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Preferences in traits and management characteristics for dairy-beef animals from a survey of New Zealand farmers

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ABSTRACT

There are three parties involved in the expansion of dairy-beef or beef-on-dairy within New Zealand, they are namely, beef breeders, dairy farmers and beef finishers. Within these three groups, there are different requirements for an animal within each those industries. In 2022, Beef + Lamb New Zealand conducted a survey to collect responses from 121 respondents across these 3 parties, to gauge farmer preferences. The survey contained questions relating to the management of young cattle from birth through to weaning or sale (depending on management practice), and then from weaning or purchase through to finishing. All farmers were asked what traits they selected for in bulls, and what they based purchasing decisions on. The results showed a series of trends, related to breed choice, price and perceived benefit to their farming system. Calves from dairy cattle that had some Jersey genetics were seen as a finishing risk and were less attractive to finishing operations. There appeared to be a disconnect between the preferences of dairy and beef finishing operations, with sire selection having opposite selection criteria. The results of this survey indicate that work needs to be taken to align the goals of both beef finishers and dairy farmers.

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Introduction

With the expansion of the dairy industry over the past 20 years within New Zealand, there has been an increase in the number of surplus non-replacement calves of dairy-origin (LIC and DairyNZ 2023). This has led to an increase in the promotion of high-quality beef sires to produce dairy-origin animals for the beef finishing industry. However, this is not a new proposition, with previous research establishing the value from using high genetic merit beef sires in the dairy industry (Martín et al. 2020; Addis et al. 2022). Farmer opinions on the growth, meat quality and robustness of calves are cited as limitations for the uptake of dairy farmers to purposefully produce animals for the beef finishing industry (Edwards et al. 2021). There is considerable public pressure on the dairy industry for greater utilisation of surplus animals produced

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each season and a reduction in the numbers of animals for slaughter before 10 days of age. As the world moves towards more sustainable practices across the livestock production sectors, there will be an increased drive to utilise these animals in a different manner. There is also a climatic argument for the use of dairy-origin animals in the beef industry with research reporting significantly lower carbon emissions from beef when the dam is a dairy cow compared with a beef cow (van Selm et al. 2021). To explore the farmer perceptions of dairy-origin animals a survey was conducted by Beef and Lamb NZ Ltd. This article presents a summary of farmer perceptions and provides some insights for those involved in dairy, beef-on-dairy and beef finishing industries on how to best convey the benefits of dairy-origin animals.

Materials and methods

An online survey consisting of 76 questions was conducted from 19th May until 27th June 2022. Respondents were sought via promotion to calf rearers, beef finishers and dairy farmers through Beef and Lamb NZ Ltd communication channels (website, email and newsletters), as well as their website. To facilitate participation participants were advised that a five-dollar donation would be made to the Rural Support Trust for each completed survey. The survey contained a mix of free text answers and rankings of satisfaction, importance, or influence of options from 1 to 7 (1 = low to 7 = high). Retrospective human ethics was deemed to be low risk and was granted through the Massey University Human Ethics Committee (Notification number: 4000026385).

A total of 121 participants completed the survey which provided 181 different permutations of answers (questions presented to farmers were dependent on the categories they completed in a previous section). Participants were classified by their dominant livestock class into: Dairy Farming ($N = 7$), Beef Finishing ($N = 39$), Sheep and Beef ($N = 22$), Calf Rearing ($N = 51$), Other ($N = 2$). These classifications were based on a combination of farmer self-designation and the category with the greatest stock numbers reported. Responses were analysed using a Proc Logistic (SAS version 9.4; SAS Institute Inc., Cary, NC, USA) with the fixed effect of farming system to obtain mean score and standard errors of responses.

Low numbers of respondents; there were a low number of respondents for both the Dairy Farming and Other category. The Other group is not discussed in further detail, however, the Dairy Farming group is to highlight that while these are a low number of responses that the Dairy Farming opinions are essential in the conversation about Dairy-Beef trait selection and management practises. This limits the number of conclusions which can be drawn from these data, as a result the results from the dairy farm responses are a reflection of those who completed the survey.

Results and discussion

Dairy-beef – rearing to weaning

Respondents were asked to select their selection criteria of calves to be retained or purchased for rearing, from a pre-populated list. The selection criteria included Breed, Price, Colour/markings, Sufficient Colostrum, General Health, Live weight, Health status, relationship /contract with dairy farm or other which could be provided by the

respondent. A total of 398 responses were generated by 121 respondents. The most common responses were General Health ($n = 45$) and Breed ($n = 45$) followed by Sufficient Colostrum ($n = 38$). Colour, Contracts, Markings and Farmer Relationships all gained 35 responses. Other responses included TB status, Local Proximity and Rearing Capacity which each received 1 response.

