one abattoir, but that 29.2% used more than one. The majority, 185 (62%), used private kill services to retail meat from livestock finished on their own farm, 59 used this service not for retail but for home consumption. The abattoirs which provided private kill services were on average smaller than those used by "commercial business" farmers.

The two characteristics farmers most often used to choose the abattoir to use for their PKR business were the abattoir's animal welfare standards (73.5%), and its closeness to the farm (70.3%). Being close allowed the majority of PKR farmers (91.9%, n=170) to transport their livestock to the abattoir to the abattoir in a farm vehicle. On average, farmers (or their staff) visited their PKR abattoir 13 times each year. These visits therefore provide first-hand opportunities to inspect abattoir operating procedures and processes, and allows farmers to assess the skills and attitudes of the abattoir's manager and its staff. The frequency of these visits provides additional scrutiny over the abattoir's compliance with animal welfare and meat hygiene standards.

The survey reported that the distance from farm to abattoir was significantly greater for the commercial business (CB) (59.4 miles/95 kms) than for PKR (27.4 miles/45 kms) and home consumption (HC) (24.6 miles/40 kms). Moreover, the range in distance travelled was also larger (with a standard deviation of 69.2 miles, compared to 27.2 miles and 16 miles for PKR and HC respectively). These findings are in line with those reported in the APGAW (2020) report. But they show that the removal of the derogation currently given to drivers of livestock for journeys below 65km (applied by EU Regulation 1/2005) would have a disproportionate impact on farmers who use the private kill services which are typically provided by the network of small abattoirs.

The majority of respondents believed the lack of choice in the existing abattoir network meant abattoirs were able to dictate terms and conditions. There was evidence that it failed to provide price-competition and the range of butchering services required. Moreover, the findings show that the existing provision of private kill services fails to meet the latent demand from a population of farmers who were either "extremely" or "very interested in diversifying their business to sell their own red meat in the future". However, a principal barrier to these activities was access to an abattoir which provided private kill services. These responses provide evidence that the existing network of private kill provision fails to meet current needs.

The survey examined the views of the 185 PKR farmers in more details. 121 (65.4%) said their private kill retail enterprise was "essential" or "very important" to the survival of their farm. Between them, these 121 respondents sold over 4,100 livestock through their PKR business each year (an average of 21.8 LSU/farmer).

The 75 (41.2%) of respondents had no alternative abattoir they would be prepared if their current abattoir closed. They sold an average of 46.4 LSU/year through their retail businesses. When asked what they would do if the abattoir they currently used for their private kill business was to close, 21 (28%) said they would be forced to close their retail business, but there was great uncertainty as to how they would respond to this hypothetical question. However, one result of such an eventuality would be a significantly longer livestock journeys from farm to abattoir.

The 107 farmers who had at least one alternative abattoir they would be prepared to use said having to change would also adversely affect their PKR business. For 29.4% (30) it would add costs, 26.5% (27) said it would increase the livestock journey, and another 16.7% (17) said it would have an adverse impact on animal welfare. 14.7% (15) said that even with another abattoir they could us, it would make their PKR business unviable.

The 75 farmers who had no alternative abattoirs were asked how they would change their farming business if their current abattoir closured. In summary, there would be a reduction in the area of grassland, the majority (58%) would reduce the number of livestock finished on the farm, and 62% would reduce the size of their breeding herd/flock. 30% would change the breeds they farmed. As the majority of PKR farmers (76.2%, n=141) sell rare and/or heritage breeds of cattle, sheep and pigs, the closure of the abattoir would adversely affect the conservation of genetic resources and specie and habitat biodiversity.

These changes will adversely affect public good provision from land just as farm payments are being targeted to support public good provision. For example, it would reduce farmers' participation in conservation grazing agri-environmental schemes management options, reduce their contribution to conserving genetic diversity and species biodiversity: which would reduce landscape character and the distinctiveness of regional landscapes. The changes would also adversely affect carbon sequestration by land.

The findings also show that the existing provision of private kill services fails to meet farmers' needs, and that further reduction will have adverse impacts on the viability of farm businesses. It would reduce local value added and therefore adversely affect the size and growth of the rural economy. It would also reduce farmers' ability to produce a wide range of public goods from land. These impacts would adversely affect the rural and wider tourist sectors.

Chapter 5. The economic performance of abattoirs: evidence from an online survey

5.1 Introduction

This study has used an online survey to assess the financial performance and economic viability of abattoirs in the UK. Respondents were asked about the services the abattoir offered, its throughput, the markets it supplied, its financial performance over the last 3 years, and its integration into the red meat supply chain. It also asked managers to identify their business's principal constraints, and what type of assistance would most help them overcome those constraints. Respondents were asked which other businesses the abattoir co-operated with, and their views about potential additional co-operative activities. The analysis considers the scope to increase the profitability of abattoirs by increasing throughput; raising slaughter and butchering fees; offering additional services; reducing costs; and diversifying (vertically and horizontally) along the red meat supply chain.

The Case Study Appendix contains additional information on several of the key issues raised in this Chapter. Namely: the potential to use animal by-produce waste as a feedstuff to produce insects for food; to introduce traceability for hides; an example of how an abattoir has used the EU's PDO marque to market Lakeland Herdwick sheep; a summary covering the processes, procedures and financial support provided to abattoirs on the Channel Islands; and a review of an economic appraisal into building an abattoir on the Isles of Scilly (Houghton, 2011).

5.2 Literature review

Several studies have examined the economic feasibility of island and mobile abattoirs in the UK and elsewhere, but the authors are aware of only one recent study into the economics of non-mobile, mainland, UK abattoirs. Kennard (2018) reported the findings of an internet survey supplemented with face-to-face and telephone interviews conducted between September and December 2018. Twelve of the 23 respondents, all which had an annual throughput below 6,500 LSU, shared their monthly costs. The study reported that,

> "on average, 50% of total costs were staff wages, with energy costs and "other costs" each accounting for 13-14%. FSA/FSS inspection and [animal by-produce] waste removal costs were 7-9%, and insurance and business rates were 3-4%"(Kennard, 2018: p 4).

The high percentage of fixed to total costs suggests the presence of economies of scale within the sector, however, the author noted that

> "variations in specific costs between abattoirs were significant" (Kennard, 2018: p 4).

In view of the small sample size, the author suggested that the results needed to be treated with caution (p 4). This study seeks to add to Kennard's study.

5.3 Survey Methodology

An online survey was created using the programme 'Online Surveys'. The URL to the survey was shared widely via the social media streams and mailing lists of four relevant organisations (The Prince's Countryside Fund, Sustainable Food Trust, National Craft Butchers and Soil Association). In addition, two researchers undertook to identify all the abattoirs in the UK which provided private kill services, which involved contacting the majority of the 213 abattoirs working in the UK.[13] All contacted abattoirs were asked if they wished to participate in the survey. Abattoir businesses were identified by contact details and supporting data supplied by AHDB and internet searches. Contacts were made in July or early August 2020 by phone or, where phone details were not available, by email. Thirty managers replied to the online survey which was open from 15th July to 31st August 2020. One response was

[13] The identify of many of these was known from the farmer survey, but many of these were also contacted to ask if they would take part in the survey.

eliminated from the final analyses because the abattoir was not based in the UK. Therefore, there were 29 useable responses. However, not all respondents answered every question.

5.4 Representativeness of survey respondents

Twenty-two of the twenty-nine respondents were located in England, three in Wales and four in the Scottish Isles: one respondent managed abattoirs in two countries (England and Wales). No responses were received from abattoirs in Northern Ireland or mainland Scotland.

5.4.1 Abattoir throughput

The surveyed abattoirs slaughtered an estimated 1.56 million cattle, sheep and pigs in a typical (i.e., pre-Covid-19) year. This represents roughly 5.6% of the 28 million cattle, sheep and pigs slaughtered in the UK each year (Defra, 2019e).

5.4.2 Size of respondent abattoirs and the underlying population of UK abattoirs

Table 5.1 summarizes the abattoirs' throughput (measured by LSU), and compares it to the throughput of the 213 abattoirs in the underlying population. Fifteen (51.7%) surveyed abattoirs slaughtered fewer than 5k livestock units (LSUs) per year, compared to 48 (41.3%) in the underlying population.

Table 5.1 also shows that twenty-seven (83.1%) abattoirs offered private kill services, compared to 147 (69%) in the UK in August 2020. Three respondents with throughputs between 30k and 90k offer private kill services, each for at least three livestock species.

Therefore, the sample over-represents small abattoirs and, because more smaller abattoirs offer private kill services, it also over-represents abattoirs offering private kill services. However, over-sampling smaller abattoirs supports the research aims and objectives as the number and rate of abattoir closures has been higher among smaller than larger abattoirs in recent years.

Table 5.1. Number of surveyed abattoirs and abattoirs in the underlying population in the UK in August 2020, and the number offering private kill service, by size (annual throughput measured in Livestock units (LSUs) slaughtered per year (1 Livestock unit = 1 cattle, 5 sheep, 2 pigs, 5 goats or 3 deer)).

	Below 1k	**1k to 5k**	**5k to 30k**	**30k to 90k**	**above 90k**	**Not known**	**Total**
Characteristics of underlying population							
Total number of abattoirs in UK	45	43	64	31	13	17	213
Total number of abattoirs offering private kill services in UK	39	42	49	11	0	6	147
% of abattoirs offering private kill service in the underlying population	86.7%	97.7%	76.2%	35.5%	0	38.9%	69.0%
Characteristics of sample							
Total number of responding abattoirs	8	7	8	3	1	2	29
Number of responding abattoirs offering private kill services	8	7	7	3	1*	1	27
% of responding abattoirs offering private kill services	100%	100%	87.5%	100%	100%	50%	93.1%

*One of the larger abattoirs reported that they offered a PK service, but this was not confirmed in the recorded underlying population data. This may be because abattoir throughput changes from year to year and abattoirs may therefore move between categories between years or because their PK business was a low proportion of their total throughput.

5.4.3 Species slaughter licences held by survey respondents

Twenty-eight respondents provided details of their slaughter licences. Between them, the respondents held 85 slaughter licenses, an average of 3 each. This compares to the underlying population average of 2.3. Cattle (26) and sheep (25) were the most commonly held licenses, in addition eighteen abattoirs were licensed to slaughter pigs, 13 goats and 3 deer. This compares with 177 cattle, 168 sheep and 129 pigs slaughter licences held by abattoirs across the UK. Therefore, the sample slightly over-represents abattoirs which hold cattle (90% to 83%) and sheep (86% to 79%) slaughter licences, but under-represents abattoirs with pig slaughter licences (50% to 60%).

Eleven abattoirs held licences to slaughter four or more species (all included cattle, sheep and pigs, plus either goat or deer), and ten were licensed to slaughter three species (all included cattle and sheep, six held licenses to slaughter pigs, the remainder either goat or deer). Three of the remaining seven abattoirs were licenced to slaughter two species (both cattle and sheep), and four (14.3%) were licensed to slaughter a single species (cattle, sheep or pigs).

5.4.4 Number of slaughter licenses and abattoir throughput

Table 5.2 shows the relationship between the number of licences held and abattoir throughput in a typical (i.e., non-Covid-19) year. Seven of the eleven abattoirs with four or more licences and six with three licences slaughtered less than 5k LSUs/year. This is in line with national data that shows that smaller abattoirs typically hold more licences than larger abattoirs, which tend to be more specialist. However, Table 5.2 also shows that two of the smaller abattoirs hold only two species slaughter licences (both cattle and sheep). This is evidence of the diseconomies of scope related to slaughtering pigs.

Table 5.2. Size of abattoirs (by LSU) and number of licences held by survey respondents (N=28).

	Up to 5 k	**5k to 30k**	**30k to 90k**	**Above 90k**	**Unknown size**	**Total**
Abattoirs with four or more licences (11)	6	2	2	0	0	34.5% (10)
Abattoirs with three licences (10)	6	2	1	0	1	34.5% (10)
Abattoirs with two licences (3)	2	1	0	0	0	10.3% (3)
Abattoirs with a single licence (4)	0	3	0	1	0	13.8% (4)
Unknown licenses held	0	0	0	0	1	3.4% (1)

5.5 Provision of private kill business

Twenty-seven (96%) abattoirs provided private kill work for an average of 79 farmers, but this ranged widely, from 5 to 400 (a standard deviation of 89.3).

Table 5.3 profiles respondents' total throughput and private kill business by livestock species. Cattle and sheep accounted for 14.7% and 9.1% respectively of private kill business of the twenty-two abattoirs which processed cattle and sheep. However, 51% of pigs slaughtered by the sixteen abattoirs with pig slaughtering licences was private kill business (2,491 of an average throughput of 4,869 pigs a year). National trends show the increase in specialization of abattoirs which slaughter pigs, so this reflects the underlying population.

The average annual throughput of goats processed by eleven abattoirs was small, at 18 LSU, however, a remarkable 97.8% of this business was for private kill customers. 50% of the deer processed by private kill abattoirs was for private kill customers.

Table 5.3. The total annual average livestock units (LSUs) slaughtered per abattoir and for private kill by species (1 LSU = 1 cattle, 5 sheep, 2 pigs, 5 goats or 3 deer) ± standard deviation and range (min-max). The number of abattoirs to specify processing each species is in the parentheses.)

	Abattoirs offering a PK service					**All abattoirs**	
	Private kill throughput		**Total annual throughput**		**PK as a % of total throughput**	**Total annual throughput**	
Species	**Mean (A) LSUs ± Std (number)**	**Range of PK throughput**	**Mean (B) LSUs ± Std (number)**	**Range**	=A/B (%)	**Mean LSUs ± Std (number)**	**Range**
Cattle	503.1 ± 658.4 (22)	3 – 2,500	3,421 ± 6393 (22)	4.0 – 27,000	14.7%	3,735 ± 6,743 (25)	4-27,000
Sheep	1,080 ± 1,958.4 (22)	10 – 8,200	11,926 ± 42,260 (22)	50.0 -200,000	9.1%	10,943 ± 40,518 (24)	36 – 200,000
Pigs	2,491 ± 4,595 (16)	6 – 16,781	4,869 ± 6,172 (16)	6.0 - 16,781	51.2%	4,603 ± 6,077 (17)	6 – 16,781
Goats	18 ± 22 (11)	0.2 – 60	19 ± 22 (11)	0.2 – 100	97.8%	25 ± 31 (12)	0.2 – 100
Deer	17 ± N/A (1)	NA	33 ± NA (1)	1.7 – 100	50.2%	45 ± 50 (3)	1.7 – 100
Total	**3,121 ± 5,944 (24)**	**49 – 22,421**	**17,328 ± 40,534 (24)**	**60.0 - 200,000**	**18.0%**	**16,099 -38,392 (27)**	**60 – 200,000**

Table 5.1 shows that abattoirs with a large throughput can be organised and managed to offer private kill services, and Table 5.2 shows these larger abattoirs can provide private kill across a wide number of species. Table 5.4 shows the proportion of private kill to total throughput by abattoir size. Across the sample, 18% of total throughput was supplied by private kill customers, but this increased to 45% for the smallest abattoirs. Dependency on private kill business fell to 16% for the abattoirs in the 5k – 30k size category, but increased to 49% for abattoirs with a throughput of between 30k and 90k. The percentage of private kill business of the largest abattoir (not reported) was very small.

