

Scottish Beef Finishing – Evidence from 2013 born animals

Cattle Network Briefing Note 1



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Summary

- Using Cattle Tracing System data with RESAS Business Reference Number look-up tables it has been possible to classify all businesses in the beef supply chain using the **predominant** beef system in use on a business. The system typologies are based on those used by Quality Meat Scotland with amended classifications for specialist finishers – those that predominately finish cattle earlier or later than the median slaughter age.

Beef System	Businesses	2013 total calves	2013 suckler calves	Prime cattle finished from 2013 cohort
Extensive upland suckler	18%	10%	14%	0%
Extended upland suckler	36%	34%	47%	3%
Lowland suckler	9%	6%	8%	1%
Rearer finisher	9%	15%	20%	20%
Early finisher	5%	2%	2%	28%
Late finisher	6%	2%	2%	34%
Dairy	11%	29%	0%	10%
Unclassified	7%	4%	6%	3%
Total	10,792	558,077	398,573	349,871

- We estimate that there were 10,792 producers involved in the supply chain for beef and dairy calves born in 2013 that were destined for slaughter. There were 558,077 calves registered in Scotland in 2013 and 398,573 (72%) were attributed to the beef herd. 349,871 of the calves were slaughtered within 36 months of registration. 71% of the suckler calves registered in 2013 were slaughtered (mostly in Scotland) by 36 months of age compared to 44% of dairy calves.
- It was estimated that there were 2,052 finishers– but that is inflated by a number of very small producers that sell the odd animal for slaughter. Indeed only 203 finishers accounted for over 148,000 prime animals born in 2013 whilst 40% of the classified “finishers” only accounted for 19,300 head.
- There is very wide variation in finishing ages of cattle, that depends on the breed as well as the rearing and finishing systems the animal went through. Whilst the breed variation is apparent there are also considerable opportunity to improve efficiency in the sector.
- As the beef finishing sector (and rearing sector to a lesser extent) is heavily concentrated on relatively few, large scale, businesses some policy outcomes can likely be achieved more quickly by focusing attention on the largest businesses.



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1.0 Introduction

Using the British Cattle Movement Service's (BCMS) Cattle Tracing System (CTS) data accessed through Animal and Plant Health Agency (APHA) in collaboration with EPIC we have extracted data from all animals that were born in Scotland on 2013 that were destined for slaughter in Scotland.

This provides a useful baseline to assess the wide range of cattle 'finishing' times within Scotland's beef sector. Using this data, aggregated to holding and then business level (using CPH to BRN look-up tables¹) we classified all the farm and croft businesses that carry cattle (from both the suckler and dairy herds) destined for slaughter by 36 months of age² into typologies based on the predominant system used on a businesses. These typologies are based on classifications used by Quality Meat Scotland (QMS) in their annual Cattle & Sheep Enterprise Profitability in Scotland publication with dairy farms added. To reflect differences in relative finishing efficiencies, and to reflect the fact that most cattle are finished on a mixed diet of cereals and grass/silage, we substituted the QMS specialist finishing systems with two new categories (in addition to rearer-finishers): - early finishers' or 'late finishers'. These classifications are based on whether the finisher predominately finished cattle under or over the median slaughter age of 699 days for 2013 Scottish born cattle, slaughtered in Scotland at less than 36 months is. The systems include:

- **Extensive upland suckler producers:** calves mostly sold about 9-10 months.
- **Extended upland suckler producers:** calves mostly sold about 11-12 months.
- **Lowland (non-LFA) suckler producers:** calves likely sold 12-14 months.
- **Rearer finishers:** mostly born and taken to slaughter within single businesses.
- **Early finishers:** younger slaughtered animals, mostly brought onto farm and mostly slaughtered at less than 699 days.
- **Late finishers:** older slaughtered animals, mostly brought onto farm and mostly slaughtered at more than 699 days.
- **Dairy:** the holding/business is identified as a dairy in the CTS. All calves born on these business are classed as "dairy" meaning there may be some suckler calves included.

Whilst many beef enterprises run different systems the **classification has taken the predominant system used within each business** based on the number of animals within age categories at point of sale or slaughter. The data extracts have been sense checked against the Scottish Government's own data.³ It is worth noting that only registered calves are included in this analysis, and practices in the dairy sector regarding male calves killed at birth have evolved since this period.

In 2013 CTS showed that there were 558,077 calves registered on all Scottish businesses in 2013 with 398,573 attributable to the beef herd. When examining **data on prime cattle for slaughter all animals (under 36 months of age⁴) that were slaughtered within 7 days after leaving a Scottish businesses were included in the analysis.** This is irrespective of whether they moved directly to slaughter or via and auction market, and **it includes a proportion (3%) of animals that were slaughtered in England and Wales.**

¹ CPH = County Parish Holding Number: BRN = Business Reference Number

² Including those with beef calves born in the dairy herd

³ <https://www2.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/agritopics/Cattle>

⁴ To avoid young breeding stock being considered prime stock a 36 month age limit was used for this analysis.



2.0 Types of beef businesses

The stratified beef system that works across much of Scotland means that animals sent to slaughter are concentrated on relatively few farms before their final move to slaughter. This contrasts with where these calves were born and raised – on smaller, more dispersed farms and crofts across the country. According to the CTS data, there were 10,792 producers involved in the supply chain for beef and dairy calves born in 2013 that were destined for slaughter (mostly in Scotland). There were 558,077 calves registered in 2013 and the suckler herd accounted for 73% of registrations. Overall 284,243 head from the beef herd were slaughtered within 36 months of registration with a further 63,354 coming from dairy farms. A small number of calves under 10 months of age were slaughtered.