Calf rearing traits and practises with high importance

The traits or conditions of highest importance across all groups were 'Being able to source healthy, high-quality calves when you want them' (6.5/7 $n = 51$, Table 1) and 'Calf growth rate during rearing', 'That the calves you rear, grow rapidly to weaning' and 'That the calves you rear, grow rapidly post weaning' (6.3–6.4 Table 1). Indicating the importance of sourcing health, high growth rate calves. The other factors of moderate importance are detailed in Table 1. Regarding bull selection criteria or traits of importance for breeding (Table 2, section a), 'Growth Potential' (6.7/7 $n = 44$), 'Feed Efficiency' (6.3/7 $n = 42$) and 'Calf Vigour' (6.1/7 $n = 42$) were all identified as the most significant traits for all farm systems. From a dairy farming only perspective, the traits of highest importance were 'Calving Ease' (7/7 $n = 7$) and 'Short Gestation' (6.3/7 $n = 7$), which were all greater than 'Growth Potential', the latter represents the areas of concern for dairy farmers. Dairy farmers will want a calf which does not extend the inter-calving interval and will not cause cow losses from dystocia. Unsurprisingly these traits were of least importance to the finishing farmers. This is likely because these traits are not expressed within their system or may even negatively impact their operations (lower birth weights or longer rearing times).

Calf rearing traits and practices with low importance

The weaner calf rearing factors with the lowest importance practices were related to Contracting, with 3.5/7 (Table 1, $n = 42$) for 'Having a binding contract with a dairy farmer' and 3.9/7 (Table 1, $n = 31$) for 'Having a binding contract with a finisher'. Beef finishing had the highest importance for 'Having a binding contract with a dairy farmer' (4.5/7 $n = 4$, Table 1) and dairy farming had the highest importance for 'Having a binding contract with a finisher' (5/7 $n = 2$, Table 1), which reflects the relationships between these two farm systems. From a breeding perspective, the trait of lowest importance was found to be 'Short gestation' (3.5/7 overall, Table 2, section a) except for dairy farmers who scored it 7/7, as discussed previously. 'Lower methane emissions' had the next lowest ranking (4.2/7 $n = 56$, Table 2, section a). This is understandable as methane emissions currently have little to no economic influence on farming operations.

Calf rearing traits and factors with high satisfaction

In terms of dairy-beef rearing farm systems, farmers were most satisfied with their 'Satisfaction with high quality calves' (overall 5.5/7, Table 3, section b). However, sheep and beef farmers rated this lower (4.8/7 $n = 5$, Table 3, section b) than the other three farm systems groups. The next highest category was satisfaction with 'calf growth rates you currently achieve' (overall 5.0/7 $n = 60$, Table 3, section b); however, again the sheep and beef and beef finishing farm systems were lower (4.4/7 $n = 5$).

Table 1. Mean score of importance (1 = low importance, 7 = high importance, ±standard error) for factors relating to dairy-beef calf rearing through to post-weaning for different farming systems.

	Price paid for calves		Sourcing healthy, quality calves		Long-term relationship with dairy farmer		Binding contract with dairy farmer		Growth during rearing		Price received weaners		Premium for Beef-cross		Breed and meat quality	
Farm system[1]	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*
Overall	5.51	45	6.50	51	5.90	52	3.47	42	6.27	61	6.14	37	5.54	39	5.63	59
Beef Finishing	6.0 ± 0.68	4	6.6 ± 0.35	5	6.8 ± 0.71	5	4.5 ± 1.09	4	6.4 ± 0.31	8	7.0 ± 0.53	5	5.3 ± 0.95	3	4.6^{b} ± 0.66	5
Dairy Farming	5.5 ± 0.97	2	6.7 ± 0.45	3	6.8 ± 0.80	4	2.5 ± 1.55	2	6.8 ± 0.39	5	7.0 ± 1.19	1	4.7 ± 0.95	3	6.8^{a} ± 0.66	5
Dairy-Beef rearing/finishing	5.6 ± 0.24	34	6.6 ± 0.13	38	5.7 ± 0.26	38	3.3 ± 0.40	30	6.3 ± 0.14	40	5.9 ± 0.23	28	5.6 ± 0.29	31	5.6^{ab} ± 0.22	45
Sheep and beef	4.4 ± 0.62	5	6.4 ± 0.35	5	5.8 ± 0.71	5	4.0 ± 0.89	6	5.9 ± 0.33	7	6.0 ± 0.69	3	6.0 ± 1.16	2	6.0^{ab} ± 0.74	4

	Long term relationship with beef finisher		Contract with finisher		Payment security for weaners		Sale price certainty – weaners		Gross margin on weaned calves		Rapid growth to weaning		Rapid growth post weaning	
Farm system[1]	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*
Overall	4.88	32	3.90	31	5.24	34	5.67	39	6.02	49	6.40	60	6.33	61
Beef Finishing	6.0 ± 1.07	3	2.0 ± 1.22	3	4.0 ± 1.07	3	5.3 ± 0.82	3	6.3 ± 0.73	3	6.3 ± 0.46	4	6.2 ± 0.49	5
Dairy Farming	6.0 ± 1.31	2	5.0 ± 1.49	2	7.0 ± 1.30	2	6.5 ± 1.00	2	5.5 ± 0.63	4	6.8 ± 0.37	6	6.5 ± 0.46	6
Dairy-Beef rearing/finishing	4.7 ± 0.36	27	4.0 ± 0.41	26	5.2 ± 0.35	28	5.7 ± 0.26	31	6.8 ± 0.20	38	6.4 ± 0.14	45	6.3 ± 0.17	45
Sheep and beef	–	–	–	–	7.0 ± 1.84	1	5.3 ± 0.82	3	5.8 ± 0.63	4	6.0 ± 0.41	5	6.4 ± 0.49	5

[1]Dominant farming system as identified by respondent response and predominant reported livestock class, *n* = number of respondents. rows with different superscripts are significantly different ($P < 0.05$) otherwise no significant difference between farming systems.