Table 5.4. The dependency of abattoirs which offer private kill services on their private kill business by size of abattoir (N=24).

Abattoir throughput	**Private kill throughput (LSU)**		**Total annual throughput (LSU)**		**Percentage throughput PK**
	Mean (A) LSUs ± Std (number)	**Range**	**Mean (B) LSUs ± Std (number)**	**Range**	**=A/B (%)**
Abattoirs up to 5k	765 ± 855 (13)	49 – 2,760	1,696 ± 1,371 (13)	60.0 – 4,800	45%
5k to 30k	2,103 ± 2,147 (7)	300 – 6235	13,304 ± 7,203 (7)	7,004 – 27,000	16%
30k to 90k	16,412 ± 9,007 (3)	6,056 – 22,421	33,571 ± 1,425 (3)	32,060 – 34,892	49%
Above 90k	NR (1)	NR	NR (1)	NR	NR
Total	**3,121 ± 5,944 (24)**	**49.0 – 22,421**	**17,328 ± 40,534 (24)**	**60.0-NA**	**18%**
NR not reported due to small sample size.					

Table 5.5 shows the contribution of private kill business by abattoir size in a typical (i.e., pre-Covid year). The three larger abattoirs (30k-90k) slaughtered some 49k LSU for private kill customers (4.4k LSU cattle, 14.8k LSU sheep, 29.8k LSU pigs and some 100 LSU goats) in a typical year. This is considerably more than the 9.9k LSU slaughtered by the 13 smallest abattoirs (3.7k LSU cattle, 3.7k LSU sheep, 2.3k LSU pigs, some goats and deer).

Table 5.5. The importance of private kill throughput of abattoir by the size of abattoirs in livestock units (LSU) slaughtered per year (1 Livestock unit = 1 cattle, 5 sheep, 2 pigs, 5 goats or 3 deer) ± standard deviation and range (min-max). The number of abattoirs to specify processing each species is in the parentheses.

	Private kill abattoirs					**All abattoirs**	
	Private kill throughput		**Total annual throughput**		**Percentage throughput PK**	**Total annual throughput**	
	Mean (A) LSUs ± Std (number)	**Range**	**Mean (B) LSUs ± Std (number)**	**Range**	**= A/B*100 (%)**	**Mean LSUs ± Std (number)**	**Range**
Abattoirs with a throughput below 5k							
Total	764.9 ± 854.5 (13)	49.0 – 2,760.0	1,695.5 ± 1,370.8 (13)	60.0 – 4,800	45.1%	1522.2 ± 1352.4 (15)	60.0- 4800.0
Abattoirs with a throughput between 5k and 30k							
Total	2,103.0 ± 2,147.2 (7)	300.0 – 6,235.0	13,303.7 ± 7,203.4 (7)	7,004.0 – 27,000.0	15.8%	13,890.8 ± 6,872.6 (8)	7,004.0 -27,000.0
Abattoirs with a throughput between 30k and 90k							
Total	16,412.2 ± 9,007.1 (3)	6,056.0 – 22,420.5	33,570.6 ± 1,425.3 (3)	32,060.0 – 34,891.7	48.9%	33,570.6 ± 1,425.3 (3)	32,060.0 - 34,891.7
Abattoirs with a throughput above 90k							
Total	Data withheld						

When contacting abattoirs 34 abattoirs which provided private kill services were chosen at random and asked how important the private kill business was to the abattoir. Table 5.6 confirms that private kill business can be important to the viability of large as well as small abattoirs. Other reports have tended to overlook the role of larger abattoirs in the provision of private kill and the importance private kill can play in the viability of those abattoirs (APGAW, 2020, Kennard and Young, 2018).

*Table 5.6. Importance of private kill business to abattoirs, by abattoir size (LSUs) (N=34)**

	Abattoir size (LSUs)				
Importance of PK business (as a % of throughput)	**<1k**	**>1k <5k**	**>5k - <30k**	**>30k - <90k**	**Unknown**
Essential (>50%)	8	2	5	2	2
Important (>30%<50%)	1	4	3	2	0
useful (>15%<30%)	0	0	0	0	0
Not important (up to 15%)	1	0	4	0	0
Total	**10**	**6**	**12**	**4**	**2**
% of "essential & important" to total	90%	100%	66.7%	100%	100%
*. No abattoir contacted in the >90k throughput provided private kill services.					

The survey findings also show that abattoirs with an annual throughput between 30k and 90k can manage private kill services across a number of species whilst also supplying wholesale markets (Table 5.4). Therefore, it is, in principle, possible for a small number of larger abattoirs to deliver substantial private kill capacity across the UK.

5.6 The economic performance of abattoirs

5.6.1 Introduction: strategies to increase profitability

Respondents summarise the profitability of their abattoir business over the three most recent pre-Covid-19 years. Table 5.7 shows that fifteen (54%) respondents reported their abattoir had been consistently profitable over that period, with nine breaking even. The data provide tentative evidence that the break-even size is about 10k LSU/year, but that to be profitable an abattoir needs to slaughter over 22k LSU/year. However, and in line with the findings of Kennard (2018), there is a good deal of variability around these data.

*Table 5.7. Participants response to the question '*over the preceding 3 years (excluding the present C-19 year) how would you describe the profitability of your business?' *according to abattoir size in total LSUs slaughtered per year (28 participants responded to this question).*

Profitability over previous three years	**Percentage (number)**	**Mean LSUs slaughtered per year ± standard deviation (range)**
Profitable	53.6% (15)	22,181 ±50,174 (min 450 – max 200,000)
Breaking even	32.1% (9)	9,824 ± 14,388 (min 60 – max 34,892)
Making a loss	10.7% (3)	6,623 ± 9,160 (min 146 – max 13,100)
Prefer not to say	3.6% (1)	(small abattoir: < 1k throughput)
Total	100% (28)	**16,099 ± 38,392 (min 60 – max 200,000)**

There are in typically five strategies businesses can be adopted to increase profitability. These are to

- increase throughput - where this delivers additional economies of scale,
- increase fees charged for currently provided services,
- change (increase or decrease) the range of slaughter and/or butchering services offered,
- reduce costs – where this can be done without reducing profitability, and

- diversify the business by investing in more lucrative activities.

The survey findings are used to explore the potential for abattoirs to adopt these strategies.

5.6.2 Increase throughput - where this will deliver additional economies of scale

As would be expected in a relatively small sector, several respondents preferred not to provide estimates of their abattoir's revenue. However, one of the tentative conclusions reached in Table 5.7 is supported by the comparison of profitability with total revenue presented in Table 5.8: a higher proportion of the abattoirs with higher revenues are profitable. This provides additional evidence of economies of scale in the abattoir sector (a finding entirely consistent with national trends).

Respondents were asked how much they could expand slaughtering throughput given their existing facilities. Table 5.9 shows that 26 (92.9%) abattoirs have surplus slaughtering capacity, with twenty-four able to increase throughput by 10% or more. This is in line with responses that showed that the majority of smaller abattoirs do not slaughter every day of the week. For example, an abattoir that slaughtered between 5k and 10k LSUs/year, on 4 days per week, for 52 weeks of the year reported that throughput could expand by 30-40% using existing facilities. However, responses also show that larger abattoirs also have surplus capacity. These findings suggest there is scope for the majority of abattoirs to use their assets more intensely and by doing so generate additional economies of scale.

Table 5.8. Response by abattoir throughput to the question: 'over the preceding 3 years (excluding the present C-19 year) how would you describe the profitability of your business?' (N=28).

Profitability over previous three years	Up to £30,000	Between £30,000 and £75,000	Between £75,000 and £150,000	Between £150,000 and £300,000	Above £300,000	I don't know	Rather not say	Percentage (number)
Profitable	0	1	0	1	7	1	5	53.6% (15)
Making a loss	1	0	0	0	1	0	1	10.7% (3)
Breaking even	1	2	1	2	0	2	1	32.1% (9)
Prefer not to say	0	0	1	0	0	0	0	3.6% (1)
Total	**2**	**3**	**2**	**3**	**8**	**3**	**7**	**28**
% profitable to total by size category	**0%**	**33%**	**0%**	**33%**	**87.5%**	**-**	**-**	

Table 5.9. Estimated additional throughput capacity by size of abattoir (28 participants responded to this question) (data for abattoir above 90K/yr. withheld).

Surplus throughput capacity	Up to 5 k	5k to 30k	30k to 90k	Total
Mean LSU throughput/yr.	1,522	13,891	33,571	
Number of abattoirs	15	8	3	27
Available surplus capacity				
None	2	0	0	7% (2)
1-10%	2	0	0	7% (2)
10-20%	6	3	2	43% (12)
20-30%	2	1	1	14% (4)
30-40%	1	3	0	18% (5)
More than 40%	2	1	0	11% (3)
Estimated additional throughput	**4,338**	**31,255**	**18,464**	**54,057**
Average additional throughput by size	**289**	**3,907**	**6,155**	**2,002**
*. These estimates are based on the mid-range estimated surplus capacity, and use 50% as the additional capacity for abattoirs with more than 40% of surplus capacity. They exclude any surplus capacity for abattoirs with a throughput above 90kLSU/yr.				

Using the assumptions set out in the footnote in Table 5.9, the estimated surplus capacity of the twenty-six abattoirs is some 54k LSU/year (an average of 2k LSU/abattoir). This may not be representative of abattoir businesses across the country, but it suggests there is significant unused slaughter capacity within the sector, despite the closure of thirteen abattoir in the 20 months up to August 2020.

Therefore, changes in agricultural policy (e.g., a reduction in import tariffs or lower phytosanitary standards applied to imports) which results in a net increase in imported meat cuts and products, and/or reduction in UK livestock production are likely to increase the number of abattoir closures, and this would have a disproportionate effect on smaller abattoirs.

Respondents were asked what constraints prevented them expanding throughput beyond their existing capacity. The principal constraint identified by eleven respondents related to bottlenecks in the processing line(s): seven were limited by existing chiller capacity, two by cutting-room space, one by lairage space and one by "hanging space" (which may or may not refer to production line or chiller space). Seven respondents would need to employ additional labour and five lacked the capital needed to fund the necessary investments.

Additional bottlenecks to expanding throughput included market uncertainty, lack of managerial time, and difficulties competing on price with large processors. Only four of the eleven respondents believed further expansion is limited by the supply of livestock, and only four believed they are constrained by the demand for their products.

5.6.3 Increasing profitability by increasing revenue and fees

One strategy for increasing profitability is to raise prices charged for the services offered. Whether this is a viable strategy will depend to a large extent on,

- existing price-pressure competition,
- farmers' evaluation of the quality and range of services the abattoir provides, and
- the impact of raised charges on
- the overall profitability of livestock farming in general, and
- of private-kill retail businesses in particular, and
- changes this may cause to livestock production systems.

Few abattoirs make their charges publicly available (see Supplementary Appendix 5.1 for the price schedules provided by three abattoirs). However, the location and proximity of abattoirs to one another can be used as a proxy for the price-competition abattoirs providing private kill services face.

The location of the 147 abattoirs which provided private kill services across the UK in August 2020 is shown in Figure 5.1. The catchment area of each abattoir is shown drawn using a radius of 27 miles (45 km), which is the average distance farmers transport livestock for private kill services (as reported from the farmer survey). Some 18.5% of UK land area is further than 27 miles from private kill services, 20.9% of land area is within one abattoir offering private kill, 13.8% is within 27 miles of two such abattoirs, and 47.1% is within 27 miles of three or more such abattoirs.

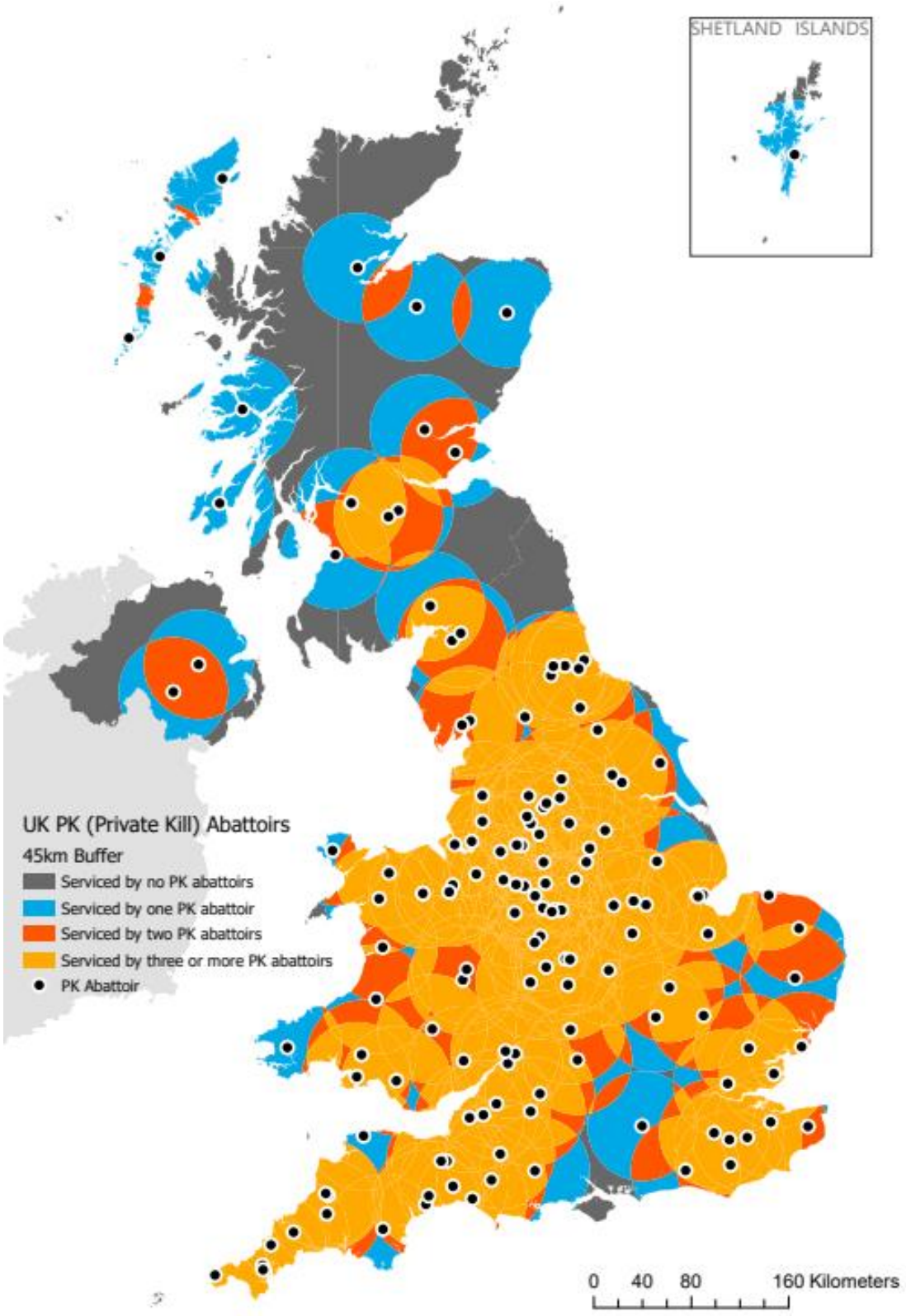
Figure 5.1 shows that the greatest concentration of private kill services lies along the spine of England, from East Yorkshire to Somerset (two counties where several abattoirs have closed in recent months (APGAW, 2020: p 17)). Therefore, abattoirs in this area would be expected to experience more competition and therefore be under higher price-pressure. However, there is more limited provision in East Anglia, north-east of England, south-west Scotland and the west coast of Wales. There is currently no local provision in Northumberland and parts of Hampshire, or on the Isle of Wight or the Scilly Isles.

