Final report

Quantifying neonatal mortality and reproductive performance in Southern beef herds

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Abstract

Neonatal calf mortality has substantial economic and welfare costs to the Australian beef industry. This project sought the opinions of beef producers on the current reproductive management of southern beef herds. Using an online and postal survey, aspects of reproductive performance of beef herds were quantified focussing on the factors that may affect calf mortality and morbidity at the time of birth or early in life.

Most respondents did not believe that reproductive performance and calf mortality or morbidity is a problem in their herd. However, there was considerable variation in both reproductive performance and in rates of calf mortality between herds. This variation was most marked in small and medium herds (with less than 50 cows, and between 50 and 250 cows, respectively). Rates of dystocia, especially in heifers, were relatively high in some herds.

The application of simple, inexpensive management techniques such as bull selection, maternal nutrition, better observation of calving heifers and basic record keeping which facilitates benchmarking has the potential to improve welfare outcomes and increase economic productivity in a significant proportion of herds.

Executive summary

Background

Neonatal calf mortality has been recognised as having significant economic and welfare costs to the Australian beef industry but there is a lack of data that quantifies the extent of calf mortality and the reproductive management practices that may contribute to it, particularly in southern Australia.

Objectives

The objectives of this project were to:

- To explore the perceptions of southern beef producers of current reproductive performance of southern beef herds and their opinions on the main factors that contribute to suboptimal productivity.
- To quantify neonatal calf losses in southern Australia beef herds and the relative importance of maternal, calf and management factors that affect the risk of perinatal and neonatal calf death.
- To investigate relationships between management practices and calf mortality to provide appropriate benchmarks for the southern beef industry
- To suggest ways for the industry to reduce the productivity inefficiencies associated with calf losses

Methodology

We hosted two focus group meetings with small groups of beef producers, seeking their views on reproductive management and the importance of calf mortality.

Subsequently, an online and postal survey was distributed to beef producers in southern Australia seeking information about herd management and the impact it has on reproductive performance and calf mortality.

Results/key findings

Most producers did not believe that reproductive performance and calf mortality was a problem in their herd. However, there was considerable variation in both reproductive performance and in calf mortality between herds. This variation was most marked in small and medium herds (less than 50 cows, and between 50 and 250 cows, respectively).

Many farmers do not appear to use robust records to monitor the performance of their herds in these aspects.

Benefits to industry

There are considerable economic and animal welfare benefits to be gained if those herds which have the highest rates of calf morbidity and mortality could achieve the performance of even the average performing herds in these areas.

Future research and recommendations

Significant calf mortality is more likely to be a problem in small or medium sized herds. The data from this survey indicates that it is in these herds that there is the most variation in performance, and in which the economic and welfare benefits of improvements are likely to

be most significant. In herds of up to 100 breeding cows, each additional calf that survives to sale represents an increase of reproductive performance by 1%.

There may be substantial benefits from more closely exploring the reasons for poor record keeping in many herds. Consideration should be given to the development of simple, easy, robust, and relatively standardised methods of recording calf losses and the major factors that contribute to allow producers to monitor the performance of their own herds and to compare themselves against appropriate benchmarks. Better understanding of the preventable causes of calf loss will allow producers to focus their resources and management on the most beneficial actions.

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1. Background

Reproductive performance is a key driver of beef herd profitability. Weaning rates for beef herds are affected by the interval between calving and resumption of ovarian function (return to oestrus), embryonic or foetal survival and perinatal calf mortality (McGowan & Holroyd 2008). Losses which occur due to failure of cows to conceive, or incomplete pregnancies due to embryonic or foetal loss, may not be immediately apparent to the producer. Calf mortality at the time of calving or during the post-calving period may be more obvious.

Beef calf mortality is a worldwide problem that causes reduction in productivity and profitability and leads to poor animal welfare outcomes. In Australia, calf losses are approximately 5 – 7% but vary between production systems and geographical regions (Wilkins 2008, Copping *et al* 2018).

While some causes of calf mortality have been clearly identified, the cause of a large proportion of neonatal calf deaths remains undiagnosed (Bellows *et al* 1987). Production losses associated with calf deaths that occur between birth and 1 month of age of *unknown* causes are estimated to cost the Australian beef industry $96.1 million each year (Lane *et al* 2015). This is in addition to losses associated with *known* causes such as dystocia, calf scours and infectious diseases such as vibriosis. In southern Australia, it has been estimated that when management is optimal, and nutrition is not limiting the weaning rate (the percentage of breeding females that successfully wean a calf) should be more than 92% in heifers and more than 95% in mature cows. Wilkins (2008) reported that “branding rates” for the southern beef herd averaged 86%, with some herds performing lower than this. While the issue is substantial, there is still limited information about causes of neonatal calf mortality and the economic and welfare impact of this on southern beef herds.

Calf mortality is a multifactorial syndrome. The main causes which are often identified include slow or difficult birth (dystocia), mismothering, and calf scours (Murray *et al* 2016). Less common issues may include respiratory diseases such as pneumonia, predation by wild dogs, trace element issues, multiple congenital malformations, environmental factors such as exposure to cold and wet conditions or heatstroke (most commonly in northern Australia) and misadventure (e.g. drowning in dams or creeks). In southern Australia, it has been estimated that one third of reproductive loss occurs as calf losses occur within the neonatal period, with most of these deaths occurring in calves under one week of age (Lane et al 2015).

Accurate records of calf mortality at a national and state level are very limited due to the difficulties of recording mortalities in extensive farming systems. This represents a considerable risk for the welfare of animals and the profitability of the Australian beef industry because, if the magnitude and causation of calf deaths are not well understood, it is difficult to tackle this problem efficiently. The timing of the loss is important to consider, as an early abortion may have less economic consequences than a cow that loses her calf at weaning.

1.1 Risk factors associated with calf mortality

Factors influencing perinatal and neonatal calf survival can be classified into internal factors (calf/cow characteristics) and external factors (e.g. management and environment). Key calf characteristics identified include calf vigour, birthweight, early colostrum intake, metabolic

imbalances and exposure to infectious diseases. In relation to cow characteristics, important risk factors include breed, age, parity, birth type (single or multiple) and body condition. For example, in the worst case (from a parity perspective) up to 30% of heifers may require assistance at calving. Also, it has been reported that maiden or young cows have increased calf losses compared to older cows (more than 4 years old) and that cows that have previously lost a calf, if not subsequently culled, are more likely to have another calf loss in the subsequent year, although most producers cull cows/heifers that fail to rear a calf (Lane et al 2015). Teat or udder characteristics, such as bottle teats, are also risk factors likely to decrease calf survival. External risk factors may include inadequate nutritional management, poor calving paddock conditions (for example heavy contamination with pathogens that cause calf scours, lack of natural shelter, sub optimal nutrition) and exposure to extreme weather. Unfortunately, the relative importance of each of these internal and external factors is not currently well understood.

High mortality rate is an important indicator of poor animal welfare. Thus, improved understanding of the causes of mortality will enable improved strategies to manage losses and increase animal welfare standards.

1.2 Mitigation strategies

As with many other diseases or syndromes of livestock, the key strategies to increase calf survival are focused on managing the risk factors associated with calf deaths. These are discussed below.

1.2.1 Dystocia

There are several important factors that can decrease the risk of dystocia. First, in herds where dystocia is an issue, genetic traits for selection should include moderate birth weight and calving ease (direct and daughters) as well as gestation length. Inadequate bodyweight (leading to poorly grown heifers) or excessive body condition (leading to big calves and/or excess maternal pelvic fat) is also associated with dystocia. Nutritional management is therefore fundamental, albeit challenging, under extensive farming conditions (Lane et al 2015).

1.2.2 Colostrum

To increase a calf's resistance to disease, early colostrum intake is essential. This is important because cattle do not pass antibodies from the dam to the foetus before birth. Calves need to absorb antibodies from colostrum to boost their immune system, and their intestines are only able to absorb these antibodies for a few hours after birth. After twelve hours of age, a calf's ability to absorb antibodies decreases significantly, and by one or two days after birth, this ability disappears completely. If neonatal calf infections are occurring, it is important to investigate the adequacy of transfer of maternal antibodies to calves. Adequate transfer of passive immunity via colostrum intake can be assessed by blood testing of calves and this is common practice in dairy herds. However, this approach is much less practical in pasture-based beef operations and observation of suckling behaviour by beef calves soon after birth may be the limit of assessment of colostrum intake.

1.2.3 Management

Management of environmental factors could also increase calf survival. Designation of appropriate calving paddocks is important. Allocating dams to smaller calving paddocks can reduce the time required for frequent observation (particularly for heifers), but if intensively run, calved heifers may need drafting off to avoid over-crowding. If the prevalence of calf scours is an issue, changing calving paddocks each year should be considered to reduce contamination. Identifying the cause of scours is also important in determining if vaccination will be cost effective. Maternal vaccination prior to calving may help to control disease in calves via antibodies in the colostrum. Also, provision of some form of shelter and sufficient watering points is essential, especially if cows are calving during hot weather. The appropriate frequency of monitoring depends to some degree on the extent of problems where intervention is required.

1.2.4 Conclusion

Prevention of neonatal calf mortality may be achieved through improved management of both nutritional and environmental conditions. However, this still needs to be further investigated. It is difficult to know precisely which risk factors are the largest contributors to neonatal calf mortality because of lack of accurate calf mortality records. Thus, a better understanding of the magnitude, causation and risk factors of calf mortality is important.

2. Objectives

The primary objective of this project was to investigate the current reproductive performance of beef herds in southern Australia, focussing on those aspects that may contribute to losses due to calf morbidity and mortality.

The project explored the perceptions of beef producers of the current reproductive performance of southern beef herds and their opinions on the main factors that might enable, or limit, high reproductive performance.

The survey aimed to describe the current reproductive performance of commercial beef herds in southern Australian and to quantify neonatal calf losses in southern Australia beef herds and the relative importance of maternal, calf and management factors that affect the risk of perinatal and neonatal calf death.

An additional objective was to investigate relationships between management practices and calf mortality to provide appropriate benchmarks for the southern beef industry.

It is intended that the findings of this research can be used to develop industry targets, identify the major risk factors that contribute to reproductive inefficiencies within the southern Australian beef industry, and to suggest ways for the industry to reduce calf losses to improve animal welfare, reproductive performance, and economic return for the beef industry.

3. Methodology

This project consisted of two components. Initially we conducted two focus groups of Victorian beef farmers. We subsequently distributed an online and postal survey to southern Australian beef producers.

3.1 Focus groups

Two focus groups were conducted in regional Victoria, Australia (Mortlake and Yea) to explore farmer attitudes towards neonatal mortality and reproductive performance in southern beef herds. Focus groups are considered an appropriate exploratory research approach to gathering qualitative information. This method allows investigators to understand general beliefs and attitudes about specific topics (Ajzen and Fishbein, 1980). The purpose of the focus groups was not to collect quantitative data from the participants but rather to explore the opinions of a select group of producers to establish whether there were critical aspects of reproductive performance or calf mortality or morbidity which needed to be added into the subsequent survey.

Purposive sampling was used to invite Victorian beef farmers to participate in this study. Participants were recruited through researcher networks and by nomination through neighbours. Suitable participants had to be beef farm owners, managers and/or workers over the age of 18. This project was approved by the Human Ethics Committee of the University of Melbourne (Ethics review number: 1852888, See Appendix 1)

Both focus groups were facilitated by one of the authors (CM) who has previous experience in managing focus group discussions. The focus groups began with a short introduction and a broad explanation of the project. The facilitator asked a series of questions using a semi-structured agenda pertaining to beef herd reproductive performance and neonatal calf mortality (Appendix 2). Participants were encouraged to discuss their opinions in an informal manner and had the opportunity to raise other related topics outside the semi-structured agenda. The facilitator ensured that all participants engaged in the conversations and maintained the direction of the conversation by guiding topics back to relevance when necessary. Both focus groups ran for 90 minutes and were audio-recorded. In the last 30 minutes of each focus group, they were provided with a draft survey and their feedback about content and format was sought.

Thematic analysis was used to analyse the focus group transcripts. Topics discussed by participants during the focus groups were classified into primary and secondary themes using Nvivo software (QSR International, Australia [www.qsrinternational.com]). At the conclusion of the two focus groups, the researchers were satisfied with the level of data saturation obtained from the discussions as both focus groups provided similar discussion themes.

3.2 Survey

Following the focus groups, the findings and feedback on the draft survey were used to refine the content and format of the survey in this project. The final version of the survey is presented in Appendix 3. Respondents took 40 - 50 minutes to complete the survey. Both online and hardcopy versions of the survey were produced.

The online survey was launched in December 2019 through various networks including MLA and Mackinnon Group newsletters, Local Land Services (NSW), South Australian beef networks, the Victorian Farmers Federation, social media and using paid advertising through Beef Central. Subsequently, hard copies of the survey were posted to beef producers directly using a commercial market research company with experience in rural-based surveys. The survey consisted of a cover letter describing the objectives of the survey and providing contact details of the research group, and seven pages of questions designed to quantify information about the respondent and their beef enterprise, the reproductive management of their herd, the reproductive performance of their herd and data relating to calf morbidity and mortality within their herd. More than 10,000 Southern beef producers were contacted and invited to complete the survey. The survey was open to producers from December 2019 until August 2020.

