SAC CONSULTING

Part of Scotland's Rural College (SRUC)

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Executive Summary

The QMS Sustainable Producer Group benchmarking programme was launched in January 2022 with the aim to encourage group members to develop their businesses to reduce environmental impact whilst improving economic resilience. Twenty-six businesses across four groups provided economic and carbon footprint data via the QMS Enterprise Profitability system and Agrecalc. Each group member was returned an individual Economic Performance summary per enterprise, a Carbon Audit report, and a group summary.

A large range in results were observed across multiple measures; this is indicative of vast improvement opportunity through learning from one another's businesses. The businesses with low forage and concentrate costs tended to show the greatest profitability. Some businesses, particularly in the sheep breeding enterprise comparisons, had below average costs and above average output; these businesses are exemplar to the other group members to learn from.

With the inclusion of soil carbon sequestration in Agrecalc, some businesses were pleased to see they are carbon negative. This is driven by stocking intensity, land-use change and cultivation. This newer aspect of Agrecalc is undergoing refinement but will prove more valuable in future comparisons.

To balance the functions of food production and environmental conservation, it is common to use the metric *kilograms of CO^2 equivalent per kilogram deadweight*. On this basis, production efficiency has been identified as a key driver of the result.

Benchmarking over the next two years will illustrate the trends within the business, within the groups and across the national dataset. We are refining the process to improve the clarity of the comparisons and meet the needs of the group members.

Contents

1 Introduction

This interim report is to feedback on the findings from Year 1 of data benchmarking from the QMS Sustainable Producer Groups.

The main objectives of the project are:

- Help farmers understand relationship between carbon, meat production and profit.
- Benchmark financial and environmental data.
- Give feedback and discuss development strategies within groups

The process agreed was to work with QMS-established Sustainable Producer Groups to gather financial and environmental performance data and provide support, analysis, and feedback with two rounds of meetings per year.

The aim is to encourage group members to develop their businesses to reduce environmental impact whilst improving economic resilience.

2 Establishing The Process and The Groups

To deliver the above objectives we used the existing QMS Enterprise Profitability system and Agrecalc Carbon Audits. The benefit of these systems is that they are well established and have delivered large data sets. Agrecalc carbon audits were completed by the members themselves, following training, and have been validated by the Agrecalc team.

The groups followed on from the previous QMS Grazing Groups project and consists of 26 businesses across four groups in Scotland: Southwest (membership: 5), Central (membership: 10), Northeast (membership: 5) and North (membership: 6).

The first round of meetings (delivered January 2022) introduced the process to the group members. Following data collection and compilation, we returned individual and group results which were discussed in the second round of meetings in June 2022.

3 Beef Financial Benchmarking

The beef enterprises were split as follows: Spring Calving, Autumn Calving and Beef finishing. Appendix 1 gives detailed breakdown graphs of the enterprise profitability and performance.

3.1 Spring Calving Enterprises

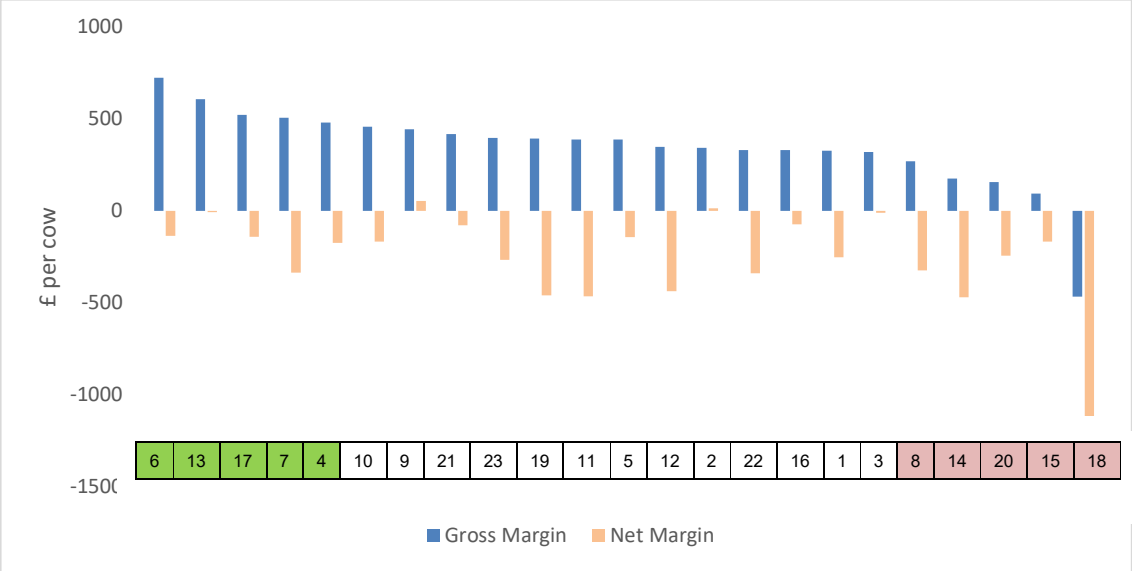

Figure 1 Gross Margin and Net Margin results across the anonymised dataset for Spring Calving Suckler herds; ranked by Gross Margin. Net Margin includes full fixed and variable costs and income collected inclusive of subsidy payments, rent, labour and asset depreciation.

The gross margins in the Spring Calving Suckler datasets averaged £347.05 per cow (ranging from -£464.37 to £724.57 per cow), Fig 1, Table 1.

In all but two of the enterprises assessed, the net margins were negative (mean net margin: -£247.87 per cow, Table 1). A big driver of the discrepancies observed was the allocation of labour; some had allocated a whole salary to the beef enterprise whereas others allocated no labour cost at all, therefore we also derived the results excluding wages (Fig. 2) (mean net margin: -£124.15 per cow, Table 1).