Only two abattoirs offer private kill services in Northern Ireland[14] (only one of which is licenced to slaughter goats). This suggests private kill farmers there face limited choice and consequently most

[14] One interviewee named a third abattoir in Northern Ireland which offered private kill services. However, its private kill business was a very small proportion of its total throughput. And this view was contradicted by the company's manager. For these reasons, the abattoir was not included as a provider of private kill services.

likely less price-competition. However, live animals are allowed to be transported between countries and the study did not examine the location and number of abattoirs which provide private kill services in the Republic of Ireland.

Figure 5.1. Location of the 147 abattoirs which offer private kill services in the UK showing 45 km buffers (August 2020) (Graphics provided by Jess Hepburn).



Limited private kill provision exists on the Islands and Isles of Scotland, and there is no longer an abattoir on Orkney. This suggests there may be scope to increase fees in these places. However, several of these abattoirs are Community Benefit Societies and therefore must be managed for the benefit of the community. Moreover, farming in these areas is not generally regarded as prosperous, and the withdrawal of direct payments is likely to be severely felt (see Defra, 2018). Therefore, the extent to which these abattoirs can raise fees is likely to be limited. The provision of private kill services across the Scottish Highlands and in the South East is poor or non-existent, and, perhaps as a consequence, livestock density maps presented in the APGAW (2020) report (pages 13-15) show relatively few livestock are farmed in these areas.

Whilst geographical configuration of private kill abattoirs suggests the location of abattoirs which face stiffest price-competition, important additional factors, such as cross-border trade, business type, the profitability of farming and changes to agricultural and trade policy also limit the scope abattoirs have to increase slaughter fees and butchering charges. Moreover, increasing fees is likely to result in a loss of some business so it is difficult to estimate the overall impact on revenues from doing so.

Responses from the farmer survey show that whilst some private kill retailers are influenced by an abattoir's fees and charges, many more are influenced by its closeness to the farm, the animal welfare considerations, and the types of services offered. Therefore, the ability of an abattoir to discriminate their services from those offered by competing abattoirs is likely to offer a more successful strategy to increasing slaughter fees and butchering charges and therefore revenues.

Defra's Farm Business Survey provides estimates of Farm Business Income by farm type. Between 2013/14 and 2017/18 Farm Business Income varied between £14,500 and £28,300 for Upland Grazing Livestock farms, and between £12,000 and £21,900 for Lowland Grazing Livestock farms (Defra, 2019d). Farm Business Income does not make a deduction for the salary of the farmer and spouse. Therefore, in each of these years, Farm Business Income was insufficient to provide a living wage for the farmer and spouse, a competitive return on capital and provide a surplus to allow reinvestment in the business. This trend in low livestock farming incomes is supported by AHDB's Stocktaker survey findings which show that the majority of livestock farmers failed to cover their full economic costs in each year during the 2010's.

Any increase in slaughter fees and butchering charges will add to farmer costs and therefore further reduce the profitability of livestock farming and private kill retailing. It would increase current trends of farms specialising into breeding, rearing, and finishing production systems. As specialisation is accompanied by changes in the geographical production of livestock, the local supply of finished animals would fall in some regions, reducing abattoir throughput in those areas.

5.6.4.1 Increasing profitability by increasing services offered: emergency slaughter

Seventeen (61%) of participants provided emergency slaughter services, eleven (39%) did not. An injured animal (i.e., a live casualty animal) that is fit for transport, and the carcase of an emergency slaughtered animal can enter the human food chain subject to the correct procedures (FSA, 2017a). In both cases, the farmer and/or official veterinarian needs to ensure the slaughterhouse operator is willing to accept the animal/carcase. They may not do so for technical or operational reasons. For example, official veterinarians must conduct an ante-mortem inspection of the live casualty animal, and post-mortem inspections on the carcase of casualty and emergency slaughtered animal (FSA, 2017a, BCVA, 2010). Only the largest abattoirs are likely to have an official veterinarian present at all times, but these larger businesses may not be willing or able to interrupt their processing schedules. Those that supply multiple retailers under contract may not be permitted to offer such services.

The FAWC has expressed concerns that

> "the absence of slaughterhouses willing to take animals that have been inspected ante-mortem by a vet and slaughtered on-farm, may also increase the pressure on on-farm killing" (FAWC, 2017: p 16).

A network of abattoirs able and willing to provide emergency slaughter services can reduce these concerns and could therefore be seen as a prerequisite of a humanely managed animal livestock industry. A recent Defra publication *Farming for the Future: Policy and Progress Update* (Defra, 2020) confirmed that higher standards of animal welfare – such as provision of emergency slaughter - should be considered a public good,

> "*highe*r animal welfare is a public good: it is possible for someone to derive positive value from the fact that animals are being well cared for as a result of another's purchasing decision" (Defra, 2020: p 16, emphasis added).

However, there are no underlying population data on the number of abattoirs which offer emergency slaughter services in the UK.

5.6.4.2 Increasing profitability by increasing services offered: slaughter of rare breeds

Twenty-four abattoirs (86%) processed what the abattoir industry would regard as "problematic, rare and/or heritage breed livestock".[15] This appears to be a high percentage of respondents, but there are no data on the number of abattoirs which provide this service across the UK.

Nine respondents elaborated on the service they offered. One specifically noted they were equipped to slaughter long-horned cattle but three stated that the threat posed by these animals to the safety of their staff meant they did not. For example,

> 'We can't slaughter long horned cattle as we can't get them into the box and it's dangerous to operators' (unspecified LSU/yr.)

Another participant specified that they were prepared to look

> 'at each individual case and go from there' (12,470 mixed species LSUs per year).

The conservation of rare and heritage breeds requires a network of abattoirs equipped to undertake what in some instances is dangerous work. However, responses suggest abattoirs need specific equipment and staff additional training to offer this service. If abattoirs withdraw this service farmers will be forced to switch to more commercial breeds. This would threaten the preservation of native and heritage breeds and the conservation of their unique gene pools, and thus undermine aspects of agri-environment policy, which considers genetic diversity to be a public good (Defra, 2019b). However, no centrally collated statistics exist on the number of abattoirs or their location which are able to slaughter these inherently valuable livestock.

5.6.5 Increasing profitability by reducing costs

To reduce costs, managers must be able to identify unproductive activity: there is no benefit reducing costs if this results in the withdrawal of profitable services. Businesses need accurate financial and management accounts if they are to avoid this mistake. Only ten respondents managed stand-alone abattoir businesses, and the more integrated into the red meat supply chain an abattoir business is, the more difficult it is to accurately allocate expenditures to different cost centres. That twelve of the nineteen respondents with more than one business kept separate accounts for their abattoir shows that the majority of managers are well aware of this and have ready access to suitable financial data to inform their decision making.

However, the survey shows that the majority of abattoir costs are not easily reduced (see Box 5.1). For example, livestock costs are set by local markets, the AHDB slaughter levy is a standing charge per animal slaughtered, and many abattoirs have difficulty sourcing labour and so must pay competitive wages. Together these costs account for some 67% of all costs. Eight of seventeen respondents (47%) believed they were subject to onerous standards and inspections from the Food Standard Agency which increased their costs: managing the costs of the official veterinarians (who are employed by the FSA

[15] For example, respondents slaughtered mangalitsa pigs, alpaca, and water buffalo. See Supplementary Appendix 4.3 for a full list of breeds.

but paid for by a charge on the abattoir) is a significant concern for many smaller abattoirs. And most fixed costs, such as rent, interest payments, depreciation and rates, are largely abattoir specific because they vary with form of ownership, profitability, investments made in previous years, and location. This makes it difficult to identify generic recommendations on how to control costs.

Box 5.1 Summary of principal revenues and costs

Respondents were asked to provide details of their abattoir's principal sources of revenues and costs. Nine useful results were returned, all from abattoirs which offer private kill services (ranging from 2% to 100%). It is understandable given the relatively small number of abattoir businesses, the confidentiality of this information, and the complexity of some respondent's businesses, that a relatively high proportion were unwilling or unable to provide this financial information.

Table B5.1 presents a table which shows the primary source of abattoir revenue was slaughter fees followed by butchering service. These were the sole sources of revenue for seven of the nine respondents and "others principal revenue" was minimal for another. The principal revenue for a third was the sale of carcasses. A Spearman's rank correlation test showed no relationship between abattoir size (LSUs slaughtered/year) and the percentage of revenue sourced from slaughter fees ($r_s = -0.067$, p=0.864), butchering services ($r_s = -0.370$, p=0.327) or other principal revenues (e.g., sale of offal, skins and hides) (rs = 0.183, p=0.638).

Table B5.1. Sources of revenue (based on Profit and Loss account from most recently completed accounting year prior to C-19) ± Std and range. (N=18).

Source of revenue	Number of completed responses	Mean percentage ± Std	Range	'Would rather not say'	'I don't know'
Slaughter fees	9	50.9% ± 35.1	1% - 100%	6	3
Butchering services	9	43.9% ± 29.6	0% - 88%	6	3
Other principal revenues (e.g., sale of offal, skins and hides)	9	15.2% ± 36.2	0% - 89%	6	3

Participants were also asked to summarize their abattoir business costs (including the purchase of livestock) in the most recent completed pre-C-19 year. Seven responses were 'rather not say' and twelve 'don't know', five did not give an answer.

Six participants provided monetary estimates, all of which provided private kill services. Their total costs averaged £235,833 per year, however, this varied widely, with a standard deviation of £148,054.5, and a range from £20,000 to £500,000. The split in costs is shown in Table B5.2. A Spearman's rank test revealed that there was no relationship between abattoir size (in total LSUs slaughtered per year) and any of the cost categories, however, the small sample size (n=6) increases the risk of Type 2 errors (whereby a statistically significant effect may not have been detected due to low statistical power).

Table B5.2. Abattoir costs (based on Profit and Loss account from most recently completed accounting year prior to C-19) ± Std and range. (N=26).

Source of cost	Number of completed responses	Mean percentage ± Std (number)	Range	Number to select 'I would rather not say'	Number to select 'I don't know'
Purchase of livestock	6	27.9% ± 21.5	Min 0% – max 60%	7	12
Salaries, wages and PAYE, employee NI and pensions	6	25.6% ± 13.2	Min 10% - max 50%	7	12
Direct costs (FSA inspection and fees, waste removal, AHDB levy)	6	13.2% ± 5.8	Min 5% - max 20%	7	12
Other fixed costs (e.g., rent & rates, power and electricity, depreciation, repairs and maintenance, interest repayments, others)	6	33.3% ± 13.3	Min 20% - max 50%	7	12

The small sample size means it is not sound to make any meaningful deductions based on these revenue and cost data. However, the large variation in both revenues and costs between abattoirs is consistent with observations made by Kennard (2018).

However, animal by-produce waste collection costs have increased in recent years and are a key concern, particularly for small abattoir operators (APGAW, 2020: p 35-36). The fall in the value of hides and fleeces (see Supplementary Appendix S5.2) means it is no longer economic for many smaller abattoirs to sell hides, so these animal products now add to costs rather than to revenue. Twenty-seven respondents specified how they dispose of animal by-produce waste materials. Twenty-two paid animal by-produce waste removal contractor(s) (81.5%), four used a bio-digester (14.8%), two their own incinerator (7.4%) and two used landfill (7.4%). Abattoirs could choose from, on average, 1.4 animal by-produce waste removal companies to use to remove this waste, but this ranged from having no choice to selecting from four possible companies. Respondents expressed considerable concern about the lack of competition between animal by-produce waste removal companies, for example one stated,

> 'One company controls all others' (over 30k mixed species LSUs per year).

Another respondent provided a similar comment,

> 'they [waste removal companies] are run like monopolies. Some won't deal with you because they all have agreements with each other: it is corrupt' (between 5k-30K mixed species LSUs per year).

These responses support the finding in the APGAW (2020: p 38) report of evidence of uncompetitive practices among animal by-produce waste removal companies, and its recommendation that the Competition and Markets Authority evaluate the competitiveness of the animal by-produce waste collection market.

As animal by-products accounts for about 50% of an animal's liveweight, one respondent believed more focus was required on how it can better be utilised,

> 'We don't have waste, we have resources at various stages of use, and our challenge is to find more ways to derive value out of everything' (size withheld).

Case study 4 provides an example of a possible innovative way to use animal by-products.

Animal by-produce waste removal charges are based on the quantity of material collected. Abattoirs with small throughput generate insufficient animal-by produce waste to be attractive business to some animal by-produce waste removal companies. The location of private kill abattoirs, shown in Figure 5.1, and of all abattoirs across the UK (Figure 1.1), indicates the areas where abattoirs may be sufficiently close together to work collectively to secure lower animal by-produce waste disposal fees and charges by putting their animal by-produce waste removal business out to joint tender. Co-operative action may also provide the economies of scale necessary to make it economic for more smaller abattoirs to reclaim a higher percentage of edible (category 3) offal. However, the creation of more, or the expansion of existing niche pet food brands, faces stiff competition from multinational businesses.

Cost reduction often requires investment in new technologies and/or processes. These investments are essential for businesses in highly competitive sectors, which are driven by the technological treadmill and new regulations, to survive. Thirteen respondents (44.8%) needed to make business-critical investments in the next two years or they would have to close. Nine respondents provided details of these critical investments: replace or extend existing chilling/hanging facilities (5); general building repairs (2); purchase of new stunners (2); the need to update lairage (1); extend the current building (1); update fridge motors (to meet new gas regulations) (1); and to purchase and install solar panels (1). Five respondents volunteered further information about the size of these investments, which ranged from £20,000 to £1 million. One manager stated,

> 'We have costed upgrading power supply with solar power panels, installing a new fridge, adding a bay to current building at £200k' (throughput less than 5k, mixed species LSUs per year).