Using our new Scottish Cattle Typology the dominant rearing system was identified for all rearers and finishers within the Scottish beef supply chain. Table 1 provides the summary headlines of the number of businesses, the number of 2013 registered calves in each system type, the number of calves in each system type and the total number of those 2013 calves that were sold to abattoirs (i.e. finished) within each business type. The main findings are:

- **Producers** – of the businesses *with beef or dairy calves*:
 - 36% were extended upland producers (with later calf sales);
 - 18% were extensive upland producers (with early calf sales);
 - 5% were lowland suckler producers;
 - 9% were rearer finishers;
 - 5% were early finishers and 6% late finishers
 - 11% were registered in CTS as dairy farms;
 - 7% were unclassified.
- **Calves** – of the calves *registered to suckler cows*:
 - 47% were on extended upland producers (with later calf sales) – which accounted for 34% of all calves;
 - 20% of suckler calves were on rearer finisher units
 - 14% were on extensive upland producers (with early calf sales);
 - 8% were on lowland suckler producers;
 - 6% were on unclassified businesses.
- **Prime suckler cattle** - of the suckler calves *registered in 2013 that were destined for slaughter*:
 - 34% were finished on businesses classed as late finishers;
 - 31% were finished on businesses classed as early finishers;
 - 24% were finished on predominately rearer finishing units;
- **Dairy Beef** – of the 159,504 calves registered on dairy farms in 2013:
 - Only 41% (65,628) calves were finished and slaughtered
 - 19% of cattle slaughtered under 36 months originated from dairy farms

98.4% of the 2013 calves registered to the suckler herd and 89.3% of the calves registered to the dairy herd that were slaughtered in the UK by the age of 36 months were slaughtered in Scotland. This highlights there is minimal leakage from the “Scotch” system, in contrast to the sheep sector⁵.

⁵ <https://www.gov.scot/publications/assessment-opportunities-retain-increase-sheep-lamb-processing-scotland/pages/3/>

Table 1 Classification of beef producers, number of calves registered at birth and number of prime calves sent to slaughter – based on Scottish calves registered in 2013

	Predominant Rearing System							Unclassified	Total
	Extensive upland suckler	Extended upland suckler	Lowland suckler	Rearer finisher	Early finisher	Late finisher	Dairy		
Businesses	1,902	3,880	965	932	488	632	1,189	804	10,792
	18%	36%	9%	9%	5%	6%	11%	7%	
All Calves registered	55,016	186,958	32,643	81,785	8,947	8,751	159,261	24,716	558,077
	10%	34%	6%	15%	2%	2%	29%	4%	
Suckler calves registered	54,775	186,734	32,643	81,554	8,794	8,751	606	24,716	398,573
	14%	47%	8%	20%	2%	2%	0%	6%	
Dairy Calves Registered	241	224	0	231	153	0	158,655	0	159,504
	0%	0%	0%	0%	0%	0%	99%	0%	
Total prime cattle slaughtered	1,283	11,570	4,579	69,124	99,526	118,755	33,932	11,102	349,871
	0%	3%	1%	20%	28%	34%	10%	3%	
Suckler Beef Slaughtered	1,222	10,541	3,865	67,339	88,563	96,340	5,655	10,718	284,243
	0%	4%	1%	24%	31%	34%	2%	4%	
Dairy Beef Slaughtered	61	1,029	714	1,785	10,963	22,415	28,277	384	65,628
	0%	2%	1%	3%	17%	34%	43%	1%	

54% of producers involved in the beef supply chain were upland suckler calf producers

932 rearer finishers were responsible for rearing 20% of suckler calves born in 2013 and were also responsible for finishing 24% of suckler reared cattle born in 2013

29% calves registered on dairy farms – with 158,655 dairy calves

41% of the dairy calves registered in Scotland in 2013 were destined for slaughter by 36 months compared to 71% of suckler calves.

1/3 of all calves and nearly 1/2 of suckler calves were raised on upland farms that sell calves about 1 year old

Specialist 'early finishers' accounted for 28% of prime suckler cattle born in 2013 prior to slaughter. These 488 finishers only reared about 9,000 calves – but bought over 90,000 calves, mainly from upland producers, but with nearly 11,000 sourced from dairy farms.

Specialist 'late finishers' accounted for 34% of prime suckler cattle born in 2013 prior to slaughter. These 632 finishers only reared about 9,000 calves – but bought over 110,000 calves, mainly from upland producers, but with over 22,000 sourced from dairy farms.

3.0 Calving month

The bulk of calving now occurs in spring and early summer to maximise use of grazing during peak lactation periods for suckler cows. Figure 1 shows the monthly registrations of Scottish calves during 2013 – where the spring to early summer dominance is apparent. With so many suckler calves born in these months phasing of finishing these calves is required to ensure that abattoir throughput remains relatively consistent throughout the year (see Figure 2 for weekly Scottish abattoir throughput).

