

THE ROLE OF SMALL ABATTOIRS IN THE DELIVERY OF THE UK'S NEW AGRICULTURE POLICY.

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Small abattoirs specialize in selling slaughter and butchery services to private kill retailer (PKR) farmers who supply them with livestock but who remain owners of the carcass, meat and offal, which they sell through their own retail outlets. A survey showed 41% of PKR farmers had no alternative provider if the abattoir they currently use closed - 52% had only one viable alternative provider. This shows that the "private kill" trade is threatened by the further closure of small abattoirs across the UK. Respondents reported their PKR enterprise to be "essential" or "very important" to 65% of PKR farmers, so further closures will result in farm business failures. Among the consequences reported by PKR farmer are (i) reduced sales of locally reared and slaughtered livestock and retailed meat, thus (ii) adversely affecting the size of the rural economy, (iii) significantly increase livestock journeys, (iv) a reduction in the rearing of native livestock species - with a corresponding loss of genetic diversity and habitat conservation grazing options, and (v), in part due to a loss of landscape and regional diversity, an adverse impact on rural tourism. Government could support small abattoirs by removing inspection requirements, using targeted grants for building and equipment, clarifying confusing food labelling, and by creating a food marque to differentiate private kill retailed meat (and meat-produce).

(Key words: abattoirs, private kill, slaughter, public goods, public money, government policy)

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1 Introduction: UK agriculture policy in transition

Between 1970 and 2000 the number of licensed red meat abattoirs in Great Britain reduced from 1,146 to 404 (FAWC, 2003).³ Over the same period, the number in England fell from 977 to 316 (68%), in Scotland from 90 to 44 (50%) and in Wales from 79 to 34 (57%) (data for Northern Ireland are not available). From 2001 to 2017 the number of small- and medium-sized abattoirs in England, Scotland and Wales (i.e. those with throughput less than 5k LSU/year⁴ and between 5k and 30k LSU/year respectively) has fallen, while the number of larger abattoirs (with a throughput above 30k LSU/year) has increased (APGAW, 2020: their Figure 1, p. 11). In the 18 months to August 2020 a further thirteen smaller abattoirs ceased trading, leaving some 213 working across the UK (Figure 1).

The low profitability of smaller abattoirs is attributed to a combination of excessive paperwork and inspections (which increase costs including on occasions abattoir downtime), difficulties recruiting and retaining staff, and the collapse of the market for hides and skins (Kennard and Young, 2018). An All-Parliamentary Group on Animal Welfare (APGAW, 2020) agreed that small abattoirs are disproportionately affected by high overhead costs (p 2), including higher equipment and training costs, with high animal waste disposal costs and the loss of revenue from hides and skins. Franks and Peden (2021) summarize the economic pressures as the dominance of economies of scale (the reduction in unit costs as throughput increases) over economies of scope (the ability to use the same buildings, equipment and skills in multiple species slaughtering and butchering activities).

