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Economic advantages of better management of your beef breeding herd

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Introduction

Increasing the profitability of beef enterprises involves lowering the costs of production, increasing the overall income, or a combination of both. In a breeding enterprise, the key area in both aspects of this equation is the management, and subsequent performance, of the breeding herd.

The primary focus of management of the breeding herd is to increase the number of calves each year that are:

- conceived
- born
- weaned
- sold.

Increasing each of these on an annual basis appears to ensure that maximum returns to the breeder will be generated, but at what cost? Within all breeding systems there are any number of complex interactions, and the overall management program should look at the most efficient and economic balance between each of these components.

For example, selecting for higher growth rate in calves will increase weight and value at slaughter, but is also genetically associated with higher birth weights, which can, if not controlled, lead to less live calves and reduced numbers for sale. This increased growth rate also requires greater feed intake, which can eventually reduce the overall numbers of stock carried on the property.

What is the optimum balance, and what are the potential costs and returns from pushing the performance levels of the breeding herd?

The issue for breeders is to adopt a system that can measure potential economic returns from any changes to management procedures, within the limitations of feed resources and accounting for any costs or physical restrictions these changes will incur.

Beef-N-Omics, a program developed by NSW DPI, can be used for this purpose. Beef-N-Omics is backed by a software program that models herd inventories, feed demand, feed supply and economic variables to calculate gross margins for a number of beef enterprises. This enables users to measure the potential benefits of adopting new or different technologies to improve the profitability and sustainability of the grazing beef industry in NSW, while operating within the constraints of available feed supply versus the total feed requirements of the beef herd.

Gross margins are very useful and common tools for financial analysis and farm planning, but they have limitations. Gross margins include only variable costs, not fixed or overhead costs. Cash flow, capital requirements, labour availability and infrastructure are not included in gross margins, and you should consider them before you consider making any changes to your management or enterprise type.

The software uses easily available data such as cow numbers, joining period, calf weaning numbers, culling levels and ages, death rates, selling policy details and monthly pasture growth rates. From these, a comprehensive monthly herd inventory is generated (Table 1). This herd inventory is used to calculate the feed demand of each of these classes of animals.

Feed demand is calculated by using the relationships from AFRC (1984). These calculations are based on cow and calf live weight, calving pattern, condition score, milk

Table 1. Herd inventory (case study herd)

All breeding enterprise stock	Month											
Class:	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Preg & Lac	332	332	331	330						134	250	333
Preg	105	105	104	104	418	416	243	93		42	79	105
Lac	52	52	52	52			172	322	413	278	146	52
Empty & dry	16	16	16	16	52	52	51	51	51	37	25	17
Culls	19	19	19	19								19
Replacements												
4–5 m												
6–7 m												
8–9 m					240	100						
10–11 m					160	299	239	99				
1–2 y	157	119	119	118	118	117	230	327	161	160	159	158
2–3 y							47	87	116	70	29	0
3–4 y												
4–5 y												
Total cattle	**683**	**644**	**642**	**640**	**987**	**984**	**982**	**979**	**741**	**721**	**689**	**685**

production, weaning age, growth rates and sale live weights. The unit used is metabolisable energy (ME), measured as MJ/kg dry matter (DM). Feed available is calculated on the basis of monthly pasture/fodder crop growth rates (kg DM per hectare per day), as well as from the supplements available (roughage and/or grain). By using a simple relationship, the ME required is converted to kilograms DM, with the assumption that all pasture available for the year has 8 MJ of ME. In most instances, the operator of the program needs to adjust feed balances to accurately reflect annual variations in feed quality. Feed available is already in kilograms DM on the basis of monthly growth rates. From this, a monthly feed balance (available minus required) is calculated.