Figure 1 Month of Scottish calf registrations in 2013 – dairy and beef

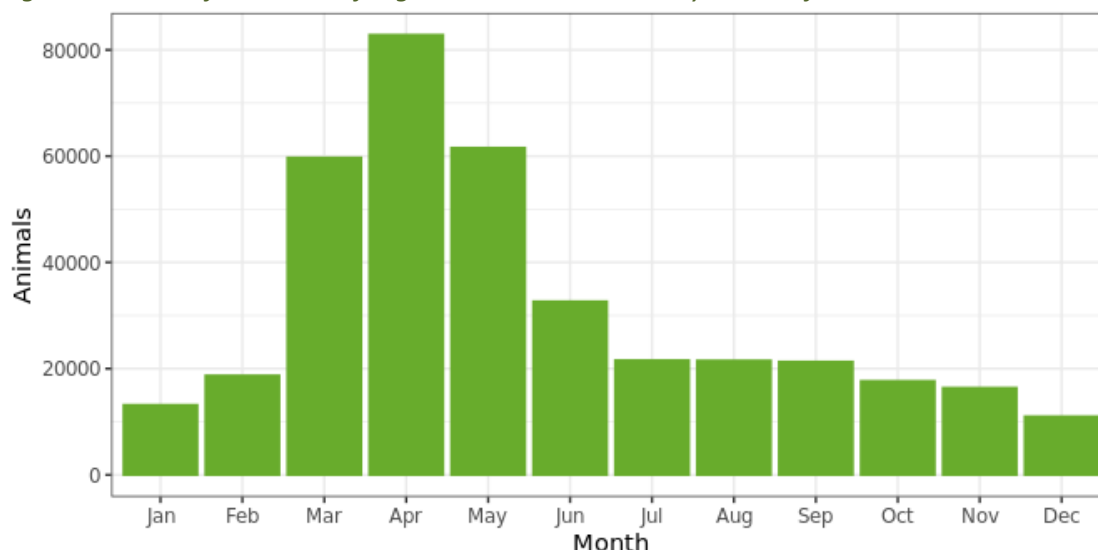
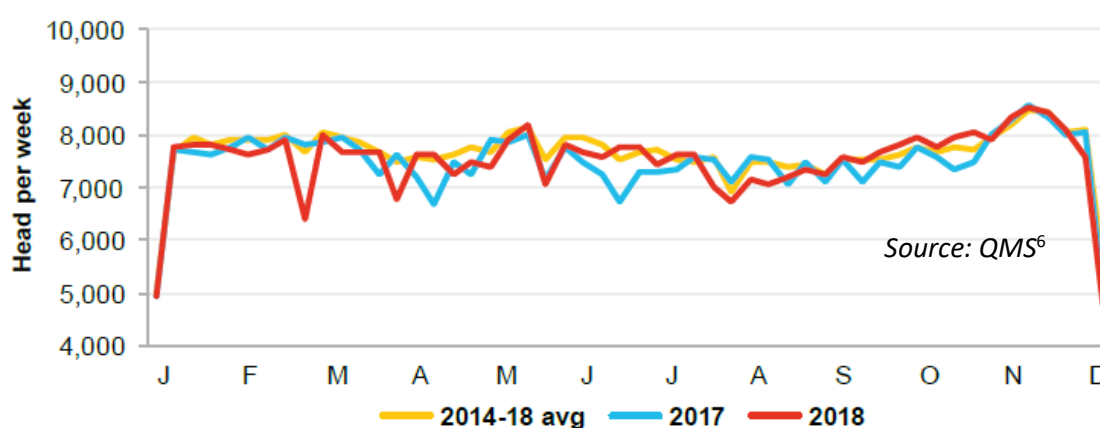


Figure 2 Weekly supply of prime cattle to Scottish abattoirs



In terms of overall animal numbers sector is dominated by relatively few large producers. Figure 3 reveals how about 450 of the 10,792 beef and dairy producers only had a single calf registration in 2013 with a few businesses at the opposite end of the scale spectrum, registering over 1,000 calves in 2013. Figure 4 shows that nearly 25% of the businesses involved in the beef supply chain registered fewer than 10 calves in 2013, whilst half the businesses registered fewer than 30 calves. Again, the concentration on few large businesses is illustrated that 18% of the businesses registered more than 100 calves in 2013.

⁶ The Scottish Red Meat Industry Profile – 2019 Edition – Available at:
https://www.qmscotland.co.uk/sites/default/files/qm3156_rmip_2019_aw_lo_res.pdf

Figure 3 2013 histogram of calf registrations per business on Scottish businesses – beef and dairy