Table 2. Mean score of importance (1 = low importance, 7 = high importance, ± standard error) of selection criteria for beef bulls to produce calves from the dairy industry (section a) and factors for rearing dairy-beef weaner calves across different farm systems (section b) for different farming systems.

Section a	Calving ease		Short gestation		Calf Vigour		Growth potential		Carcase and Meat quality		Disease Resistance		Feed efficiency		Methane Emissions		Colour markings		Muscling					
	Temperament		Polled																					
Farm system[1]	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*
Overall	4.89	55	3.51	55	6.19	59	6.66	61	5.83	60	5.86	59	6.22	58	4.19	56	4.66	58	5.41	56	5.59	59	5.23	57
Beef Finishing	2.8[b] ± 0.95	5	3.6[b] ± 0.97	5	6.4 ± 0.53	5	7.0[a] ± 0.27	5	5.6[ab] ± 0.65	5	6.8 ± 0.61	5	5.8 ± 0.48	5	4.0 ± 0.89	5	4.2 ± 0.99	5	5.4 ± 0.67	5	5.6 ± 0.69	5	6.5 ± 0.85	4
Dairy Farming	7.0[a] ± 0.81	7	6.3[a] ± 0.82	7	6.3 ± 0.45	7	6.1[b] ± 0.23	7	4.9[b] ± 0.55	7	5.6 ± 0.51	7	6.0 ± 0.45	6	4.4 ± 0.75	7	4.9 ± 0.84	7	5.0 ± 0.32	6	6.1 ± 0.59	7	6.1 ± 0.64	7
Dairy-Beef rearing/ finishing	4.8[b] ± 0.33	41	2.9[b] ± 0.34	40	6.1 ± 0.18	42	6.7[a] ± 0.09	44	5.9[ab] ± 0.22	43	5.8 ± 0.21	42	6.3 ± 0.17	42	4.3 ± 0.31	41	4.8 ± 0.34	42	5.5 ± 0.24	40	5.5 ± 0.24	42	4.9 ± 0.26	42
Sheep and beef	5.0[ab] ± 1.51	2	5.0[ab] ± 1.25	3	6.4 ± 0.53	5	6.6[ab] ± 0.27	5	6.6[a] ± 0.65	5	5.6 ± 0.61	5	6.0 ± 0.49	5	2.7 ± 1.15	3	3.5 ± 1.10	4	5.4 ± 0.67	5	5.8 ± 0.69	5	6.0 ± 0.85	4

Section b	Source high quality weaner calves		Price of weaner calves		Long-term relationship with rearer		Binding contract with calf-rearer		Growth rate during finishing		Finishing cattle before second winter		Price for finished cattle		Certainty of selling finished cattle		Gross margin for finished cattle		Premium for beef cross cattle over Friesian bulls		Long-term relationship with processor selling cattle		Binding contract with processor	
Farm system[1]	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*
Overall	5.82	76	5.30	76	5.24	63	3.85	55	6.15	96	5.57	89	6.19	97	5.74	99	6.04	99	5.00	85	5.94	96	4.88	86
Beef Finishing	5.8 ± 0.24	35	5.3 ± 0.25	35	4.9 ± 0.36	26	3.8 ± 0.41	24	6.1 ± 0.15	38	5.6 ± 0.28	34	6.3 ± 0.18	39	5.7 ± 0.23	39	6.2 ± 0.19	39	4.7 ± 0.34	35	5.9[ab] ± 0.21	39	5.0 ± 0.29	35
Dairy Farming	5.0 ± 1.42	1	5.0 ± 1.49	1	6.0 ± 1.85	1	6.0 ± 2.02	1	6.3 ± 0.55	3	5.3 ± 0.94	3	5.5 ± 0.81	2	5.3 ± 0.84	3	5.7 ± 0.67	3	4.5 ± 1.41	2	4.3[b] ± 0.75	3	4.5 ± 1.23	2
Dairy-Beef rearing/ finishing	5.6 ± 0.34	18	5.1 ± 0.35	18	5.7 ± 0.44	18	4.1 ± 0.51	16	6.2 ± 0.16	33	5.8 ± 0.29	30	6.0 ± 0.20	33	5.5 ± 0.25	35	5.9 ± 0.20	35	4.9 ± 0.38	28	6.1[a] ± 0.23	32	4.7 ± 0.32	29
Sheep and beef	6.1 ± 0.32	20	5.4 ± 0.33	20	5.1 ± 0.45	17	3.7 ± 0.56	13	6.1 ± 0.21	21	5.2 ± 0.36	21	6.2 ± 0.25	21	6.2 ± 0.33	20	6.0 ± 0.26	20	5.6 ± 0.47	18	5.9[ab] ± 0.29	19	4.9 ± 0.41	18