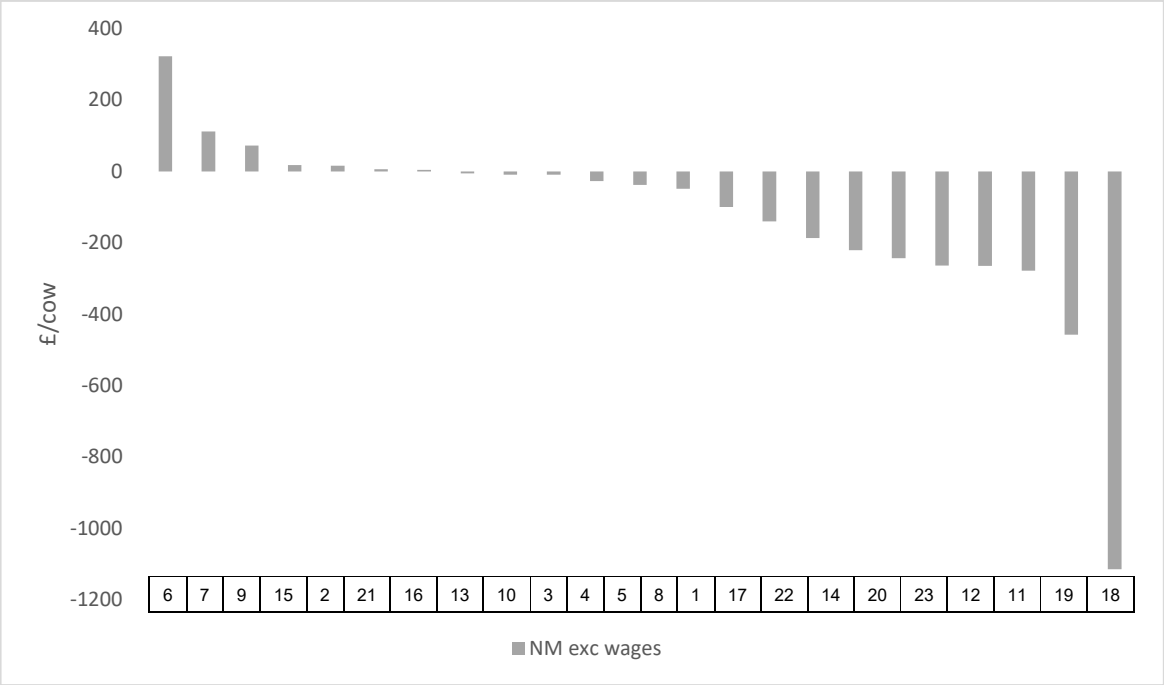

Figure 2 Net Margin excluding wages results across the anonymised dataset for Spring Calving Suckler herds

The results overall indicate the poor profitability of the beef industry, however those that were the most profitable in terms of Net Margin excluding labour were those we recognise as 'grass-based' systems. It is important to note rent is included in the dataset as an actual figure.

Table 1; Summary data for the Spring and Autumn Calving Herds

		Spring Calving			Autumn Calving		
		Av.	Min	Max	Av.	Min	Max
Gross Margin	£ per cow	347.05	-464.37	724.57	323.95	124.55	614.46
Net Margin	£ per cow	-247.87	-1113.65	54.38	-251.68	-573.74	47.68
Net Margin Excl. Wages	£ per cow	-124.15	-1113.65	322.43	-144.89	-336.89	47.68
Fixed costs	£ per cow	594.92	261.19	858.95	575.64	413.37	713.20
Output per calf	£ per cow	690.43	271.00	1000.00	692.60	330.00	1010.00
Weight at sale	kg	293.26	230.00	400.00	288.40	150.00	391.00
Calf value	ppkg	236.66	100.00	336.10	236.98	215.00	258.00
Forage costs	£ per cow	92.20	0.00	207.00	52.03	20.96	117.87
N Fertiliser use	kg N/ha	48.61	0.00	106.00	58.00	22.00	106.00
Concentrate	£ per cow	95.48	6.28	214.88	126.84	42.39	286.84
Vet & med	£ per cow	36.57	7.76	121.43	63.89	21.49	121.00
Barren rate	%	8	0	24	11	3	19
Rearing rate	%	92	81	112	86	78	100
Total variable costs (exc forage costs)	£ per cow	191.74	47.02	414.75	243.55	134.92	473.62

Drivers of profitability

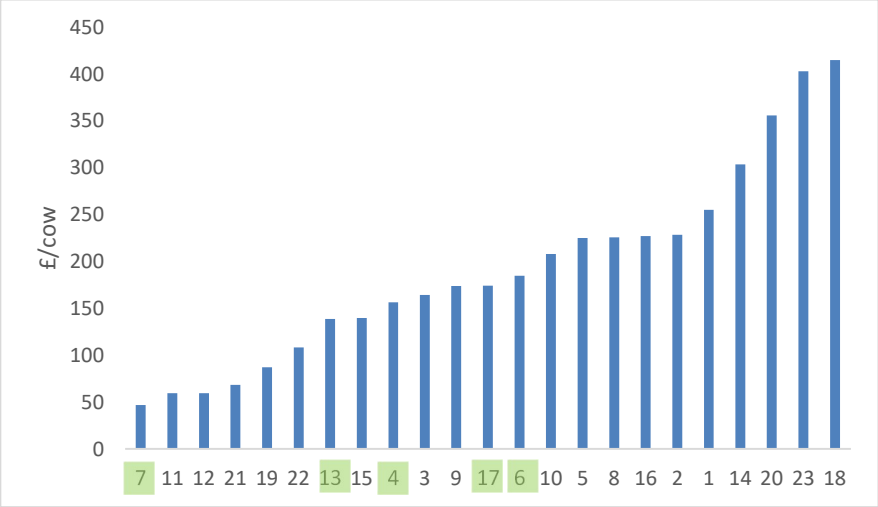

Figure 3 Total variables costs excluding forage across the anonymised dataset for Spring Calving Suckler herds.