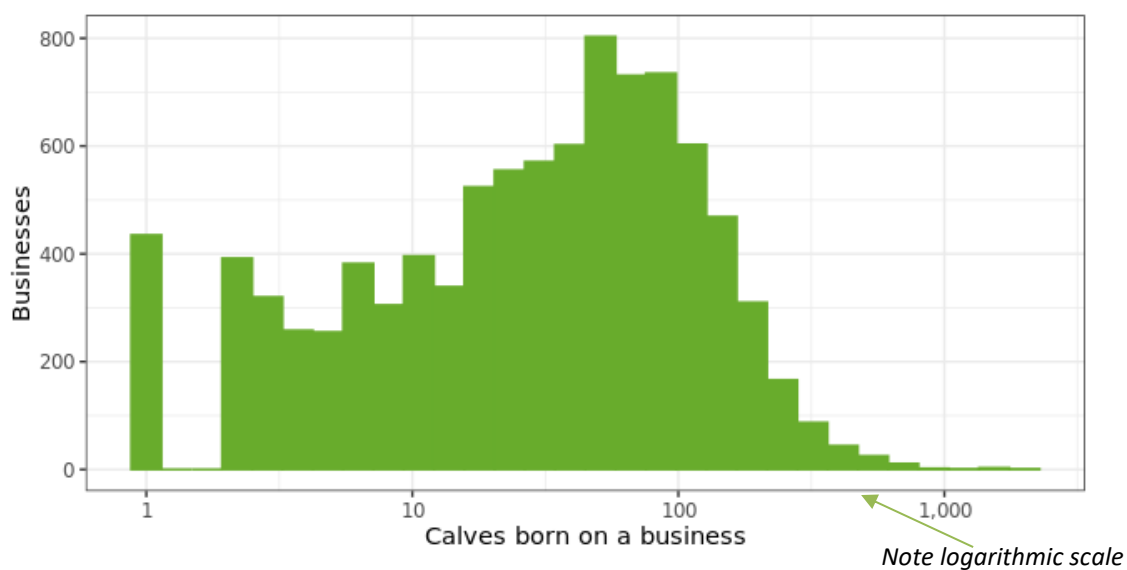
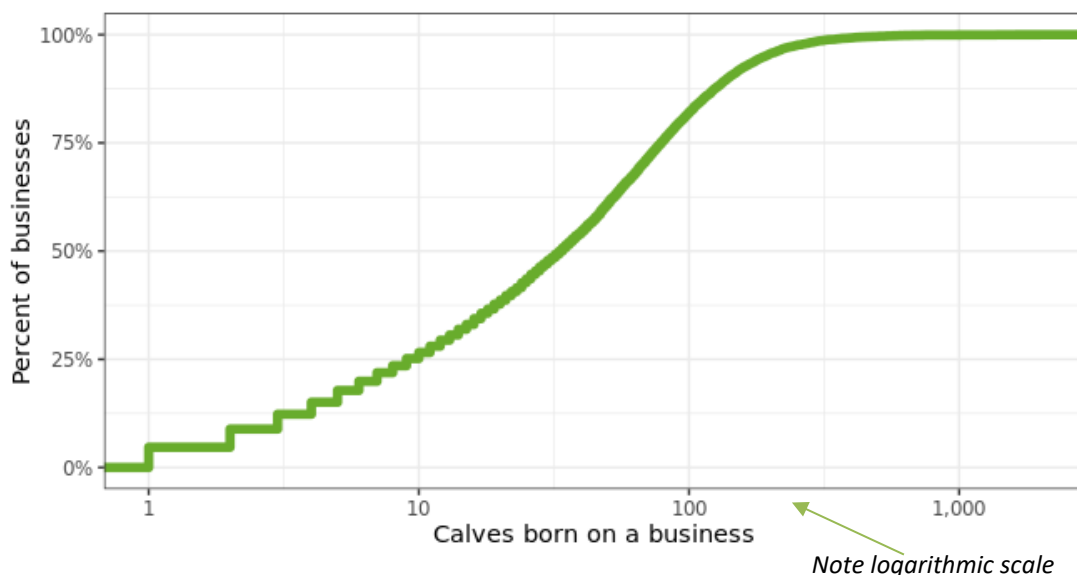


Figure 4 Cumulative distribution of calves born (beef and dairy) in 2013 per business



4.0 Finishing Prime Animals

Of the 349,871 prime (dairy and suckler) cattle born in Scotland in 2013 27% were slaughtered in 2014, 65% were slaughtered in 2015 and 8% in 2016. Some of this variation in finishing times is accounted for the month of birth in 2013, but within the sector, and even within breeds there is considerable variance

in the length of time taken to finish cattle. Part of this relates to the largest finishers smoothing supply to the abattoirs to allow consistent throughput, but there are undoubted inefficiencies within the sector. Figure 5 shows the month in which 2013 calves were slaughtered, with the main peak in the first half of 2015. It is worth noting that as this graph only illustrates a single year's crop of calves (and does not account for country of slaughter) and therefore does not

347,298 cattle born in 2013 destined for slaughter

2014
27%

2015
65%

2016
8%

reconcile with the total weekly slaughter profile shown in Figure 2 which includes prime animals from multiple birth years. As mentioned previously there is wide variation in the finishing times across Scotland due to the breed, the rearing and finishing systems an animal goes through, as well as finishers matching supply to abattoir demand.