However, estimating essential future investments was not straightforward, as it depends

> *'on [what] new legislation that may come into action'* (throughput less than 5k, mixed species LSUs per year).

Rather more, twenty-three respondents, needed investments to increase the efficiency and profitability of the abattoir so it could remain viable in the long-term. These investments included: new animal traceability software (5); improved chiller (3); equipment to increase the value of animal by-produce waste (e.g., pet food or as a fuel source) (2); and investment in advanced cutting plant (2) - such as an automated boning system. Other investments needed included a forklift truck, updating computer systems, solar panels, an anaerobic digester and a hide and skin puller.

Businesses in highly regulated and competitive markets that are unable to finance essential investments will close. This appears to be a well understood fact, for example,

> 'We are at a point where we need to invest money right across the whole business in all areas. However, due to the very fine line between making any money or making a loss, investment in new plant, fixtures and fittings has been nearly non-existent, and we are reaching a point where it will be better to close the business than burden the business with heavy loans which need repaying to keep trading' (throughput less than 5k).

Another respondent referred to the opportunity cost of the real estate occupied by the abattoir as a possible reason for their closure,

> *'There is a particular challenge with many of the small abattoirs and that is, while they are often prime real estate is old market towns, where their value for development is so much greater than their value as an abattoir - that's why they shut.'*

Managers must have confidence in the prospects for their business to make investments which have long payback periods. Twenty-five respondents were concerned about the uncertainty created by the change in agricultural policy resulting from the decision to leave the European Union, which may result in new import and export tariffs and phytosanitary standards on traded red meat. Only two respondents were unconcerned by these developments. If these wide-spread concerns continue to delay essential and necessary investments it will undermine the long-term viability of many abattoirs.

Table 5.10 shows the financial support respondents believed would be of most assistance to their business. Fifteen believed unconditional grant aid was the most appropriate form to support abattoirs (Table 5.10), which reflects the diversity of their requirements. Twelve supported additional public procurement by government bodies - such as local authorities. Twelve supported rate relief, eleven staff training courses and nine would benefit from computer skills training. Only four (14.3%) participants said they did not require any financial support.

Table 5.10. Respondents answers to the question 'What form(s) of financial support would be the best way to support your abattoir business (you can select more than one answer)?' 28 participants responded to this question.

Support	Up to 5k	5k to 30K	30k to 90K	Above 90k	unknown	Total percentage (number)
Unconditional grant aid	8	7	0	0	0	53.6% (15)
Increased procurement by local authorities	7	4	1	0	0	42.9% (12)
Business rate relief	6	4	2	0	0	42.9% (12)
Staff skills training courses	8	3	0	0	0	39.3% (11)
Dedicated support to improve computer facilities and training	6	3	0	0	0	32.1% (9)
None needed, can finance from profit and savings	2	1	0	0	1	14.3% (4)

5.6.6 Diversifying the business along the red meat supply chain

Diversification is an often-advised strategy is increase revenue and profit. Abattoirs could, for example, invest in vertically or horizontally integrating the abattoir into the red meat food chain.[16] However, as Table 5.11 shows, the majority of respondents are already integrated into the red meat supply chain. Only eleven respondents managed stand-alone abattoirs. Eight managed at least one retail outlet (seven of which were butcher shop(s)), and eight managed a farm as well as some type of retail outlet(s) (six of which were butcher shop(s)). And a small number had diversified into pet foods and managing a café.

However, a diversification enterprise can also reduce profitability. The cross-subsidisation between the abattoir business and their butcher shop is reported by thirteen respondents. Five (38%) respondents said the viability of their butcher shop was dependent on their abattoir. However, eight (62%) said their abattoir was not essential to the successful running of their butcher shop. For example, one respondent commented,

> 'The butcher shop is going very well, it is the costs of running the abattoir that is giving cause for concern and the complete unwillingness of the farming community to pay a realistic price for the service' (unspecified LSUs per year).

Another respondent confirmed that their abattoir business was not critical to the success of their retail business,

> 'My abattoir exists solely to provide for my [number undisclosed] high street shops. If my plant was to close, I could outsource slaughtering very easily. This would have a very marginal effect on my costs as a viable business' (Abattoir with a throughput below 5k).

Table 5.11. The integration of abattoirs into the red meat supply chain (N=29).

Business enterprise	Up to 5k	5k to 30K	30k to 90K	Above 90k	Not known	Total
Abattoir	4	6	0	1	0	**37.9% (11)**
Abattoir and at least one retail outlet (e.g., butcher shop, online sales etc.)	6	0	2	0	0	**27.6% (8)**
Abattoir, farm and at least one retail sales outlet (e.g., butcher shop, online sales etc.)	5	1	1	0	1	**27.6% (8)**
Others: both abattoir and farm	0	1	0	0	1	**6.9% (2)**
Total	**51.7% (15)**	**27.6% (8)**	**10.3% (3)**	**3.4% (1)**	**6.9% (2)**	**100% (29)**

Although the majority of respondents already managed some form of diversified business, only four retailed on-line (three of these also managed a butcher shop(s)), and only four retailed through box schemes (two of which were attached to butcher shops). It is not possible to speculate on the extent to which expanding these outlets would compete with farmers' private kill retail business.

5.7 Growing the market for locally finished and slaughtered meat

Ten (63%) participants supported developing a local abattoir "brand" or "label" to allow customers to identify their unique product and thereby be able to support businesses in the local economy and help conserve the environment and countryside (Table 5.12). However, eleven participants "did not know" if they would support such schemes, as one explained,

[16] A declining sector produce products with an income elastic of demand which is positive but less than one. As such, demand for the sector's goods and services increase less than proportionately to the increases in real incomes. As a result, the sector's share in GDP declines. This increases the competition between businesses and some will eventually be forced to close.

'Not sure. I am proud of what we do but there are a lot of people against what we do so I am reluctant to shout from the rooftop as I have had objections before' (less than 1k, mixed species LSUs per year).

Two (7.1%), both with larger than average throughputs, did not support developing a local brand. Table 5.12 also shows the interest in and need for training to allow the businesses to expand retail business online, and for additional digital skills training. Five respondents said they would be willing to work together to develop an online marketing site with other meat suppliers in their local area.

Table 5.12. Participants responses to the question 'What would help you market your meat to more customers? (you can select more than one answer)'. (N=16).

Support to help increase meat sales	Percentage (number)
The development of a "locally procured" meat brand	62.5% (10)
Help to set up and manage your own online site	37.5% (6)
Access to an online marketing site where you could promote your meat alongside meat from other suppliers in your local area	31.3% (5)
Digital skills training	31.3% (5)
Don't know	6.3% (1)
None	6.3% (1)

Expanding markets by selling locally produced, slaughtered, processed and packed meat and meat products through supermarkets (where the majority of red meat is sold) would require abattoirs to comply with the retailer's quality assurance standards. However, almost half of respondents were not members of any quality assurance scheme (Table 5.13). This finding is roughly consistent with a survey conducted by the Food Standards Agency (Defra, 2019h) which found that 52% of red meat slaughterhouses operating in England and Wales were not a member of any quality assurance scheme (Defra, 2019h). By developing a well-recognised "local" meat brand it may be possible to increase sales through multiple retailers.

Table 5.13. Quality assurance membership by abattoir size. (N=29).

Number of quality assurance schemes	Up to 5k	5k to 30K	30k to 90K	above 90k	Not known	Total	Mean LSUs slaughtered/year
No scheme	7	3	1	0	1	12	**7,270**
One scheme	6	4	2	0	0	12	**10,388**
Two or more schemes	1	1	0	1	0	3	**76,530**
Unknown	1	0	0	0	1	2	**N/A**
Total	**15**	**8**	**3**	**1**	**2**	**29**	**16,098.9**

The level of support for a local "brand" adds weight to Kennard and Young (2018) recommendation to set up a task force to explore inter alia support for the introduction of a "low throughput stamp for small abattoirs exclusively supplying local meat markets" (p 9), suggesting it might be "similar to the square stamp previously used" (p 9). The current threat to changes in tariffs and phytosanitary standards may be partly responsible for this level of support.

However, Case Study 6 shows that abattoirs do not need to work collectively to develop a local meat brand. The EU's Protected Designation of Origin (PDO) status (which is being retained albeit in slightly altered form following the decision of the UK to leave the European Union) has been used by an abattoir in Cumbria to discriminate their Lakeland Herdwick product in the marketplace.

5.8 Integration of the abattoir business in the rural economy

The number and type of businesses abattoir sell to and buy from provides a measure of their importance to the local economy. Twenty-eight respondents specified the customers groups they supplied,

- 27 (96%) abattoirs provided private kill services for farmers and other retailers for private kill. The average number of farms provided with private kill services was 79, but this ranged widely, from 5 to 400 (a standard deviation of 89.3).
- 25 (89%) supplied butcher shops, other than own butcher shop.
- 17 (61%) supplied caterers.
- 15 (54%) supplied "other retailers (e.g., farm shops, farmers markets, etc.) NOT for private kill".
- 15 (54%) supplied "retailer customers".
- 13 (46%) supplied "wholesalers", and
- 1 (4%) included a "boning plant".

The majority of abattoirs sold to more than one customer group; seven abattoirs slaughtered for all seven customer groups, six for six groups, five for four groups, four for three groups, four for two groups, only, two abattoirs slaughtered for a single customer group.

The twenty-six abattoirs employed full-time staff. On average these businesses employed 22.5 people (standard deviation 41.1, min 1 – max 200). Seven participants did not employ part-time staff, fifteen employed three people on average.

Estimates provided by sixteen abattoirs suggest that 70.6% of total business expenditure (including purchase of animals) was to business or employees located or living within 30 minutes' drive to the abattoir. But there was a large range in expenditure, from 5% to 100% (standard deviation 25.5). A Spearman's rank correlation test revealed no relationship between abattoir size and expenditure on local businesses and employees (r_s =-.445, $p>0.05$). Rather unsurprisingly, given the difficulty making these estimates, a relatively large number of respondents (11) did not provide estimates.

5.8.1 Involvement in the local community

The collaborative activities abattoirs are involved with are detailed in Table 5.14. Thirteen (56.5%) of the twenty-three respondents who provided details were not involved in any local collaborative activities, four (17.4%) were involved in one, three (13%) with two, one (4.3%) with three and two (8.7%) with four. There was no relationship between the size of the abattoir (LSUs slaughtered per year) and the number of collaborative activities ($r=0.95$, $p>0.05$).

Table 5.14. Collaborative activities of abattoirs according to size (LSUs slaughtered per year). (N=23).

Collaborative activity	Up to 5K	5k to 30K	30k to 90K	Above 90k	Total percentage (number)
None	8	3	2	0	56.5% (13)
Butcher shops	4	1	0	0	21.7% (5)
Livestock markets	3	2	0	0	21.7% (5)
Farmers	3	0	0	0	13% (3)
Wholesalers	1	1	0	0	8.7% (2)
Deliver meat for a nearby abattoir	0	1	0	0	4.3% (1)
Local pubs	1	0	0	0	4.3% (1)
Events and shows	1	0	0	0	4.3% (1)
Catering companies	1	0	0	0	4.3% (1)
Remove animal by-produce waste for nearby abattoir	0	0	1	0	4.3% (1)

Respondents views on working collectively to develop a "local" brand have been presented and discussed above. Possible additional collaboration includes working with deer management organisations, jointly developing UK sheep export markets, and working with local schools, butchers, farmer groups and care homes. One respondent saw possible value in creating a group to jointly purchase inputs.

5.9 Conclusions

The findings report management and financial information from 29 abattoirs, 27 of which provided private kill services. Each private kill abattoirs provided private kill services to an average of seventy-nine farmers each year, though this ranged from 5 to 400, (standard deviation 89.3). The findings confirmed that smaller abattoirs are most likely to offer private kill services, and that these abattoirs are more dependent on private kill business than larger abattoirs. However, it also confirmed that larger abattoirs - with annual throughputs between 30k and 90k – also provide private kill services across all major livestock species and that this trade is essential to their business.

Only fifteen (54%) of the twenty-nine abattoirs had consistently profitable in the three years to December 2019, nine had broken-even over this period. The study provides tentative evidence that break-even throughput is about 10k LSU/year, but consistently profitable abattoirs have throughputs above 22k LSU/year. However, this study, like that of Kennard (2018), found considerable variability around these data.

The analysis examines five strategies by which abattoirs may increase profitability,

- increase throughput - where this delivers additional economies of scale,
- increase fees charged for services currently provided,
- change (increase or decrease) the slaughter and/or butchering services offered,
- reduce costs - but without reducing profitability, and
- diversify by investing in more lucrative activities.

A rough and ready estimate suggests considerable unused slaughter capacity exists among the respondents. However, to increase capacity further, most businesses require additional investment in, for example, fridges and freezers, plant infrastructure and staff training. A lack of capital and widespread concerns about future agricultural policy have held back investment in this essential equipment. This suggests there is likely to be further rationalization among abattoir businesses despite thirteen having closed in the 20 months to August 2020, particularly if the new agricultural policy disadvantages livestock farming. Unconditional government grants were the most popular means of government support to enable these investments to take place, reflecting the diversity of their needs.

Few abattoirs post their fees and charges publicly. Therefore, the location of abattoirs offering private kill services is used as a proxy for the price-competition between abattoirs. However, important additional factors, such as cross-border trade, business type, the profitability of farming locally and nationally, and expected changes in agricultural policy can also be expected to limit the scope abattoirs have for increasing slaughter fees and butchering charges. Moreover, increasing fees is likely to result in a loss of some business, so it is difficult to estimate the overall impact of increasing fees on total revenues.

It has increasingly uneconomic for smaller abattoirs to slaughter pigs, provide emergency slaughter and slaughter rare and heritage breeds. Many can no longer justify the investments in the specialist equipment and training needed for these activities given their relatively low throughput. Few abattoirs slaughter goats, but a high proportion of goats slaughtered were for the PKR business, which suggests further reductions in this service poses a threat to goat meat production.

Nineteen respondents have already invested in vertically or horizontally businesses. That twelve kept separate accounts for their abattoir business shows a high level of awareness of the importance of good record keeping to inform business decisions. However, eight abattoir businesses were being supported by the butcher shop(s), and for some sourcing meat from their own abattoir was no longer considered to be essential for the survival of those shops. However, five respondents reported that the abattoir cross-subsidised the butch shop.

