Improving performance in a beef herd

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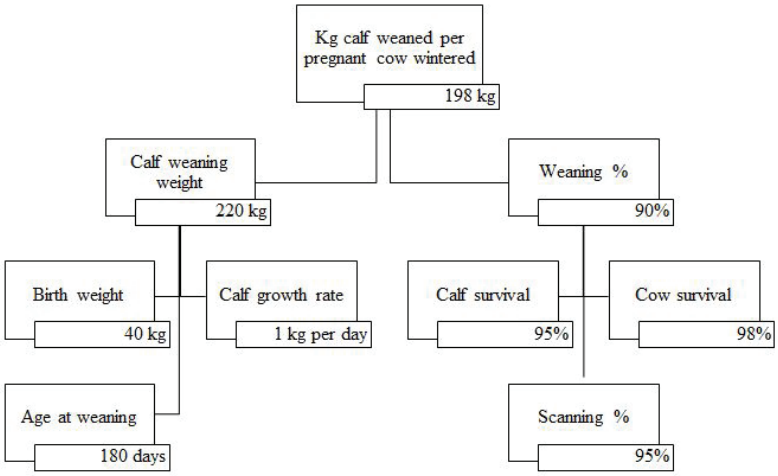
Introduction

Improving the performance of a beef breeding herd is often a low priority. On many farms the beef cow herd is primarily seen as a tool for improving pasture quality to enable other stock classes to perform at a high level. Further to this, the cattle enterprise of the average sheep and beef farm only contributes approximately 25% of gross farm revenue and at a lower gross margin than other stock classes (Beef+Lamb NZ 2018, Smeaton *et al.* 2008). Lastly, the calf production cycle is relatively long compared to lamb production so the benefits of improvements made at mating are only fully realised 18 months later at weaning. For these reasons, farmer motivation to improve the performance of the beef cow herd can be low.

Improvement in performance must focus on the key output from a beef breeding herd which is the total weight of calves weaned (Geenty and Morris 2017). The main drivers of this are the lactation performance measured by the calf weaning weight, and the reproductive performance measured by the weaning percentage (Figure 1).

Figure 1. Key drivers of beef herd production and associated performance targets. Adapted from Morris and Smeaton, 2009



In the case presented, the beef herd was part of a complex mix of stock classes on a farm that became part of a farm productivity improvement programme in 2015. The animal production systems were measured and managed using the StockCare programme.

Farm description

- 664 effective hectares of easy to steep hill country
- 4,200 sheep stock units (ewes, replacements, and sale lambs)
- 3,200 beef stock units (cows, replacement heifers, and finishing steers).
- Farmax estimated annual pasture production ~7,000kgDM/ha, predominantly Browntop

Cattle policy

- 180 Hereford x Friesian mixed-age cows
- 60 heifer replacements are purchased at 90-100kg liveweight from a

commercial calf rearer
- Mixed age cows mated 14 January (calving 20 October) for 50 days to terminal sires (Belgium Blue, Charolais, and Saler) at 1:40 mating ratio
- Rising two year old heifers mated 27 December (calving 5 October) for 50 days to Angus Wai-Group, low birthweight bulls.
  - Minimum mating weight 300kg
- Bulls are given an annual breeding soundness examination and semen test.
- Bulls are single sire mated and changed after one cycle
- Cows are wintered for four to five weeks in a bush block then given silage until spreading with lambing ewes prior to calving
- Heifers sold at 420kg local trade in March or April, a few carried over for second winter.
- Steers are sold pre-winter at 400-450kg
- Fatten 120 Friesian bulls bought in at 180-210kg in autumn. Sold pre-winter at 450kg
- Finishing cattle typically lose weight through winter

Historical herd performance

Table 1. Case farm beef herd performance history

Year mated	Scanning %1	Calving %[2]	Average calf weaning weight (kg)[3]	Kg calf weaned per pregnant cow wintered[4]
2010	nd	nd	259kg	nd
2011	nd	86%	247kg	195kg calf/cow5
2012	88%	nd	257kg	nd
2013	82%	nd	nd	nd
Farm targets	90%	90%	230kg at 200 days old	207kg calf/cow