Figure 5 Month of slaughter of prime cattle born in Scotland during 2013

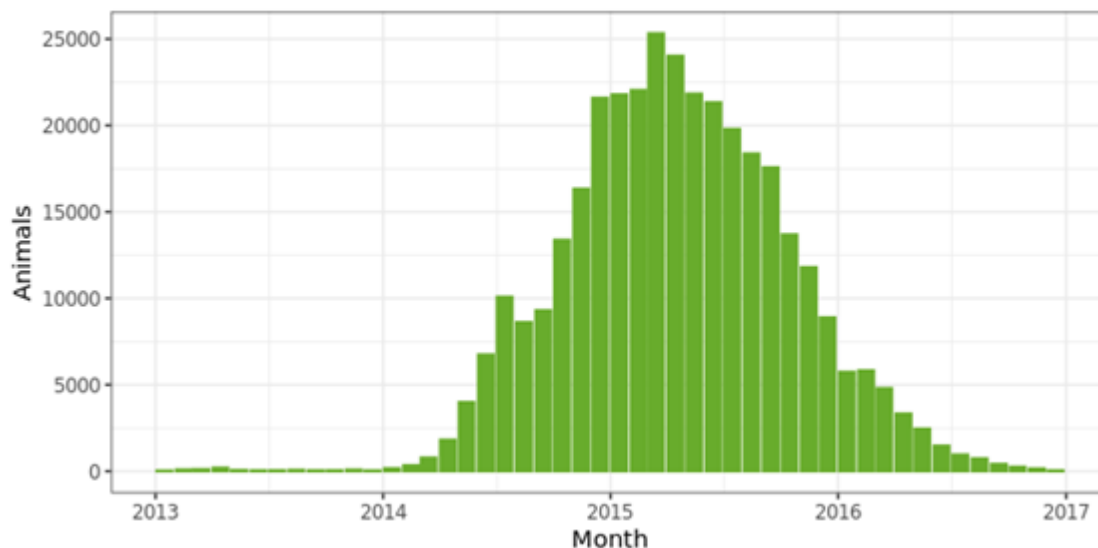
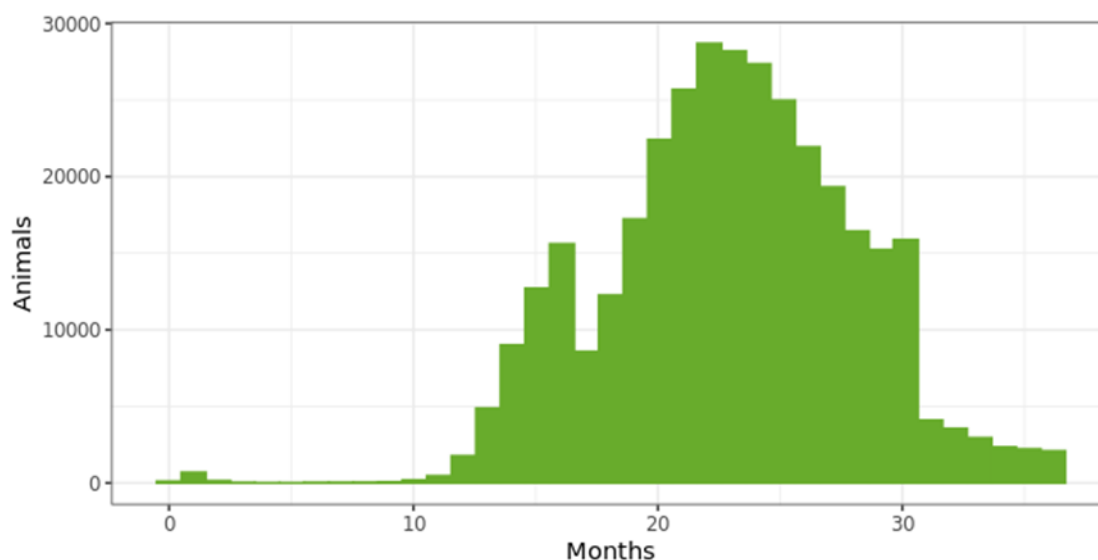


Figure 6 shows the wide variation in slaughter age across all cattle born in 2013 that were slaughtered before they were 36 months old. The number of very early finished cattle increases from about 2,500 at 13 months to nearly 15,000 at 16 months of age. There was a notable drop back in the number being slaughtered at 17 and 18 months of age before a steady increase to 28,000 being slaughtered at 22 months of age and similar amounts for 23 and 24 months before the numbers taper off to 13,000 being slaughtered at 30 months of age.