4. Results

4.1 Focus groups

The two focus groups in Mortlake and Yea comprised six and seven Victorian farmers respectively, representing eleven farm businesses with herd sizes of 100 to 2000 cattle.

The main topics discussed in the focus groups are presented in Table 1.

Table 1. Themes discussed during the focus group sessions.

Main Themes	Secondary Themes	Summary of discussion
Reproductive Management	Overall satisfaction	Participants were "somewhat satisfied" with the reproductive performance of their own herd
	Reproductive parameters	For 'average years' participants reported 80% of heifers in calf and 90% cows in calf
	Heifer management	Nutrition during the last trimester was considered a "huge" challenge. Calving assistance was more commonly required for heifers than cows (up to 20% assistance in heifer calvings)
	Bull management	Checking the conformation and semen quality of bulls was considered to be important
Calf Mortality	Perceived importance	Calf losses were accepted to be an important issue
	Mortality rates	It was generally agreed that 3 - 5% calf losses were "acceptable". It was believed that mortality could well be higher than currently recognised by many farmers.
	Main causes	Oversized calves were identified as being an important cause of calf death at calving. However, causes of subsequent neonatal calf losses were generally unclear.
Record Keeping	Quality and type of recording	Perceived as being an uncommon practice among beef producers. Records kept by focus group participants varied from infrequent records written down on a notebook to over 30 years of digital records.

4.1.1 Reproductive management

Participants involved in the focus group discussions were asked to indicate their satisfaction with the reproductive performance of their own herd, using a 5-point scale (Very satisfied; Somewhat satisfied; Neutral; Somewhat dissatisfied; Very dissatisfied).

Overall, participants involved in the focus group discussions were "somewhat satisfied" with the reproductive performance of their herd. When asked "Are you happy with the reproductive performance of your herd?" participants neither strongly agreed nor disagreed with the question. However, it was difficult to get consensus on what constituted 'good' reproductive performance. Overall, pregnancy rates (number of cows/heifers in calf after the joining period) of 90% for cows and 80% for heifers were accepted as typical figures in the industry in average years. It was also perceived by some participants that pursuing pregnancy rates of more than 95% was not cost effective. Direct quotes from participants included "*We are happy if we get to 90-95% percent [pregnancy rate], but to put much more effort in selection pressure…and the requirements to get above that [95%]… the cost of doing it would be much more expensive than the revenue*" and "*If you aim for 100% [pregnancy rate] how much would that cost?*".

There was some variation in management practices between the participants (small versus large-size farms). Calving periods, for example, ranged from 4 to 9 weeks with large-size farms usually calving for shorter periods. Participants recognised that shorter calving periods (4 to 6 weeks) significantly decreased birth complications, with one participant indicating that "*shorter calving period make it is easier to manage the body weight of the heifers*". Overall, a joining period of 9 weeks was recognised as "*common practice*". Routine pregnancy testing was perceived as "*essential*" by participants. However, while most participants stated that they pregnancy test their herd every year, there was a consensus that not all producers use pregnancy testing routinely, with some producers only pregnancy testing during "*tough years*". Also, participants generally believed that small farmers in their area would be less likely to pregnancy test their cows and heifers.

Nutrition management of heifers was viewed as "*a huge challenge*", particularly in the last three months of pregnancy. "*It is a big issue to deal with heifers in that last trimester… not getting them too light or too fat*". Participants monitored their heifers significantly more frequently than cows during the calving period. It was common for the participants to check their heifers at least once daily and up to three times a day. Cows, in contrast, were usually checked once weekly or every second week. Most participants managed their cows and heifers separately, and this decision mostly depended on mob and farm size.

Birth assistance was more commonly required for heifers than cows, with one farmer consistently intervening for 20% of his heifer calvings. Calving assistance was mainly required due to oversized calves. There were also comments around breed differences. Herefords were recognised as being more prone to birth complications than Angus. Participants also pointed out that in the previous year they had had significantly more complications with *"lazy calvers"* which they associated to a "*spring calving issue"* due to feed quality.

Bull management was also mentioned as being an important aspect for adequate reproductive performance in beef herds. Participants running larger enterprises (more than 500 cows) were

more likely to seek veterinary advice each year to check bull conformation and semen quality (a veterinary bull breeding soundness evaluation). Other participants were less likely to seek veterinary advice but monitored bull performance by assessing the performance of the progeny at 18 months. Most participants use 2 - 3% of bulls at joining (1 bull for 30 to 50 cows). Common issues related to bull performance, mentioned by the participants, included testicular trauma (thought to be due to fighting between bulls) and low semen count. Some producers grouped bulls of different age together as a management strategy to minimise fighting.

When asked about the highest priorities in their farm, participants identified nutritional management and feed availability as their main concerns. Although participants seemed satisfied with their reproductive management and the reproductive performance of their herd, they also acknowledged that 2019 was a good year for rainfall in their region, with low rates of calf losses in comparison to other years. However, they did recognise that there are important differences between locations, with some areas more affected by low reproductive performance than others. Indicative comments by the participants included: *"I mean for me it is something that is always in the back of my head. I think it is fairly important"* and *"It's not a worry [reproductive performance], but it would be a different response in Gippsland due to a series of droughts".*

4.1.2 Calf mortality

Calf losses were an important issue for focus group participants due to its impact on animal welfare and farm productivity. It was agreed that 3 - 5% calf loss is typical and acceptable, but it was difficult for the participants to estimate calf losses in their area as there was a general perception of *"lack of figures in the commercial world".* Participants were generally reluctant to share their own figures with the rest of the group during the discussions, but some participants emphasised that actual mortality may be higher than currently perceived by producers as many do not keep accurate records of animal mortality. Some relevant quotes included: "*I think some people can be quite shocked if they knew exactly what is going on*"; *"Yeah I said 5% but it could be 10%...probably not, but a lot of people don't know*"; and "*I think if you ask farmers, most of the figures would be naïve. We know because we have the records and we are surprised by the records".*

Participants recognised that most calf losses occur during the first 24 hours of life, with the calf being born dead or dying soon after birth. For the participants, the main reason for calf losses during the first 24 hours was believed to be excessive calf size. *"The size of the calf is an issue, but what causes the size of the calf?... Is it genetics? Or is it the fact that you fed the heifer too well? This is my biggest issue*". Comments around the influence of the weight and age of the dam (e.g. heavy heifers) were also raised during the discussions. According to one participant, around 5% of calf losses in his farm were related to dystocia (in heifers), 0.5% were related to abortion and 0.5% were related to healthy calves for no obvious reasons. Participants reported that rotavirus had previously been an important cause of calf losses (around 5%) but vaccinations had resolved the problem. While one producer confidently identified the cause of calf losses on his property, actual causes of calf losses were less clear among the other participants. Veterinary advice was not commonly sought. Some direct quotes included: *"We don't understand the causes [of calf losses] a lot of the time; we just find*

them deceased and we think…well that was mismothering… or disease"; "Sometimes you could investigate further with the vet … but you get the vet out and they say… well… it could be this or it could be that"; and *"Most producers would not get the vet out unless there is a big issue on the farm".*

Another factor mentioned was the size and quality of calving paddocks. Some participants mentioned the importance of placing cows in protected calving paddocks provided with trees or other form of natural shade and shelter. Others mentioned issues with specific calving paddocks but were unable to identify possible causes for having higher calf losses in some paddocks compared to others. Calf losses within 48 hours of birth were mainly attributed to scours and mismothering (in heifers), and further losses beyond 7 days of age were considered to be minimal.

4.1.3 Record keeping

Participants in the focus groups considered record keeping as an uncommon practice among beef producers. In general, there was a perception that older producers (over 60 years of age) were less likely to keep records, while farms run by managers were more likely to have some sort of records as managers usually must report back to farm owners. Overall, there was large variation among participants in the consistency and quality of their own record keeping. A few participants stated that they keep digital records of the reproductive performance of the herd and calf mortality every season, while others only kept records "*sometimes*" or "*in case something happens*". For these participants, records were mainly kept in a hand-written notebook. Those participants who keep some sort of records pointed out that a detailed analysis of the data collected is rarely done. A perceived lack of time is an important barrier to record keeping. Participants' comments included: "*We don't go back and analyse what we have…because we have beef, sheep and crops … and there is way too much to think about*"; "*I recorded certain events, but I don't analyse them very often*"; and "*A lot of people don't know that it is concerning [calf mortality] until they look up the numbers… they may not realise until they see the numbers*".

When asked about calf mortality targets, participants were hesitant to provide a figure, but were also unaware of specific targets. Direct quotes included: "*We don't know what that target [for calf mortality] should be*"; "*We don't want to set ourselves a target which is absolutely unachievable too*"; "*A target of 85 - 90% at weaning is achievable…but, what if you don't achieve the target? What do you change? You can't change the weather…*"; "*Do you set targets within your herd or withing the 'industry'?*"; "*We don't sit down and have conversations about calf mortality and what is going to be our targets*"; and "*What's the meaning of setting a target if we don't know what we need to do to improve that target?*". The discussion raised the differences between beef production and sheep production, especially the lack of focus on beef calf mortality in comparison to the greater focus on lamb survival as part of the management sheep flocks.

4.2 Survey

4.2.1 Survey respondents

A total of 644 survey responses were received via either online (n=136) or hard copy (n=508) channels.

A further 717 mailed surveys were returned unopened (typically marked as 'Return to Sender', or with an incorrect or obsolete address) or sufficiently incomplete to be invalid.

The initial launch of the survey coincided with a period of intense and widespread bushfires throughout many of the areas that were to be sampled. As a result, early response rates were very low. Major community disruption resulting from the Covid-19 pandemic also complicated our efforts to encourage participation. Although less than hoped for, the best response came following distribution of hardcopy surveys. The number of surveys received was deemed to be sufficient to gain an informative insight, albeit with less ability to conduct robust statistical analysis.

A small number of surveys were received describing beef enterprises which were outside the scope of the study, based on location or management type. (Online access to the survey was not geographically limited). These surveys were not used in subsequent analysis.

Most completed surveys were received from Victoria, New South Wales and South Australia (Table 2).

Most respondents nominated themselves as being primarily Cow/Calf enterprises. Replies were also received from Trade and Stud enterprises, although most of those respondents indicated that these activities were not their primary enterprise.

Table 2: Number of survey respondents, by State and indicated type of beef enterprise

	WA	SA	Vic	Tas	NSW	Other[a]	Total[b]
Respondents	2	49	297	6	271	10	635
Cow/Calf	1	46	273	4	250	4	578
Vealers	-	19	79	-	81	1	180
Store weaners	1	12	147	3	106	2	271
Feeder steers	-	16	88	1	105	1	211
Trade	-	17	85	1	68	1	172
Steers	-	10	41	1	50	1	103
Bullocks	-	-	17	-	10	-	27
Cows/calves	-	7	38	-	25	-	70
Heifers	-	9	37	-	45	-	91
Stud	1	7	24	-	20	1	53
Bulls	-	5	20	-	13	-	38
Cows/heifers	-	4	13	-	11	1	29

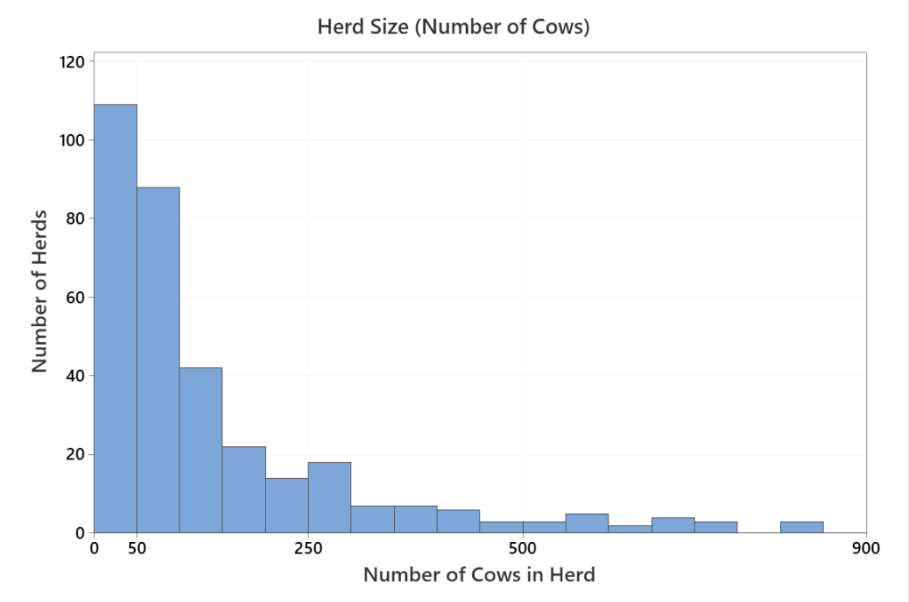
[a] State/Postcode not provided

[b] Numbers do not tally as respondents could nominate more than one type of enterprise

Many respondents did not answer all the questions in the survey. A total of 635 returned surveys were deemed to be valid for inclusion in the study. Throughout this report the data reflects that the number of valid responses to individual questions was less than this.