The top five businesses in terms of gross margin, had below average variable costs (Fig. 3), although their route to low variable costs differed (see appendices for all graphs). All had above 90% rearing rate and less than 5% barren rate and greater than £684 revenue per calf. Thus, demonstrating the influence of good performance on the costs and revenue of the herds. Each business performance appears to be driven by different aspects of profitability, which means there is opportunity for every business in the group to improve profitability further.

Key conclusions from the Spring Calving financial comparisons

- Low forage cost and concentrate costs are significant drivers of profitability, with some businesses achieving high net margins excluding labour, despite a poor herd production year. With the range in concentrate cost from £6.28/cow to £214.88/cow and forage costs ranging from £0 to £207/cow – there is great opportunity to learn from those with low costs to improve herd profitability. With greater fertiliser and concentrate feed prices seen in 2022, feed and forage costs will become a greater driver in the 2021-22 dataset.
- Veterinary and Medicine cost does not necessarily relate to greater herd profitability, however, the business with the highest veterinary and medicine cost (21 (£121.43/cow) was in the bottom five for gross margin. To understand this further, we

discussed differentiating the proactive health costs (vaccination, health planning, routine visits) and the reactive health costs (antibiotic costs and treatments).

- Fixed costs are important to profitability, however, there is some subjectivity in the allocation of fixed costs which will be clouding the data interpretation. The members agreed that fixed costs will not be collected for the next dataset.
- Output in the dataset is estimated based on calf weight at the end of the year and the value per kilogram. The weights quoted ranged from 230kg to 400kg and priced at £1.00 to £3.36/kg. This reflects different calving times, weaning times and markets. This will also be skewing the results and standardisation of these values will be considered for future comparisons.

3.2 Autumn Calving Comparisons

Figure 3 Gross Margin (GM), Net Margin (NM) and Net Margin excluding labour (NM exc wages) results across the anonymised dataset for Autumn Calving Suckler herds. Full fixed and variable costs and income collected inclusive of subsidy payments, rent, labour and asset depreciation.

There were few Autumn calving enterprises (Fig. 3), and the average margins were slightly lower than the Spring Calving herds, although the range was narrower, Table 1.

The farms with the greatest margins have lower Nitrogen fertiliser use and low forage costs, however 22 goes against the trend with low forage costs and concentrate costs, yet negative net margins due to lighter weight at sale/transfer.

The high barren rate for business 14, which consequently had the lowest rearing percentage coupled with the high feed costs (see Appendix 1, section A1.2) indicates why this business is second lowest profitability in the dataset in terms of gross margin and net margin excluding wages. The business with the lowest profitability (4), also has the lowest weight at sale; output is driving the result for this business.

Key conclusions from the Autumn Calving financial comparisons

With a smaller dataset, it is difficult to derive robust conclusions, however, the businesses with the lowest profitability figures are driven by the feed and forage costs, coupled with lower production per cow. The most profitable businesses are those with either the best herd performance (17) or low concentrate and forage costs (20).

3.3 Beef Finishers

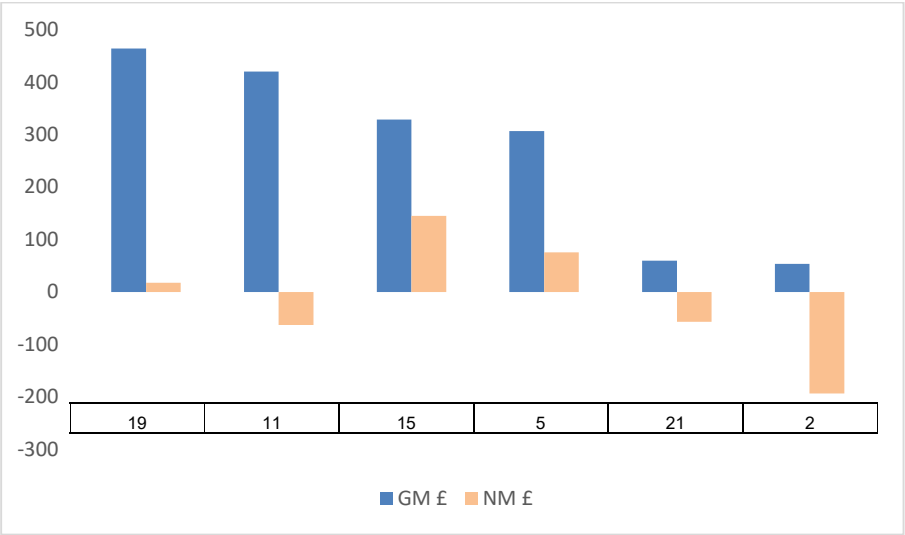

Figure 4 Gross Margin and Net Margin results across the anonymised dataset for Beef Finishing herds. Full fixed and variable costs and income collected inclusive of subsidy payments, rent, labour and asset depreciation.

Summary data for the finishing herds is in Table 2. The business labelled 19 achieved the greatest Gross margin due to the second highest daily liveweight gains (0.89kg liveweight gain/day), second highest finished weight (533kg/head) with low veterinary (£0/head) and feed costs (£104/head). This business has the highest fixed costs, however, and therefore net margins are just positive (£17.67/head); economies of scale would benefit this herd, providing the fixed costs have been allocated fairly.