	Payment security finished cattle		Cattle produce high meat yield		Breed of cattle		Meat quality		Fit with existing or other farm systems	
Farm system[1]	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*
Overall	6.07	94	5.73	97	4.85	96	5.20	95	6.05	96
Beef Finishing	6.3 ± 0.19	38	5.6 ± 0.21	39	4.6 ± 0.29	37	5.4 ± 0.27	39	6.1 ± 0.19	36
Dairy Farming	7.0 ± 0.86	2	5.7 ± 0.76	3	5.7 ± 1.04	3	5.3 ± 0.96	3	6.3 ± 0.66	3
Dairy-Beef rearing/finishing	6.1 ± 0.21	33	5.8 ± 0.23	34	4.7 ± 0.31	33	5.0 ± 0.29	33	6.0 ± 0.81	35
Sheep and beef	5.6 ± 0.28	19	6.0 ± 0.29	20	5.2 ± 0.39	21	5.1 ± 0.38	19	6.1 ± 0.26	20

[1]Dominant farming system as identified by respondent response and predominant reported livestock class, *n* = number of respondents, rows with different superscripts are significantly different ($P < 0.05$) otherwise no significant difference between farming systems.

Calf rearing traits and factors with low satisfaction

The lowest category for satisfaction was the 'can sell your calves with certainty when you want to' with an overall score of 3.5 out of 7 ($n = 47$, Table 3, section b). Scores for this factor were low across all farm systems. The other questions were neither relatively high nor low for satisfaction. This indicates areas where farmers are neither unhappy nor happy with the status quo, with average scores between 4 and 5 overall indicating satisfaction is average. The lowest scores for this group of questions were a 3.0/7 ($n = 4$, Table 3, section b) from dairy farmers for 'relationships you have with beef finishers for selling weaner calves' and a 3.3/7 ($n = 3$, Table 3, section b) for 'payment security offered by your main weaner calf buyer'.

Satisfaction with post-weaning traits and factors

The highest ranked factor was 'payment Security offered by your main meat processor' (5.3/7 $n = 100$, Table 3, section a). There were no weaner calf factors had a mean satisfaction score greater than 6 or less than 3 out of 7. The lowest satisfaction score was for 'finished dairy-beef cattle have high meat quality and receive processor premiums' (3.9/7 $n = 95$, Table 3, section a). All other factors were moderately ranked with means between 4.0/7 and 5.0/7.

Post-weaning satisfaction by farm system

Respondents that identified as dairy farming had the fewest responses per question (range of 1–3 responses in Table 3, section a). Those that responded had high satisfaction with their ability to source 'high quality dairy-beef weaner calves' (6.5/7, $n = 2$, Table 3, section a), 'relationships with rearers for sourcing calves' (7.0/7, $n = 1$), ' cattle growth rates you currently achieve' (6.3/7, $n = 3$), the proportion of 'proportion of cattle you finish before their second winter' (6.5/7, $n = 2$) and 'cattle you finish produce a high meat yield' (6.0/7, $n = 2$).

Respondents from all other farming types were moderately satisfied with their ability to source 'high quality dairy-beef weaner calves' (scores between 4.5 and 4.9), 'relationships with rearers for sourcing calves' (scores between 4.7 and 5.3), 'cattle growth rates you currently achieve' (scores between 4.8 and 5.0), 'proportion of cattle you finish before their second winter' (scores between 4.3 and 5.0) and the 'cattle you finish produce a high meat yield' (scores between 4.4 and 4.9).

All respondents regardless of their farm system were moderately satisfied that 'finished dairy-beef cattle have high meat quality and receive processor premiums' (scores between 3.8 and 4.3/7). All respondents, except dairy farmers, were moderately satisfied with the 'certainty that you are able to sell your finished cattle when you want to' (scores between 3.9 and 4.3). The two dairy farming respondents had a much lower satisfaction score (2.0 out of 7). Similarly, all respondents, except dairy farmers, were moderately satisfied with the 'payment security offered by your main meat processor' (scores of 5.2–5.6). The three dairy farming respondents were slightly less satisfied with a mean score of 4.7/7.

Importance of post-weaning factors

Post-weaning factors with high importance

Factors that were scored as highly important (mean score of 6 or greater) included 'growth rate during finishing' (6.2/7 $n = 33$, Table 2, section b), the 'sale price for

Table 3. Mean score of satisfaction (1 = low satisfaction, 7 = high satisfaction, ± standard error) with current situation of dairy beef weaner calves across different farming systems (section a) and for factors relating to dairy-beef calf rearing through to weaning (section b) for different farming systems.