Returned surveys described herds ranging in size from only a few cows up to ~1800 cows (Figure 1).

Figure 1: Herd size of respondents, based on number of cows at least 2 years old. (Five additional herds of between 1000 and 1800 cows not shown).



Those herds which provided data were nominally categorised by herd size (Table 3) for subsequent analysis, using the following formula…

"Herd size" = "Preg cows >2yo" + "Nonpreg cows >2yo"

Table 3: Nominal categorisation of 337 herds based on number of cows > 2-years-old

	Small	Medium	Large	Very Large
Number of Cows	1 - 49	50 - 249	250 - 499	500 +
Number of Herds	105	166	41	25

While some of the herds described in returned surveys may not be considered to be commercial, it was decided not to impose a lower herd size limit in subsequent analysis to maximise the amount of information available. The terminology used to describe these herd size categories (Small; Medium; Large; Very Large) are nominal and indicative for this survey only and do not make any assessment of the standing of these herds within the broader industry.

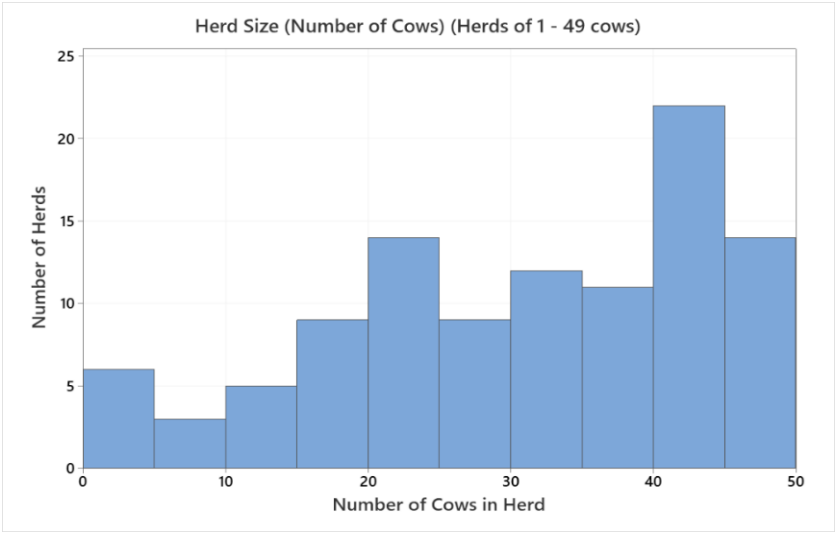
The herd size profile of categorised herds is provided in Figure 2.

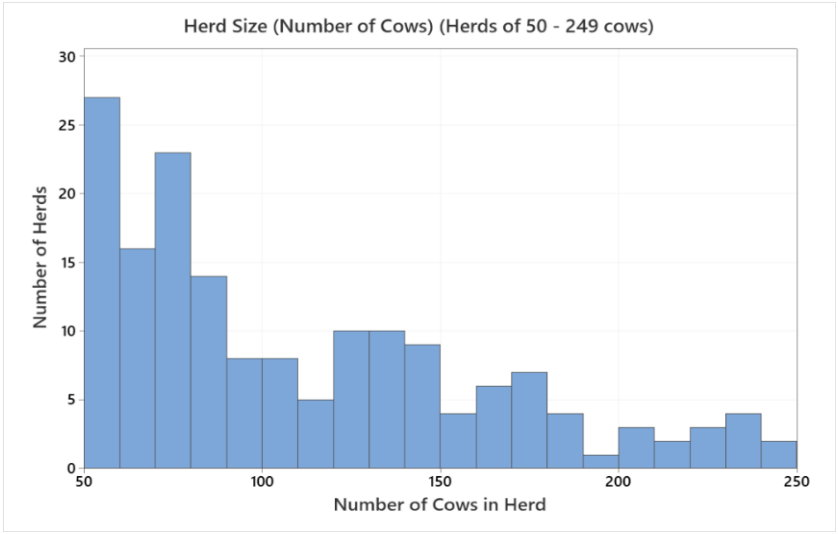
On average, respondents reported that beef operations represented about 80% of their enterprise. Over half the respondents reported that their business operations were entirely beef related.

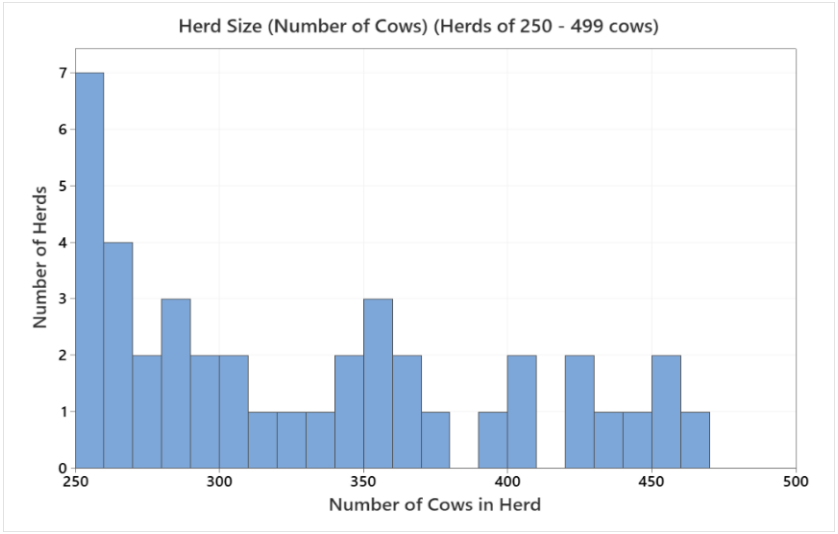
Table 4: Average herd size, relative activity of enterprise and area used for beef operations for nominal herd size categories

	Small	Medium	Large	Very Large
Number of cows used for categorisation	1 – 49	50 – 249	250 – 499	500+
Average Total Number of Cows (>2yo)	30	110	330	797
Enterprise as Beef (%)	82	80	78	87
Total Hectares Beef	163	405	1130	2259

Figure 2: Herd sizes within nominal herd size categories







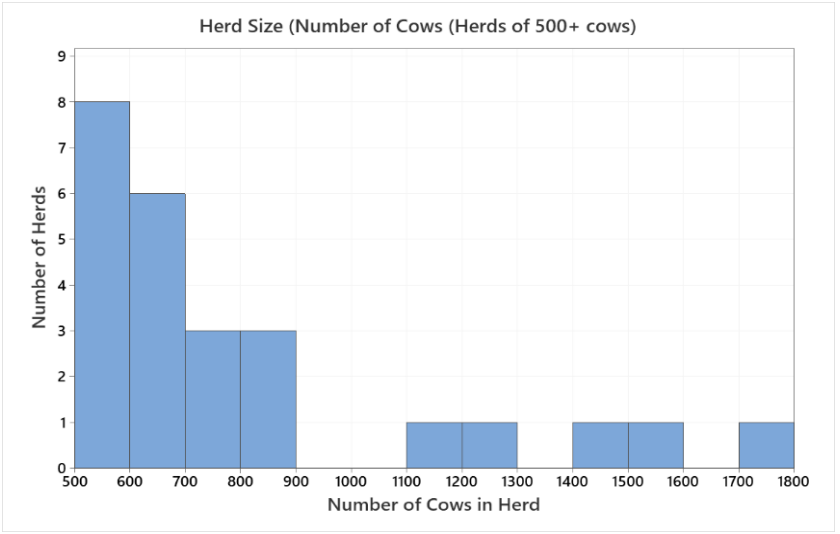
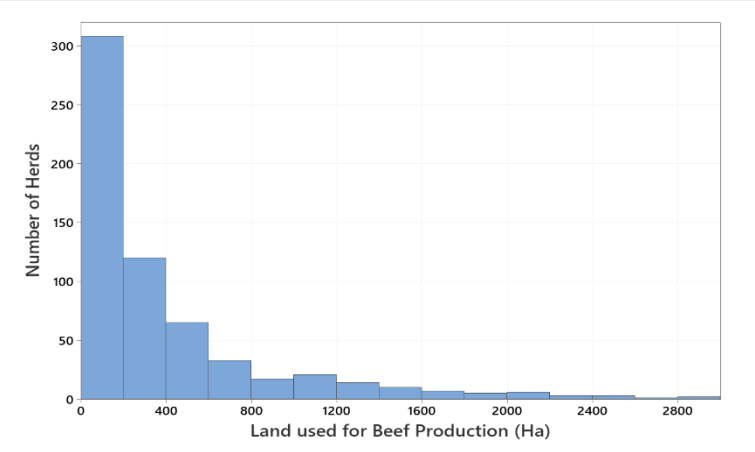


Figure 3: Hectares of farmland used for beef operations



Of the respondents who provided labour data, most indicated that their enterprise was staffed by either one (n = 286), two (n = 106) or three (n = 12) owners. Ninety respondents reported the owner as less than 1 Full Time Equivalent (FTE).

Similarly, when additional labour was employed it was frequently one (n = 45) or two (n = 48) FTE. The indicative educational level and industry training engagement is provided in Table 5.

Table 5: Educational qualifications and Industry Engagement of any owner or employees by herd size category

	Small	Medium	Large	Very Large
Highest education level of any staff				
University (Ag)[a]	14	28	7	6
University (Non-Ag)[b]	37	53	18	11
TAFE (Ag)c	26	44	19	12
Secondary school	61	113	34	16
Industry engagement of any staff				
More Beef from Pastures	11	34	9	9
Bred well, fed well workshop	4	25	9	13
Member of Better Beef Group	-	-	-	-
Profitable grazing system program	13	19	9	6
Livestock Production Assurance plan	58	88	26	18

[a] University qualification related to agriculture

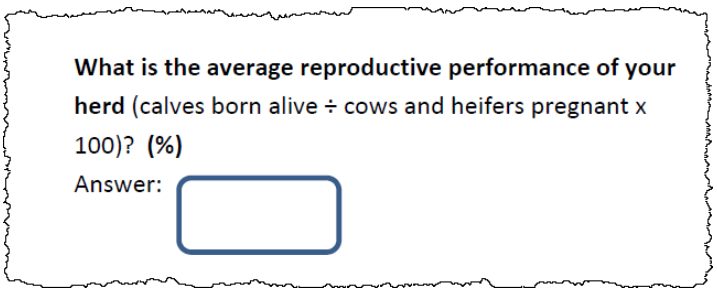
[b] University qualification in topic unrelated to agriculture

[c] TAFE qualification related to agriculture

4.2.2 Reproduction and management

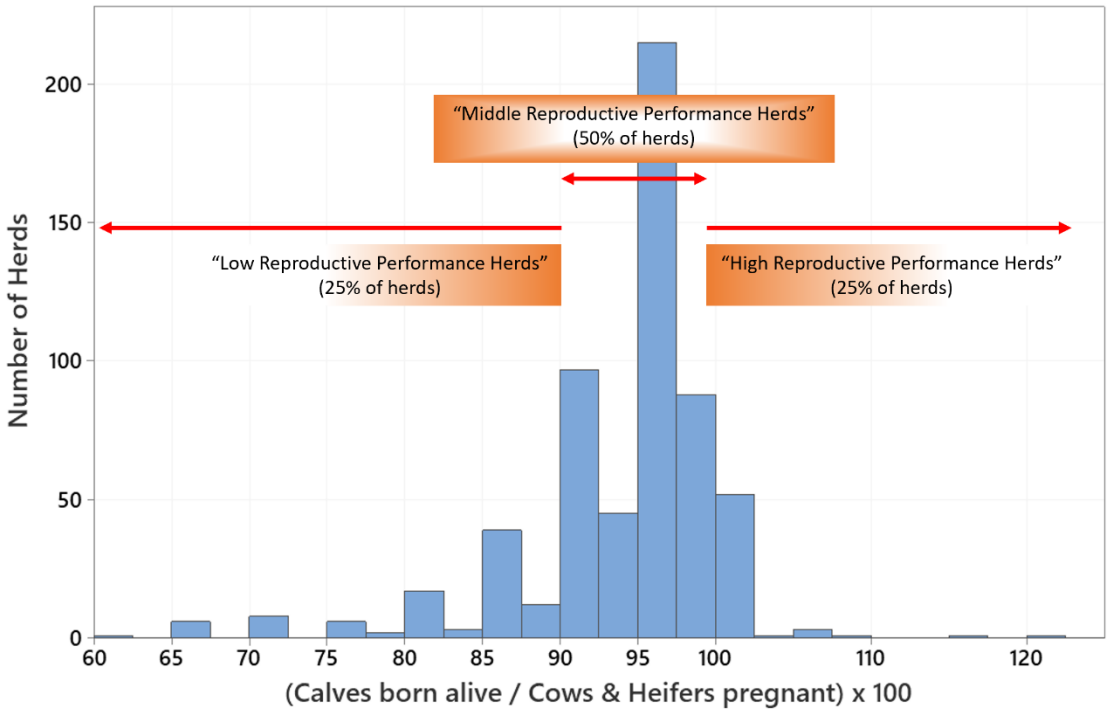
4.2.3 Reproductive management

Surveyed producers were asked to provide the average reproductive performance of their herd as a percentage, calculated as:



This figure was then used as a summary statistic of reproductive performance for surveyed herds.