The profitability of the best-performing business at net margin level (15), is not driven by their animal performance (as seen in Appendix 1, section A1.3) but their low fixed costs and mid-range variable costs. Conversely, the business with the best animal performance figures (21), has the greatest concentrate costs (£430/head) which has a substantial impact on the margins.

Key conclusions from the Beef Finishers financial comparisons

Although the dataset is small, there is evidence that cost is a greater driver of profitability than per head performance, with gross margins ranging from £54/head to £465/head – there is high opportunity to improve the profitability of the businesses on the low profitability end of the scale.

Table 2; Summary data for the Beef Finishing Herds

		Beef Finishers		
		Average	Min	Max
Gross Margin	£ per head	272.90	54.02	464.76
Net Margin	£ per head	-11.96	-193.12	146.06
Total variable costs (exc forage costs)	£ per head	251.94	62.06	499.32
Concentrate	£ per head	197.93	17.14	430.29
Vet & med	£ per head	12.98	0.00	27.64
Forage costs	£ per head	20.64	0.00	32.62
Fixed costs	£ per head	284.85	116.31	483.26
Feeding period	days	312.00	232.00	390.00
Finished weight	kg liveweight	516.50	427.00	600.00
DLWG	kg /day	0.81	0.49	1.03

4 Sheep Financial Benchmarking

The Sheep enterprises were split between breeding- and finishing- enterprises.

4.1 Sheep breeding enterprises

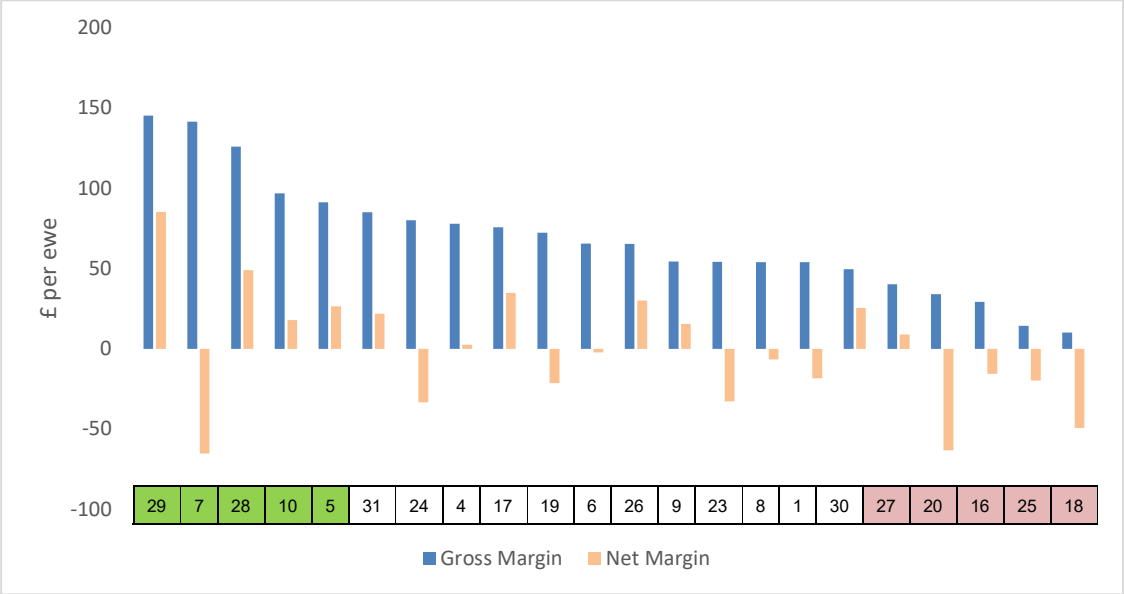

Figure 5 Gross Margin and Net Margin results across the anonymised dataset for sheep breeding flocks. Full fixed and variable costs and income collected inclusive of subsidy payments, rent, labour and asset depreciation.

The top three farmers in terms of gross margin are characterised by:

- Low concentrate costs (all less than £10 per ewe)
- Mid- to low- forage costs (all less than £6/ewe)
- Above average rearing rate
- Above average return per lamb.

Analysing to the net margin level, business 7 has the poorest performance, but this is largely driven by the allocation of wages which is inconsistent between the businesses, this again suggests that either labour standardisation or analysing to gross margin level is more useful.

Table 3; Summary data for the Sheep Breeding Flocks

		Sheep Breeding		
		Average	Min	Max
Gross Margin	£ per ewe	69.01	10.17	145.24
Net Margin	£ per ewe	-0.40	-65.05	85.33
Forage costs	£ per ewe	6.79	0.00	30.19
N Fertiliser use	kg N/ha	43.18	0.00	106.00
Fixed costs	£ per ewe	67.66	24.09	206.62
Barren rate	%	7	2	18
Rearing rate	%	134	63	188
Vet & med	£ per ewe	9.01	0.32	17.95
Conc & other feed	£ per ewe	9.70	0.00	26.84
Return per lamb	£ per lamb	87.18	61.00	110.00
Lamb sale / trans weight	kg	38.09	23.90	56.50
Percent lambs finished	% of lamb crop	0.49	0.03	1.00
Total variable costs (exc forage costs)	£ per ewe	25.69	0.32	53.30

Key conclusions from the Sheep Breeding enterprise financial comparisons

With a £135/ewe difference in gross margin between the highest and the lowest in the group, there is great opportunity for the group members to improve profitability through understanding each other's businesses. With the top three businesses (by gross margin) ranking amongst the six lowest in variable costs, the dataset shows cost, largely driven by concentrate use, is an important profit driver.