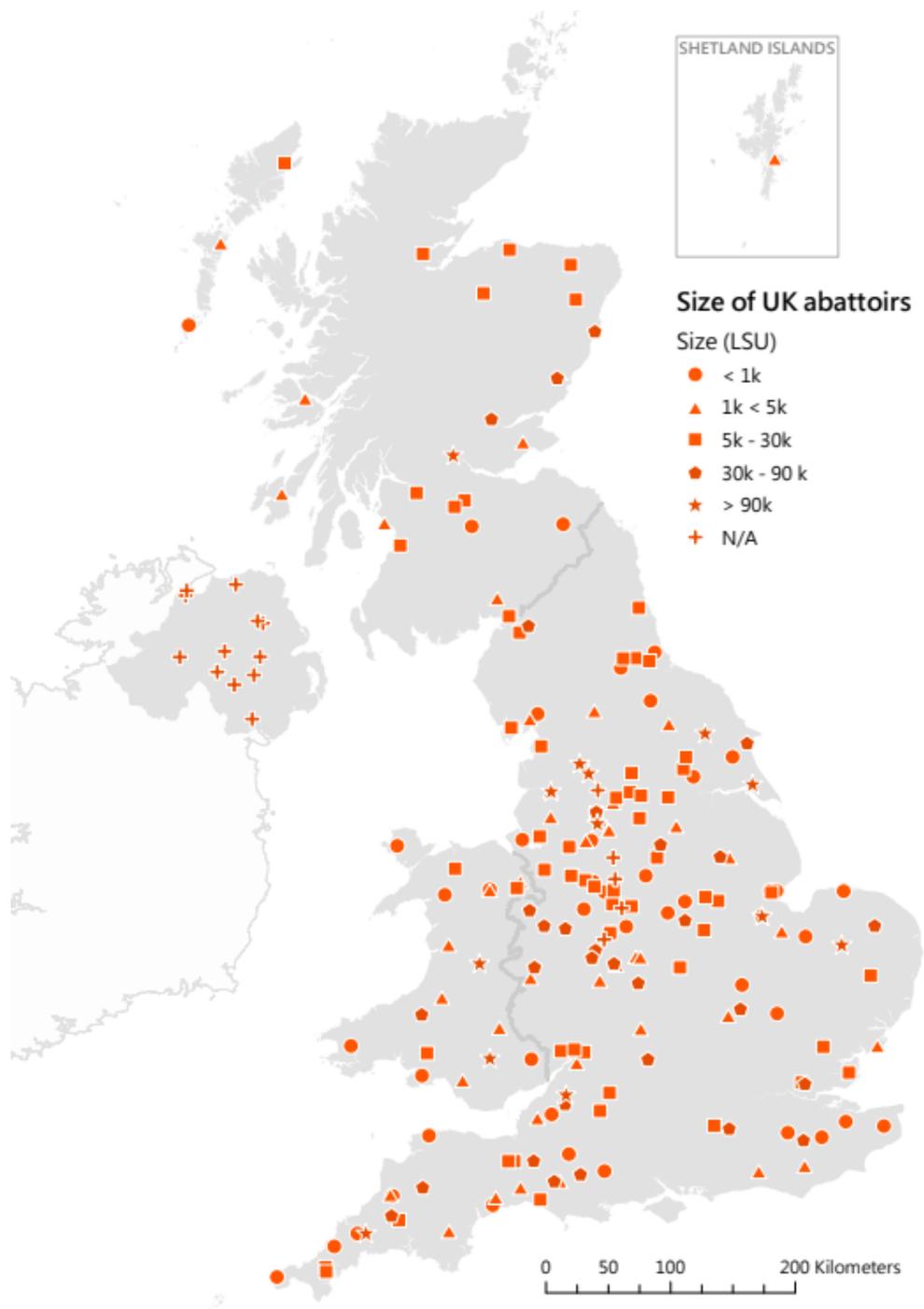
Smaller-abattoirs increasingly specialize in private kill trade which services the local meat markets (APGAW, 2020: p 1). Private kill is the term given to the provision of slaughtering and butchering services to the farmers who supply the abattoir with its raw material, livestock, but who retain ownership of the carcass, meat and offals (but not the hide) which they retrieve from the abattoir and sell through their own and other, overwhelmingly local, retail outlets.

This study examines the importance of these private kill abattoirs for supporting public goods from farmland. Public goods are characterised as non-excludable and mutual in consumption, such as animal welfare, rare gene pools, biodiversity, landscape character, and clean water and air. The move towards using “public money for public goods” is a primary objective of the UK’s new, post Brexit, agriculture policy (Defra, 2020a). The principal aim of this study is to quantify the impacts of the further closure of small abattoirs on the public goods produced by private kill retail (PKR) farmers.

³ FAWC is now known as the Animal Welfare Committee.

⁴ 1 Livestock unit = 1 cattle, or 5 sheep, or 2 pigs, or 5 goats or 3 deer.

Figure 1. The location and size (measured by throughput in Livestock Units (LSU)) of abattoirs working in the UK in August 2020. (GIS graphic provided by Jess Hepburn).



2 Survey methodology and descriptive statistics

2.1 Survey design and methodology

An online survey asked farmers who finished livestock in the UK how they selected and used abattoirs, and the impacts a further reduction of private kill services on their farming business and livestock enterprises. A total of 21 organizations agreed to share the survey URL via their newsletters, social media streams and mailing lists. This allowed the survey to be widely distributed to the targeted group of UK livestock farmers. The survey received 300 responses, of which 185 were from farmers with private kill retail enterprises (Table 1). Further details of the methodology can be found in Franks and Peden (2021).

Table 1. Survey respondents' use of abattoirs (Number of farmer responses (N)=300).

Response	Percentage (number)
For commercial business (CB) only*	19.7% (n=59)
For commercial business (CB) and for home consumption (HC)	18.7% (n=56)
For private kill retail only (PKR)	8.7% (n=26)
For private kill retail (PKR) and for home consumption (HC)	26.7% (n=80)
For private kill retail (PKR) and for commercial business (CB)	6.0% (n=18)
For commercial business (CB), home consumption (HC) and for private kill retail (PKR)	20.3% (n=61)

*. We recognize PKR is also a commercial enterprise, but Commercial Businesses (CB) is the name used to differentiate PKR farmers from farmers who sell their livestock to the abattoir.

3 Survey findings – impacts on farm livestock enterprise and business viability

3.1 Impacts of closure of PKR business on the viability of the farm business.

Figure 2 show that the abattoir used for PKR was “essential” for 44.9% (who sold an average of 88% of their annual production through their PKR business) and “very important” for 20.5% (who sold an average of 51% of their annual production through their PKR business).