Figure 4: Summary reproductive performance of herds, based on the number of calves born alive per pregnant cows and heifers, showing nominal categorisation into three groups for subsequent analysis.



The distribution of this data is shown in Figure 4. Analysis of this data showed that a quarter of herds had a summary reproductive performance of less than 90% and a quarter of herds had a

reported reproductive performance of 99% or greater. (A figure of greater than 100% is possible in the event of twin calvings, especially in smaller herds.)

For subsequent analyses throughout this report herds were categorised into three nominal groups: “Low” (up to 89 calves born alive per hundred cows/heifers); “Middle” (between 90 and 98 calves); and “High” (at least 99 calves born alive per hundred cows/heifers) as illustrated in Figure 4.

Breeds:

Angus and Hereford were the most used breeds in the 635 surveyed herds.

Most respondents use a single breed of bull to mate with their mature cows. Of 598 herds which provided data, 491 use a single breed of bull, 91 use two breeds and only 13 use three breeds.

Similarly, it is most common to use a single breed of bull to mate heifers. Of 526 herds, 489 use a single breed of bull to mate with heifers and only 36 use two breeds of bull.

Most herds (424 of 558 herds) consist of a single breed of female, with only 93 herds using two breeds and 41 herds using 3, 4 or 5 breeds of cow and/or heifer.

A total of 413 herds used Angus bulls. Sixty-five herds used Angus bulls to mate just their mature cows, 40 herds used Angus bulls to mate just their heifers and 308 herds mated both mature cows and heifers to Angus bulls.

Hereford bulls were used in 127 herds. Forty-seven herds used Hereford bulls to mate just their cows, 6 herds used Hereford bulls to mate just their heifers and 74 mated both cows and heifers to Hereford bulls.

Charolais, Limousin and Murray Grey were the other breeds frequently used as sires, usually mated as crossbreeding sires to other breeds of cows or heifers.

Estimated Breeding Values:

Slightly more than half the respondents (335 of 624 respondents, 54%) reported that they use reproduction estimated breeding values (EBVs) to select appropriate bulls for their mature cows.

The proportion using EBVs for mature cows was much greater in larger herds (Small 39%; Medium 58%; Large 80%; Very Large 76%).

The differences of proportions were not as marked when comparing herds categorised by reproductive performance (as described above Figure 4) (Low 48%; Middle 56%; High 48%).

More than half the respondents (331 of 614 respondents, 54%) also reported that they use reproduction estimated breeding values (EBVs) to select bulls for their first calf heifers.

The proportion using EBVs for heifers was also much greater in larger herds (Small 38%; Medium 61%; Large 78%; Very Large 76%). The differences of proportion using EBVs were not as marked when comparing herds categorised by reproductive performance (Low 51%; Middle 56%; High 45%).

The most frequently used EBVs related to birth weight, calving ease and weight gain. Birth weight or calving ease were nominated by 25 – 30% of respondents, with these traits being slightly more frequently nominated for use when choosing bulls for first calving heifers. Gestation length was more frequently used when selecting bulls for use with heifers compared to mature cows. Growth traits (such as 200-, 400- and 600-day weight) were more likely to be nominated when choosing bulls for use with mature cows, as were carcass traits (such as eye muscle area).

Liveweight Measurement of Heifers:

Most respondents (380 of 635 herds, 60%) reported that they did not measure the liveweight of the heifers between birth and weaning. Just over half of the respondents (320 of 635 herds, 50%) also reported that they did not measure the liveweight of the heifers between weaning and mating. Similarly, 65% (414 of 635 herds) reported that they did not measure the liveweight of heifers between mating and calving.

Calving Pattern:

Respondents were asked to choose which type of calving pattern best described their herd, using standard definitions. Most herds (237 of 337 herds, 70%) were described as having a 'seasonal' calving pattern, with only 76 herds described as 'split' and 24 herds as 'year-round' (Table 6).

Table 6: Calving pattern by herd size category (n=337)

	Small	Medium	Large	Very Large	Total
Seasonal[a]	71	118	32	16	237
Split[b]	21	39	7	9	76
Year round[c]	13	9	2	-	24

[a] Seasonal: One main calving period per year
[b] Split: Two to four distinct calving periods each year
[c] Year-round: Calving all year

Herds which had a 'year-round' calving pattern were more likely to have either low or high reproductive performance (Table 7)

Table 7: Calving pattern by reproductive performance category (n=588)

	Low	Middle	High	Total
Seasonal[a]	61	305	53	411
Split[b]	19	90	15	124
Year round[c]	14	25	14	53

[a] Seasonal: One main calving period per year
[b] Split: Two to four distinct calving periods each year
[c] Year-round: Calving all year

Age of heifers at mating:

Although 12 (of 541) producers reported that the youngest heifer presented for mating was less than 12 months old when mated, it was most common for the youngest heifer presented for mating to be 12, 13, 14 or 15 months old (n = 33; 70; 116; 101 respectively). The data indicated that it was also common for heifers to be mated around 18 (n = 73) and 24 (n = 65) months of age.

Joining period:

The average reported joining period for mature cows amongst 548 herds was 10.9 weeks (median 10.0 weeks). The average reported joining period for heifers for 480 herds was slightly shorter (10.6 weeks, median 9.0 weeks).

For mature cows, the average joining periods of Large and Very Large herds (9.3 and 8.3 weeks respectively) tended to be slightly shorter than those for Small and Medium herds (11.2 and 11.1 weeks respectively). The average joining periods for heifers was not substantially different between different herd sizes (Small 10.3 weeks; Medium 10.9; Large 10.3; Very Large 11.0).

Figure 5: Joining period for cows and heifers

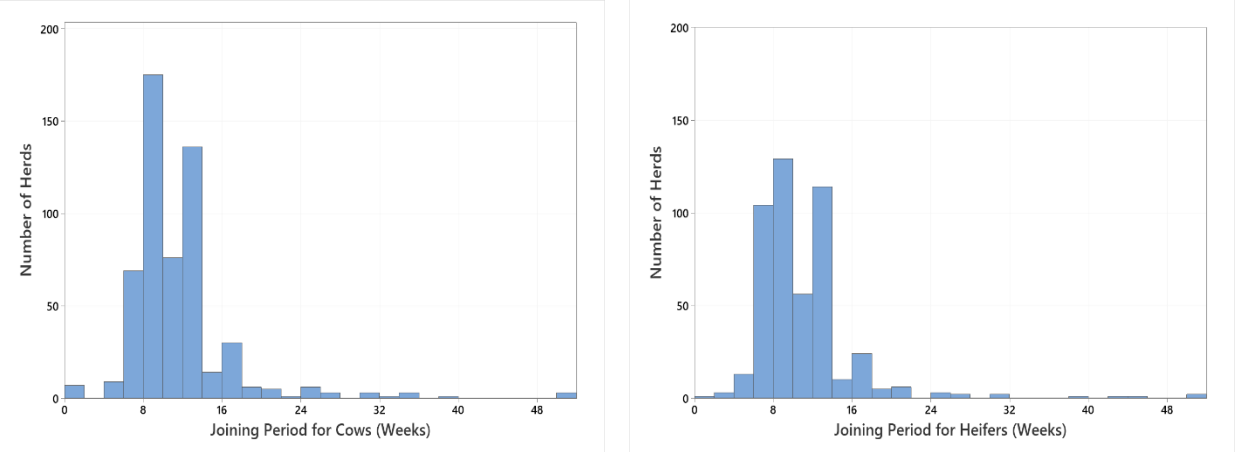


Table 8: Joining period for cows (weeks), by herd size

	Small	Medium	Large	Very Large
No of farms	91	151	39	24
Average	11.2	11.1	9.3	8.3
Median	10	10	9	8
Lower[a] / Upper[b] quartile	8 / 12	8 / 12	7 / 12	7 / 10

[a] Lower quartile means that a quarter of herds were at or below this figure

[b] Upper quartile means that a quarter of herds were at or above this figure

Table 9: Joining period for heifers (weeks), by herd size

	Small	Medium	Large	Very Large
No of farms	71	142	36	24
Average	10.3	10.9	10.3	11.0
Median	9	10	8	7
Lower[a] / Upper[b] quartile	8 / 12	8 / 12	6 / 12	6 / 10

[a] Lower quartile means that a quarter of herds were at or below this figure

[b] Upper quartile means that a quarter of herds were at or above this figure

Pregnancy testing:

Sixty-three per cent of producers used pregnancy testing to confirm pregnancy in their cows and heifers. The use of pregnancy testing was more commonly reported in Very Large herds (88%) and Large herds (88%) than in Medium herds (70%). Pregnancy testing was reported by only 50% of Small herds.

Pregnancy testing was usually performed by a veterinarian (65%), but the use of an animal technician or consultant was also frequently reported (23%). Pregnancy testing by the producer, an employee or other person was relatively uncommon (12%).

Calving Paddock:

The area of calving paddocks used for cows and heifers is provided in Table 10 and Table 11.

Table 10: Size of (cow) calving paddock (hectares), by herd size

	Small	Medium	Large	Very Large
No of farms	102	151	35	24
Average	21.7	35.8	97.6	56.3
Median	10	16	30	45
Lower[a] / Upper[b] quartile	5 / 450	8 / 35	20 / 50	26 / 79

[a] Lower quartile means that a quarter of herds were at or below this figure

[b] Upper quartile means that a quarter of herds were at or above this figure

Table 11: Size of (heifer) calving paddock (hectares), by herd size

	Small	Medium	Large	Very Large
No of farms	88	143	35	24
Average	15.2	22.4	29.2	35
Median	8	10	20	30
Lower[a] / Upper[b] quartile	5 / 20	5 / 21	15 / 40	18 / 40

[a] Lower quartile means that a quarter of herds were at or below this figure

[b] Upper quartile means that a quarter of herds were at or above this figure

Frequency of checking calving cows/heifers:

Surveyed producers were asked: "How often are animals checked between the start and end of calving?" Of 596 herds that responded for cows, 193 (32%) checked cows twice or more each day, 271 (45%) indicated they checked their cows daily and 112 (19%) checked every 2 – 7 days. Five respondents stated that they never checked the calving cows during the calving period.

Producers were more proactive in monitoring their calving heifers. Of the 555 respondents that provided separate answers regarding frequency of checking of calving heifers, 374 (67%) checked the heifer mob twice or more each day, 140 (25%) checked daily and 28 (5%) check every 2 – 7 days. A single respondent reported that they never checked their heifers during the calving period.

4.2.4 Keeping records

Throughout the survey, producers were asked whether the data that they were providing to some specific questions was from "records" or from "best estimates".

Please tick one:

Is this information from records?	
Is this information from best estimates?	

This question was asked as part of questions relating to reproductive management: Bodyweight of non-pregnant cows; Bodyweight of cows and heifers at mating; and Body condition score of cows and heifers at mating. The use of records was also asked as part of questions relating to calf morbidity and mortality: Numbers of calves which were born; Number of calves born alive; Number of calves born dead; Number of calves which died within the first 7 days of life; Number of calves which were marked; and Number of calves which were weaned. Producers were also asked whether they kept records of any factors that were apparent for dead calves from cows and heifers.

Fewer than half of the respondents referred to records when answering the questions relating to reproductive management. Most respondents (322 of 465, 69%) based their answers of average bodyweight of non-pregnant cows on 'best estimates'. Similarly, only about a third of respondents referred to records when answering the question on bodyweight of cows (128 of 429 respondents, 30%) and bodyweight of heifers at the time of mating (103 of 426 respondents, 24%). Few respondents referred to records (54 of 428 respondents, 13%) when answering the questions on body condition score of cows and heifers.

Respondents more frequently referred to records when answering questions relating to calf morbidity and mortality (Table 12).

Table 12: Proportion of respondents referring to records when answering questions regarding calf morbidity and mortality.

	Records	Best Estimate	% Records
What was the total number of calves born during the last complete calving period?	407	152	73%
How many calves were born alive to cows and heifers?	391	125	76%
How many calves were born dead to cows and heifers?	367	136	73%
How many calves that were born alive to cows and heifers subsequently died in their first 7 days of life?	345	140	71%
How many calves were marked?	370	123	75%
How many calves born to cows / heifers were marked?	242	90	73%
How many calves were weaned?	242	90	73%

In addition to being asked whether they kept records of calf mortality, producers were also asked, if they did so, in what form those records were kept. Over half of the respondents (343 of 621 herds, 55%) kept such records. Similarly, about half of the survey respondents indicated that they kept some sort of records of factors which were evident of dead calves from cows (241 of 503 respondents, 48%) or heifers (229 of 452 respondents, 51%).