Output is important too however, as these lost cost businesses are also in the top five in terms of rearing rate and above average for revenue per lamb. This shows that low cost does not necessarily lead to low output, these are examples of businesses driving profitability on both input and output sides of the equation; great examples to inspire others in the groups.

4.2 Lambing Finishing Enterprises

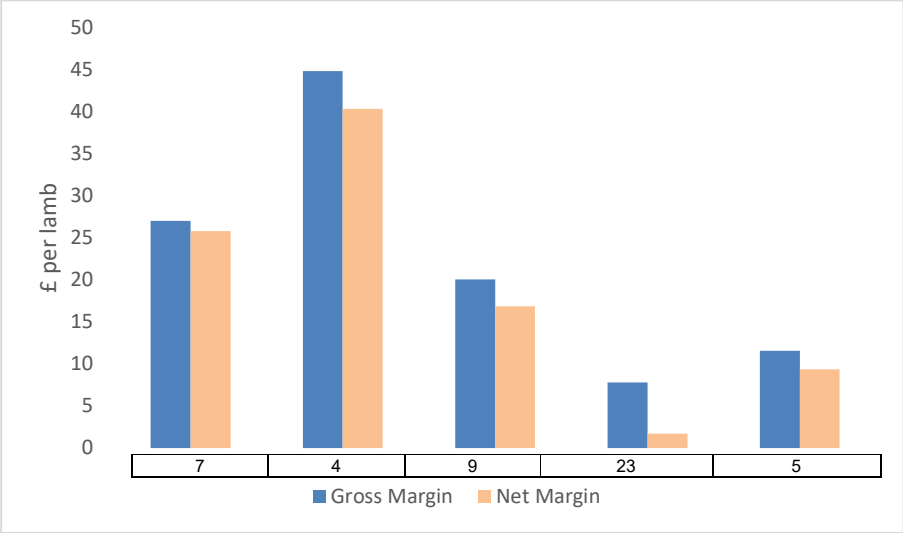

Figure 6 Gross Margin and Net Margin results across the anonymised dataset for lamb finishing enterprises. Full fixed and variable costs and income collected inclusive of subsidy payments, rent, labour and asset depreciation.

One farm (4) stands out with 65% greater gross margin than the next best gross margin and this is despite high concentrate use; the high average lamb sale weight (50kg) and lamb value at sale (£125.30/lamb) are the drivers here, showing revenue was more important than cost of production in the 2020-21 production season. We can expect this high concentrate lamb finishing system to be vulnerable to concentrate price and early season lamb price – future benchmarking will indicate this.

The business with the lowest concentrate feed costs (£0/lamb) is the that with the lowest Gross Margin per lamb, even though sale weight is high (50kg) – this is due to a long finishing period and a pessimistic valuation of the lamb.

Table 4; Summary data for the Lamb Finishing Enterprises

		Lamb Finishing		
		Average	Min	Max
Gross Margin	£ per lamb	22.26	7.80	44.83
Net Margin	£ per lamb	18.82	1.72	40.36
Concentrate	£ per lamb	4.50	0.00	7.67
Feeding period	days	65	38	91
Conc per head kg	kg/head	12.8	0.0	34.0
Sale weight	kg per lamb	44.6	40.0	50.0

Key conclusions from the Lamb Finishing financial comparisons

Drivers of profitable lamb finishing will vary depending on lamb price and input costs. Only five businesses kept lambs long enough (not finished by October 31st) to define the lamb enterprise as separate to the breeding enterprise, these businesses range from mixed arable units to niche products and therefore comparisons based on actual data is challenging. The process could be improved upon in future benchmarking to focus on the production effect of profitability by standardising the lamb price.

5 Carbon Audit Benchmarking

Twenty-four businesses submitted their carbon footprint data via Agrecalc. The national dataset is provided below, we provided the group datasets at the June meetings and looked at parallels between the carbon footprints and the financial- and production- data at the group level.