Figure 2. Responses to the question: ‘How important is the private kill retail business to the viability of your farm?’ (N=185).

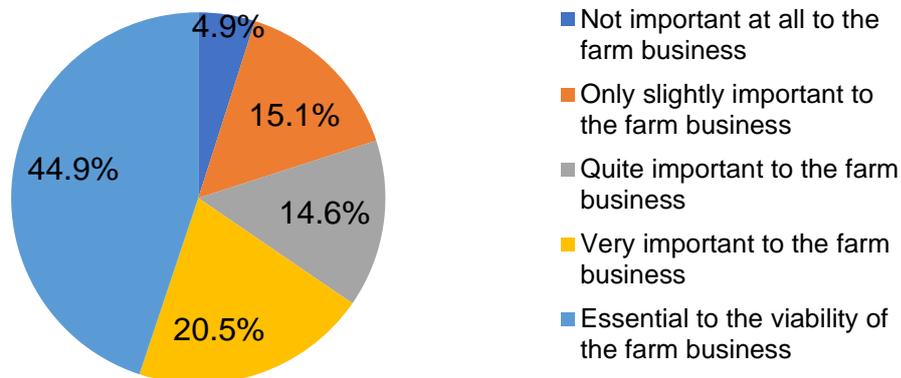


Table 2 provides examples of the value PKR can add to livestock enterprises.

3.2 Impacts of the closure of abattoirs on the viability of the private kill retail (PKR) enterprises

The survey found that 41% (75) of PKR farmers had no suitable alternative, 52% (96) had one viable alternative, while 6% (11) would use two or more (Figure 3). Twenty-one of the 75 PKR farmers (28%) who had no commercially viable alternative abattoir said closure of the abattoir they currently use would mean closing their PKR business. The level of uncertainty reported in Figure 3 reflects the difficulties such a hypothetical question raises. For example, an organic grower who PKR 230 LSUs/year,

‘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 [organic slaughter] licence?’.

Figure 3. Responses to the question: 'What would be the impact on your PKR business if the abattoir you currently use for private kill closed?' (Question asked to PKR farmers with no alternative abattoir (N=74)).

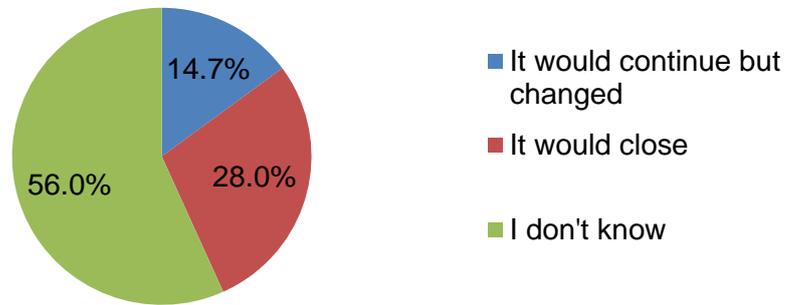


Table 2. Details of mark-up achieved through by PKR businesses.

Number head sold/yr.	Livestock species and breed	Farmer reported route to market	(Farmer's) estimate of the market value/head before costs (£)	(Farmer's) estimate of the retail value/head before costs (£)	(Farmer's) estimate of the "mark-up"/head (retail value less market value) less indicated costs (£)
4	Lincoln Red	Box scheme	1,200	2,800	After all costs = £1,060
350	Texel x Romney/Lleyn	Retail business	100	170	Before retail costs = £34
350	Texel sheep	Farm shop	105	200	After all costs = £56.50
18	Oxford Sandy and Black pigs	Farm shop	145*	844	Before retail costs = £183
3	Cattle: Angus cross	Retail business	1,000	4,775	After own retail costs but before deadweight selling costs = £3,775
These are selected findings from a smaller survey of a sub-sample of respondents who were willing to share this financially sensitive information. *. The market value of these animals is uncertain because of the weak demand for this breed through liveweight and deadweight markets					

3.4 Latent demand for private kill services

Twenty-one (18.3%) of the 115 CB farmers were interest in setting up their own PKR enterprise but were unable to do so because they did not have access to suitable private kill services. For example, a farmer who finishes 640 LSU/yr. commented,

“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.”
(Farmer finishes 640 LSU/yr. mixed species, cattle and sheep).

Table 3 shows the potential number of LSU these twenty-one farmers would have available to supply through a PKR enterprises given access to private kill services.

Table 3. Annual LSU produced by farmers who are “extremely” or “very interested in diversifying their business by retailing meat from their own livestock (N=21). (The number of farmers who keep each species is shown in the parenthesis.)