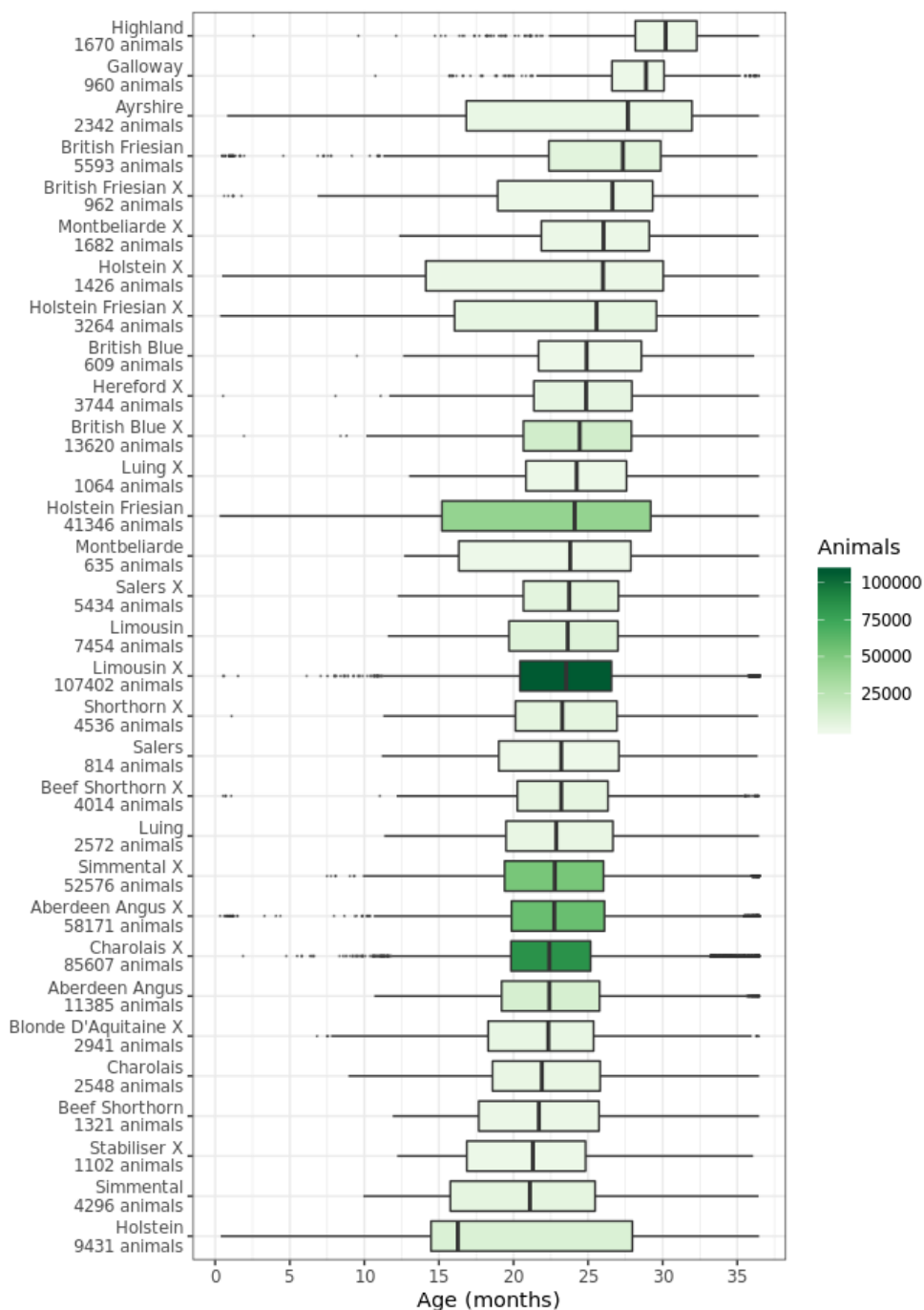
Figure 6 Age at slaughter of cattle born in Scotland in 2013 (beef and dairy)



It is perhaps convenient to think that the bulk of the variance in slaughter age is related to the breed of cattle, and to some extent it is with slower maturing breeds naturally taking longer to finish (also carcass weights, carcass conformation and meat yield will differ between breeds but CTS does not record this). Figure 7 shows the box plots of the slaughter age of 2013 born cattle by breed – with

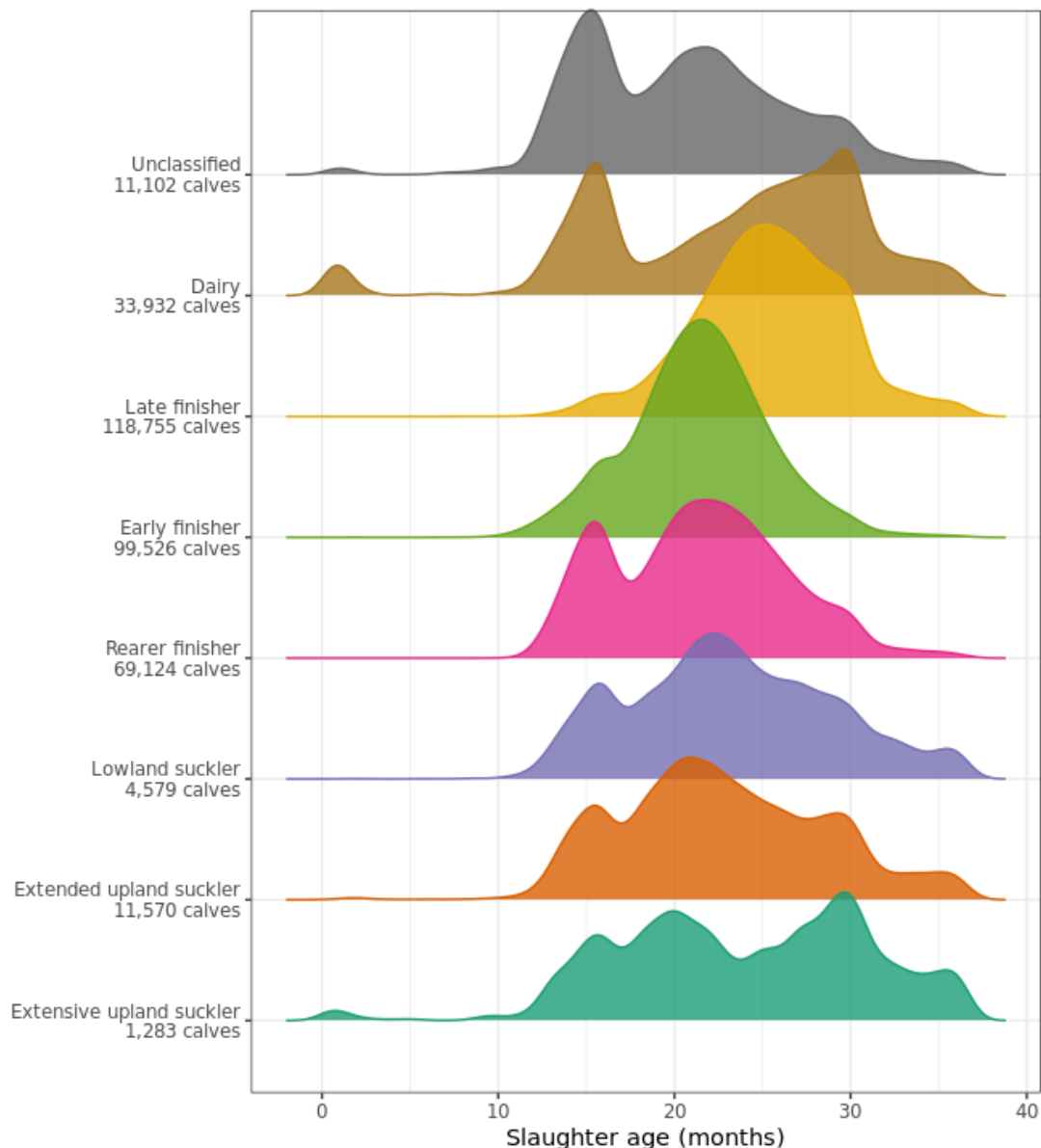
the vertical line showing the median slaughter age – the box shows the spread of the middle 50% of cattle (the interquartile range) whilst the lines indicate the lower and upper values and the dots any outliers. A tighter box and whiskers indicates a greater uniformity in the age of the cattle slaughtered within a breed. In Figure 7 the breeds with the highest median slaughter age are at the top and those with lowest median age at the bottom. The darkest boxes indicate the most popular breeds in terms of abattoir throughput. Perhaps unsurprisingly, the slow maturing Highland and Galloway breeds that often graze rough grazing hill areas take longest to finish. Many of the dairy breeds also take relatively longer than the main beef breeds to finish, although there is often quite large variances.