When asked how mortality records were kept, participants responses varied from "*I keep manual records, in a wall chart, sometimes*" to "*I use a spreadsheet system along with a photo taken of the dead calf*". Most survey respondents (63.3%) kept hard-copy (non-digital) records of calf mortality. The most common recording methods described were a paddock book, notebook or farm diary or variations. A smaller number of survey participants (35%) reported using a varied combination of non-digital and digital records (typically a paddock book from which the data was periodically entered into a spreadsheet) and only a few (1.7%) mentioned the use of a computerised database or herd management software. Tellingly, a few farmers

who claimed to keep records, also offered that those records were kept "*in my head*" or "*by memory*". There is clearly a broad interpretation of what constitutes 'keeping records'.

4.2.5 Reproductive performance

Producer Perceptions:

To confirm that the results of this survey were reasonably reflective of what is 'typical' respondents were asked to give a subjective assessment of how the year being reported in the survey compared to what they considered to be an 'average' year.

Table 13: Producer's subjective assessment of survey year's reproductive performance relative to an 'average' year

	WA	SA	Vic	Tas	NSW	Other[a]	Total
Better than Average	2	9	65	-	43	-	119
Average Year	-	33	171	4	154	4	366
Worse than an Average	-	6	48	2	58	1	115
Total	2	48	284	6	255	5	600

[a] Not specified

Producers were asked to rate how strongly they agreed or disagreed with a series of statements regarding the reproductive management and performance of their herds. The responses were stratified based on the herd size category and the summarised reproductive performance as described above (Figure 4). Producers were generally positive (Table 14). Over half of the "Low" reproductive performance herd respondents indicated that they were positive about their herd's reproductive performance.

Table 14: "I am satisfied with the reproductive performance of my herd"

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
All Herds	7	81	49	354	138	629
Herd size category						
Small Herds	1	16	9	60	19	105
Medium Herds	3	30	20	89	24	166
Large Herds	1	4	3	27	6	41
Very Large Herds	-	8	3	9	5	25
Reproductive performance of herd[a]						
Low	3	35	7	48	2	95
Middle	3	41	38	247	93	422
High	-	1	1	43	37	82

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Respondents were more positive in their assessment of the reliability and accuracy of their own records (Table 15).

Table 15: "Our reproductive records are reliable and accurate"

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
All Herds	3	16	79	294	230	622
Herd size category						
Small Herds	1	3	13	45	42	104
Medium Herds	1	6	22	77	59	165
Large Herds	-	1	5	23	12	41
Very Large Herds	-	1	2	13	9	25
Reproductive performance of herd[a]						
Low	-	6	19	46	23	94
Middle	3	7	52	200	156	418
High	-	3	5	35	39	82

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

There were some minor differences between respondents' assessment of the reproductive performance of their cows and their heifers, being slightly less positive about their heifer performance (Tables 16 and 17).

Table 16: "I am satisfied with the reproductive performance of my mature cows"

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
All Herds	4	42	65	331	181	623
Herd size category						
Small Herds	1	11	14	47	32	105
Medium Herds	2	15	17	92	39	165
Large Herds	-	2	7	21	11	41
Very Large Herds	-	1	2	11	11	25
Reproductive performance of herd[a]						
Low	1	24	16	40	13	94
Middle	3	15	42	237	122	419
High	-	-	4	38	40	82

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Table 17: "I am satisfied with the reproductive performance of my first calving heifers"

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
All Herds	5	53	113	332	110	613
Herd size category						
Small Herds	1	8	21	51	21	102
Medium Herds	2	21	37	82	24	166
Large Herds	-	2	9	21	8	40
Very Large Herds	-	5	9	6	5	25
Reproductive performance of herd[a]						
Low	2	18	22	48	4	94
Middle	3	30	81	226	75	415
High	-	1	6	41	28	76

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Respondents were confident that their management of heifers from birth through to the time of joining was appropriate (Table 18).

Table 18: "My management of heifers between birth and joining is appropriate"

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
All Herds	3	13	83	367	141	607
Herd size category						
Small Herds	1	3	11	68	18	101
Medium Herds	1	8	26	95	36	166
Large Herds	-	-	7	23	9	39
Very Large Herds	-	-	7	12	6	25
Reproductive performance of herd[a]						
Low	-	4	18	60	12	94
Middle	3	8	56	252	92	411
High	-	1	6	37	30	74

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

At Calving:

Dystocia in their own herd was not considered to be a problem by most respondents. Most producers disagreed or strongly disagreed that the number of calves which required assistance at birth was a problem in their herd (Table 19).

Table 19: "The number of calves requiring assistance during birth is a problem on our farm"

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
All Herds	193	268	133	27	6	627
Herd size category						
Small Herds	35	40	22	5	2	104
Medium Herds	40	77	41	8	-	166
Large Herds	10	22	8	-	1	41
Very Large Herds	5	9	7	4	-	25
Reproductive performance of herd[a]						
Low	25	39	28	3	-	95
Middle	114	190	92	23	3	422
High	43	30	5	-	3	81

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

The proportion of calvings in cows and heifers that required assistance is presented graphically in Figure 6 and the data is described in Table 19. It is clear from this data that dystocia is a more common issue in heifers than in cows. The rate of dystocia is more likely to be a problem in small herds, although many herds did not report high rates of dystocia at all. It is important to recognise that the survey did not standardise the definition of what constitutes "requiring assistance" and that this may introduce an element of subjectivity to the responses. It is concerning that so many herds reported that in excess of 20% of their heifers required calving assistance, even in medium sized herds with up to 250 cows.

Figure 6: Percentage of Calving Cows and Heifers requiring assistance

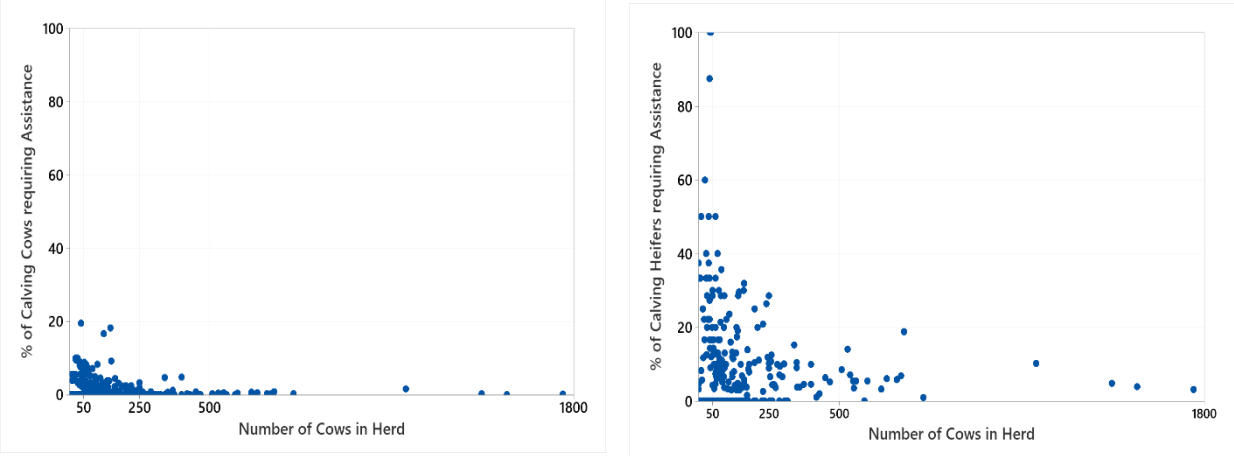


Table 20: Proportion of calvings (cows and heifers) requiring assistance, by herd size

	Small	Medium	Large	Very Large
% of Cows requiring assistance during calving				
Number of herds	94	151	36	20
Average	1.7	1.8	0.6	0.4
Range	0.0 – 19.5	0.0 – 18.2	0.0 – 4.8	0.0 – 1.7
Median	0.0	0.9	0.0	0.3
Lower[a] / Upper[b] quartiles	0.0 / 3.1	0.0 / 2.4	0.0 / 0.8	0.0 / 0.6
% of Heifers requiring assistance during calving				
Number of herds	78	132	32	18
Average	15.1	9.9	6.6	6.3
Range	0.0 – 100	0.0 – 50.0	0.0 – 28.6	0.0 – 18.9
Median	4.8	7.7	5.7	5.5
Lower / Upper quartile	0.0 / 22.9	0.0 / 13.8	2.4 / 10.0	3.5 / 7.5

[a] Lower quartile means that a quarter of herds were at or below this figure

[b] Upper quartile means that a quarter of herds were at or above this figure

On average, 15% of heifers required assistance in small herds, and more than 6% of heifers required assistance in large and very large herds. According to the respondents, the percentage of heifers requiring assistance ranged from 0 to 100% in small herds and from 0 to 28.6% in large herds.

A direct comparison of proportions of cow and heifer calvings that require assistance can be obtained by analysing data from the 412 herds which reported both of these figures. In these herds, on average 1.8% of mature cow calvings required assistance compared to 10.2% for heifer calvings.

In response to the question "In your opinion, what are the 3 most important things to consider to have a good reproductive performance in your herd", respondents frequently nominated body condition (or body weight) of the dam at the point of calving. Responses often mentioned the importance of avoiding excessive body condition. The nutrition of the dam leading up to calving was also a common response, as was the importance of selection of easy calving or low birth weight bulls. Other notable responses included variations on the theme of a 6-week calving period, an easy calving herd, high fertility and low stress handling. A less convincing response was "good luck"!

4.2.6 Calf mortality

Respondents were generally neutral or disagreed that calf mortality was a problem on their farm. Few producers agreed with the statement, and this did not appear to be different between different herd sizes or reproductive performance (Table 21).

Table 21: "Calf mortality is a major problem in my herd"

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
All Herds	221	268	99	28	9	625
Herd size category						
Small Herds	52	32	14	5	1	104
Medium Herds	39	86	31	7	2	165
Large Herds	8	18	12	3	-	41
Very Large Herds	4	6	10	4	1	25
Reproductive performance of herd[a]						
Low	20	35	32	6	1	94
Middle	143	193	61	18	6	421
High	50	26	3	1	1	81

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Stillbirths (Dead at birth):

No distinction was made in this study between calves that died during birth and those that died soon after. While the term 'stillbirth' is strictly defined as a calf that does not survive the birthing process, it is commonly used to describe any calf that fails to survive beyond 24 hours of life.

For all the herds in the survey for which data was recorded, the average number of calves born to cows in the last complete calving period was 147.3 calves (Median 68 calves; lower quartile 35; upper quartile 160). For cows, the average number of calves born alive was 108 and the number born dead was 2.7. The average proportion of calves which were dead at birth (calculated as the number of calves born dead divided by the total number of calves born either alive or dead) was 2.2 percent for cow calvings. For heifers, the average number of calves born alive was 32 and the number born dead was 2.0. The average proportion of calves which were dead at birth (calculated as above) was 6.4 per cent for heifer calvings. It is clear from the distribution shown in Figure 7 that many herds are able to avoid stillbirths completely, while some herds have a substantial problem, especially with stillbirths in heifers.

Figure 7: Stillbirths for Cow and Heifer Calvings. (Data truncated with individual herds with more than 25% stillbirths removed.)

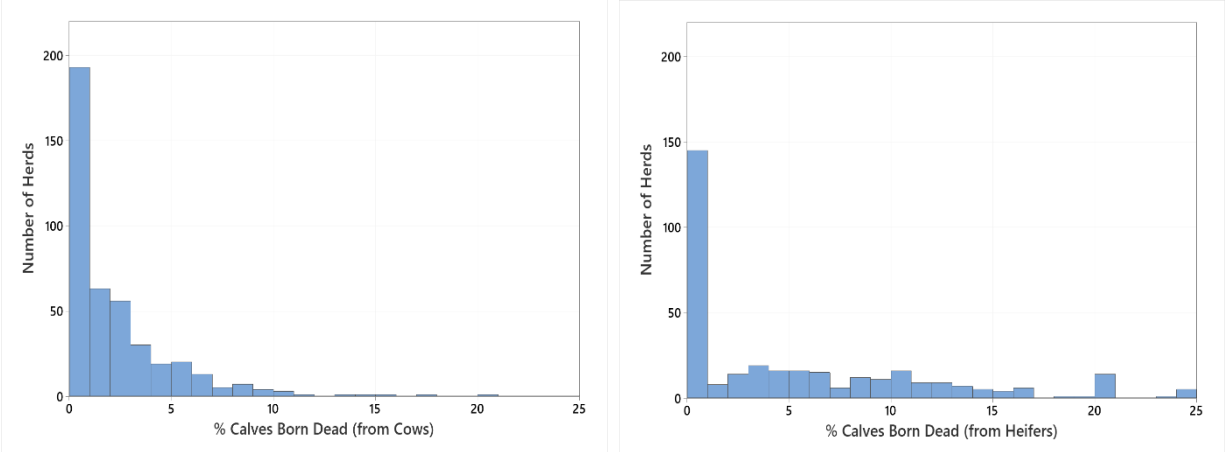
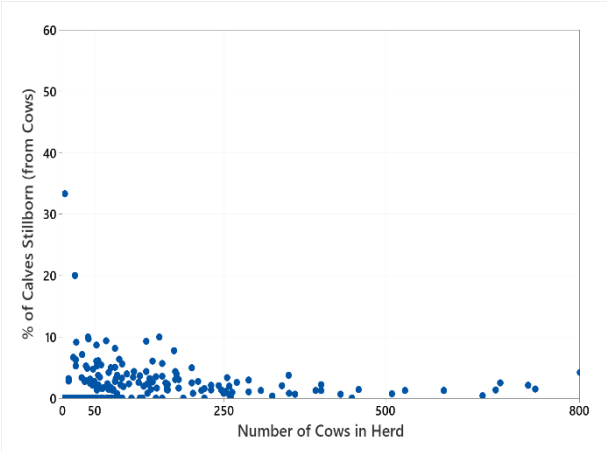