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

4 Survey findings – impacts of loss of private kill provision on farm animal welfare

4.1 Farmers choice of abattoirs

Key criteria PKR farmers use to select the abattoir for their PKR trade included the abattoir’s animal welfare standards, the distance it is from the farm, to the personalised services abattoir offered, including the type and style of butchering available, and to their confidence in the abattoir’s traceability systems which ensure they receive the carcasse/meat and offal from their own livestock (Table 4).

Table 4. Factors that influence farmers' choice of abattoir for their PKR business (n=185).
(Respondents could select more than one factor in their answer)

Factor	% of private kill retail farmers (number)
Total assurance to get own animals back	86.5% (160)
Animal welfare standards of abattoir	73.5% (136)
Closeness of abattoir to farm	70.3% (130)
Total assurance farmer gets their own offal back	37.8% (70)
Type of butchering services offered	30.8% (57)
Slaughtering fee	19.5% (36)
Butchering fee	13% (24)

4.3 Distance from farm to abattoir

Figure 4 shows the average distance from farm to abattoir was significantly shorter for PKR (27.4 miles/45km) than for CB livestock farmers (59.4 miles/95 kms). The range in distances was also smaller, with standard deviations of 17.2 miles for PKR compared to 69.2 miles for CB.

Figure 4. Average distance from farm to abattoirs for private kill retail (PKR) (n=183), commercial business (CB) (n=103) and home consumption (HC) (n=54). (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.)

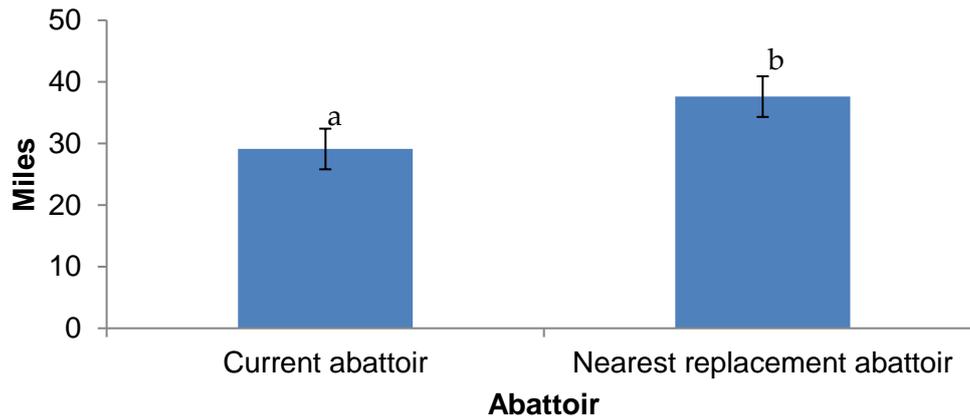


4.4 Impacts of the closure of abattoirs currently used for PKR business on livestock journey distances

The PKR farmers with at least one alternative provider of private kill services estimated the distance from their farm to the alternative abattoir they would use if their current abattoir

closed. Switching abattoir would result in significantly longer journeys, by an estimated 20 miles (a paired sample t test shows $p < 0.001$, $t = 3.95$, $SE = 2.15$), adversely affecting the profitability of their PKR enterprise (Figure 5).

Figure 5. The estimated change in the distance livestock would travel for slaughter if the abattoir currently used for private kill closed. (This question was asked to farmers with at least one alternative abattoir, $N = 107$). Bars labelled with different letters significantly differ ($p < 0.001$).



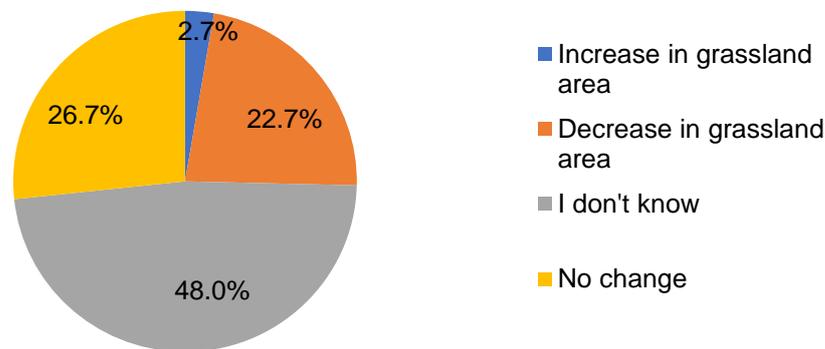
5. Impact of abattoir closure on PKR farmers' provision of public goods from land

5.1 Impacts on land use of further abattoir closures

PKR farmers without an alternative abattoir were asked how their land use would change if the abattoir they currently use closed (Figure 6): 22.7% would decrease the area of grassland farmed, increasing their arable area: a change in land use that would create an immediate net release of greenhouse gases (Drewer et al., 2017, Vellinga et al., 2004), thus adversely affecting the possibility of delivering net zero carbon emissions for the UK by 2050 (Institute for Government, 2020) and for the agriculture sector by 2030 (NFU, 2019).⁵

⁵ The longer-term impacts on greenhouse gas emissions and sequestration would depend on what the land was eventually used for.