Using Beef-N-Omics to model the economic advantages of improved breeding herd management

To measure the effect of changing management strategies, a typical or 'case study' herd is modelled and analysed in terms of the gross margins generated for any beef enterprises in that herd. To allow a fair comparison of different enterprises incorporating differences in cow or calf numbers, classes of stock, growth rates, turn-off weights, sale times, weaning ages and dates, weaning numbers, mortalities, joining weights and ages, calving patterns and stock numbers must be adjusted to a constant point.

For these comparisons, breeding cow numbers in each scenario being compared are adjusted such that the overall total feed deficit is equal to that in the original case study herd. Monthly feed balances developed for the case study herd are shown in Table 2.

Details of the case study herd

- **Property:** 900 hectares typical of Central West NSW. There are 200 hectares of predominantly native summer grasses and 700 hectares of a partly improved mixture of perennials, annuals

Table 2. Monthly feed balances for the case study herd

Feed balance (kg DM/ha)												
Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Feed available	818	484	193	223	365	389	259	271	470	1141	1545	1278
Total demand	338	339	354	370	279	279	321	362	332	331	322	326
Balance	480	145	–161	–147	86	110	–62	–91	138	810	1223	952

Total annual feed deficit	–461 kg DM/ha
Number of months of feed deficit	4

and sub-clover. Prograze (a NSW DPI farmer course on balancing pasture quality and quantity to animal nutrition needs) default growth rates for these pasture types have been selected.

- **Cattle:** 500 British breeding cows weaning 400 calves (80 per cent) (average age 8 months) in April. Mortality is 3 per cent annually, other culls are 3 per cent annually, joining age is 27 months and age at last joining is 10 years. Each bull is joined to 33 cows for 12 weeks, with calving in July (40 per cent), August (35 per cent) and September (25 per cent).
- **Sales**: 80 per cent of steers sold at an average of 350 kg (age 14 months) at 200 c/kg live weight. The remaining 20 per cent of steers sold at an average of 420 kg (age 19 months) at 180 c/kg live weight. Surplus heifers are all sold at an average of 330 kg (age 14 months) and 185 c/kg.
- **Structure of the herd:** as shown in Table 1.
- **Gross margins**: $162,865.00 (total); $180.96 (per hectare).

A number of alternative breeding herd management strategies have also been modelled by using Beef-N-Omics to measure the potential profitability of these strategies by way of changes in the gross margin. The alternative scenarios modelled, with their gross margins and those of the case study herd, are:

- reducing annual mortality from 3 per cent to 1 per cent per year
- joining at 15 months, rather than 27 months of age
- mating bulls to 50, rather than 33, cows per year.•
- shortening the calving spread and condensing the calving pattern. Joining for 6 weeks, rather than 12 weeks, to calve from mid July (60 per cent) to the end of August (40 per cent).
- increasing weaning from 80 to 87 percent.
- all of these scenarios combined.

Additionally, three crossbred herds have been included. These are modelled on the same management strategies as for the final situation described above, with all the scenarios combined. These are:

- straightbred British cows joined to a different breed British bull (B × B).
- straightbred British cows joined to a European bull (B × Euro).
- cross-bred British cows joined to a European bull (b/B × Euro).

Selecting bulls that can be mated to more cows will lift profits. Photo: Brian Cumming

General results

Reduced annual mortality. Total breeding herd numbers are not changed from the original. An additional 12 dry cows and 3 replacement heifers are available for sale.

Gross margin: $177,159.00 (total); $196.84 (per hectare); improvement: 8.9 per cent

Joining age 15 months. The average age of the herd is lowered from 5 to 4 years, and yearling heifers become productive early, rather than waiting until they are 27 months. Breeding herd numbers increase to 570 (additional 70 breeders), producing an additional 56 calves. Additional sales: 28 steers, 22 heifers, 19 dry cows.

Gross margin: $191,213.00 (total); $212.46 (per hectare); improvement: 17.4 per cent

Bull mating load. Joining bulls with a working life of 3 years to 50, rather than 33 cows, reduces the number of bulls purchased each year from 6 to 4. Profitability is largely driven by bull sale prices, which have been extremely variable. This example assumes a sale price of $1,200.00 and a purchase price of $3,500.00.