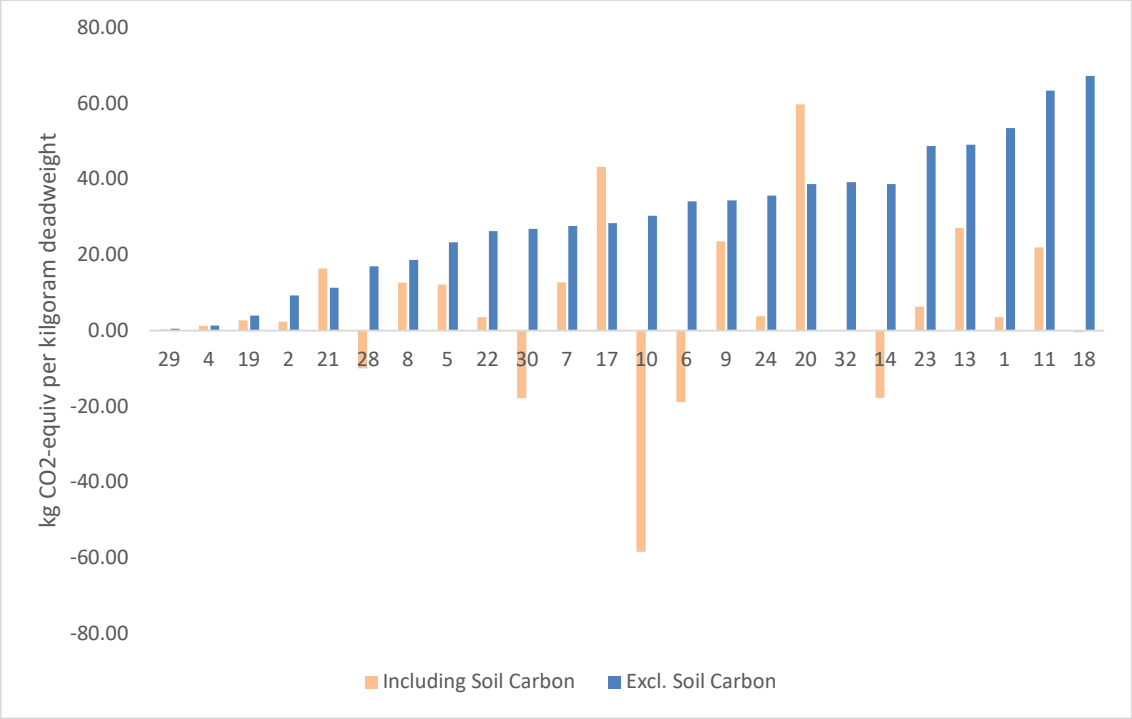

Figure 7 Carbon emissions (expressed as kilograms of CO2 equivalent per kilogram deadweight) of the anonymised businesses in the dataset, ranked lowest to highest kg CO2 equivalent per kg deadweight excluding soil carbon

The soil carbon sequestration calculations are a new addition to Agrecalc which will be further refined with user feedback and science development, the main influencers of soil carbon sequestration in the model are land-use change, stocking intensity and cultivation methods. We looked at the data including- and excluding- soil carbon separately, as not all businesses will have the opportunity to store more carbon in their soils. Business 28, 30,10, 8 and 14 were pleased to see, with the inclusion of soil carbon, the model deemed their businesses carbon negative. Some businesses saw their carbon footprint increase with the inclusion of soil carbon sequestration (Businesses: 21, 17 and 20), this is influenced by stocking intensity – based on global data, heavily stocked livestock farms have shown soil carbon loss. Rotational grazing will improve this outcome of the model, as the increased

grass utilisation observed under rotational grazing can change a farm deemed heavily stocked to a lower intensity category.

The farms with the lowest carbon footprints excluding soil carbon (29 and 4) are mixed livestock and arable farms and therefore have low carbon emissions per kilogram of output at the farm scale (i.e., grain is not associated with high methane emissions).

The Effect of Output

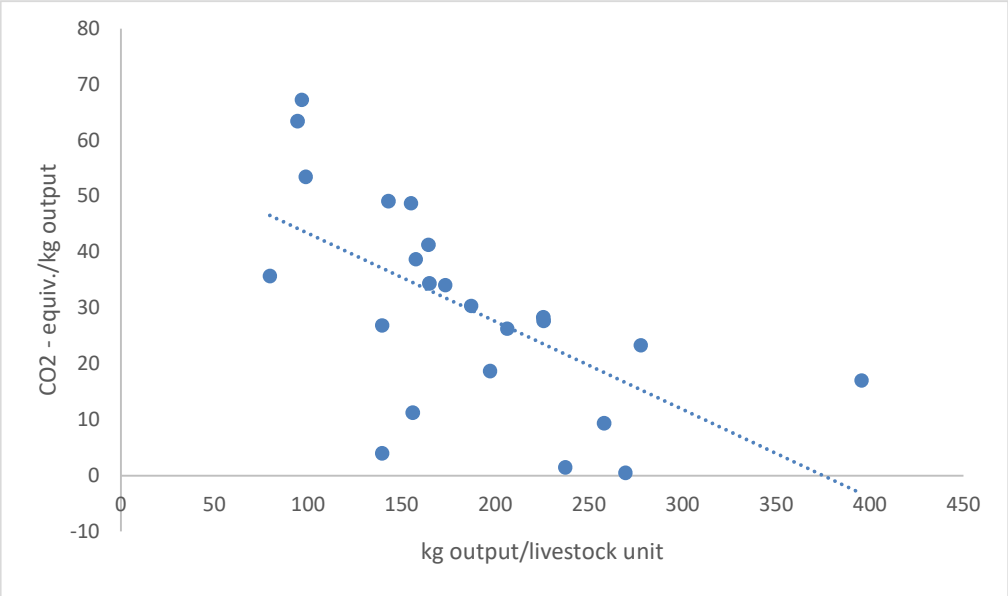

Figure 8 Relationship between Carbon emissions (expressed as kilograms of CO2 equivalent per kilogram deadweight) and livestock product output per livestock unit

Using the metric, kilograms of CO^2 equivalent per kilogram deadweight, to balance the functions of food production and environmental conservation, will favour efficient businesses. To illustrate this, figure 8, compares the results with kg output per livestock unit equivalent and Figure 9 shows the businesses most efficient in this regard.