Figure 6. Responses 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)).



5.2 Impact of abattoir closure on rare or heritage breeds farmed

The majority (76.2%, of the n=141 who answered the question) PKR farm “rare or heritage livestock breeds”. The majority of the 75 PKR farmers without an alternative abattoir said they would have to reduce the number of livestock they finish and 62% would reduce the size of their breeding herd/flock if their abattoir closed. But 30% of the 75 farmers would also be forced to change the breeds of livestock they farm threatening the continued conservation of the gene pool of heritage breeds, and reducing conservation grazing options⁶. For example,

‘[We] wouldn’t keep pedigree Red Ruby Devon’s if no private kill option as live price is undervalued’ (farmer slaughtering 50 cattle LSU per year).

6 Discussion

6.1 Implications of the closure of small abattoirs for farm business viability

The viability of 44% of PKR farm businesses depend on adding value to their livestock enterprise(s) by retailing meat finished on their farm, and 28% of the PKR with no viable alternative abattoir would cease farming if the one they currently used ceased trading. Those respondents who switched to selling through the large-scale red meat chain would lose the product distinctiveness and the added value attached to it,

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

⁶ It is not possible to calculate from the data collected in the survey the number of each breed of livestock slaughtered, so the impacts on the number of heritage livestock, and therefore on the conservation of the gene pool, cannot be estimated.

6.2 Implications of the closure of small abattoirs for the rural economy

The government has committed to “strengthening the rural economy” (Defra, 2020b: p 7). PKR trade allows farmer to add value to their livestock enterprise(s) and, by retailing to largely local consumers and rural food businesses (although internet sales are enlarging the geographical reach of these markets), to support businesses and employment in the rural economy.

Although there are no meaningful estimates of the value of the private kill retail market,⁷ a recent study estimated that the market for locally produced and sold food and drink (which defined “local” as produce purchased within 30 miles of the point of production) was worth £9.6 billion in 2013 (ICF Consulting Services, 2016), with an estimated £2.9 billion of this sold in rural areas. The same study estimated total tourism expenditure on local food and drink in England at £2.6 billion, with some 50% spent in rural areas. The loss of the PKR trade would reduce the supply of locally produced and sourced meat adversely affecting the size and growth of the local economy.

In 2012, the Campaign to Protect Rural England identified food labelling as a problem for growing the PK retail trade,

‘In many locations local food was often not clearly defined or labelled leading to a perception of poor availability Shoppers may not know which food is local and cannot make an informed choice’ (CPRE, 2012: p 44).

In *Our action plan on animal welfare* (Defra, 2021c) Defra acknowledges existing difficulties with food labelling and intends to consult on how food labelling (p. 13) may be improved to make it

“easier for consumers to purchase food that aligns with their values. For example, by clarifying confusing and misleading terms” (Defra, 2021c: p 13)

It has also promised to explore

“complementary market interventions that could sit alongside labelling reforms to stimulate market demand for higher welfare products” (Defra, 2021c: p 13).

Kennard and Young (2018) advocate changes along these lines. They argue well designed labelling could support small abattoirs by, for example, creating a carcass stamp to differentiate private kill retail produce sold exclusively through local markets (Kennard and Young, 2018: p 34). This, they argue, would provide consumers with additional confidence that the produce they buy will fulfil their expectations.

⁷ All abattoirs are subject to the same licensing and reporting regulations, but they are not required to report the number of livestock slaughtered for the private kill market.

In the UK, all abattoirs are subject to the same animal welfare and meat hygiene regulations and regulatory supervision.⁸ However, as a member of the EU, the UK chose not to apply the “de minimis” derogation available under EU Directive 853/2004/EC (European Commission, 2004: p 47) which reduces supervisory costs without adversely affecting animal welfare or lowering food hygiene standards (see below). This study shows PKR farmers support the use of this derogation to support private kill services, on the basis of the “ancillary” status of small abattoirs: businesses essential to the viability of many, particularly smaller farm businesses.

6.3 *Implications for the closure of small abattoir for higher animal welfare standards*

The findings from the survey show the significantly shorter distances from farm to abattoir traveled by PKR than by CB livestock (27.4 miles/45 kms compared to 59.4 miles/95 kms). As importantly perhaps, is the livestock’s familiarity with the farm vehicle and staff, and less steep loading ramps than commercial hauliers. Moreover, journeys made by PKR livestock are less complex, being direct from farm to abattoir.