Table 22: Stillbirths for Cow Calvings, by herd size category

	N	Average	Lower quartile	Median	Upper quartile
All Herds	420	2.2	0.0	1.3	3.1
Herd size category					
Small Herds	84	1.9	0.0	0.0	2.4
Medium Herds	115	2.3	0.0	1.9	3.4
Large Herds	23	1.4	0.7	1.1	2.1
Very Large Herds	11	1.6	0.7	1.4	2.1
Reproductive performance of herd[a]					
Low	57	3.3	0.0	1.8	4.9
Middle	280	2.3	0.0	1.6	3.2
High	65	0.6	0.0	0.0	0.0

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Figure 8: Percentage of Calves Stillborn from Cows and Heifers



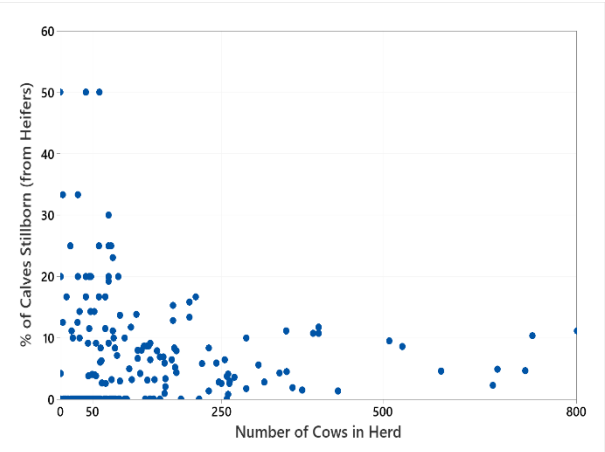


Table 23: Stillbirths for Heifer Calvings, by herd size category

	N	Average	Lower quartile	Median	Upper quartile
All Herds	351	6.4	0.0	3.4	10.0
Herd size category					
Small Herds	66	5.9	0.0	0.0	11.2
Medium Herds	105	6.6	0.0	4.2	9.1
Large Herds	22	4.8	1.9	3.7	7.3
Very Large Herds	11	7.3	4.0	4.9	10.3
Reproductive performance of herd[a]					
Low	57	7.0	0.0	2.6	11.5
Middle	237	6.8	0.0	4.1	9.3
High	42	1.4	0.0	0.0	0.0

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Calf deaths within first week of life:

A large majority of respondents reported that they did not lose any calves during the 7 days immediately after birth (not including those that were dead at birth). However, in some herds deaths of calves from either cows or heifers were reported during this period (Figure d11).

Figure 9: Percent of Live born calves (from cows or heifers) which subsequently died at less than 7 days of age

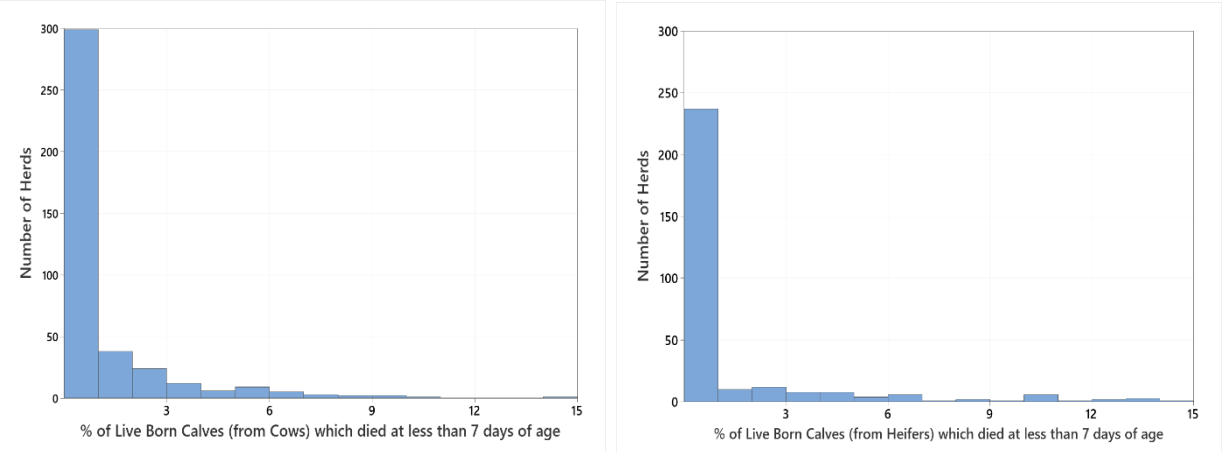


Table 24: Percentage of live born calves that die <7 days of age for Cow Calvings, by herd size category and summarised reproductive performance

	N	Average	Lower quartile	Median	Upper quartile
All Herds	407	1.3	0.0	0.0	1.2
Herd size category					
Small Herds	84	1.3	0.0	0.0	0.0
Medium Herds	111	1.3	0.0	0.0	1.3
Large Herds	21	0.7	0.0	0.3	1.1
Very Large Herds	10	0.6	0.1	0.4	0.8
Reproductive performance of herd[a]					
Low	53	2.0	0.0	0.0	1.3
Middle	271	1.2	0.0	0.0	1.4
High	66	1.1	0.0	0.0	0.0

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Table 25: Percentage of live born calves that die <7 days of age for Heifer Calvings, by herd size category and summarised reproductive performance

	N	Average	Lower quartile	Median	Upper quartile
All Herds	313	2.3	0.0	0.0	0.9
Herd size category					
Small Herds	64	2.9	0.0	0.0	0.0
Medium Herds	93	1.4	0.0	0.0	1.4
Large Herds	20	3.5	0.0	1.2	3.7
Very Large Herds	10	2.6	1.4	2.3	4.0
Reproductive performance of herd[a]					
Low	49	3.3	0.0	0.0	3.1
Middle	208	2.4	0.0	0.0	1.5
High	43	1.2	0.0	0.0	0.0

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Those producers who made observations about calves that died considered that the birthing process was the riskiest time for the calf. However, a relatively small number of producers

reported that diarrhoea and respiratory diseases occurred 'often' both in calves from cows and heifers (Tables 26 and 27)

Table 26: Amongst dead calves from cows, how often were the following factors evident?

	Very often	Often	Rarely	Never	Total
Died during birth	38	105	260	73	476
Had an assisted birth	12	39	264	104	419
Had an obvious deformity	1	8	151	227	251
Developed diarrhoea	4	37	181	160	382
Had breathing difficulties	5	15	106	230	356

Table 27: Amongst dead calves from heifers, how often were the following factors evident?

	Very often	Often	Rarely	Never	Total
Died during birth	36	103	228	63	430
Had an assisted birth	18	76	226	74	394
Had an obvious deformity	-	6	114	214	334
Developed diarrhoea	-	30	146	160	336
Had breathing difficulties	-	14	89	209	312

Consistent with this, most producers did not agree that calf scours was a problem on their farm (Table 28).

Table 28: "Calf scours is a problem on our farm"

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
All Herds	195	238	128	52	14	627
Herd size category						
Small Herds	39	34	20	8	4	105
Medium Herds	46	66	39	12	3	166
Large Herds	9	22	5	4	1	41
Very Large Herds	4	7	8	5	1	25
Reproductive performance of herd[a]						
Low	29	37	20	7	2	95
Middle	119	168	87	37	10	421
High	36	25	13	6	2	82

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Calves Marked:

The proportion of calves which were marked is presented in Table 29 (cows) and Table 30 (heifers). This data is calculated from the number of calves marked, divided by the total number of calves born (both live and dead).

Table 29: Percentage of live born calves that were marked for Cow Calvings, by herd size category and summarised reproductive performance

	N	Average	Lower quartile	Median	Upper quartile
All Herds	306	87.7	92.5	97.27	100.0
Herd size category					
Small Herds	70	85.4	75.0	97.5	100.0
Medium Herds	81	91.0	94.0	97.0	98.3
Large Herds	17	98.1	97.2	98.3	99.3
Very Large Herds	5	95.0	90.1	97.9	98.6
Reproductive performance of herd[a]					
Low	40	86.4	91.5	96.8	99.8
Middle	209	87.8	92.7	97.2	99.0
High	42	89.0	93.3	100.0	100.0

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Table 30: Percentage of live born calves that were marked for Heifer Calvings, by herd size category and summarised reproductive performance

	N	Average	Lower quartile	Median	Upper quartile
All Herds	263	85.4	81.8	93.1	100.0
Herd size category					
Small Herds	58	82.0	75.0	98.1	100.0
Medium Herds	77	86.9	81.5	91.7	98.7
Large Herds	17	92.5	89.6	94.4	96.9
Very Large Herds	6	94.3	92.9	95.2	95.6
Reproductive performance of herd[a]					
Low	42	80.4	69.2	89.4	100.0
Middle	181	86.6	83.3	92.9	100.0
High	28	88.8	90.0	100.0	100.0

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Calves weaned:

The proportion of calves which were weaned is presented in Table 31 (cows) and Table 32 (heifers). This data is calculated from the number of calves weaned, divided by the total number of calves born (both live and dead).

Table 31: Percentage of live born calves that were weaned for Cow Calvings, by herd size category and summarised reproductive performance

	N	Average	Lower quartile	Median	Upper quartile
All Herds	255	86.6	93.3	100.0	100.0
Herd size category					
Small Herds	55	83.0	83.9	97.2	100.0
Medium Herds	63	88.7	94.9	97.2	100.0
Large Herds	15	98.1	97.0	98.3	100.0
Very Large Herds	5	94.4	88.2	98.2	98.9
Reproductive performance of herd[a]					
Low	35	84.1	91.7	96.0	99.3
Middle	174	87.7	93.6	97.2	99.0
High	34	85.7	97.8	100.0	100.0

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Table 32: Percentage of live born calves that were weaned for Heifer Calvings, by herd size category and summarised reproductive performance

	N	Average	Lower quartile	Median	Upper quartile
All Herds	207	83.8	83.3	93.1	100.0
Herd size category					
Small Herds	42	82.6	78.8	100.0	100.0
Medium Herds	57	83.1	82.3	91.7	96.8
Large Herds	14	94.5	92.2	94.5	97.3
Very Large Herds	6	90.6	86.9	91.8	94.4
Reproductive performance of herd[a]					
Low	33	82.8	80.0	96.2	100.0
Middle	143	84.7	83.9	92.9	100.0
High	21	84.3	92.2	100.0	100.0

[a] Reproductive performance of herd is a nominal categorisation of herds, using the producer supplied data of the number of calves born alive for each 100 pregnant cows/heifers.

Calf survival - Producer opinion:

Survey respondents were asked to freely nominate the three most important things that increase calf survival in their herds. Not surprisingly this prompted a wide and diverse range of responses which did not easily lend itself to quantification. However, common themes were evident: Monitoring of calving to allow timely intervention if required; Provision of shelter; Bull selection to contribute to calving ease; and Maternal nutrition to contribute to calving strength. Relatively few respondents nominated specific health issues such as calf scours or paralysis tick control although some did nominate some particularly novel (and presumably locally specific) factors. Overall, the emphasis was on the appropriate application of well-established management practices.

5 Discussion & Conclusion

Despite the significant difficulties associated with conducting a survey which coincided with periods of broad and intense bushfire, and unprecedented community disruption resulting from a pandemic, it is pleasing to see the willingness of producers to spend substantial time and effort providing data for this survey. Although the response rate to the survey was less than hoped for, given the challenging circumstances the response rate was satisfactory and provided sufficient data to allow robust analysis.

We believe beef producers much prefer hardcopy surveys to online surveys. We received several responses which were quite apologetic that they could not complete the survey because they were experiencing such difficult times. Some even apologised for having left the industry all together. In contrast, we also received a considerable number of responses that indicated, sometimes quite firmly, that they did not wish to receive further postal surveys. Considering the relatively low response rate and some apparent challenges in accurately completing the survey questions, we consider it wise to interpret the results with care.

The survey was intended to explore data from southern Australian beef herds. The data gives an insight into herds from New South Wales and Victoria and, to a lesser extent, South Australia. Only a small number of responses were received from Tasmania and Western Australia. While there is little reason to believe that a greater response from these regions would have substantially altered our results, we would consider it worthwhile for efforts to be made to try to collect data from these areas. It would probably be beneficial to utilise local contacts to encourage greater producer participation.

The herds included in our survey range markedly in size. We deemed it appropriate to categorise herds into four groups based on reported numbers of mature cows in the herd, although several other categorisation criteria could have been used. Although there was a somewhat unexpected number of very small herds, we decided to include all herds that provided data in the belief that excluding some herds, whom some may deem too small to be commercial, could have introduced bias in the data for which it would have been very difficult to compensate. Most respondents did indicate that beef operations were their primary type of enterprise. They also nominated their own beef operations as primarily cow/calf enterprises. We did not find a standardised system of classifying Australian beef herds for reproductive analysis that we could apply to our own data. Future studies would benefit from some standardisation of such demographic parameters as this would allow more direct comparison of different studies.