Figure 7 Box plot showing age of cattle at slaughter born in Scotland in 2013 (dairy and beef)



The age profile of slaughtered prime cattle from the different systems are shown in Figure 8. The difference between rearer finishers, early and late finishers is apparent. It is likely that in dairy, unclassified and rearer finishers there was more bull-beef rearing that give rise to the early slaughter peaks.

Figure 8 Slaughter age profile of prime cattle born in 2013 by Scottish cattle systems

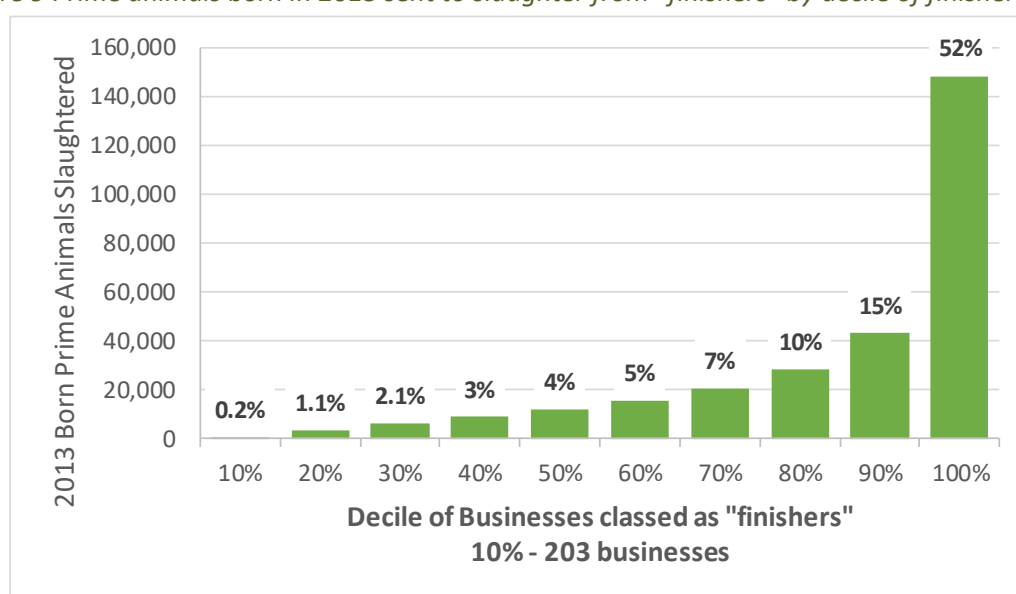


To illustrate the concentration of the Scottish beef finishing sector Table 2 and Figure 9 show the number of businesses classed as predominately 'early finishers', 'late finishers' or 'rearer finishers' by decile of businesses based on number of 2013 born cattle they finished. These finishers accounted for 287,405 prime cattle that were born in 2013. Only 203 businesses accounted for 52% of all the prime animals sent to slaughter from this wider group – with an average of 730 head from the 2013 cohort alone. The next decile (group of 203 finishers) accounted for a further 15% of cattle with an average of 213 prime animals that were born in 2013. Ultimately 20% of these finishers were responsible for 67% of the 2013 born cohort, with 610 (30%) finishers having 76% of the throughput of prime cattle born in 2013.

Table 2 Distribution of finishers and the number of cattle born in Scotland in 2013 that slaughtered* within 7 days from moving-off the finishing unit.