The average increase in the journey of PKR livestock caused by abattoir closures is 10 miles. But because PKR visit abattoirs many times a year, it would increase the total miles travelled to the alternative abattoir by 186 miles/year, and the total LSU miles (additional distance times the number of LSU slaughtered for PKR/year) by a total of 24,381, an average of 228 additional LSU miles for PKR with an alternative viable abattoir.

The higher transport costs reduce the viability of transporting livestock in farm vehicles driven by the farmers increasing the likelihood of using commercial transport, with livestock undertaking more complex journeys. This would reduce farmer in-presence overview of abattoir operating procedures and compliance with regulations. The findings of this study, therefore, support and quantify a conclusion of the APGAW report that,

“a well distributed network of small abattoirs reduces journey distances for a number of animals this strengthens a case for some financial support for small abattoirs through new funding outlined in the Agriculture Bill or other mechanisms” APGAW (2020: p 2).

This problem is particularly acute for PKR farmers on islands without abattoirs. For example

"The abattoir on Orkney has closed. We're looking to take our stock to Shetland, but that is a 7 hr ferry crossing if they ever allow our sheep to enter the island, or to [name retained] abattoir on the mainland, again a 7 hr ferry crossing then approximately 80 miles. ... The closure has turned a quick 15 minute drive to a small abattoir with superb handling in lairage into a hugely expensive 2 day trip away from

⁸ For abattoirs in England, Wales and Northern Ireland this is The Food Standard Agency (FSA), in Scotland it is Food Standards Scotland.

the farm if we have to use [name retained].” (Farmer supplies 2.4 LSU/year, sheep only, 5 trips a year).

6.4 *Implications for the closure of small abattoirs for the provision of public goods from farmland*

Path to Sustainable Farming: An Agricultural Transition Plan 2021 to 2024 sets out Defra’s intention to support farmers and other land managers farming in Protected Landscapes by

“[helping them] to diversify their income streams and lay the groundwork for our Environmental Land Management offer” (Defra, 2020a: p 44).

Details of the support available for farming in Protected Landscapes (Defra, 2021a) show how Defra plans to use public money to support farming in Areas of Outstanding Natural Beauty (AONB), National Parks and The Broads. Supported projects will need to meet at least one of the outcomes of four themes: climate, nature, people, and place. Outcomes included in the “climate” theme include; (i) more storage or sequestration of carbon, or both. “Nature” theme outcomes include; (ii) increase the area of wildlife-rich habitat, (iii) managing existing habitats better for biodiversity outcomes, and (iv) increasing biodiversity. “People” theme outcomes include; (v) delivery of greater public engagement in land management. And “place” theme outcomes include; (vi) reinforcing or enhancing landscape quality and character, and (vii) increasing the economic resilience of nature-friendly sustainable farm businesses - because of the contribution they make to a more thriving local economy. Although some of these objectives overlap with Countryside Stewardship and the proposed Environmental Land Management Scheme (ELMS), this programme is not an agri-environment scheme, which may allow compensation payments to be less restricted by the “profit forgone and transaction costs” compensatory calculation.

The PKR farmer survey shows the ways in which PKR farmers support these “farming in Protected Landscape” objectives. They improve habitat biodiversity - through conservation grazing, support livestock genetic diversity - by finishing distinctive native breeds. Further loss of private kill services will result in land use change as grassland is converted for arable cropping, which will result in an immediate increase in greenhouse gas emissions and reduce the capacity of soil to store carbon. Farming native breeds not only enhances habitat management it also supports biodiversity and landscape diversity.

Interestingly, an example Defra gives of the type of project “Farming and Protected Landscapes” might support is “a locally branded food initiative that promotes the links between the product and the landscape in which it is produced” (Defra, 2021a). Such funding could support private kill services and the ELMS objective of supporting

“those farmers and land managers who provide the greatest environmental benefits” (House of Commons, 2018).

.6 *PKR farmer support for small abattoirs*

“Slaughtering” is included as an “ancillary service” in the Agriculture Bill. This allows Government to target grant funding schemes to abattoirs (Sustainable Food Trust, 2020), helping end excessively long journeys to slaughter (Defra, 2021b). Any such scheme would need to take account of the general circumstances of small abattoirs revealed by Halliday’s (2019) review of the (now closed) Scottish Government’s Food Processing, Marketing and Co-operation (FPMC) awards.⁹

For example, small abattoirs might be supported to continue to slaughter pigs. This has become very specialist, so that the ten largest abattoirs with licence to slaughter pigs process 99% of all pigs slaughtered in the UK (Franks and Peden, 2021; their Table 2.6, p 12). Many smaller abattoirs have returned their pig slaughtering licence due to the increased cost of the specialist equipment this service requires,

“Our last abattoir had to stop killing pigs simply because their stun machine did not send data to a computer so was deemed unfit by FSA even though it had been doing the job for yrs.” (Farmer supplies 3.5 LSU/year, pigs only).