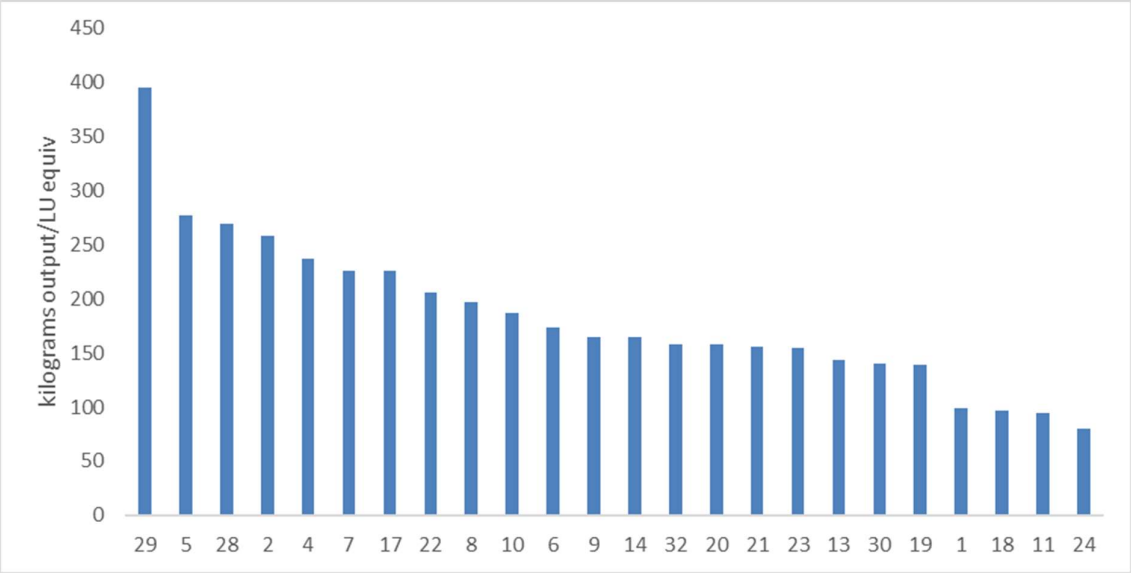

Figure 9 Production efficiency (based on kg livestock output/livestock unit) of the anonymised businesses in the dataset

This data is skewed by replacement rate and culling decisions for the year of assessment – those farms with a high replacement rate or building the herd/flock will look poorer in terms of their carbon footprint than those culling heavily or with a low replacement rate because their output will be lower compared with the livestock maintained on farm. This is a limitation of an annual snapshot and justifies the need for long term monitoring to gain a medium-term average. For this reason, there was no clear association between the carbon footprint data and financial performance data for 2020-21 season, but the discussions held at the June 2022 feedback meetings were useful to draw out these differences.

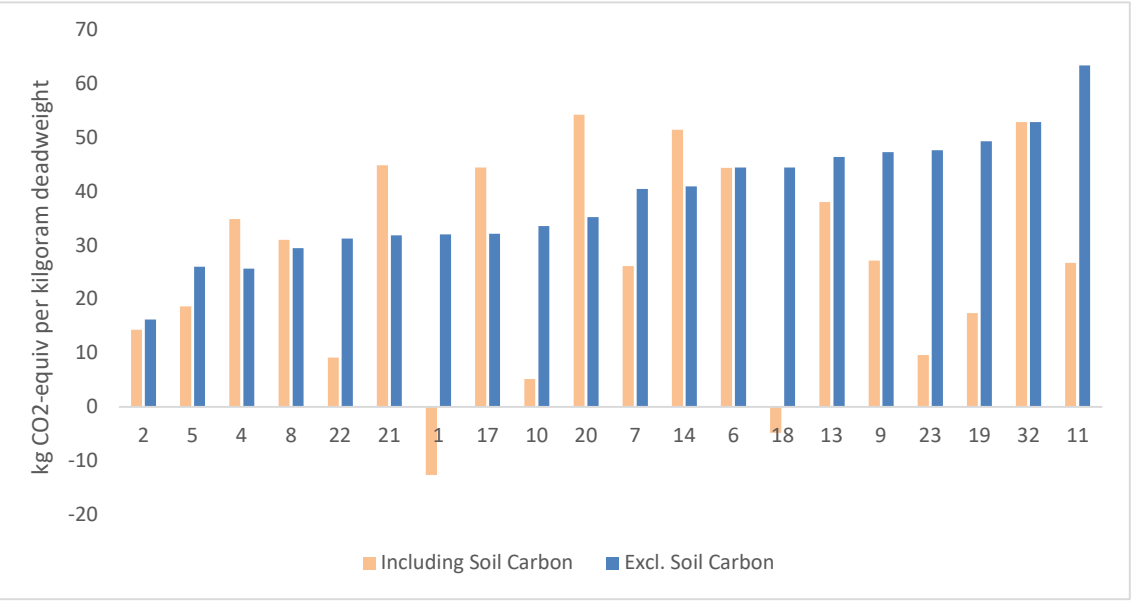

Figure 10 Carbon emissions the anonymised beef enterprises in the dataset, ranked lowest to highest kg CO^2 equivalent per kg deadweight excluding soil carbon