Section a	Source quality Dairy-beef Weaners		Rearers for sourcing calves		Cattle growth rates		Percentage cattle finished before second winter		Processor selling finished cattle		Certainty of selling finished cattle		Finished Dairy-beef cattle produce high meat yield		Finished Dairy-beef cattle high quality & receive premiums		Payment security – main processor	
Farm system[1]	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*
Overall	4.82	65	5.03	65	5.00	99	4.55	91	4.91	100	4.03	102	4.85	97	3.91	95	5.33	100
Beef Finishing	4.9 ± 0.28	26	5.1 ± 0.32	26	5.0^{ab} ± 0.19	39	4.9 ± 0.33	32	5.1 ± 0.29	39	4.0 ± 0.31	39	4.9 ± 0.25	37	3.8 ± 0.28	37	5.6 ± 0.29	39
Dairy Farming	6.5 ± 1.15	2	7.0 ± 1.62	1	6.3^{a} ± 0.67	3	6.5 ± 1.32	2	4.7 ± 1.03	3	2.0 ± 1.38	2	6.0 ± 1.06	2	4.3 ± 0.97	3	4.7 ± 1.04	3
Dairy-Beef rearing/ finishing	4.9 ± 0.33	20	5.3 ± 0.36	20	4.9^{ab} ± 0.19	36	4.2 ± 0.31	35	4.8 ± 0.29	36	3.9 ± 0.32	38	4.9 ± 0.25	36	4.0 ± 0.28	35	5.2 ± 0.30	35
Sheep and beef	4.6 ± 0.38	17	4.7 ± 0.39	17	4.9^{b} ± 0.26	20	4.3 ± 0.41	21	4.8 ± 0.39	21	4.3 ± 0.43	21	4.4 ± 0.33	21	3.8 ± 0.38	19	5.2 ± 0.39	21

Section b	Satisfaction with high quality calves		Satisfied with relationship with dairy		Satisfied with growth rates		Relationship with beef finishers		Can sell with certainty when required		Payment security from calf buyer		Rapid growth after weaning	
Farm system[1]	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*
Overall	5.48	50	5.60	48	5.02	60	4.13	39	3.50	47	4.30	36	5.0	60
Beef Finishing	5.8 ± 0.73	5	6.6 ± 0.72	5	4.4 ± 0.66	5	4.7 ± 0.99	3	3.0 ± 1.08	3	5.0 ± 1.05	3	3.8^{c} ± 0.59	5
Dairy Farming	7.0 ± 1.62	1	4.7 ± 0.93	3	6.0 ± 0.66	5	3.0 ± 0.86	4	3.8 ± 0.84	5	3.3 ± 1.05	3	5.8^{a} ± 0.54	6
Dairy-Beef rearing/ finishing	5.5 ± 0.26	39	5.6 ± 0.27	35	5.0 ± 0.22	45	4.3 ± 0.32	30	3.5 ± 0.31	36	4.3 ± 0.34	29	5.1^{ab} ± 0.20	44
Sheep and beef	4.8 ± 0.73	5	4.6 ± 0.72	5	4.4 ± 0.66	5	4.0 ± 1.22	2	3.3 ± 1.08	3	5.0 ± 1.81	1	4.0^{bc} ± 0.59	5

[1]Dominant farming system as identified by respondent response and predominant reported livestock class, n = number of respondents. rows with different superscripts are significantly different ($P < 0.05$) otherwise no significant difference between farming systems.

finished cattle' (6.2/7 $n = 21$), the 'gross margin on finished cattle' (6.2/7 $n = 20$), 'payment security for finished cattle' (6.1/7 $n = 33$ Table 2, section b) and 'fit with existing or other farm systems' (6.1/7 $n = 20$, Table 2, section b).

Post-weaning factors with low importance

No factors had mean importance scores less than 2. The lowest scored factor was having a 'binding contract with a calf-rearer' (3.7/7 $n = 13$, Table 2, section b).

Post-weaning factors of importance by farm system

There was agreement in importance between respondents from different farming farm systems across many of the factors ($n = 7$ of 18 Table 2, section b). As with satisfaction the importance scores that differed were predominantly those of dairy farmers which was likely due to the low number of respondents. 'The breed of cattle you finish' was more important to both dairy (5.7/7 $n = 3$, Table 2, section b) and sheep & beef (5.2/7 $n = 21$, Table 2, section b) farmers than beef finishing (4.6/7 $n = 37$, Table 2, section b) or dairy-beef finishing farmers (4.7/7 $n = 33$, Table 2, section b).

Number and percentage of cattle sold and finished

In the last year, and over the last 5 years, beef finishing farms finished the greatest number of dairy-beef cattle per year followed by specialist dairy-beef finishing farms. The percentage of cattle finished varied widely within each farm class from 72% to 100%.

Of the cattle sold in the last year by beef finishing, dairy-beef finishing and sheep & beef farms the predominant breed type was Friesian bulls. The second most common cattle sold were beef heifers for beef finishing and sheep & beef farmers whereas for dairy-beef finishers it was dairy-beef steers.

Across all farm systems and respondents the most common dairy-beef breed-cross was Hereford ($n = 47$ farms) followed by Angus ($n = 25$ farms) and Speckle park ($n = 7$ farms), this included adjustment for number of animals on farm.