As a result,

“It is not easy to find abattoirs which do the complete package of slaughter and butchering cattle and pigs.” (Farmer supplies 5 LSU/year, pigs and cattle).

This has the direct result that

“We are completely satisfied with the service we receive from the abattoir. Unfortunately it has stopped taking pigs and so we no longer keep a herd of pigs.” (Farmer supplies 3.6 LSU/year, all sheep).

One hundred PKR farmers (69% who answered the question what can government do to support PKR enterprises) supported making support available to small, local abattoirs. For example, by funding the building of new abattoirs and by helping to relocate and modernisation inner-town located PK abattoirs. They believed government should also reduce small abattoir’s red tape and regulatory costs. These responses were typically motivated by the awareness of the benefits of smaller abattoirs for animal welfare, the environment, provision of choice to local consumers and enhanced 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).

⁹ This grant scheme had provided funding to several abattoirs, including £4m to Scot beef Inverurie Ltd to construct a state-of-the-art abattoir.

7 Conclusions

The paper shows what other public goods would be lost by the continual closure of private kill services. In a continuation of the long-term trend in the closure of smaller abattoirs, a further thirteen, all of which offered private kill services, closed in the 18 months to August 2020. The shrinkage of the private kill network undermines the resilience of the low-volume red meat supply chain, which, as Covid-19 demonstrated, is a vital component of national food security: itself classified by some authors as a public good (Dwyer et al., 2015, McVittie et al., 2009).

Further closures will remove a route by which farm businesses diversify into adding value to their livestock enterprise(s). It will drive out of business farmers who typify the entrepreneurial culture the withdrawal of direct payments is intended to nurture (Defra, 2018).¹⁰ Moreover, closure of these retail businesses reduces the size and potential growth of the rural economy and reduces local landscape and food distinctiveness - which are major attractions to rural tourists. Government support to safeguard or even expand the network of private kill provision would allow more farmers to enter the PKR trade, boosting farm business profitability - another core objective underpinning the withdrawal of direct payments – and further supporting local economies. Support would also help underpin the farming of native livestock species, helping conserve genetic diversity; enhance animal welfare through shorter, less complex journeys; and help prevent an immediate increase in greenhouse gas emissions resulting in land use change.

Leaving the EU has given the UK some freedom to “do things differently”. By including slaughtering as an “ancillary” business in the Agriculture Bill government has the legal powers to design programs that support small abattoirs. It has also published its intention to resolve the existing confusion about food labelling. It can go further by, for example, introducing an equivalent “de minimis” derogation for private kill slaughtering, and helping to develop a marque to differentiate private kill retailed produce from wholesale produce.

Although the number and geographic location of private kill services needed to maintain a resilient UK wide private kill slaughter and butchery network remains an open question, it is clear the existing private kill network needs targeted support, which could be justified by importance to the delivery of many of the new policy’s objectives. Whether the necessary support will be made available is a direct test of whether the new freedom to “do things differently” arising from leaving the EU results in actually doing things differently.

¹⁰ In *Moving away from Direct Payments*, Defra define diversified enterprises as “non-agricultural work of an entrepreneurial nature on or off farm, but which utilize farm resources. This includes letting buildings for non-farm use, *the processing or retailing of farm produce*, sport and recreation, tourist accommodation and generating renewable energy” (emphasis added).

