Thinking Harder About Friesian Cross Cows

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There are 1.5 million breeding cows in New Zealand primarily run on hill country farms where most are farmed in conjunction with sheep. This is seldom to the short-term benefits of the cattle, but often improves the performance of sheep and the pasture. This should always be considered when evaluating the financial performance of a beef breeding cow enterprise. With appropriate management, breeding cows fill an important niche on hill country, particularly when the pasture growth curve has a large summer surplus and a contrasting winter deficit.

The breeding cow herd is dominated by two breeds the Angus and Hereford. The heavier European breeds began to be imported in the late 1960's and some, especially Simmental, Charolais, South Devon and Limousin have made an impact as Terminal sires, where all progeny (both male and female) are sold for slaughter or to finishing farms. In an effort to increase productivity and profitability there has also been increased use of the Hereford / Friesian crossbred cow, the Friesian introducing genes for higher milk production.

The objectives of most commercial beef breeding cow herds are to:

- rear to weaning a large number of calves (95) per 100 cows mated each year
- wean calves with a heavy liveweight (50% of autumn cow liveweight)
- maintain a low death rate in the herd (2 to 3% per annum)
- make use of the breeding cow in promoting and maintaining improved pastures.

The overall output of the breeding cow herd is dependent on both weaning % and weaning weight of the calf, these are often combined into a term called cow productivity.

$$\text{Productivity} = \frac{\text{no. of calves weaned x Av. weaning weight}}{\text{no. of cows joined with bull}}$$

However, the total feed consumed by large cows is greater than that of small cows and to take account of this the weight of calf weaned per cow joined (ie the productivity) can be divided by the cow liveweight and used as a proxy measure of biological efficiency in the beef breeding cow herd.

$$\text{Efficiency} = \frac{\text{Productivity}}{\text{Cow liveweight}}$$

The beef cow is capable of generating only about 0.5 times her body weight in progeny marketed each year (some farmers often use this ratio where weaners at 200 days of age weigh 50% of their autumn dam liveweight), compared to the sow which produces 8 times her body weight per year and the meat-type hen which produces 70 times her body weight per year in progeny market weight. However within a breeding cow system there are some cows that are more efficient both in biological and economic terms. Table 1 lists four different breeding cow policies: the traditional Angus being the least efficient in biological and economic terms while the once-bred heifer (where a heifer calves at 2 years of age with the calf being weaned at 200 days and sold and the heifer is then herself slaughtered for meat) is the most efficient in biological terms. A cow with twins is ranked the best for economic efficiency.

Table 1. Comparison of biological and economic efficiency of different breeding cow policies

Policy	Biological Efficiency (g carcass/kg DM consumed)	Economic Efficiency ($ GM[1]/tonne DM consumed)
Traditional	26 (100)[2]	(100)
Beef x Dairy	31 (120)	(113)
Beef x Dairy (twins)	32 (125)	(132)
Once-bred heifer	34 (133)	(111)

[1]GM = gross margin.

[2]Relative to traditional system (=100)
Source: Morris et al (1994)

Calving date in most beef breeding cow herds usually coincides with the onset of the spring flush of pasture growth thus ensuring adequate feeding levels post-calving to encourage cow milk production and the onset of reproductive activity. Calf growth rates should exceed 1.0 kg/head/day while calves are suckling their dams. This requires the provision of a pasture mass greater than 1500 kg DM/ha or 6-8 cm sward surface height.

Choice of Breeding System

The choice of breed for a particular farm will often involve compromises. Once the performance characteristics for breeding and finishing have been identified for a particular farm these compromises can be minimised by using sires with different attributes from dams (an example is a large sire over a beef cross dairy cow (ie Simmental bull mated to a Hereford x Friesian cow)).