Selection criteria for dairy-beef weaners

Overall, of the seven options provided 'Price' and 'Live Weight' were selected by 52% (Table 4) of all respondents as the most common criteria for selecting dairy-beef weaners. 'Breed' and 'Health Status' were also selected by more than 40% ($n = 95$, Table 4) of respondents. Within farm system, however, there were wide fluctuations in selected criteria: among beef finishers ($n = 37$) 68% selected 'Price' and only 'Live weight' and 'Availability' were selected by more than 40%. Among dairy-beef finishers ($n = 33$), 'Price' was selected by 39% whereas 'Live weight' (58%), 'Health Status' (58%) and 'Breed' (55%) were the most common. Sheep and beef farmers ($n = 22$) were similar to dairy-beef finishers with 'Live Weight' (55%) and 'Breed' (50%) being most common selection criteria. Overall ($n = 95$) 'Sired by high genetic merit bulls' (23%) and 'Colour' (26%) were least selected by respondents across all farm systems.

Table 4. Percentage of selection criteria options chosen for dairy-beef weaner calves across different farming systems by respondents.

Farm system[1]	*n*	High genetic merit sire	Price	Colour	Live weight	Availability	Health status	Breed	Other
Overall	95	23%	52%	26%	52%	36%	41%	46%	12%
Beef Finishing	37	19%	68%	30%	46%	41%	30%	38%	11%
Dairy Farming	3	0%	33%	0%	33%	0%	33%	0%	0%
Dairy-Beef rearing/ finishing	33	21%	39%	30%	58%	33%	58%	55%	15%
Sheep and Beef	20	40%	45%	20%	55%	35%	35%	50%	10%

[1]Dominant farming system as identified by respondent response and predominant reported livestock class, *n* = number of respondents.

Preferred method of buying and selling cattle

The preferred method for buying dairy-beef weaner calves was 'Private farm gate' (29%, 28/98) and '3rd party agents' (22%, 22/98). The low response rate was due to 23 respondents who did not answer the question and 6 respondents that did not buy in calves. Across all farm systems, the preferred method of selling was through a 'Meat company agent' ($n = 64$) with a '3rd party agent' being the second most common response ($n = 22$). The least preferred methods were 'Private farm gate' ($n = 5$), 'Sale yard auction' ($n = 5$) and 'Direct to slaughter' ($n = 2$).

Discount or premium for weaner calves

Likelihoods to purchase weaner calves from different breeds are presented in Table 5. Respondents could choose from a list of Beef × Friesian, Beef × Kiwi Cross, Beef × Jersey, Kiwi Cross and Jersey weaner bulls, steer and heifers ($n = 16$ combinations). Respondents (average $n = 91$) indicated that compared with Friesian bull weaner calves

Table 5. Percent of responses for likelihood of buying different breeds of dairy-beef weaner calves (*n* = number of responses) across all respondents.

	Unlikely to buy		Buy with discount		Buy with no premium		Buy with premium	
Breed of calf	*n*	Percent	*n*	Percent	*n*	Percent	*n*	Percent
Bulls								
Beef × Friesian	35	38%	2	2%	28	31%	26	29%
Beef × Kiwi Cross	63	69%	12	13%	15	16%	1	1%
Beef × Jersey	77	85%	12	13%	2	2%	0	0%
Kiwi Cross	76	84%	9	10%	6	7%	0	0%
Jersey	83	91%	5	5%	3	3%	0	0%
Steers								
Beef × Friesian	25	27%	10	11%	28	31%	29	32%
Beef × Kiwi Cross	56	62%	14	15%	20	22%	1	1%
Beef × Jersey	73	80%	12	13%	6	7%	0	0%
Friesian	72	79%	11	12%	6	7%	2	2%
Jersey	83	91%	5	5%	2	2%	0	0%
Heifers								
Beef × Friesian	32	35%	12	13%	37	41%	11	12%
Beef × Kiwi Cross	60	66%	17	19%	12	13%	2	2%
Beef × Jersey	77	85%	10	11%	3	3%	1	1%
Friesian	73	80%	10	11%	7	8%	1	1%
Kiwi Cross	81	89%	5	5%	4	4%	1	1%
Jersey Weaner	86	95%	3	3%	1	1%	1	1%

they would pay a premium for Beef × Friesian bulls ($n = 26$), Beef × Friesian weaner steers ($n = 29$) and Beef × Friesian weaner heifers ($n = 11$). Farmers were least likely to buy Jersey heifers ($n = 86$), bulls ($n = 83$), or steers ($n = 83$) and Kiwi Cross heifers ($n = 81$). Similarly, farmers were also unlikely to buy Beef × Jersey heifers ($n = 77$), steers ($n = 73$) and bulls ($n = 77$) or Friesian steers ($n = 72$) and heifers ($n = 73$). This indicates that the reluctance to take on animals with Jersey type genetics is still common in the industry despite several studies reporting successful beef-production from Jerseys and Jersey-cross animals (Purchas and Barton 1976; Barton et al. 1994; Muir et al. 2001; Martín et al. 2021).