Findings such as these confirm the variability that exists within abattoir businesses. This variability makes it difficult to develop generic recommendations. For example, most fixed costs are abattoir specific. Nevertheless, there was evidence that abattoirs would benefit from

- increased competition between animal by-produce waste removal companies,
- less onerous regulations, and
- support for providing key public goods, such as equipment and training to allow them to continue to provide emergency slaughter and to slaughter rare and heritage breeds.

Few businesses sold produce on-line or through box schemes, which explains the demand to help expand sales through these retail outlets, for example, to help invest in specialist skills training. However, the extent to which expansion into these markets would undercut the market supplied by their private kill customers or grow that market is unknown.

There was some collective interest in developing a brand to differentiate "local" meat so that consumers could make informed purchasing decisions which reflect their support for local produce, supplied by local businesses, and which reflect their animal welfare preferences. However, for those not interested in collective action, there are examples which an individual abattoir could follow to develop their own regional, locally produced meat brand.

Smaller abattoirs play important roles buying from and supplying businesses in the local economy. In addition to supporting local farm businesses, twenty-five (89%) respondents supplied butchers (thirteen managed by the abattoir owner). Other markets supplied included caters, retailers and wholesalers.

The study has shown that the existing network of small abattoirs provides services that provide public goods, including emergency slaughter and slaughter of rare and heritage breeds. However, assessing the overall impacts of further abattoir closures on the provision of these services is not possible because there are no underlying population data on the provision of these services. However, closure of more abattoirs would also reduce animal welfare standards because of longer and more complex journeys, and more mixing of livestock.

The findings show that larger abattoirs, with an annual throughput between 30k and 90k LSU, can provide private kill services across the major livestock species whilst also supplying wholesale markets. In principle, therefore, it is possible for a small number of larger abattoirs to deliver substantial private kill capacity across the UK. However, such a business structure would result in the closure of the vast majority of smaller abattoirs. It would also

- reduce the type and range of butchering services available,
- reduce price-competition,
- have adverse animal welfare consequences because livestock would need to travel further, undertake more complex journeys, and mix with livestock from other farms, and
- reduce the ability of farmers to add value to their farm produce close to the source of production.

These changes would adversly affect the size and growth of the local economy.

Chapter 6. Consumer demand for local meat

The review of national trends and the findings from the survey of abattoirs show that the majority of smaller abattoirs depend on revenue from private kill services. Their customers are typically smaller-scale farmers who sell the meat of livestock finished on their farm through their own retail outlets. This market largely depends on consumers' valuation of the credence attributes attached to meat and meat products purchased through the small volume, locally produced and processed red meat supply chain.

This Chapter examines these credence attributes. It summarizes the literature to explore (i) the definitions used for "local" as applied to food and meat, and (ii) the credence attributes consumers attached to "local" food and meat. It then reviews estimates of the size of the local food network, its economic value to the national and rural economy, and to the farming sector. The Chapter draws on abattoir and famer survey data to review the short-term impacts of the coronavirus pandemic on the demand for, and provision of, private kill services in the spring and early summer of 2020, and to report managers' views on how the additional business some experienced could be retained. Survey data is then used to explore the impact of different definitions of local to the current supply of livestock for private kill retail. This is followed by a presentation of a methodology that could be used to assess the future shape and size of private kill provision by abattoirs across the UK.

6.1 What is local food? A review

A systematic review of the literature relating to the demand for local meat in the UK identified nine relevant research articles. These define "local food" as food that has been

- produced within 30 miles of the point of sale (Pearson et al., 2011, ICF Consulting Services, 2016, Campaign to Protect Rural England, 2012),
- produced within the UK region of sale (Khan and Prior, 2010, O'Neill, 2014),
- produced within the UK country of sale (Akaichi et al., 2020, Whybrow and Macdiarmid, 2018), and even as,
- produced within the UK in general (Furnols et al., 2011, Realini et al., 2013).

There is, therefore, no widespread agreement in the literature as to what "local" means.

A Campaign to Protect Rural England (2012) survey found that 88% of 1,900 surveyed shoppers purchased what the shoppers considered to be "local" food. However, and perhaps unsurprisingly, surveys show that consumers in England are similarly inconsistent in what they consider to be "local" produce (Pearson et al., 2011, Khan and Prior, 2010, O'Neill, 2014, Campaign to Protect Rural England, 2012). For example, the Campaign to Protect Rural England (2012) survey found that 28% of respondents perceived local to be associated with a "region of sale", 27% thought local produce needed to be produced "within 30 miles of the point of sale", 26% considered a produce local if it came from "within the county of sale", 11% as being from a "local shop", and 3% perceived it as "being from England". Other studies have shown that urban consumers define local even more broadly than rural consumers (Defra, 2008).

While local food may generally be considered to be produced and sold within a given geographical area, the lack of a consistent definition of what this area should be (O'Neill, 2014, Feldmann and Hamm, 2015, Pearson et al., 2011, Jones et al., 2004, Campaign to Protect Rural England, 2012) has important implications for the growth in the market of locally produced and processed food. For example, it prevents the development of a uniform, nationwide assurance standard that can be used to label and advertise food products in general, and meat products in particular, as "local". Such a labelling scheme would provide consumers with the confidence that purchasing a product such labelled fulfils their expectations.

However, the Farm Retail Association (FRA, formally Farmers' Retail and Markets Association (FARMA)) offers a working definition of local. Its certification scheme (Farm Retail Association, 2020) states that FRA assured markets should

> 'recruit stall holders from as close to the market as possible. The majority of stalls should come from within the county in which the market is located. Where markets are close to county boundaries or require specific producers, additional traders should be sourced from neighbouring counties' (p 3)

The Chapter considers local meat as that produced in line with FRA's flexible regulations.

6.2 Credence attributes of local meat

The literature (see: Khan and Prior, 2010, Defra, 2008, Campaign to Protect Rural England, 2012, Hashem et al., 2018, Furnols et al., 2011, Realini et al., 2013, Pearson et al., 2011, ICF Consulting Services, 2016, Edwards-Jones et al., 2008) divides the credence factors associated with consumers motivations to purchase local food into two broad categories,

- hedonistic factors (e.g., health, freshness, quality, taste, food safety, nutrition and price); and
- ethical factors (e.g., anti-globalisation, animal welfare, fair trade and environmental)

The relative importance of these factors can be assessed from the analysis of a survey of 1,300 consumers of local produce in England (Campaign to Protect Rural England, 2012). The hedonistic factors consumers supported include quality (54%), taste (41%), value for money (19%), seasonality (19%), and health reasons (12%). The ethical factors found to underpin the purchase of local food identified in the same survey included support local farmers and producers (56%), support the local economy (51%), reduce waste and packaging (15%); and to protect the local countryside (11%) and animal welfare (9%).

A Defra (2008) study found that consumers also link local produce to "nostalgia, wholesomeness, and a simpler, less stressful way of life" (p24). The study found that some, particularly urban consumers, purchased local produce in recognition that they had

> "lost touch with agriculture, and expressed a desire to reconnect themselves and their families with the provenance of their food" (Defra, 2008, p 32).

An example of changing consumers behaviour toward local food purchases motivated by a belief that their societal goals and values were being undermined by the industrial food system is provided by Adams and Salois (2010). These authors show how the introduction of a federal organic food standard across the USA undermined consumer trust in organic foods because it allowed large-scale corporate farmers to enter the organic market (p 331). Many who had purchased organic food because they associated it with "smaller farms, animal welfare, deep sustainability and community support" (Adams and Salois, 2010, p 331), switched away from "organic" to supporting "local" foods. The authors noted the broader implications of this shift for the food system at large. Because of trends such as these, local foods, in contrast to some of the mass produced but relatively anonymous products available through supermarkets, have been described as,

> 'keeping alive links to the recognisable places and landscapes where food is grown, raised or made… rooted in place and linked to real, meaningful landscapes' (Campaign to Protect Rural England, 2012, p 1)

Clearly many factors and associations underpin food choice. However, as long as local remains a contested term that "defies definition" (O'Neill, 2014, p 112) the reality is that "local" food will be produced under a range of different production systems across the UK. For example, in a case study from East Yorkshire, O'Neil (2014) found meat from highly intensive production systems was described and sold as "local".

However, pointing this out does not help address the barriers to creating a local brand, some of which are summarised in the Campaign to Protect Rural England (2012) study,

> 'In many locations local food was often not clearly defined or labelled leading to a perception of poor availability. Outlets too are unaware of the presence of suppliers. Businesses lack time

and other resources to market their products, and the range, choice and value of local food are not widely appreciated. Shoppers may not know which food is local and cannot make an informed choice' (p 44).

6.3 The network for and value of "local" food sales in the UK

The Campaign to Protect Rural England (2012) study estimated the network of local food producers in England to involve some 4,000 farm shops and 500 home-delivery box schemes. The study found that a large majority of the 220 food businesses interviewed were micro-businesses employing fewer than 10 people (69%), a quarter of which had a turnover less than £50,000 per annum, 28% were small- and only 3% were medium-sized businesses.

However, the study noted that the size of the network was responsive to market demand. For example, in 2000 there were 250 farmers' markets in the UK. By 2008 this had increased to 800, but by 2012 it has fallen to 500 following the recession. But by 2019, immediately prior to the Covid-19 pandemic, the number had grown to some 650 (Harris, 2020, Campaign to Protect Rural England, 2012). This responsiveness to the general economic prosperity of the country in general appears to be a key characteristic of the demand for locally produced and processed meat and meat products.

The Campaign to Protect Rural England (2012) estimated the total turnover of local food sales (defined as primarily of fresh, rather than processed, meat, fruit, vegetables and dairy with its main ingredients grown or produced within 30 miles of the point of purchase) sold through "independent outlets" at 19 surveyed locations to be £132m/yr. It also reported that "sales of local produce accounted for more than 25% of turnover for two-thirds of these outlets (148 out of 218) with a third selling very high levels of local food (75% or more by value)" (p 38). The study also cites a New Economics Foundation study that found that "income from organic box schemes generates about twice as much for the local economy as supermarkets" (NEF, 2002, p 38). However, perhaps because local meat is retailed through such a variety of outlets (farm shops, farmers markets, box schemes, butcher's shops and supermarkets) the study did not provide estimates of the value of local meat products.

It did however use the survey findings to estimate the value of "local food to be £2.7 billion/year across England". It estimated the local multiplier effect of this expenditure on the local economy to be £6.75 billion (p 38). It concluded that local food systems supported more than 103,000 jobs in England and estimated that spending in smaller independent local food outlets supported three times the number of jobs than national supermarket chains.

A study by ICF Consulting Services (2016) provided an estimate of the value of local food and drink in rural areas in England. Also defining local as produce purchased within 30 miles of the point of production, it estimated the market in 2013 to be worth £9.6 billion, and that £2.9 billion of this was sold in rural areas. The study also estimated total tourism expenditure on local food and drink to be £2.6 billion across England in the same year, and of this, £1.4 billion was spent in rural areas. Therefore, the ICF Consulting Services (2016) study found that tourist spending accounted for roughly 50% of local food and drink sales in rural areas. It concluded that local food and drink increases the attractiveness of rural destinations and helps to extend the tourism season. This encouraged greater tourism spend and in doing so benefits rural businesses and the rural economy.

The study found that national supermarkets and some regional chains also sold local produce, but they "do not stock a high percentage of local food – from 0-4% at most by turnover" (Campaign to Protect Rural England, 2012: p 5). An exception is Booths. A regional supermarket chain with 28 stores across North West England it sources at least 25% of all products, and 85% of its meat, from local or regional producers and processors (Campaign to Protect Rural England, 2012). Commanding retail space in supermarkets provides an additional strategy for expanding sales of local meats.

6.4 The impact of the coronavirus pandemic on consumption of local meat: current demand

Coronavirus disease (Covid-19, caused by the novel coronavirus SARS-CoV-2) was identified in December 2019 and declared a pandemic by the World Health Organisation (WHO) on 11th March 2020.

The regulations introduced to control the spread of Covid-19 across the UK created immediate and drastic changes in the structure of people's daily routines worldwide, including their shopping habits. For example many consumers started 'panic buying', which itself caused shortages (Martin-Neuninger and Ruby, 2020, Laato et al., 2020). 'Lockdown' restrictions prevented people from leaving their homes which forced consumers to change their purchasing behaviour. An example of shoppers switching from supermarkets to shopping locally is reported by Gladman (2020),

> "during the first 12 weeks of lockdown British shoppers spent an extra £45m at butchers' shops compared to the same period last year" (Gladman, 2020).

A summary of some of the key impacts of the regulations introduced to control the spread of Covid-19 across the UK on the red meat supply chain is presented in Table 6.1.

In 2018, only 3% of meat sold in the UK was retailed through independent butchers (AHDB, 2019d). The supermarket multiples sold 89.9% of pork and 90.7% of bacon by value in 2017, with butchers selling only 8.4% and 3% respectively (AHDB, 2020c: Table 11.2). By sourcing meat directly from dedicated UK abattoirs, supermarkets take additional control over guarantees made to their consumers about provenance and traceability – changes made in response to a growing demand from the public for greater assurances about the food they eat.

However, the supermarket supply chain is built on just-in-time manufacturing and delivery (Hobbs, 2020). In normal times, this continuous flow of products and low levels of stocks has proven its efficiency. But the early stages of the pandemic indicated that this model was vulnerable to the unexpected shocks. A summary of the short-term impacts of the pandemic on red meat supply chains is given in Table 6.1. Hobbs (2020) believes that local supply chains were less vulnerable to some of the disruption caused by Covid-19. For example, they do not typically involve cross-border trade or pass through the major choke points found in larger supermarket supply chains for meat and meat products. This has led Hobbs (2020) to hypothesis that consumer interest in local food markets will grow, at least in the short- to medium-term, post pandemic.

6.5 The impact of the coronavirus pandemic on small abattoirs

An important driver of changes in shopping habits was the enforced closure of restaurants, cafes, bars, schools, gyms and hotels. These are key markets for many smaller abattoirs, so meat intended for these outlets needed to be redirected. However, their exclusion from the multiple retailer supply chain prevented them supplying these outlets.

Early in the pandemic, all abattoir employees, vets and meat hygiene inspectors were designated key workers (Department for Education, 2020). However, as abattoir staff typically work side-by-side, the need to observe 2m social distancing guidelines slowed production and reduced throughput in some abattoirs, other totally or partially closed (Lindars, 2020).[17] In an overview of initial impacts, the British Meat Processing Association (2020) reported that,

> "10 small ones [abattoirs] have closed and 51 cutting plants (of which 38 are poultry) have also closed mainly due to the drop in demand from Food Service" (BMPA, 2020).

For a food distribution system built around just-in-time manufacturing and delivery, the sudden and unexpected spike in demand across key categories created short-run stockouts. Perry (2020) reported the impacts on smaller abattoirs. Some increased throughput, but others were forced to withdraw their private-kill services, often at short notice cancelling existing bookings because of a combination of,

- biosecurity concerns (closure restricted the number of people coming to the site),
- a shortage of labour (due to staff being ill or in isolation) and the need to observe social distancing, resulted in reduced throughput,

[17] The Technical Operational Director, British Meat Processors Association (bmpa).