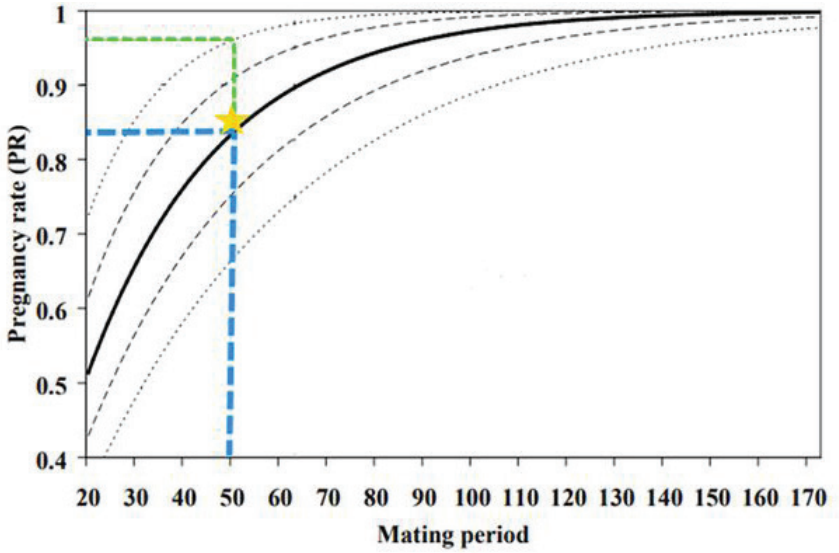
[1] Scanning % = number of pregnant cows ÷ number of cows mated; [2] Calving % = number of calves at calf marking ÷ (number of cows mated +/- number of pregnant cows bought/sold); [3] Measured approximately one month after weaning; [4] Kg calf weaned per pregnant cow wintered = (number of calves weaned × average calf weaning weight ÷ number of pregnant cows wintered); [5] Adjusted to account for an assumed 20kg weight gain between weaning date and weighing date; nd = no data available from farm records.

Identifying the opportunities

By comparing the historical performance to the targets in Figure 1 the main opportunity to improve the kg calf weaned per pregnant cow wintered is by increasing the scanning percentage. The historical scanning percentage average of 85% can be compared to the survey results from over 500 New Zealand beef herds done in 2005/2006 to further benchmark performance (Figure 2) (Heuer *et al.* 2008a). The case herd sits just above the average, but well below the top performers.

The historical weaning weights were actually measured approximately one month after weaning. Assuming the calves were 20 kg lighter than this on the day of weaning, the three year average weaning weight is 234kg, just above the farm target.

Figure 2. Calculated pregnancy rate after 50 days mating in average (blue dashed line, 84%) and the top 10% (dashed green line, 97%) of beef herds across New Zealand compared to the case herd historical average (gold star, 85%). Solid black line = average, dashed black lines = lower and upper quartiles, dotted black lines = lower and upper 10%. Adapted from Heuer *et al.* (2008)



Scanning percentage

A low scanning percentage means that one or a combination of three things has happened:

1. The cows/heifers were not cycling during mating
2. The cows/heifers were cycling but did not get mated
3. The cows were mated but failed to conceive or lost the pregnancy before scanning

To identify which of these three broad factors are driving suboptimal performance requires gathering some data and comparing that to accepted benchmarks. The first piece of data should be foetal-aged scanning results from each age group of heifers and cows grouped by birth year where possible. This can identify if any particular age group/s is affected and allow per cycle conception rates to be estimated. Scanning can also provide a measure of bull performance if mating mob records are available.

Scanning in 2015 (for mating in 2014) identified that the rising two-year old heifers were performing well with 93% pregnant after 50 days of mating. The farm manager later recalled that the heifers had historically achieved over 90% pregnant at scanning. Only 71% of the mixed age cows were scanned pregnant after 50 days of mating. The mixed age percentage includes the rising three-year old heifers which were not scanned or recorded separately. Of the dry cows, ~70% were rising three- and four-year olds.