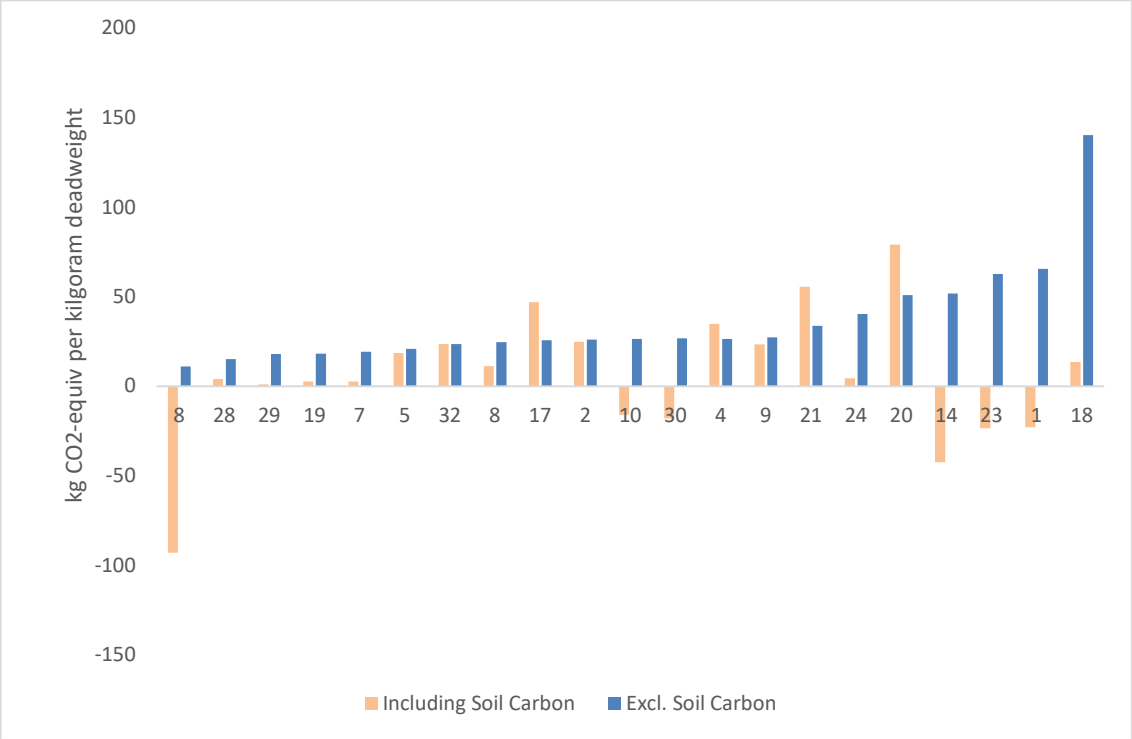

Figure 11 Carbon emissions of the anonymised sheep enterprises in the dataset, ranked lowest to highest kg CO2 equivalent per kg deadweight excluding soil carbon

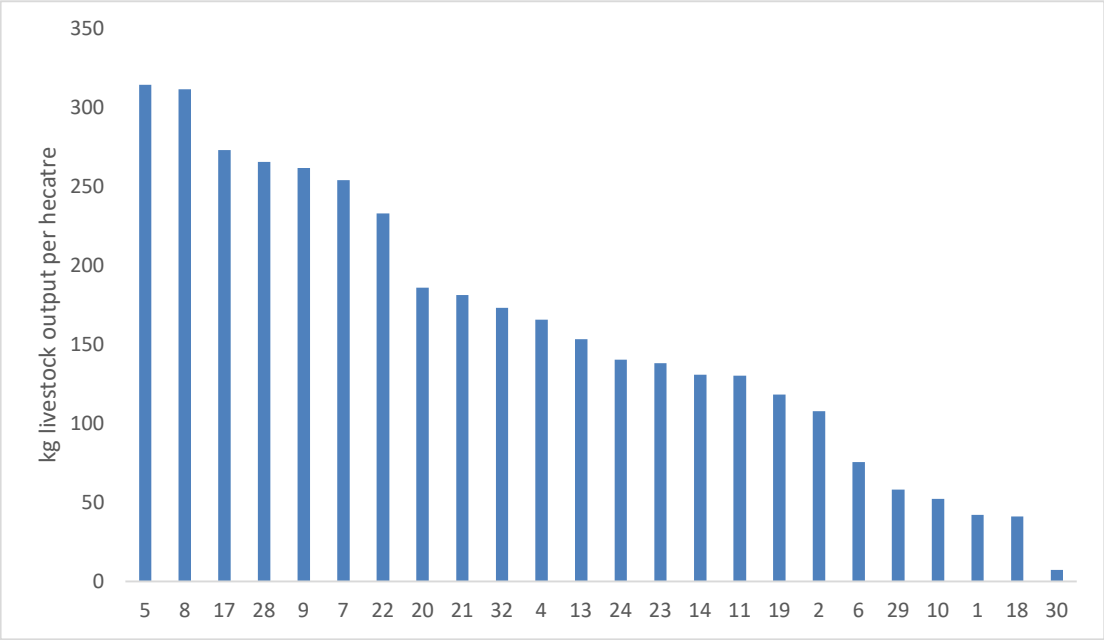

Figure 12 Kilogram of livestock output per hectare (deadweight basis), derived from the Agrecalc data.

Finally, the livestock production per hectare (deadweight basis, derived from the Agrecalc data) provides another indicator of business efficiency and should indicate the businesses with the greatest net margin when fixed costs such as rent are standardised. Grazing strategy will influence this result.

6 Communication Messages

- The large range observed across the national groups over several economic-, production- and environmental- measures indicates high scope for improvement through comparing businesses and discussing the results, every business stands to gain from one another. No business is leading on every measure.
- Where in the past, 'high cost-high revenue' businesses may have been the most profitable, there is indication that the low-cost businesses are now leading the profitability ranks. This is clearest in the Spring Calving and Sheep breeding enterprises. The most commendable are the 'low cost-high revenue' businesses which were apparent in the Sheep Breeding Enterprise comparisons.
- Production efficiency expressed in kilograms of output per livestock unit, influences the farms carbon outputs. The linkage between profitability and carbon footprint is unclear at this stage however due to culling and replacement rates influencing the output result.

7 Looking forward

Year one has established the process and launched the groups. We have refined the process and defined improvements to enable us to derive clearer results in the next dataset. Following the discussions during the feedback meetings, we hope that the group members are learning from one another, and with the future benchmarking results, the individual business trends may illustrate their improvements as a result.

We held the meetings to launch the second year of data collection in November 2022, during which we instructed the members to gather data for the year running from November 1st 2021 to October 31st 2022. They have been given the deadline: December 31st 2022.

We aim to confirm and collate their data to feedback in meetings in February and March 2023.

Timetable for Year 2

	Nov	Dec	Jan	Feb	Mar	Apr	Jun
Initial meeting delivery Y2 x 4							
Initiate 2021-22 data collection							
Farmer deadline to return data							
Feedback meetings x4							