It is disappointing to us that such a large proportion of beef producers only conducted relatively basic measurement, monitoring and recording activities. Many producers did not measure the weight of their heifers at any stage between birth and calving. It was also uncommon to maintain robust records of reproductive performance of cows or heifers, but a large proportion were able to provide data based on ‘best estimate’. While it is quite possible that producers are using simple record keeping systems that suit their needs, it is also a concern that this may lead to inconsistency and inaccuracies that make it very difficult for these producers to benchmark themselves against comparable parts of the beef industry. We believe that there is scope for the development of basic, simple ‘ready reckoners’ that producers could use to collect reliable,

relevant data without increasing their workloads. The benefits of being able to reliably benchmark against similar enterprises should be promoted to producers.

It is clear from the data that there is a wide range of reproductive performance across the herds that were surveyed, and this is likely to apply to the broader beef industry. Even using the basic summary of reproductive performance as a categorisation of herds showed that the number of calves born alive as a percentage of pregnant cows and heifers ranged from about 60% to over 100%. The data also showed that high reproductive performance was possible across the full range of herd sizes. This suggests that there is the potential for improvement in many of the aspects of management that contribute to reproductive performance, and that minimise early calf loss. It is also important to recognise that many of the producers in the current study who were ranked in the lower quartile of performance did not agree that they had a problem with issues like the need for calving assistance and calf mortality.

It was also clear that many producers are confident that they do not have a problem with some aspects of management or performance even though many do not have robust methods of record keeping that would allow them to monitor subtle differences or changes in performance within their own herd, or which would allow stringent comparison of their herd's performance against standardised benchmarks.

6 Key findings

Reproductive performance varied substantially across farms. Average performance, as described by the number of calves born alive as a percentage of pregnant cows and heifers, was 93.3%, but ranged in individual herds from 60 to more than 100%.

Some aspects of neonatal calf loss, such as proportion of stillbirths and deaths within the first 7 days of life, are generally low across most herds. Problems with dystocia and stillbirths in heifers warrants greater focus. Some smaller herds in particular appear to have substantially higher rates of problems.

Most respondents did not agree that reproductive performance and calf mortality was a problem in their herds, even those for whom these parameters were well below the performance of similar herds.

Most respondents seem to be satisfied with the performance of their herd, however record keeping of reproductive performance and calf mortality are low.

7 Benefits to industry

There is the potential for considerable gains for the industry if the reproductive performance of lower performing herds could be brought up to that being achieved by other comparable herds.

There are considerable economic and animal welfare benefits to be gained if those herds which have the highest rates of calf morbidity and mortality could achieve the performance of even the average performing herds in these areas.

A focus on management efforts to decrease dystocia, especially in heifers, would increase the number of calves that survive and that go on to be productive units within the herd. Benefits are readily available without the need for increased expense or resources, such as more emphasis on selection of bulls for calving ease, better monitoring of calving heifers and attention to the nutrition of calving cows and heifers.

8 Future research and recommendations

Significant calf mortality is likely to be primarily a problem in small or medium sized herds. It is in these herds that there is the most variation in performance, and in which the economic and welfare benefits of improvements are likely to be most significant.

There may be substantial benefits from more closely exploring the reasons for poor record keeping in many herds. Consideration should be given to the development of simple, easy, robust and relatively standardised methods of recording calf losses and the major factors that contribute to allow producers to monitor the performance of their own herds and to compare themselves against appropriate benchmarks.

9 References

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10 Appendix

10.1 Human Ethics Approval

Approval for this study was granted by the University of Melbourne Veterinary and Agricultural Sciences Human Ethics Advisory Group (Ethics ID: 1852888.1) on 14 August 2019, as per the attached letter. This approval was subsequently renewed annually for the life of the project.

14 August 2019

THE UNIVERSITY OF MELBOURNE

FACULTY OF VETERINARY & AGRICULTURAL SCIENCES

Dr Kelly Stanger
Faculty of Veterinary and Agricultural Sciences
The University of Melbourne

Dear Dr Stanger,

I am pleased to advise that the Veterinary and Agricultural Sciences Human Ethics Advisory Group has approved the following Minimal Risk Project.

Project title: **Quantifying neonatal mortality and reproductive performance in Southern beef herds.**
Researchers: **Dr Kelly Stanger, Prof Peter Mansell, Carolina Gallardo, Dr David Beggs**
Ethics ID: **1852888.1**

The Project has been approved for the period: **14-August-2019 to 31-Dec-2019.**

It is your responsibility to ensure that all people associated with the Project are made aware of what has actually been approved.

Research projects are normally approved to 31 December of the year of approval. Projects may be renewed yearly for up to a total of five years upon receipt of a satisfactory annual report. If a project is to continue beyond five years a new application will normally need to be submitted.

Please note that the following conditions apply to your approval. Failure to abide by these conditions may result in suspension or discontinuation of approval and/or disciplinary action.

(a) **Limit of Approval:** Approval is limited strictly to the research as submitted in your Project application.

(b) **Amendments to Project:** Any subsequent variations or modifications you might wish to make to the Project must be notified formally to the Human Ethics Advisory Group for further consideration and approval before the revised Project can commence. If the Human Ethics Advisory Group considers that the proposed amendments are significant, you may be required to submit a new application for approval of the revised Project.

(c) **Incidents or adverse effects:** Researchers must report immediately to the Advisory Group and the relevant Sub-Committee anything which might affect the ethical acceptance of the protocol including adverse effects on participants or unforeseen events that might affect continued ethical acceptability of the Project. Failure to do so may result in suspension or cancellation of approval.

(d) **Monitoring:** All projects are subject to monitoring at any time by the Human Research Ethics Committee.

(e) **Annual Report:** Please be aware that the Human Research Ethics Committee requires that researchers submit an annual report on each of their projects at the end of the year, or at the conclusion of a project if it continues for less than this time. Failure to submit an annual report will mean that ethics approval will lapse.

(f) **Auditing:** All projects may be subject to audit by members of the Sub-Committee.

Please quote the ethics registration number and the name of the Project in any future correspondence.
On behalf of the Ethics Committee I wish you well in your research.

Yours sincerely,

Dr Christina Marth - Chair
Veterinary and Agricultural Sciences Human Ethics Advisory Group

Faculty of Veterinary and Agricultural Sciences
The University of Melbourne, Victoria 3010 Australia
T: +61 3 8344 7357 F: +61 3 8344 7374

unimelb.edu.au

10.2 Focus group agenda

Introduction 5 min	Welcome Introduce the research team Explain the purpose of the focus group discussion: Explain the reason for taping: *For noting important points post-meeting* Request participants to read the explanatory statement and complete consent form.
Roundtable Introductions 5 min	Break the ice Each person will take turns in giving a brief introduction of themselves *Demographic information: herd size, years of experience, etc.*
General discussion 20 min	General questions: farmers' perceptions ➢ Do you think the reproductive performance of your herd is important? Why? How important? eg Compared to? ➢ Do you think calf mortality is a problem? Why? What about other farmers? Or in other areas? ➢ Risks associated with poor reproductive performance – probe cost, trade-offs/resource implications, public concerns. ➢ Are you satisfied with the reproductive performance of your herd? Why? What about other farmers? Consensus within the group? If not, why not? ➢ What is your management of heifers between birth and joining? Same for everyone in the group? If yes, why? In not, why? ➢ What is a good figure in terms of reproductive performance? ➢ Do you keep reproductive records? Or mortality records? Do you think is important? Why? What about other farmers?
Study Logistics 30 min	Feedback on the survey and practicalities of administering the questionnaire ➢ *Any questions or suggestions?* ➢ *Anything else to include? Or unclear?* ➢ *How much time would you be willing to spend on completing a questionnaire on this topic?* ➢ *Paper version vs online?*
Wind up and thank you 5 min	Brief wrap-up

10.3 Survey

10.3.1 Plain Language Statement

Ethics ID Number: 11852888

Plain Language Statement

Faculty of Veterinary and Agricultural Sciences

Project: **Quantifying neonatal mortality and reproductive performance in Southern beef herds.**

Dr Carolina Munoz (Responsible Researcher)
Tel: +61 4 24634321 Email: munoz.c@unimelb.edu.au

Introduction

Thank you for your interest in participating in this research project. The following few pages will provide you with further information about the project, so that you can decide if you would like to take part in this research. Please take the time to read this information carefully. You may ask questions about anything you don't understand or want to know more about.

Your participation is voluntary. If you don't wish to take part, you don't have to. If you begin participating, you can also stop at any time. The decision to participate will not impact your relationship with either The University of Melbourne or Meat and Livestock Australia.

What is this research about?

The purpose of this research is to understand trends in beef herd size, attitudes to reproductive management and performance, quantify calf mortality rates and identify potential risk factors that contribute to neonatal beef calf mortality in Southern Australia.

What will I be asked to do?

- This survey should be answered by beef cattle farmers. The survey takes about 30 min.
- Farm owners, managers and workers over the age of 18 are all eligible but we ask that only one survey per farm is returned.
- When answering this survey, please consider a beef farm only. If you own or work on more than one beef farm, feel free to fill in a survey for each farm individually. If you do not know the answer to a question, simply leave it blank.
- Please provide information relating to your most recent, complete calving period (i.e. joining to the end of calving).

What are the possible benefits?

This information will be used to help identify the major factors that contribute to neonatal calf loss and affect the reproductive performance of Southern Australian beef herds. This will enable us to be pro-active as an industry in setting research priorities that could significantly reduce neonatal calf losses and improve the reproductive efficiency within this region.

What are the possible risks?

The questions in the survey are not of a sensitive nature, however, if you feel uncomfortable you can leave them blank.

Ethics ID Number: 11852888

Do I have to take part?

No. Participation is completely voluntary. You are able to withdraw at any time, however, due to the anonymous nature of the data collection, it will not be possible to remove any data already obtained prior to withdrawal.

Will I hear about the results of this project?

This research will be written up as a report and in journal articles. It is also possible that the results will be presented at academic conferences. If you want to hear more about this project, please provide your email or contact details to the research team to receive a summary of the research findings.

What will happen to information about me?

We will protect your anonymity to the fullest possible extent, however, the confidentiality of the information provided is subject to legal limitations. The data collected will be stored securely for five years from the date of recording before being destroyed. All computer files will be password protected.

Data generated in this project may be used to support future research grant applications within the same general area of the research project.

Who is funding this project?

This study is funded by Meat & Livestock Australia Ltd and The University of Melbourne.

Where can I get further information?

If you would like more information about the project, please contact the researchers;

Carolina Munoz (responsible researcher)
Phone: 0424634321
Email: munoz.c@unimelb.edu.au

Prof Peter Mansell
Phone: 03 9731 2222
Email: pmansell@unimelb.edu.au

Dr David Beggs
Phone: 03 97312093
Email: dbeggs@unimelb.edu.au

Dr Kelly Stanger
Phone: 03 9731 2310
Email: kelly.stanger@unimelb.edu.au

Who can I contact if I have any concerns about the project?

This research project has been approved by the Human Research Ethics Committee of The University of Melbourne. If you have any concerns or complaints about the conduct of this research project, which you do not wish to discuss with the research team, you should contact the Manager, Human Research Ethics, Research Ethics and Integrity, University of Melbourne, VIC 3010. Tel: +61 3 8344 2073 or Email: HumanEthics-complaints@unimelb.edu.au.
All complaints will be treated confidentially. In any correspondence please provide the name of the research team or the name or ethics ID number of the research project.

Plain Language Statement, December 2019

10.3.2 Distributed Survey

Faculty of veterinary and Agricultural sciences
Ethics ID Number: 1852888

THE UNIVERSITY OF MELBOURNE

- Beef calf mortality survey –

By completing this survey, you have the chance to win one of the five prizes valued at $500

This ANONYMOUS SURVEY aims to understand trends in beef herd size and reproductive management practices, quantify calf mortality rates and identify potential risk factors that contribute to neonatal beef calf mortality in Southern Australia.

What will I be asked to do?

- This survey should be answered by beef cattle farmers.
- Farm owners, managers and workers over the age of 18 are all eligible but we ask that only one survey per farm is returned.
- When answering this survey, please consider a beef farm only. If you own or work on more than one beef farm, feel free to fill in a survey for each farm individually. If you do not know the answer to a question, simply leave it blank.

Please return the survey in the reply-paid envelope to:

Dr. Carolina Munoz
Reply Paid 73157
University of Melbourne, FVAS
250 Princes Hwy, Werribee, VIC, 3030.

Faculty of veterinary and Agricultural sciences
Ethics ID Number: 1852888

When completing this survey, please use the figures from your most recent, and complete calving period only. If you are unsure of any questions, please leave them blank.