- many small abattoirs sold to food businesses which had to close, and
- some abattoirs chose only to slaughter for their own retail or wholesale businesses (Perry, 2020).

Table 6.1 Summary of short-term impacts of coronavirus on the red meat supply chain (RMSC)

Impact on demand for red meat	Impact on supply of red meat
Consumers. Panic buying to obtain specific household food needs. Access to shops restricted, forcing change in shops used. Shop introduced rationing varies from shop to shop and with items. More efficient use of produce cooked and eaten at home. Availability of items varied from shop to shop. Fewer tourists (loss of their larger spending power). **At home group meals.** Change in red meat items purchased – increased demand for mince to stock freezers. Ban on family meetings reduced demand for larger joints. Ban on festive celebrations reduces demand for larger joints. **Out–of-home meals.** Closure of food service businesses reduced demand for higher value joints (e.g., steaks). **Purchasing power.** Reduced incomes as staff furloughed and laid off.	**Supplies to market.** Supplies tested by availability of people to work. Increased demand from supermarket outlets caused drawdown in warehouse stocks. **Closure of retail outlets.** Closure of food service businesses (cafes, hotels, schools, restaurants, gyms and pubs). **Haulage.** Lack of refrigeration containers to service increase in demand. Reduced imports, • borders closed, • haulage drivers reluctant to cross national borders in case they are unable to return hope. **Closure of markets and distribution centres.** Closure of livestock auction markets – in some cases only temporarily. Reduced sales on export markets caused market prices to fall. **Carcase balancing.** Change in demand for meat joints and cuts, and closure of markets caused problems for carcase balancing, sales of higher value meat as mince reduced carcase value. Closure of overseas tanneries reduced prices for skins and hides, which reduced carcase value. **Supply from farms.** The fall in carcase value, of sheep in particular, reduced the number of livestock brought forward for sale.

6.5.1 Impact of the coronavirus pandemic on abattoirs: findings from a survey

Data from a survey of 29 abattoir owners/managers and 300 red meat farmers provide insights into the immediate short-term impacts of the Covid-19 pandemic on these key actors in the local meat supply chain. Thirteen of the twenty-nine abattoirs which responded to the survey (46.4%) reported an increase in throughput compared to the February-May throughput in a typical year, and six (25%) reported no change.

Seven of the thirteen respondents who increase throughput said it had made a significant difference to the short-term viability of their business, but four stated that it had made no difference. One participant said it was too soon to say.

Further key findings from the survey of abattoirs are shown in Tables 6.2-6.4. These are

- Smaller abattoirs were more likely to have experienced an increase in throughput in the first four months off the pandemic (Table 6.2).
- All thirteen abattoirs that reported an increase in throughput offered a private kill service. However, only 44% of abattoirs offering a private kill service reported an increase in throughput (Table 6.3).
- Nine of the thirteen abattoirs businesses (69%) that reported an increase in throughput supplied their own retail outlets. However, this was only 56% of the abattoir businesses that supplied their own retail outlets (Table 6.4)

Clearly the immediate changes in throughput caused by Covid-19 varied. The survey shows that the smaller abattoirs are under most financial pressure, and the increase in throughput had provided at least some temporary relief from these financial pressures to some of these businesses. Nevertheless, many abattoirs that offered private kill services received no benefit. Supplying a retail business owned by the abattoir proved to be more important, although this in itself was no guarantee of increased throughput.

Table 6.2. Responses of abattoir owners/managers, by abattoir size, to the question: 'how has your abattoir throughput been affected by Covid-19 compared to a typical February-May period?' (N=28).

Change in throughput as a result of Covid-19	Number of LSUs slaughtered in a typical year					Total
	Up to 5k	5k to 30k	30k to 90k	above 90k	Unknown	
Increased	8	3	1	0	1	46.4% (13)
Decreased	2	3	1	1	0	25% (7)
Remained unchanged	5	2	1	0	0	28.6% (8)
% increased by size category	**53%**	**37%**	**33%**	**0%**	**100%**	**-**

Table 6.3. Responses of abattoir owners/managers, by whether they offer private kill services, to the question: 'how has your abattoir throughput been affected by Covid-19 compared to a typical February-May period?' (N=28).

Change in throughput as a result of Covid-19	Provide private kill service		Total
	Yes	No	
Increased	12	1	13
Decreased	7	0	7
Remained unchanged	8	0	8
Total	**27 (44%)**	**1 (100%)**	**28**

Table 6.4. Responses of abattoir owners/managers, by whether they have a retail outlet (e.g., butcher chop, online sales, box scheme), to the question: 'how has your abattoir throughput been affected by Covid-19 compared to a typical February-May period?' (N=28).

Change in throughput as a result of Covid-19	Have at least one retail outlet		Total
	Yes	No	
Increased	9	4	46% (13)
Decreased	3	4	25% (7)
Remained unchanged	4	4	29% (8)
Total	**56% (16)**	**33% (12)**	**100% (28)**

The increase in throughput reported by thirteen respondents provides evidence for the increased demand for local meat. Six said the supply of livestock to supply these additional sales was provided by additional stock brought forward from their existing farmer customers, four that the extra livestock were supplied by farmers new to their business. It is not known if these new customers had transferred from other abattoirs which had either closed or chosen to reduce throughput.

6.5.2 How can abattoir owners retain this additional business?

Respondents who reported an increase in throughput (46%) were asked what support they believed would most help them to retain this additional business. Three said it would be entirely up to the consumers, they either would or would not continue to support local businesses after the pandemic. However, three believed consumers needed to be made more aware of the benefits of local meat through, for example, marketing campaigns. One participant believed support should,

> 'Raise awareness of eating local meat, highlighting that meat procured and processed locally has minimal effect on global warming and a positive effect on local economy and dietary benefits' (between 1k and 5k, mixed species LSUs/year).

Another respondent believed that their abattoir needed support to continue to supply the additional customers, stating

> 'Grants for increasing our [abattoir] plant efficiency (between 5k – 30k, mixed species LSUs per year).

Three participants believed they will be able to retain this additional business without any specific additional assistance.

Seven (25%) respondents reported a *decrease* in abattoir throughput during the Covid-19 pandemic (Table 6.2). Although all these abattoirs offered private kill services (Table 6.3) they were less likely to retail their own meat (Table 6.4). The decrease in abattoir throughput had a significant adverse impact on the short-term viability of five of the seven abattoirs, one reported no adverse impacts, and said it was too soon to say.

Three respondents attributed the reduced demand to the closure of their customer's businesses (e.g. restaurants, pubs, cafés, hotels and gyms). Three attributed the decrease in throughput to a reduction in the number of farmers supplying livestock to their abattoir, and one to the reduction in the number of animals brought forward by existing farmer customers.

Responses to how they might recapture lost business were mixed. Three believed their trade would not recover until after Covid-19, one said it could not be recaptured and asked for compensation for their lost business, and one advocated an advertising campaign.

Eight (28.6%) respondents experienced no change in throughput during the first four months of the pandemic. One was unaffected because the abattoir was always closed in these months. Another commented that, although their throughput had not changed, the pandemic had opened new opportunities for their business,

> 'Previously the foodservice sector took most of our product, directly and indirectly. Supermarkets were out of reach. A surge in demand for the supermarkets opened doors to us previously closed. So, we started at a massive disadvantage and worked hard to turn this around.' (between 5k and 30k, cattle LSUs per year).

However, not all small abattoirs are able to supply local multiple retailers (such as Booths) as the majority do not currently comply with the retailer's quality assurance schemes and standards.

6.5.3 A proposed marketing initiative

A recommendation Kennard and Young (2018) made to support small abattoirs was the introduction of a low throughput stamp for abattoirs that exclusively supply local meat markets (Kennard and Young, 2018: p 34). In the past, an oval shaped stamp had been used on meat to allow it to be traded across the EU, whereas a square stamp restricted sale to the UK. Abattoirs on mainland Europe which sell all their produce within a restricted geographical area are currently allowed to apply the "de minimis" derogation to some regulatory requirements (EU Directive 853/2004/EC (European Commission, 2004: p 47)). This derogation had not been applied to UK abattoirs. The introduction of a similar derogation, marked by its unique stamp, which reduces the regulatory burden imposed on small abattoirs becomes under the control of the UK government now the UK is no longer a member of the EU. Clearly such a stamp could be used to communicate 'local' credence attributes of meat produced and supplied through the small-scale local businesses.

However, as discussed above, the immediate problem this might face would be to define the restricted geographical range, i.e. to define "local". A UK wide stamp could be used by abattoirs of all sizes. This problem may be eventually be addressed by using "smart tags". These are electronic markers which can provide consumers with the information they need to allow them to make their own decisions about what "local" means (Kaisa Vehmas Institute, 2020).[18]

Nationwide initiatives do not have universal support. However, managers can adapt existing examples (such as the Lakeland Herdwick PDO used by Airey's abattoir) to establish their own local brand. But to do so they would need advice and assistance to overcome their lack of time and to supply the expertise needed to develop such initiatives.

6.6 Immediate impact of coronavirus on farmers' businesses

The online survey of farmers in the UK was open between 14th April and 26th May 2020. This was after the UK government imposed national lockdown but before these measures had begun to be lifted, so the survey could only identify the most immediate impacts of the Covid-19 on farm business. Table 6.5 shows the responses received from 271 farmers (of which 168 had a private kill retail business).

Roughly a third of farmers in both private kill and commercial business supply chains (31.5% and 36.9% respectively) reported no immediate, short-term impacts of the pandemic. However, farmers in both supply chains (14.9% and 19.4% respectively) expressed concerns about possible longer-term impacts,

> 'None [impact] yet…. but if lockdown restrictions continue for much longer, it could have increasing impact with regards to accessing abattoir services & selling stock at market' (farmer of 7 mixed species LSUs per year).
>
> 'Currently very limited, but will have issues later in the year' (farmer of 5.75 mixed species LSUs per year).
>
> 'No great impact at the moment, but come late summer and autumn we have no idea what our markets could be like. Very uncertain' (farmer of 100 sheep LSUs per year).

[18] "Smart tags" are electronic markers, which can be simple barcode, that can be read by mobile phone. They can contain information about the production system and supply chain used to supply the product.

However, the majority of respondents had been affected by Covid-19. The nature of the impacts differed between supply chains.

Table 6.5. The percentage (number) of farmers to specify each impact in response to the question 'what have been the impacts of the coronavirus outbreak on your farm business?' (N=168 private kill retail (PKR) business, N=103 commercial business (CB) farmers).

Impact	Number and % of PKR farmers	Number and % of CB farmers
No impacts	31.5% (53)	36.9% (38)
Increased private kill retail (PKR) sales	27.4% (46)	1.9% (2)*
Closure of usual route to market (e.g., restaurants, farmers markets)	20.2% (34)	11.7% (12)
Uncertain of future impacts	14.9% (25)	19.4% (20)
Introduced additional services (e.g., home deliveries)	10.1% (17)	2.9% (3)
Experienced delivery and supply difficulties	8.9% (15)	8.7% (9)
Disruption of slaughter services	6.6% (11)	12.6% (13)
Reduced prices for livestock	5.4% (9)	31.1% (32)
Reduced human disturbances on their farm	3.6% (6)	1.9% (2)
Others, including increased human disturbances on their farm, loss of holiday let income, more time available to focus on farm, experienced practical difficulties related to social distancing and/or isolating at work, disrupted business cash flow, reduced staff availability resulted in increased workload and disrupted butcher services.	18.6 (31)	12.8 (13)

* Both commercial business (CB) farmers started their retail business after the lockdown.

Private kill retailers were more likely to experience an increase in demand for their produce (27.4%) but also a reduced demand (20.2%). Relatively few were adversely affected by disruptions to the slaughter service. The increase in private kill retail business was driven by increased consumer demand for their locally produced meat, as these statements demonstrate,

> **'**More interest in locally produced beef. My butcher has seen sales increase 300%' (farmer of 10 cattle LSUs per year).
>
> 'Positive as people shopping locally' (farmer of 140 mixed species LSUs per year).
>
> 'Increased interest in our products sold direct to customers' (farmer of 40 cattle LSUs per year).
>
> 'Very positive a huge increase in demand' (farmer of 7 cattle LSUs per year).
>
> 'New customers seeking local trusted organic food' (farmer of 75 mixed species LSUs per year).

A small number of private kill retail farmers experienced difficulties supplying the increase in demand because of limited or reduced slaughter capacity (6.6%) and butcher services (1.8%). For example,

> '(I experienced) massive increase in demand for our product but was unable to increase production due to lack of extra abattoir capacity' (farmer of 215 mixed species LSUs per year).
>
> 'We are getting lots of requests for meat boxes but the abattoir is unable to handle much capacity because they have staff who either have, or are caring for relatives, with C-19'. (27.5 mixed species LSUs per year).

Many private kill retailers (20.2%) reported that their usual markets, such as restaurants, farmers markets, and auction markets, had closed. However, almost half of the respondents affected in this way used alternative outlets to sell their produce (e.g., home deliveries). For example,

> '[I] have had to do direct deliveries instead of having the pop-up shop, so more work to sell what we need to' (farmer of 4.4 mixed species LSUs per year).
>
> 'Private catering events all stopped but were able to mitigate this with increased supply to farm shops offering high welfare locally produced meats' (farmer of 51 mixed-species LSUs per year).

Several farmers believed the changes they had been forced to make could become embedded in the longer-term, for example,

> '[It] made us want to be more independent and do more ourselves. Pushing us to sort our web presence out properly. Considering taking a government loan to invest into the business' (farmer of 70 mixed species LSUs per year).
>
> 'No markets = no sales. But has nudged us to look at online and build more local business with regular deliveries' (farmer of 9 mixed species LSUs per year).

Commercial business farmers also experienced a range of impacts, but on the whole were more affected by changes in the market prices for their livestock. One respondent stated that they experienced,

> 'a 20% price drop, £6,000 on the last 300 lambs'[19] (1k mixed species LSUs/year)

Two farmers responded to Covid-19 by setting up their own retail outlets.

6.7 The importance of definitions of "local" to existing private kill retail business.

The Campaign to Protect Rural England and ICF Consulting Services used 30 miles as the distance from point of production to point of sale in their estimates of the market size and value of local foods. The Defra (2008) survey suggested 50 miles better reflected consumer attitudes,

> "For local food and drink, geographical definitions generally suggest an association with the immediate vicinity, with 35% stating that they see it coming from within up to 20 miles; and following that, in terms of distance, a further 25% indicating that local is between 20 and 50 miles. Combining these, over 60% suggest that they see local food as coming from within 50 miles." (Defra 2008, p 154).

Both studies agree that distance is key to defining "local", but there remains the question of "how far?"