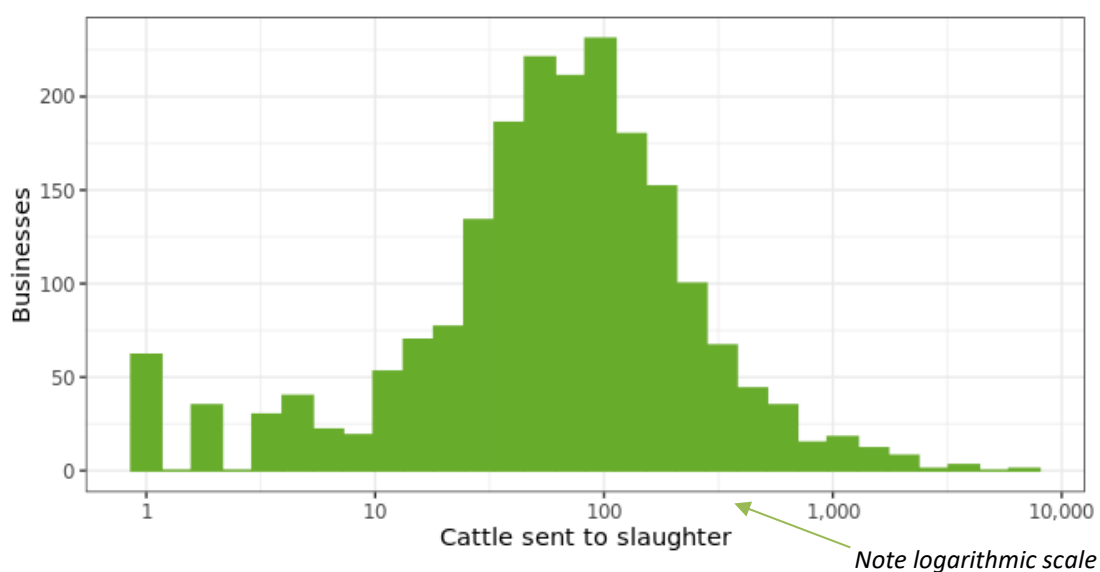
Percent of BRNs	Cumulative Number of BRNs	Prime Cattle to Slaughter	% of all Prime Cattle to Slaughter	Cumulative % of prime cattle to slaughter	Average number of prime animals
10%	203	148,272	52%	52%	730
20%	406	43,148	15%	67%	213
30%	610	28,277	10%	76%	139
40%	813	20,760	7%	84%	102
50%	1,016	15,744	5%	89%	78
60%	1,219	11,896	4%	93%	59
70%	1,422	9,008	3%	96%	44
80%	1,626	6,264	2%	99%	31
90%	1,829	3,380	1%	100%	17
100%	2,032	656	0%	100%	3
Total prime animals slaughtered			287,405		
<i>*includes 5.8% that were slaughtered in England and Wales</i>					

Figure 9 Prime animals born in 2013 sent to slaughter from “finishers” by decile of finisher scale



The large number of producers that only sent a few prime cattle (under 36 months) born in 2013 directly to slaughter is illustrated in Figure 10 . At the opposite end it can be seen that there was a few very large finishers who act as key links in Scotland’s beef supply chain– each supplied more than 1,000 finished cattle from the 2013 calf crop. There were a handful of farms supplying over 5,000 prime cattle from the calves born in 2013.

Figure 10 Number of calves born in 2013 sent to slaughter per producer



5.0 Beef from Dairy Farms

Table 3 Breed profile of calves born in 2013 on dairy farms

Stabiliser X	186
Beef Shorthorn X	192
Norwegian Red X	211
British Holstein	216
British Blue	328
Jersey X	329
Fleckvieh Cross	405
Simmental	408
Montbeliarde	569
British Friesian X	747
Holstein X	1,072
Aberdeen Angus	1,206
Limousin	1,220
Montbeliarde X	1,258
Hereford X	1,389
Charolais X	1,494
Ayrshire	1,618
Holstein Friesian X	2,147
Simmental X	4,130
British Friesian	4,536
Holstein	6,575
British Blue X	7,094
Aberdeen Angus X	9,378
Limousin X	9,871
Holstein Friesian	30,246

Table 2 highlights that 35% of the calves born on dairy farms in 2013 that were slaughtered by 26 months were Holstein Friesian. 11% were Limousin crosses and a further 11% were Aberdeen Angus crosses. With increased use of sexed semen and some retailers⁷ and dairy processors⁸ more recently moving to encourage a change to the practice of killing pure bred male dairy calves at birth this profile is likely to have changed in recent years. Planned analysis of later years of data will identify any such changes

⁷ <https://www.theguardian.com/environment/2019/aug/21/morrisons-moves-to-end-killing-of-male-calves-at-birth>

⁸ <https://milkprices.com/membersnewsarticle.asp?id=1811>

6.0 Policy considerations

The beef sector is dominated by a relatively small number of large businesses meaning any short term targeted policy actions related to finishing weights, length of time to finish cattle, etc. can impact on the majority of prime stock (80%) by focusing on the largest businesses (20%). For longer term changes outwith a single production cycle (e.g. for genetic improvements, improvements to breeding stock) then targeted policy needs to consider a much wider pool of producers.



There is natural variation in finishing times between breeds, but the level of variance within breeds suggest that a lot of efficiencies can likely be made across the sector. Future policy must take cognisance of the differences between breeds in any measures, and will also need to consider the positioning of Scotch Beef as a high quality, slow finishing, “grass reared” product that differentiates from more intensive beef production in competitor nations.

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