Gross margin: $167,657.00 (total); $186.29 (per hectare); improvement: 2.9 per cent

Shortened and condensed calving spread and pattern. Slaughter progeny average 20 days older at the date of sale, with steers weighing 15 kg and heifers 10 kg heavier. Commencing calving 2 weeks later alleviates a considerable period of feed deficit, allowing an additional 10 breeders to be carried. There are additional sales of 4 steers and 3 females. The total additional weight of slaughter progeny equals 3785 kg.

Gross margin: $172,451.00 (total); $191.61 (per hectare); improvement: 5.9 per cent

Increased weaning percentage. Increasing the weaning rate from 80 to 87 per cent increases feed requirements owing to the increased numbers of pregnant and lactating cows and increased number of progeny grown to slaughter. Overall breeder numbers need to be reduced to 493 head to compensate, with an additional 29 calves weaned.

Gross margin: $177,811.00 (total); $197.57 (per hectare); improvement: 9.2 per cent

All changes concurrently. Breeding herd totals 525 head weaning 457 calves, increases of 25 and 57, respectively. Average age of the breeding herd is reduced from 5 to 4 years, and the heifer replacement rate declines from 24.4 to 17.4 per cent. Additional sales of 32 steers, 61 heifers and 6 CFA cows are generated, and 22 fewer dry cows are sold. Additional total sale weights of 3405 kg for steers and 1370 kg for heifers are also achieved.

Gross margins: $221,143.00 (total); $245.71 (per hectare); improvement: 35.8 per cent

Results in crossbred herds

All crossbred scenarios include an additional freight cost of $20 for heifer purchases. Heifers are purchased empty and dry in September at $600 per head straightbred and $650 per head cross-bred (final scenario). European cross progeny receive a premium of 7 c/kg, being half a muscle score higher than British-sired progeny. European bulls are 100 kg heavier and attract a premium of 10 c/kg as culls owing to their additional weight and muscle. The mature weight of crossbred cows is increased by 5 per cent, increasing cull values but decreasing stock numbers.

British × British (B × B). Weaning weights are increased by 3 per cent, and slaughter weights of progeny by 5 per cent, resulting in 515 breeding cows (10 fewer than the final scenario, straight-bred) weaning 448 calves.

Gross margins: $228,019.00 (total); $253.35 (per head); improvement: 40 per cent (3.1 per cent higher than in the final straightbred scenario).

British × European (B × Euro). Weaning weights are increased by 7 per cent and slaughter weights of progeny by 10 per cent, resulting in 500 breeding cows (25 fewer than in the final scenario, straightbred) weaning 435 calves.

Gross margins: $246,890.00 (total); $274.32 (per head); improvement: 51.6 per cent (11.6 per cent higher than in the final straightbred scenario).

British/British × European (B/B × Euro). Weaning weights are increased by 12 per cent and slaughter weights of progeny by 15 per cent. The weaning percentage of the crossbred cows is lifted to 90 per cent due to heterosis, resulting in 475 breeding cows (50 fewer than in the final scenario, straightbred) weaning 428 calves.

Gross margins: $246,890.00 (total); $274.32 (per head); improvement: 56.1 per cent (15 per cent higher than in the final straightbred scenario).

Discussion and conclusions

There are clear economic advantages of a number of improved strategies for the management of beef cattle breeding herds in Australia. The options discussed above are by no means all that are available, nor do they attempt to explain the many

Angus Hereford cows joined to Limousin bulls. Photo: Brian Cumming

ways in which improvements can be achieved. Likewise, Beef-N-Omics is but one of the many programs capable of modelling and measuring herd performance. Many of the improvements above can be achieved simply by changes in levels of management, and many can be further enhanced by adopting advances in nutrition, genetics and marketing.

References and further reading

Agricultural and Food Research Council (1984) *Energy Requirements of Ruminant Livestock*. Technical Bulletin. UK.

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