References

- APGAW 2020. The Future for Small Abattoirs in the UK. Report on an inquiry into small red meat abattoir provision. <https://apgaw.org/wp-content/uploads/2020/06/The-Future-for-Small-Abattoirs-in-the-UK.pdf> [Accessed June 2020].
- CPRE 2012. From field to fork: The value of England's local food webs. <https://www.cpre.org.uk/resources/from-field-to-fork-2/> [Accessed January 2021]: Campaign for the Protection of Rural England.
- DEFRA 2018. Moving away from Direct Payments. Agriculture Bill: Analysis of the impacts of removing Direct Payments. <http://www.nflg.co.uk/files/agri-bill-evidence-slide-pack-direct-payments.pdf> [Accessed April 2020].
- DEFRA 2020a. The Path to Sustainable Farming: An Agricultural Transition Plan 2021 to 2024. London <https://www.gov.uk/government/publications/agricultural-transition-plan-2021-to-2024> [Accessed May 2021].
- DEFRA. 2020b. *Rural Proofing in England 2020 Delivering policy in a rural context* [Online]. Available: <https://www.gov.uk/government/publications/rural-proofing-in-england-2020> [Accessed June 2021].
- DEFRA. 2021a. *Get funding for farmers in protected landscapes. Guidance.* [Online]. Available: <https://www.gov.uk/guidance/funding-for-farmers-in-protected-landscapes?msclkid=5c6a431aa5dd11ec8247d02b50c0e07c> [Accessed March 2022].
- DEFRA. 2021b. *Improvements to animal welfare in transport* [Online]. London. Available: <https://consult.defra.gov.uk/transforming-farm-animal-health-and-welfare-team/improvements-to-animal-welfare-in-transport/> [Accessed May 2021].
- DEFRA 2021c. Our action plan on animal welfare. London. Action Plan for Animal Welfare. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/985332/Action_Plan_for_Animal_Welfare.pdf [Accessed April 2022].
- DREWER, J., ANDERSON, M., LEVY, P. E., SCHOLTES, B., HELFTER, C., PARKER, J., REES R. M. & SKIBA, U. M. 2017. The impact of ploughing intensively managed temperate grasslands on N₂O, CH₄ and CO₂ fluxes. *Plant and Soil*, 411, 193-208.
- DWYER, J., SHORT, C., BERRIET-SOLLIEC, M., GAEL-LATASTE, F., PHAM, H.-V., AFFLECK, M., COURTNEY, P. & DÉPRÉS, C. 2015. Public Goods and Ecosystem Services from Agriculture and Forestry – a conceptual approach. . Project number: 633814, European Commission Horizon 2020 Collaborative project.
- EUROPEAN COMMISSION 2004. Laying down specific hygiene rules for on the hygiene of foodstuffs. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:139:0055:0205:en:PDF> [Accessed June 2020].
- FAWC 2003. Report on the welfare of farmed animals at slaughter or killing. Part 1: Red meat animals. *Farm Animal Welfare Council.* <https://www.gov.uk/government/publications/fawc-report-on-the-welfare-of-farmed-animals-at-slaughter-or-killing> [Accessed June 2020].
- FRANKS, J. R. & PEDEN, R. 2021. An economic analysis of the role and viability of small abattoirs in the red meat supply chain. <https://www.princescountrysidelfund.org.uk/our-impact/our-research/all-on-the-table/> [Accessed May 2022].
- HALLIDAY, K. 2019. Evaluation of the Food Processing, Marketing and Co-Operation Fund 2014-2020. *In: RURAL AND ENVIRONMENTAL SCIENCE AND ANALYTICAL SERVICES DIVISION (ed.) PPDAS632630 (09/19).* <https://www.gov.scot/publications/evaluation-food-processing-marketing-co-operation-fund-2014-2020/pages/3/> [Accessed May 2020].
- HOUSE OF COMMONS 2018. The Agriculture Bill (2018): 266. <https://services.parliament.uk/bills/2017-19/agriculture.html> [Accessed September 2018].

- ICF CONSULTING SERVICES 2016. Rural tourism and local food and drink. Final report to the Department for Environment, Food and Rural Affairs.
- INSTITUTE FOR GOVERNMENT. 2020. *UK net zero target. UK net zero target.* [Online]. Available: <https://www.instituteforgovernment.org.uk/explainers/net-zero-target#:~:text=UK%20net%20zero%20target%20In%20June%202019%2C%20parliament,would%20make%20the%20UK%20a%20%E2%80%98net%20zero%E2%80%99%20emitter> [Accessed January 2022].
- KENNARD, B. & YOUNG, R. 2018. A good life and a good death: re-localising farm animal slaughter. <https://sustainablefoodtrust.org/articles/a-good-life-and-a-good-death-re-localising-farm-animal-slaughter/> [Accessed January 2021]: Sustainable Food Trust.
- MCVITTIE, A., MORAN, D. & THOMSON, S. 2009. A review of literature on the value of public goods from agriculture and the production impacts of the Single Farm Payment Scheme. [accessed January 2017]. Report Prepared for the Scottish Government's Rural and Environment Research and Analysis Directorate (RERAD/004/09). Land Economy and Environment Research Group. December. <http://www.gov.scot/Resource/Doc/278281/0093368.pdf> [Accessed Jan 2022].
- NFU. 2019. *Achieving net zero. Farming's 2024 goal.* [Online]. Available: <https://www.nfuonline.com/nfu-online/business/regulation/achieving-net-zero-farmings-2040-goal/> [Accessed February 2022].
- SUSTAINABLE FOOD TRUST. 2020. *Abattoirs to be eligible for support under the Agriculture Bill, following House of Lords debate* [Online]. Available: <https://sustainablefoodtrust.org/articles/abattoirs-to-be-eligible-for-support-under-the-agriculture-bill-following-house-of-lords-debate/> [Accessed March 2022].
- VELLINGA, T. V., VAN DEN POL-VAN DASSELAAR, A. & KUIKMAN, P. J. 2004. The impact of grassland ploughing on CO₂ and N₂O emissions in the Netherlands. *Nutrient Cycling in Agroecosystems*, 70, 33-45.