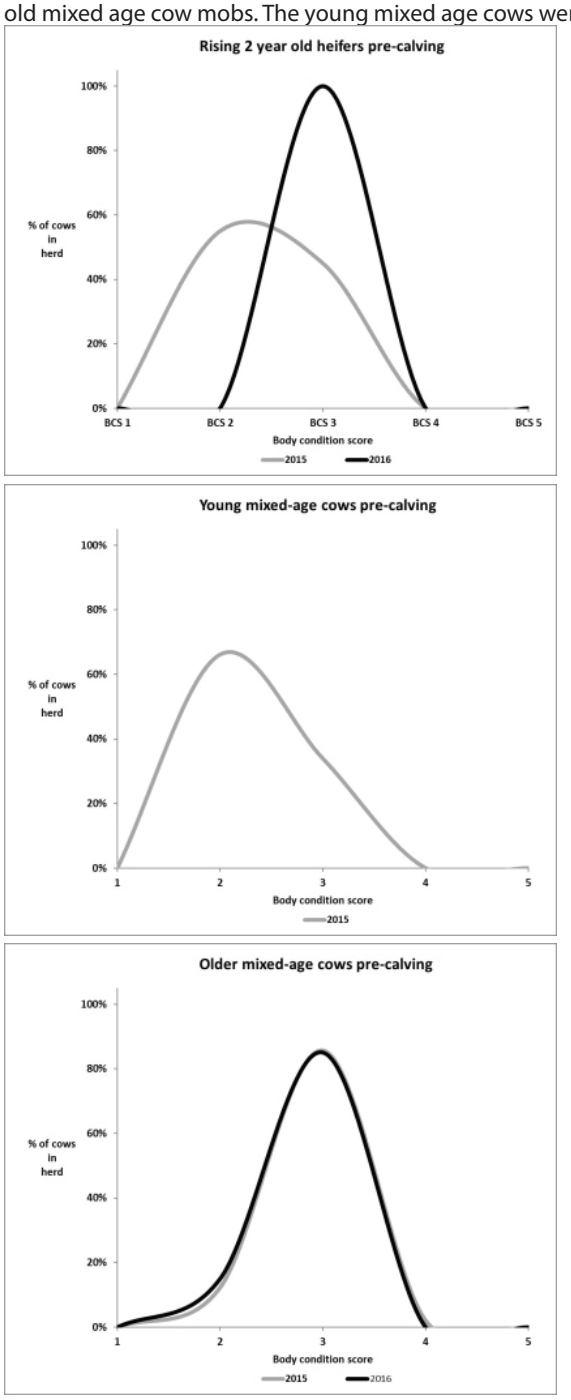
The opportunity to improve was with the young mixed age cows but unfortunately foetal ageing was not done. Therefore we did not know which of the three broad factors identified above presented the greatest opportunity for improvement.

1. The cows were not cycling during mating

The main reasons for a cow not cycling at mating time relate to her body condition score (BCS) at calving and to the amount of time since she last calved (post-partum anoestrus interval, PPAI).

Several studies have reported a positive association between BCS at calving and/or mating and reproductive performance (Nicoll 1979, Morris *et al* 2006, Reardon *et al* 1978, Osoro and Wright 1992). Figure 3 shows the BCS profiles (1-5 scale) of the different age groups of heifers and cows approximately one month pre-calving on the case farm. With over half of the rising two-year old heifers and young mixed age cows BCS 2 out of 5, this presented a huge opportunity to increase both reproductive and lactation performance in the next season.

Figure 3. One month pre-calving body condition score profiles for rising two-year old heifers, young mixed age cows and old mixed age cow mobs. The young mixed age cows were not condition scored in 2016.



The duration of the PPAI is affected by calving date, cow age, cow breed and nutrition between calving and mating (Geenty and Morris 2017). The calving date had already been shifted by the current farm manager from 20 August to 20 October for the mixed age cows to better align with the pasture growth curve. Morris *et al.* (2016) found the inter-calving interval between the first and second calf born was 13–20 days longer than the interval between the next four successive calves born from Angus-cross cows which may help explain why the majority of the dry cows were rising three- and four-year olds. The results of a New Zealand study by Nicoll (1979) measured the effect of different pasture allowances before and after calving and suggest that a higher post-calving pasture allowance can reduce the PPAI. In early September 2015 the average pasture cover across the farm was below 1100kgDM/ha and predicted to drop further by calving resulting in low pasture allowance post-calving.

2. The cows were cycling but did not get mated

This category covers issues with the bulls. On this farm there is a risk with single sire mating. The indication that the young mixed age cows are where the opportunity lies could be due to bull failure. Annual mating ability testing and semen assessment is in place to mitigate the risk as much as possible but cannot guard against bulls getting injured during mating.

3. The cows were mated but failed to conceive or lost the pregnancy before scanning

There are many possible causes of failed conception, early embryonic death and foetal loss. The more common among these are sudden weight loss/feed restriction, bovine viral diarrhoea (BVD), Leptosporosis, Neosporosis, selenium deficiency and copper deficiency/molybdenum toxicity (Diskin and Morris 2008, Heuer *et al.* 2008b).