A separate Defra (2008) study suggested that the geographic area was important and should also be a consideration when defining local,

> "The only other significant response relates to the businesses interpreting local as being in the county that they are based." (Defra, 2008: p 154).

This section examines the implications of the distance and geographical definitions to (i) the number of private kill farmers and (ii) the number of livestock that would qualify as local by various mileage and geographical area definitions.

6.7.1 Distance from farm to abattoir: survey evidence for private kill farmers and livestock.

The farmer survey recorded the distance they transported livestock from their farm to the abattoir. This information is presented as a cumulative frequency curve in Figure 6.1. It shows that 62% of private kill farmers transported livestock less than 30 miles to the abattoir, and 90% less than 50 miles. Therefore, the majority of private kill farmers would comply with both the 30- and 50-mile definitions of "local".

[19] Average UK lamb prices were unseasonably high at the start of lockdown. The fall in lamb prices during the early months of lockdown brought prices more into line with typical seasonal average prices.

Figure 6.1. Cumulative distribution of farmers (%) by distance livestock travel from farm to abattoir.

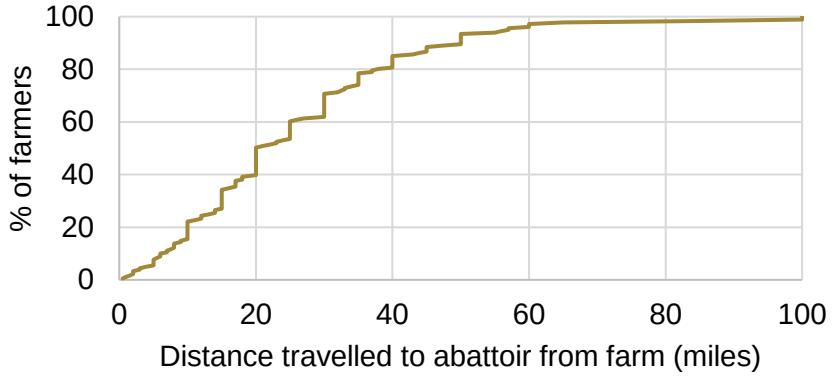
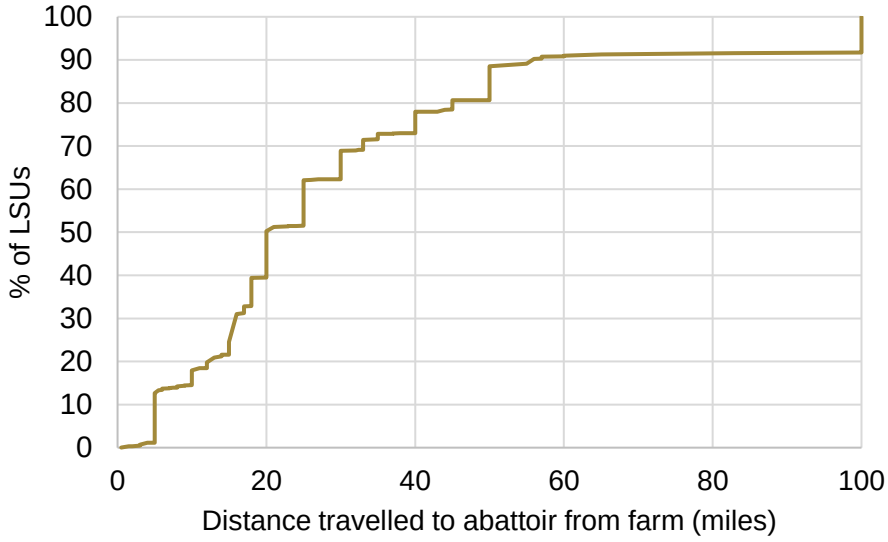


Figure 6.2 shows that also 62% of livestock used in the private kill retail trade travelled less than 30 miles, and 81% travels less than 50 miles. Therefore, the majority of livestock sold through private kill retail businesses also comply with both of these definitions of "local".

Figure 6.2. Cumulative distribution of livestock units (LSUs) (%) by distance travelled by livestock from farm to abattoir.



6.7.2 Geographical definitions of "local"

The majority of red meat sold through private kill retail businesses is slaughtered within 30 miles of the farm. However, Figure 6.3 shows the areas in the UK which are not within 30 miles of an abattoir which offers private kill services. It shows the location of the 147 abattoirs which offered a private kill service in August 2020. And the area covered by these abattoirs assuming livestock was transported no further than 30 miles. Table 6.6 summarises the area of the UK covered by this network. It shows that 18% of the UK land area is further than 30 miles from an abattoir that offers private kill services. As abattoirs close, more farmers will be placed in this position, though clearly how many more will depend on which abattoirs close.

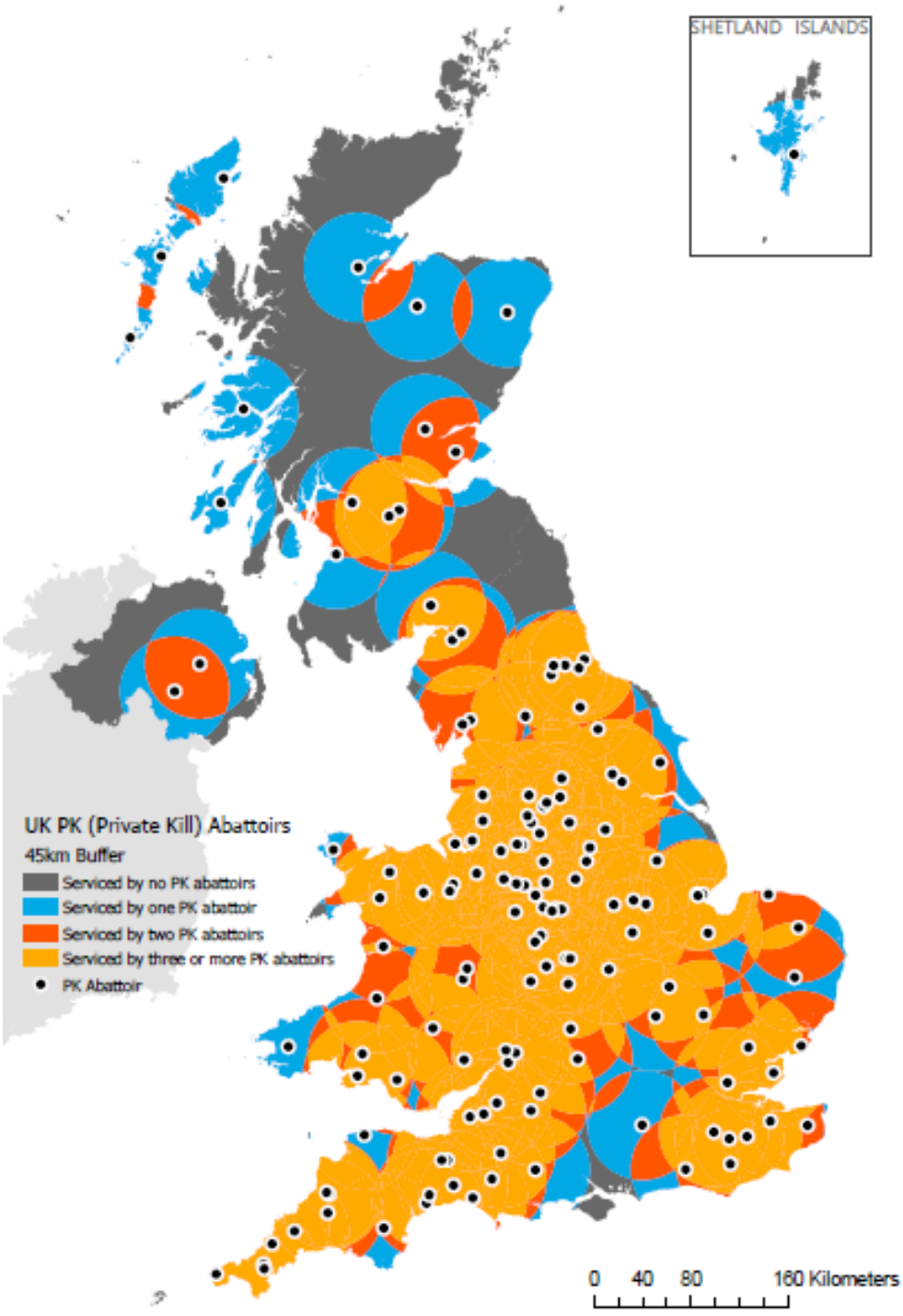
Table 6.6. The area (km^2) and percentage of the UK without private kill abattoir provision and covered by one, two and 3 or more abattoirs (assuming a catchment area of 27 miles (45 km)).

Number of private kill abattoirs in area shown in column 2	Area (km^2)	% of area serviced by number of abattoirs shown in column 1
0	44,510	18.22%
1	50,989	20.88%
2	33,809	13.84%
3 or more	11,4917	47.05%
Total	**24,4226**	**100%**

Table 6.6. The area (km^2) and percentage of the UK without private kill abattoir provision and covered by one, two and 3 or more abattoirs (assuming a catchment area of 27 miles (45 km)).

Number of private kill abattoirs in area shown in column 2	Area (km^2)	% of area serviced by number of abattoirs shown in column 1
0	44,510	18.22%
1	50,989	20.88%
2	33,809	13.84%
3 or more	11,4917	47.05%
Total	**24,4226**	**100%**

Figure 6.3. The locations of the 147 abattoirs offering private kill services in the UK in August 2020 with 27 miles (45 km) buffers (map created by Jess Hepburn).



The areas further than 30 miles from private kill provision include parts of Hampshire, the Northumberland, East Anglia, South West Scotland, and west Wales. In addition, there is no private kill provision for farmers in Northumbria and Hampshire. And there is no abattoir on the Scilly Isles, the Isle of Wight or on Orkney. Therefore, if a definition of local was based on "the county that the produce was produced and processed" the proportion of farmers able to benefit from a "local" brand would be reduced.

6.8. The robustness of the network of private kill provision in the UK: proof of concept

The robustness of the existing private kill network can be examined by identifying the impacts of further abattoir closures on the existing provision. However, the data required to identify the abattoirs most likely to close is not available. Therefore, as a proof of concept, the analysis is based on assuming the existing rate of closure of abattoirs offering private kill services over the last 18 months continues for the next 18 and 36 months. Thirteen abattoirs closed in the 20 months between January 2019 and August 2020, or 9% of private kill abattoirs.

However, it is not possible to identify which existing abattoirs are most likely to close. Therefore, 9% and 18% of abattoirs were selected at random and the area of the UK without private kill provision calculated (assuming a 30-mile catchment area). This exercise was done seven times to remove 9% and 18% to create fourteen unique datasets: seven with 134 abattoirs, and seven with 121 abattoirs.

The geographical area without abattoir coverage, and that covered by one, two and three and more abattoirs was calculated for each data set, and these areas were averaged for each of the seven datasets. The results are presented in Table 6.7. Although the overall average change in the area without abattoir coverage is modest (Table 6.8), there is a large range in the area covered depending on the abattoirs removed from the existing 147 working abattoirs.

Table 6.7. The average, minimum and maximum coverage of the seven datasets with 9% of private kill abattoirs removed, and the seven datasets with 18% of private kill abattoirs removed.

% of abattoirs randomly removed (number)	Number of abattoirs within 27 miles (45km)	Km coverage			% coverage		
		Average	Minimum	Maximum	Average	Minimum	Maximum
9% (13)	0	50,239	45,402	56,309	20.6%	18.6%	23.1%
	1	51,808	48,235	57,591	21.2%	19.8%	23.6%
	2	37,571	34,869	40,377	15.4%	14.3%	16.5%
	3 or more	104,609	101,312	109,550	42.8%	41.5%	44.9%
	Total	**244,226**			**100%**		
18% (26)	0	59,151	49,797	78,991	24.2%	20.4%	32.3%
	1	51,337	37,686	61,499	21.0%	15.4%	25.2%
	2	37,832	28,934	44,790	15.5%	11.8%	18.3%
	3 or more	95,9076	90,034	99,314	39.3%	36.9%	40.7%
	Total	**244,226**			**100%**		

Table 6.8. Simulated change in the geographical area covered following closure of 9% and 18% of abattoirs offering a private kill service.

		Number of abattoirs within 27 miles (45km)			
		0	1	2	3 or more
% coverage	Baseline (147)	18.2	20.9	13.8	47.1
	Loss of 9% of abattoirs (134)	20.6	21.2	15.4	42.8
	Loss of 18% of abattoirs (121)	24.2	21.0	15.5	39.3
	Further closure of 13 abattoirs (134)	**2.3**	**0.3**	**1.5**	**-4.2**

Absolute change in coverage	**Further closure of 26 abattoirs (121)**	**6.0**	**0.1**	**1.6**	**-7.8**

These results show the potential of this approach to examining the robustness of private kill provision across the UK. However, closure of abattoirs will have a greater impact than the number of farmers and livestock that might be defined as local. It will also reduce the range of butchering services available, reduce emergency kill provision, lower inter-abattoir price- competition. Moreover, the farmer survey shows that a proportion of farmers would not use the alternative abattoirs should the one they currently use close.

6.8 Conclusions

The literature confirms that consumers do make links between 'local' food and various positive credence attributes, such as higher standards of freshness, quality, taste, food safety, animal welfare, and perceive it as more environmentally friendly.

However, there is disagreement as to what constitutes "local". Surveys reveal that producers and consumers generally consider local food to be food produced and sold within a given distance from the point of production, one study suggests 30 miles, another 50 miles. Another study argues that consumers view local food as being from a similar geographical area to where it is sold. However, studies show that consumers disagree how far the distance should be or which geographical boundaries to use. Using 30 miles as the definition of local, a survey estimated the market value of "local" foods in England to be worth £2.7 billion/year. (Campaign to Protect Rural England, 2012). Another survey using the same measure for local shows the local food market is particularly important for rural economies and for the wider tourist sector (ICF Consulting Services, 2016).

Responses to the farmer survey show that the majority of farmers and livestock sold through private kill retail businesses are produced within 30 miles of the place of slaughter.

Survey data covering the first four months of the Covid-19 pandemic shows many abattoirs experienced an increase in demand for local meat when regulations caused consumers to change their shopping habits. However, impacts varied depending largely on the supply of livestock, the outlets served by the abattoir and farmer-retailers, and on the availability of staff. Abattoir managers differed in their view as to whether and how this additional business could be retained after the pandemic is controlled. Some believe it was not possible to influence consumers to continue their new shopping habits and routines. But there was some, though not universal, support for an advertising campaign to support local produce, produced by local businesses in the local economy.