Section 1 – About you

1. **In which post code is your property located?**

Answer: ☐

2. **What is the most accurate description of your herd reproductive performance for your most recent calving period?**

- ☐ Farm average (considering the pass 5 years)
- ☐ Less than farm average (considering the pass 5 years)
- ☐ Better than farm average (considering the pass 5 years)

What is the average reproductive performance of your herd (calves born alive ÷ cows and heifers pregnant x 100)? **(%)**

Answer: ☐

3. **What is the best description of your production system?**

(tick all that apply)

- ☐ **Cow/Calf enterprise**
  - ☐ Producing vealers
  - ☐ Producing store weaners
  - ☐ Producing feeder steers
- ☐ **Trade enterprise**
  - ☐ Steers
  - ☐ Bullocks
  - ☐ Cows/calves
  - ☐ Heifers
- ☐ **Stud enterprise**
  - ☐ Bulls
  - ☐ Cows/heifers
- ☐ **Other (Please specify)**

Answer: ☐

4. **What percentage (%) of your farming enterprise is dedicated to beef cattle activities?**

Answer: ☐ %

5. **What is the total area of your farm (owned)?**

Answer: ☐ hectares

6. **What is the total area of your farm allocated to beef production?**

Answer: ☐ hectares

7. **What is the total area of other land (i.e. leased land) used for beef production?**

Answer: ☐ hectares

8. **On an average year, how many labour units are involved with the management of the beef cattle on farm?** *(please fill in the table)*

Owners/managers?		(Full time equivalents)
Other employees?		(Full time equivalents)
Casual or part-time		(Total hours per year)

9. **Have you or any employees completed the following training or industry initiatives (tick any that apply)**

- ☐ University qualification in Agricultural Science
- ☐ University Qualification – Other
- ☐ TAFE qualification relevant to agriculture
- ☐ Secondary school
- ☐ Primary school
- ☐ No formal schooling
- ☐ More beef from pastures
- ☐ Bred well, fed well workshop
- ☐ Member of better beef group
- ☐ Profitable grazing system program
- ☐ Livestock production assurance (LPA) plan

Faculty of veterinary and Agricultural sciences
Ethics ID Number: 1852888

10. Please rate how strongly you agree or disagree with the following statements:

a. I am satisfied with the reproductive performance of my herd

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
☐	☐	☐	☐	☐

b. Our reproductive records are reliable and accurate

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
☐	☐	☐	☐	☐

c. I am satisfied with the reproductive performance of my mature cows

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
☐	☐	☐	☐	☐

d. I am satisfied with the reproductive performance of my first calving heifers

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
☐	☐	☐	☐	☐

e. My management of heifers between birth and joining is appropriate

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
☐	☐	☐	☐	☐

f. Calf mortality is a major problem in my herd

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
☐	☐	☐	☐	☐

g. The number of calves requiring assistance during birth is a problem on our farm.

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
☐	☐	☐	☐	☐

h. Calf Scours is a problem on our farm.

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
☐	☐	☐	☐	☐

Section 2 – About your herd

11. At the start of your most recent, completed calving, how many cattle of each age group did you have on farm (total number)?

The term 'heifer' refers to a young animal (<36mth) calving for the first time, any animal that has previously calved is a defined as a 'cow'.

Pregnant cows > 2 years old	
Non pregnant (dry) cows > 2 years old	
Pregnant heifers 12-24mth old	
Non pregnant (dry) heifers 12-24mth old	
Weaned heifers <12 month old	
Weaned steers <12 month old	
Weaned bulls <12 month old	
Bulls >12 months old	
Steers >12 months old	

12. What is the age of the oldest cow(s) on your farm (years)?

Answer: ☐

13. Which type of calving pattern best describes your herd ?

☐ Seasonal – one main calving period per year
☐ Split – two to four distinct calving periods each year
☐ Year Round – calving all year

14. In what month are the majority of calves born?

Answer: ☐

15. What breeds of cattle do you have on your farm?

**Please note – this includes semen used for AI if applicable.* (tick all that apply)

Bulls join to mature cows	**Bulls** joined to heifers	**Cows/heifers**
☐ Angus	☐ Angus	☐ Angus
☐ Hereford	☐ Hereford	☐ Hereford
☐ Shorthorn	☐ Shorthorn	☐ Shorthorn
☐ Charolais	☐ Charolais	☐ Charolais
☐ Limousin	☐ Limousin	☐ Limousin
☐ Murray Grey	☐ Murray Grey	☐ Murray Grey
☐ Simmental	☐ Simmental	☐ Simmental
☐ Other	☐ Other	☐ Other
Answer: ☐	Answer: ☐	Answer: ☐

16. On your farm, what is the average weight of a non-pregnant cow in body condition score 3 (score from 1 to 5)? *(leave blank if unsure)*

Answer: ☐ kg

Please tick one:

Is this information from records?	
Is this information from best estimates?	

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17. On your farm, what is the average frame size of a mature cow?

- ☐ Small (e.g. dexter)
- ☐ Medium (e.g. Angus, Murray Grey)
- ☐ Large (e.g. Belgium blue, Charolais)

18. Do you use reproduction estimated breeding values (EBVs) to select appropriate bulls for mature cows?

- ☐ Yes
- ☐ No

19. If yes, what are the top 3 EBV traits you select for?

1.....
2.....
3.....

20. Do you use reproduction estimated breeding values (EBVs) to select appropriate bulls for first calving heifers?

- ☐ Yes
- ☐ No

21. If yes, what are the top 3 EBV traits you select for?

1.....
2.....
3.....

22. What is the average body weight of cows at their first mating? *(leave blank if unsure)*

Answer: ☐ kg

23. What is the average body weight of heifers at their first calving? *(leave blank if unsure)*

Answer: ☐ kg

Please tick one:

Is this information from records?	
Is this information from best estimates?	

24. What is the average body condition score of cows at their first mating? *(leave blank if unsure)*

Answer: ☐ (Score from 1-5)

25. What is the average body condition score of heifers at their first calving? *(leave blank if unsure)*

Answer: ☐ (Score 1-5)

Please tick one:

Is this information from records?	
Is this information from best estimates?	

26. In the last 12 months, how frequently do you measure the live weight of heifers during the following periods;

Birth to weaning	Weaning to mating	Mating to first calving
☐ Never	☐ Never	☐ Never
☐ Weekly	☐ Weekly	☐ Weekly
☐ Monthly	☐ Monthly	☐ Monthly
☐ Every 2 months	☐ Every 2 months	☐ Every 2 months
☐ Every 3 months	☐ Every 3 months	☐ Every 3 months
☐ Every 6 months	☐ Every 6 months	☐ Every 6 months
☐ Yearly	☐ Yearly	☐ Yearly

Section 3 – Reproduction and management

Please provide information from your most recent, complete calving period (joining to end of calving).

27. How old is the youngest heifer presented for mating?

Answer: ☐ months

28. During the most recent, complete calving period, how many cows were joined by;

a. Natural mating (bulls)
Answer: ☐ number of cows

b. Artificial insemination
Answer: ☐ number of cows

c. Embryo transfer
Answer: ☐ number of cows

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29. During the most recent, complete calving period, how many heifers were joined by;

a. Natural mating (bulls)
Answer: ☐ number of cows

b. Artificial insemination
Answer: ☐ number of cows

c. Embryo transfer
Answer: ☐ number of cows

Natural mating only

If you do not use AI or ET, please fill in this section.

30. In a typical year, how long is the joining period by natural mating?

Answer (cows): ☐ weeks

Answer (heifers): ☐ weeks
OR:
Calving all year round (tick if applicable)
☐

31. At the last mating, how many bulls were joined to the cows and heifers

Answer (cows): ☐ # Bulls for cows

Answer (heifers): ☐ # Bulls for heifers

OR:

Answer (joined together): ☐ # Bulls for all females

Artificial insemination and embryo transfer

If you use artificial insemination or embryo transfer please fill in this section. If you do not use AI or ET, leave this section blank and fill in 'natural mating only' section above.

32. Do you use a synchrony program when mating cattle to AI or ET?

☐ Yes
☐ No

33. Do you use bulls for natural mating after the end of the AI period?

☐ Yes
☐ No

34. If yes, how long are the bulls run with the cows and heifers after the end of the AI period?

Answer (cows): ☐ weeks

Answer (heifers): ☐ weeks

35. How many bulls are joined with the cows and heifers following the end of the AI period?

Answer (cows): ☐ # bulls joined to cows

Answer (heifers): ☐ # bulls joined to heifers

36. How many AI straw were used to mate cows and heifers?

Answer (cows): ☐ Total number of straws

Answer (heifers): ☐ Total number of straws

For all reproduction systems, please complete the following;

37. Are your cows pregnancy tested?

☐ Yes
☐ No

If yes, when does this typically occur
☐ # weeks after bulls removed/AI
Complete

38. If yes, who usually conducts the pregnancy testing?

☐ Veterinarian
☐ Animal technician/consultant
☐ Farm employee/owner
☐ Other _____

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39. If yes, how many cows and heifers were pregnancy tested?

Answer (cows): ☐ Number tested

Answer (heifers): ☐ Number tested

40. What proportion (%) of cows and heifers were pregnant at testing? *please use the figures from your most recent, and complete calving period only.*

Answer (cows): ☐ % pregnant

Answer (heifers): ☐ % pregnant

41. What is the average size of calving paddocks used for cows and heifers?

Answer (cows): ☐ hectares

Answer (heifers): ☐ hectares

42. How often are animals checked between the start and end of calving?

Cows	Heifers
☐ Twice daily ☐ Daily ☐ Weekly ☐ Other (please specify) Answer:	☐ Twice daily ☐ Daily ☐ Weekly ☐ Other (please specify) Answer:

43. By the end of the calving period, how many cows calved?

Answer (cows): ☐ total number

Of these, how many cows required assistance during calving?

Answer (cows): ☐ number assisted

44. By the end of the calving period, how many heifers calved?

Answer (heifers): ☐ total number

How many heifers required assistance during calving?

Answer (heifers): ☐ number assisted

In your opinion, what are the 3 most important things to consider to have a good reproductive performance in your herd?

1.....
2.....
3.....

Section 4 – Animal health and Calf survival

Please provide information from your most recent, complete calving period (joining to end of calving).

45. If known, what was the total number of calves born during the last complete, calving period?

Answer: ☐ total number

Please tick one:

Is this information from records?	
Is this information from best estimates?	

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46. If known, how many calves were <u>born alive</u> to cows and heifers? *(leave blank if unsure)*

Answer (cows): ☐ total number

Answer (heifers): ☐ total number

Please tick one:

Is this information from records?	
Is this information from best estimates?	

47. If known, how many calves were <u>born dead</u> to cows and heifers? *(leave blank if unsure)*

Answer (cows): ☐ total number

Answer (heifers): ☐ total number

Please tick one:

Is this information from records?	
Is this information from best estimates?	

48. If known, how many calves that were born alive to cows and heifers, subsequently died in their first 7 days of life? *(leave blank if unsure)*

Answer (calves from cows):
total number died ☐

Answer (calves from heifers):
total number died ☐

Please tick one:

Is this information from records?	
Is this information from best estimates?	

49. How many calves were marked?

Answer: ☐ total number

Please tick one:

Is this information from records?	
Is this information from best estimates?	

50. If known, how many calves born to cows were marked? *(leave blank if unsure)*

Answer (cows): ☐ total number

51. If known, how many calves born to heifers were marked? *(leave blank if unsure)*

Answer (heifers): ☐ total number

Please tick one:

Is this information from records?	
Is this information from best estimates?	

52. How many calves were weaned?

Answer: ☐ total number

53. If known, how many calves born to cows were weaned? *(leave blank if unsure)*

Answer (cows): ☐ total number

54. If known, how many calves born to heifers were weaned? *(leave blank if unsure)*

Answer (heifers): ☐ total number

Please tick one:

Is this information from records?	
Is this information from best estimates?	

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55. If known, what date were calves born to cows weaned? *(leave blank if unsure)*
Answer: ☐ dd/mm/yyyy

56. What date were calves born to heifers weaned?
Answer: ☐ dd/mm/yyyy

57. For year-round calving, at what age were calves weaned?
Answer: ☐ months

58. Amongst dead calves from cows, how often were the following factors evident?

	Never	Rarely	Often	Very often
Died during birth				
Had an assisted birth				
Had an obvious deformity				
Developed diarrhoea				
Had breathing difficulties				
Other, please provide details				

Please tick one:

Is this information from records?	
Is this information from best estimates?	

Do you keep records of this?
- ☐ Yes
- ☐ Sometimes
- ☐ No

59. Amongst dead calves from heifers, how often were the following factors evident?

	Never	Rarely	Often	Very often
Died during birth				
Had an assisted birth				
Had an obvious deformity				
Developed diarrhoea				
Had breathing difficulties				
Other, please provide details				

Please tick one:

Is this information from records?	
Is this information from best estimates?	

Do you keep records of calf mortality?
- ☐ Yes
- ☐ Sometimes
- ☐ No

How are mortality records kept?

In your opinion, what are the 3 most important things to consider to increase calf survival in your herd?

1.....
2.....
3.....

Thank you for your assistance in completing this survey.

If you would like to receive a summary of the results from this survey, please provide your contact details below: (optional)

Name:	
Email:	