The average 'fair' premium given by respondents for finished beef-cross cattle over primarily dairy breeds was 47 c/kg live weight, however, there was a great deal of variation both between and within farm systems. From least to greatest premium; Dairy-beef finishers were 27 c/kg LWT (range −20 to 100, $n = 18$), Beef finishers were 46.9 c/kg LWT (range 0–250, $n = 27$), Dairy farmers were 50 c/kg LWT ($n = 1$) and sheep farmers were 68.3 c/kg LWT (range 10–550, $n = 15$).

The average 'fair' gross margin given by respondents was highest for dairy-beef bulls ($715/head, range $526–$766) followed by Friesian bulls ($693, range $580–$764), then steers ($649, range $570–$696) and heifers ($600, range $526–$664). The range of responses was again highly variable between respondents, however, in general dairy-beef finishers' gross margins were lower than all other farm systems.

Dairy-beef cross sire traits

High importance

Across all respondents the sire traits that had an average score of greater than 6/7 were 'Growth potential' (6.80/7 $n = 85$, Table 6 section a), 'Carcass and meat quality' (6.05/7 $n = 84$) and 'Feed efficiency' (6.27/7 $n = 83$). It should also be noted, however, that 'Calf vigour' had a mean score of 5.90/7 ($n = 82$). No sire traits had average importance score of less than 2. The lowest scored factor was female fertility (2.51/7 $n = 71$, Table 6, section a).

There was agreement between farmers across the farm types in the importance of all sire traits except for 'Calving ease' which sheep and beef farmers scored higher (5.0/7 $n = 17$, Table 6, section a) compared with beef finishing (3.7/7 $n = 27$) and dairy-beef finishing (4.2/7 $n = 31$). This finding reflects that finishing farms do not have breeding stock, which also aligns with the findings of Oliver and McDermott (2005). The perception of calving ease from beef animals is yet to be completely dispelled, despite research showing it can be mitigated through selection (Martín et al. 2020; Coleman et al. 2021)

Impact of raising all non-replacement dairy calves for beef

Responses to the question 'The dairy industry would like to see all non-replacement calves raised for beef. What impact could this have for your farm business?' ranged widely. There were equal numbers of 'positive' impact or 'negative' impact responses ($n = 34$) with few respondents who believed there would be no impact ($n = 8$) or did not know what the impact would be ($n = 2$). There were no differences between farm systems in the frequency of positive or negative responses.

Table 6. Mean score of Importance (1 = low importance, 7 = high importance, ± standard error) of traits of beef sires to produce dairy-beef calves for rearing (section a) and the importance of different types of information when purchasing weaner calves (section b) across different farm systems.

Section a	Calving ease		Birth weight		Short gestation		Calf vigour		Growth potential		Carcass + meat quality		Disease resistance		Feed efficiency	
Farm system[1]	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*
Overall	4.20	78	5.10	80	3.40	75	5.90	82	6.80	85	6.05	84	5.73	83	6.27	83
Beef Finishing	$3.7^{b} \pm 0.46$	27	5.0 ± 0.34	27	$3.2^{b} \pm 0.43$	26	5.7 ± 0.28	30	6.9 ± 0.09	30	6.1 ± 0.23	29	5.9 ± 0.25	29	6.5 ± 0.22	29
Dairy Farming	$7.0^{a} \pm 1.68$	2	7.0 ± 1.24	2	$7.0^{a} \pm 1.55$	2	6.0 ± 1.08	2	6.5 ± 0.36	2	6.5 ± 0.89	2	6.0 ± 0.95	2	6.0 ± 0.83	2
Dairy-Beef rearing/finishing	$4.2^{ab} \pm 0.43$	31	5.0 ± 0.31	32	$3.1^{b} \pm 0.39$	31	6.0 ± 0.27	32	6.7 ± 0.09	33	6.0 ± 0.22	33	5.8 ± 0.24	32	6.2 ± 0.21	32
Sheep and beef	$5.0^{ab} \pm 0.58$	17	5.2 ± 0.41	18	$3.8^{ab} \pm 0.57$	15	6.0 ± 0.37	17	6.7 ± 0.11	19	6.0 ± 0.29	19	5.5 ± 0.31	19	6.1 ± 0.27	19

	Low methane		Female fertility		Colour/ markings		Muscling		Temperament		Polled calves	
Farm system[1]	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*
Overall	3.98	81	2.51	71	4.02	83	5.74	84	5.80	86	5.01	83
Beef Finishing	3.9 ± 0.39	28	2.2 ± 0.41	25	3.7 ± 0.40	29	5.4 ± 0.24	30	5.7 ± 0.27	30	5.0 ± 0.37	29
Dairy Farming	6.0 ± 1.48	2	4.0 ± 1.46	2	6.0 ± 1.53	2	6.0 ± 0.92	2	7.0 ± 1.03	2	7.0 ± 1.42	2
Dairy-Beef rearing/finishing	4.0 ± 0.36	33	2.5 ± 0.38	30	3.9 ± 0.38	33	5.9 ± 0.23	33	5.7 ± 0.25	33	4.6 ± 0.35	32
Sheep and beef	4.1 ± 0.51	17	3.0 ± 0.57	13	4.4 ± 0.51	18	5.9 ± 0.31	18	5.8 ± 0.34	19	5.5 ± 0.46	19