Current regulations require all abattoirs to stamp each carcase with the abattoir's unique licence number. Kennard and Young (2018) suggested low-throughput abattoirs which exclusively supply local meat markets be permitted to use a different shaped stamp to differentiate meat sold into the local supply chain. Having left the European Union, the UK may have more scope to apply this approach, permitted within the EU using the "de minimis" derogation applied to meat sold within a restrictive geographical area (EU Directive 853/2004/EC (European Commission, 2004: p 47)), to meat from abattoirs that only supply UK markets. If so, this may be the catalyst for developing new markets within the UK, including forging closer links with multiple retailers.

An approach based on the random removal of abattoirs from the underlying population is used to examine the future size and shape of private kill provision across the UK. The method used successfully does this. However, for it to be useful for policy purposes the abattoirs most likely to cease trading need to be identified. This would require additional financial information, so its successful application would require the cooperation of the majority of abattoirs that offer private kill services across the UK.

Chapter 7. Conclusions

This economic analysis of abattoirs has used statistical data, telephone and face-to-face interviews, reviews of relevant literature and online searches, and online surveys of farmers and abattoir managers to produce evidence of the economic and environmental benefits of abattoirs to the standard acceptable to funding bodies.

The findings show that the network of small abattoirs forms an essential part of the infrastructure needed to enable a diverse livestock sector to thrive. The distinctive contribution of the small abattoir network is to supply the low-volume red meat supply chain. Small abattoirs provide the private kill services that enable farm businesses to locally add value to their livestock enterprises by retailing meat from livestock finished on their farm. By promoting and sourcing food produced and retailed locally, the small abattoir network supports the local economy and underpins the rural and wider tourist sectors.

Therefore, small abattoirs provide the infrastructure essential to enable livestock farmers to increase market revenues. But livestock farming also provides a number of public goods and benefits, including, for example, the conservation of genetic resources, species biodiversity, habitat management and iconoclastic, traditional, highly valued, rural distinctiveness. Future farm support payments will be linked to the ability of farmers to produce public goods, so shrinkage in private kill provision will reduce the number and range of public goods livestock farmers can produce.

The network of smaller abattoirs reduced the distance livestock have to travel from farm to slaughter, which reduces the risk of farm animal welfare being compromised because they avoid longer, more complex journeys. It therefore follows that the continuing shrinkage of the small abattoir network threatens the provision of these economic, environmental and animal welfare benefits. In the 18 months from January 2019, 13 small abattoirs, all of which provided private kill services, have closed.

The survey findings quantify some of the key economic, environmental and animal welfare consequences that will result from the closure of small abattoirs. The reduction in the private kill services these businesses provide will;

- increase the risk to animal welfare by increasing journey distances from farm to slaughter;
- threaten the viability of farming businesses which will no longer be able to add value by providing local food, produced by local businesses;
- reduce the number rare breed livestock and rare breed species farmers will stock; and
- lead to changes in land use that will reduce the capacity of land to sequestrate carbon.

Small abattoirs are the fulcrum of the low-volume red meat supply chain which operates separately from and in parallel to the high-volume red meat supply chain. The study found significant barriers that prevent abattoirs supplying both supply chains. A key lesson learnt from managing the corona pandemic is the importance role diversity plays in ensuring robust and resilient food chains. The release of statutory financial support to support a nationwide network of small abattoirs and the private kill services they provide will help to maintain the diversity essential for providing buffers against future shocks.

Figure 1.1 in Chapter 1 shows the location of the 213 abattoirs working in the UK in August 2020. The Chapter summarizes the variability between abattoir businesses in terms of their; business form, size, principal markets, integration into the supply chain and location - with respect, for example, to each other, where livestock are finished, and the border with the Republic of Ireland.

Chapter 2 reviews the two countervailing economic forces, economies of scale and economies of scope, that have combined to create the present structure and distribution of abattoir businesses across the UK. The trends confirm the continuing dominance of economies of scale over economies of scope, a trend identified in a FWAC report published in 1983. That report warned of three possible adverse consequences of the increase in size, geographic concentration and redistribution of slaughter capacity,

- an increase in the length and complexity of livestock journeys from farm to market or abattoir;
- an associated increase in the risk to animal welfare; and
- the dangers to the continuing provision of local and specialist foods produced and supplied by local businesses.

The study shows the increase in size, specialization and closure of abattoirs has continued since the 1983 study was published, with the consequential increase in the risk that each of these outcomes has occurred.

The telephone survey of 28 abattoir managers summarized in Chapter 3 shows how the operational, management and business structure of large and small abattoirs differ as each has increasingly specialized to serve separate red meat supply chains. Small abattoirs have specialized in providing private kill services to farmers, and some continue to supply their own retail outlets. The largest abattoirs have specialized into supplying meat and meat products to order, under contract to specific multiple retailers and/or export markets.

The responses presented in Chapter 3 provide details of the price pressures managers of small abattoirs face, and of the cost management problems they face, for example high animal by-produce waste charges, and managing Food Chain Information paperwork and FSA charges. It also provides evidence that the cost of complying with regulations absorbs capital that managers need to invest on equipment and infrastructure to allow the abattoir to remain in business. The responses to the telephone survey are used to help design the online survey of abattoirs reported in Chapter 5.

The evidence from the farmer survey presented in Chapter 4 shows that the majority of farmers believe there is a lack of choice in the existing abattoir network and this allows abattoirs to dictate terms and conditions. They also believe the existing network fails to provide price-competition and the range of butchering services they require. Moreover, the findings show that the existing provision of private kill services fails to meet latent demand from farmers who currently use abattoirs for commercial business but who were either “extremely” or “very interested” in diversifying to retail their own red meat in the future. A principal barrier these farmers face is access to private kill services. These responses provide evidence that the existing network of private kill provision fails to meet farmers’ existing needs.

Chapter 4 also provides quantifiable evidence of the impacts of the closure of small abattoirs on farm businesses, farming system and animal welfare, and the knock-on impacts this would have on the provision of public goods from land.

It shows the complex ways in which farmers select and use abattoirs for their private kill retail, home consumption, and commercial business: 29.2% of respondents used more than one abattoir, with 245 of 300 farmers using private kill services for private kill retail and/or home consumption, and 185 (62%) for private kill services for retail. Respondents said animal welfare standards (73.5%) and closeness to the farm (70.3%) were the most important determinants of the abattoir they select for their private kill retail business. Closeness to the abattoir allowed the majority of private kill retailer farmers (91.9%, n=170) to transport their finished livestock to the abattoir themselves, in a farm vehicle. In doing so they visit the abattoir an average of 13 times each year, which provides additional oversight of the abattoir’s practices and procedures.

75 of the 185 private kill retail farmers (41.2%) said there was no alternative abattoir they would be prepared to use if the one they currently used closed. 21 of these (28%) said that if this happened, they would be forced to close their retail business: these farmers sold an average of 36.7 LSU through their private kill retail business each year.

An immediate result of the closure of the abattoir farmers currently used would be an increase in average journeys time for livestock from 27 to 38 miles. Other changes farmers would be forced to make would include: reducing the area of grassland farmed, reducing the number of livestock finished on the farm (58%), and reducing the size of their breeding herd/flock (62%). 30% would change the breed of livestock farmed. As the majority of private kill retailer farmers (76.2%, n=141) finish and sell

rare and/or heritage breeds of cattle, sheep and/or pigs, this would adversely affect the conservation of genetic resources, and the provision of species and habitat biodiversity.

Chapter 5 presents the findings of a survey designed to assess the economic viability of smaller abattoirs across the UK. There is tentative evidence that abattoirs need a throughput of 10,000 LSU/year to break even, and over 22,000 LSU/year to be consistently profitable. However, there is a wide range around these numbers. Responses show that it has proved increasingly difficult for smaller abattoirs to justify continuing to slaughter pigs, provide an emergency slaughter service, and to retain the capacity to slaughter rare and heritage breeds.

Five strategies for improving the profitability of abattoir businesses were considered. However, the variability between abattoir businesses make identifying generic prescriptions difficult. In general, the majority of abattoirs

- had some surplus slaughtering capacity, which if it could be used could generate additional economies of scale,
- actively managed the abattoir to reduce FSA costs, and
- would benefit from more competition between animal by-product waste removal firms.

However, extending slaughtering services and utilizing existing surplus capacity required additional investment in, for example, specialist slaughter equipment, fridges, freezers and skills training. A lack of capital and widespread concerns about the direction of future agricultural policy have held back investment in these essential investments. The combination of lack of investment and overcapacity in the sector suggests there will be further rationalization among small abattoir businesses in the near future, despite thirteen having closed in the 20 months to August 2020.

Unconditional government grants were the most popular means of government support to enable these investments to take place, which perhaps reflects the difficulties some managers reported in securing the multiple tenders typically necessary to release government funding.

Some managers expressed interest in collectively developing a brand that would allow their meat to be differentiated as “local”. This would help consumers to make more informed purchasing decisions which reflect their support for local produce, supplied by local businesses, and which reflect their animal welfare preferences. The UK government may have more scope to apply the “de minimis” derogation to meat sold within a restrictive geographical area - which is currently allowed for abattoirs in Europe under EU Directive 853/2004/EC (European Commission, 2004: p 47) but which has never been applied to abattoirs in the UK. However, there are examples which individual abattoirs could adapt to develop their own “local” meat brand.

There was little widespread interest in developing additional co-operative activities, though there was local interest in working with deer management organisations; jointly developing UK sheep export markets; and working with local schools, butchers, farmer groups and care homes. One respondent saw possible value in creating a group to collectively purchase inputs.

Chapter 6 reviews the evidence of consumers’ attitudes toward the so-called “credence” attributes linked to small abattoirs which may affect their willingness to pay a premium for meat associated with local slaughter. A literature review provides survey evidence that confirms consumers do make links between ‘local’ food and various positive credence attributes, such as higher standards of freshness, quality, taste, food safety, animal welfare, and perceive it as more environmentally friendly. There was no indication of how this might affect their willingness to pay for these locally-produced products.

There was disagreement in the literature over what constitutes “local”. Survey evidence reveals that producers and consumer generally agree that “local food” is food produced and sold within a given distance from the point of production, or from a similar geographical area to where it is sold. But they disagree about how far the distance should be or which geographical boundaries to use. For example, one study suggests 30 miles, another 50 miles. A study that used 30 miles as the definition of “local” estimated the market to for local food to be valued at £2.7 billion/year. Another survey shows this

market is particularly important for rural economies and for the wider tourist sector. Data from the farmer survey show that the majority of private kill retail farmers farm within 30 miles of the abattoir, and the majority of the livestock sold through private kill retail businesses travel less than 30 miles to the place of slaughter.

Appendix 1 summarises the various grants and support available that abattoirs might be able to use to support their long-term sustainability. It is intended to be a starting point for abattoirs looking for ideas and advice regarding how their business can be supported by external organisations. However, with the UK leaving the UK several schemes, such as the Scottish Government's Food Processing, Marketing and Co-operation (FPMC) awards, which has provided funding for several abattoirs, including £4 m to allow Scotbeef Inverurie Ltd to construct a state-of-the-art abattoir, have closed. It is intended the European Regional grants will be replaced by a UK Shared Prosperity Fund, but details of this are awaited. The FPMC grants were criticized for not being accessible to small businesses, a problem that will need to be safeguarded against in the UK Shared Prosperity Fund.

Appendix 2 provides eight case studies which examine new ways of working. They include; an introduction to "agriculture of the Middle"; developing innovative markets, such as the use of animal waste byproducts to feed insects and developing traceability for hides used in the UK leather industry; and descriptions of the many ways farmers and conservation graziers organize their private kill retail business. It also presents an overview of how an individual abattoir has used the EU PDO marque to develop a "local" brand based on locally produced and slaughtered Lakeland Herdwick sheep. The UK has agreed to continue the PDO marque, albeit in a slightly altered form. It also provides a brief review of the working arrangements and government support provided to subsidizing small abattoirs on the Channel Islands of Guernsey, Jersey and Alderney. A case study which presents the findings of a feasibility study into building an abattoir on the Isles of Scilly shows government support will be essential for this project to go ahead.

The key conclusions and recommendations of the study are presented in the introduction to the study.

The key recommendations identify the joint working activities agricultural sector bodies (for example, AHDB, NFU, Natural England and National Parks, statutory bodies (e.g., LEPs)) could participate in which would help support and extend the provision of private kill services across the UK. There are several stakeholder groups which have successfully raised the profile of small abattoirs and the difficulties they face. But these are underfunded and essentially run on a part-time basis. The study recommends establishing a fully financed Small Abattoir Advisory Group with a remit to work with these agricultural sector bodies to, *inter alia*:

- jointly present the case for government support for small abattoirs (encapsulated in this study) to statutory funding to help release finances to help safeguard the provision of private kill services across the UK,
- to provide bespoke advice to individual abattoir businesses to help them address their individual concerns,
- to organize collective activities within the small abattoir sector. These activities could include developing collective "local" meat brands, and working with individual abattoirs to create their own "local" meat brand, organizing joint tendering for animal by-product waste removal, and other activities – such as joint purchase of inputs - that allow small abattoirs to benefit from economies of scale,
- Interact with government research councils and other awarding bodies to influence their research priorities, and with universities to provide industry-partners (often a requirement of research tenders) to jointly tender for research calls that may benefit small abattoirs,
- to explore market mechanisms to support and increase the value of hides and fleeces, and
- to help establish traceability system for hides and fleeces, for example, by helping develop "smart labels".

The study found examples of larger abattoirs (with a throughput between 30k and 90k LSU/year) which are organized and managed to provide private kill services. It is therefore theoretically possible for a smaller number of large throughput abattoirs to replace the private kill slaughter capacity that lost by the continued closure of smaller abattoirs. However, besides the closure of the vast majority of smaller abattoirs this would imply, such a business structure would

- reduce the type and range of butchering services offered,
- reduce price-competition between abattoirs,
- result in the closure of many farm-based retail enterprises, and
- further limit the number of farmers able to add value to their farm produce close to the source of its production.

It would also have adverse impacts on the provision of public goods from farming and land. For example, it would

- reduce emergency slaughter provision,
- reduce animal welfare standards by requiring livestock to
    - endure longer more complex journeys,
    - be transported in large-scale commercial transporters (rather than in farm vehicles), and therefore
    - be mixed with stock from other farms,
- reduce the provision of the environmental goods from land, including
    - carbon sequestration,
    - conservation of genetic diversity and species biodiversity,
    - reduce the use of conservation grazing, which would limit habitat management options and therefore reduce habitat diversity,
    - reduce the use of multi-species livestock farming systems, and
    - adversely affect the distinctiveness of rural landscapes.

A reduction in the provision of private kill services will therefore adversely affect the viability of many farm businesses by reducing local added value, changing landscape character and reducing regional distinctiveness. These changes would restrict economic growth in rural economies and have adverse impacts on the rural and wider tourist sectors. It would also reduce the capacity of the small-volume red meat supply chain. The consequence loss of resilience in the red meat supply chains would remove an important buffer against future shocks.

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