Pooled BVD antibody testing of a sample of mixed age cows at scanning in 2015 showed exposure to BVD virus (S/P ratio >0.75) which indicates BVD is circulating in the herd and persistently infected cattle are present.

Plan to capture the opportunities

Increase focus on BCS management throughout the year in rising two-year old and young mixed age cows to reach a target of at least 80% BCS 3/5 at calving was set. This was a small part of a farm-wide approach to improve nutrition of all stock classes through tighter management of feed demand and supply through summer and autumn to reach pasture cover targets in winter and spring. Breeding cow numbers were reduced to 50 rising two-year heifers and 140 mixed age cows mated, with approximately 40 sold as in-calf cows before winter.

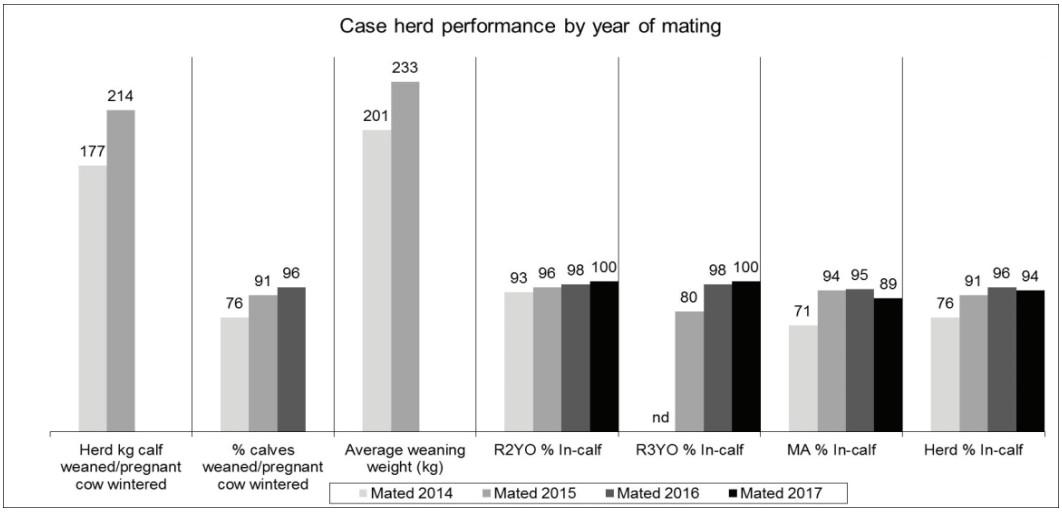
BVD PCR testing of all bulls and rising two-year old heifers at pre-mating 2015 was negative. A BVD management plan was put in place involving whole herd vaccination pre-mating and testing of brought-in replacement heifers on arrival. The decision was made to not test the mixed age cows due to the high cost compared with the potential benefit in this sized herd. The BVD risk from trading cattle was to be managed by herd vaccination and separation of trading and breeding cattle, particularly from mating to scanning.

Ensure bull testing continues every year, with a focus on the bulls used over the young mixed age cows.

Results

Figure 4 shows the change in key performance indicators (KPI's) for the case herd by year of mating. The calf weaning weight for cows mated in 2016 was not available at the time of writing. There has been an increase in all KPI's over time to above farm and industry targets. The challenge now is to maintain this level of performance.

Figure 4. Case herd key performance indicators by year of mating. R2YO = rising two-year old heifers, R3YO = rising three-year old heifers, MA = Mixed age cows, nd = no data available. The average weaning weight for the calves from those mated in 2016 was not available at the time of writing.



The farm manager and I are in agreement that the improved performance is a result of better BCS at calving, improved pasture allowance post-calving, proactive BVD management and continued focus on growing replacement heifers to meet target weights. The manager believes the replacements need to remain a focus until they reach the mixed age herd after scanning as rising three-year olds.

This farm has achieved significant increases in not only beef herd performance but also greater production from the ewe flock, sale lambs and trade cattle. Favourable summer weather set the potential with higher pasture growth rates. This potential was realised with focussed stock management to ensure the extra pasture was utilised.

Summary

Opportunities to improve performance in a beef herd have been well described in the literature and can be readily found in practice through collecting some key information. Capturing those opportunities presents a different challenge and requires a highly motivated farmer which is often lacking when it comes to beef herd performance. In this case the motivation came through involvement in the StockCare programme and has been hugely rewarding to be a part of.

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