Section b					Pre-weaning growth								Post-weaning growth			
	Sire breed		Sire EBVs beef traits		Birth weight		Weaning age / weight		rate		Colostrum fed		Rearing diet		rate	
Farm system[1]	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*
Overall	5.72	88	5.80	87	4.59	85	5.60	83	5.79	85	6.35	85	5.55	83	6.38	86
Beef Finishing	5.6 ± 0.26	33	5.9 ± 0.23	32	$4.1^{b} \pm 0.29$	31	$4.9^{b} \pm 0.24$	32	$5.3^{b} \pm 0.23$	32	6.0 ± 0.22	31	5.4 ± 0.25	31	6.2 ± 0.19	32
Dairy Farming	5.0 ± 1.48	1	5.0 ± 1.31	1	$5.0^{ab} \pm 1.65$	1	-	0	-	0	-	0	-	0	-	0
Dairy-Beef rearing/finishing	5.6 ± 0.26	33	5.6 ± 0.23	33	$5.2^{a} \pm 0.29$	33	$6.1^{a} \pm 0.24$	33	$6.2^{a} \pm 0.23$	33	6.5 ± 0.21	33	5.8 ± 0.25	32	6.6 ± 0.18	33
Sheep and beef	6.2 ± 0.33	20	6.1 ± 0.29	20	$4.2^{b} \pm 0.38$	19	$5.8^{ab} \pm 0.33$	17	$5.7^{ab} \pm 0.30$	19	6.7 ± 0.27	20	5.5 ± 0.32	19	6.4 ± 0.24	20

	Live weight history		Date born		Date castrated		Date weaned		Animal health history		Property location history		Owner history		
Farm system[1]	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	Score	*n*	
Overall	5.11	81	4.40	81	3.43	75	4.81	81	5.50	84	4.54	84	4.99	83	
Beef Finishing	4.7 ± 0.26	32	3.9 ± 0.32	32	3.0 ± 0.35	30	4.3 ± 0.33	32	5.7 ± 0.26	32	4.5 ± 0.37	32	5.1 ± 0.34	32	
Dairy Farming	-	0	-	0	-	0	-	0	-	0	-	0	-	0	
Dairy-Beef rearing/finishing	5.5 ± 0.26	32	4.7 ± 0.32	32	3.5 ± 0.36	28	5.3 ± 0.33	32	5.3 ± 0.26	33	4.3 ± 0.37	32	4.6 ± 0.34	31	
Sheep and beef	5.1 ± 0.37	16	4.7 ± 0.45	16	3.9 ± 0.48	16	4.8 ± 0.46	16	5.3 ± 0.35	18	5.1 ± 0.48	19	5.4 ± 0.44	19	

[1]Dominant farming system as identified by respondent response and predominant reported livestock class, *n* = number of respondents, rows with different superscripts are significantly different ($P < 0.05$) otherwise no significant difference between farming systems.

The most common themes identified included the oversupply of calves ($n = 20$), reduced calf price ($n = 16$), breed concerns ($n = 13$), slow calf growth ($n = 11$), better access to calves ($n = 10$), reduced profit ($n = 9$) and better selection and genetics ($n = 8$). All other themes were seen in four or fewer responses.

Positive responses included comments such as 'A very good impact as the dairy industry would have to use more high EBV sexed semen producing a good supply of cattle', 'Better supply giving better selection' and 'Huge impact, planning to get rid of breeding cows to make way for more dairy beef'.

Negative responses included 'An effect on returns because the industry would be swamped with undesirable calves that would be hard to finish and at discounted prices', 'Retention of live export to cater for a lot of these animals is paramount', 'As a dairy farmer, it would depend on what the pickups were', 'We do not have enough space to keep the calves we are not rearing on farm for more than the 4 days we currently keep bobbies for', 'Huge, where are 2 million extra calves going to be finished?' and 'Potential to cause severe problem of getting space at meat works, over supply of poor quality beef, so could cause price drop at meat works over all beef grades, there are a lot of ill breed calves around'.

Conclusion

A series of trends have emerged from this survey, primarily around breed of choice, calf prices and perceived benefits to the systems of these combinations. Calves from dairy cattle with a portion of Jersey were seen as being a finishing risk and were less attractive to the finishing operations, and even beef cross Friesian animals would struggle to replace the preference for pure Friesian type animals. There was a disconnect between the dairy farmer preferences and those of the beef finishing operations, with (at least for sire selection) almost opposite selection criteria. This survey, although having limitations, gives insights to guide the next phase of dairy-beef development by understanding wants and needs of the different actors within the supply chain. It is clear that tools that enable a stronger understanding of the needs of both dairy, calf-rearers and beef-finishers are required.

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