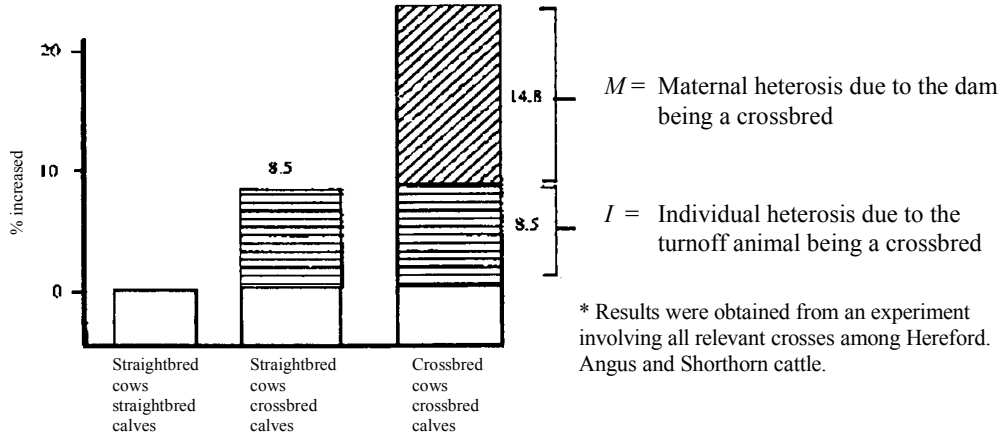
There are two basic breeding systems. If the source of replacement females is heifers produced from within the herd then this is called a *continuous* system. If heifers are not put back in the herd this is a *terminal* system. Differences in these systems must be understood or serious mistakes can be made. In a continuous system since replacement females are retained in the system the cowherd has genetics of both sire and dam traits. Therefore, if sires have traits that are undesirable in cows, they cannot be hidden in a continuous system. In a terminal system replacement females are purchased. This offers more flexibility in choice of genetic types enabling specialized maternal and sire lines to be used.

A combination of relatively small dams bred to large sires in a terminal system fully exploits breed complementarity. For example, crosses between beef and dairy breeds can be used to produce cows that, when fed suitably, have superior milking and reproductive ability. Mating these animals to terminal sires with large mature size and growth rates allows slaughter offspring to be produced with the benefits of growth rate and leanness to attain heavy carcass weights while maintaining smaller, highly productive breeding cows. In this way, the breeds can be chosen to

complement each other in a manner not achievable with straightbred animals. This is probably the best reason for using crossbreeding.

The benefits resulting from crossbreeding are best achieved through increased fertility of crossbred cows and growth rate of calves. In Figure 1, it can be seen that if straightbred cows reared crossbred calves rather than straightbred calves, on average, there would be an extra 8.5% increase in weight of calf weaned per cow mated (e.g. for a 200 kg weaner this would equate to 17 kg of extra calf weaning weight). If crossbred dams were then used to rear the crossbred calves, a further 14.8% increase could be expected as a result of the better maternal environment (due to primarily to fertility and milk production) provided by the crossbred dams. Using crossbred dams to rear crossbred calves, the expected extra calf weight weaned/cow would be 23.3% compared to straightbred cows rearing straightbred calves. The monetary increase from this at current prices is $115.00 (Table 2)

Figure 1 A comparison of % increase in calf weight weaned/cow exposed to breeding, as a result of mating either straightbred cows to bulls of a different breed (centre), or mating first cross cows to bulls of a third breed (right).



By adopting a policy of buying-in all heifers, 100 percent of the cows in the herd can be mated to a terminal sire. A common system used by farmers is the purchase of Beef x Dairy cross heifers (Hereford x Friesian or Angus x Friesian) as weaned calves, mating these at 15 months to an easy calving sire breed (e.g. Angus, Hereford, Murray Grey) and from then on to a larger terminal sire breed (e.g. Simmental, Charolais, Limousin or South Devon). The main disadvantage of this system is the

need to organise a reliable source of replacement heifers. Some farmers solve this by having formal arrangements with dairy farmers whereby they purchase appropriate sires for the dairy farmer and then contracts to purchase the female and sometimes male progeny back.

Table 2 Percentage of maximum heterosis expected in progeny for various mating system.

Mating system	Heterosis retained		Superiority over parent breeds		
	Individual (%)	Maternal (%)	Weight of calf Weaned / Cow mated (%)	(kg)	Value at $2.50/kg LW
Straightbred A x A	0	0	0	200	0
2 breed cross (A x B)	100	0	8.5	217	42.50
3 breed cross (A x B) x C	100	100	23.3	246	115.00

The suitability of Friesian cross cows suitable as beef breeding cows

The Ministry of Agriculture and Fisheries undertook breed comparison trials during the 1970's. The performance of female crossbred progeny (except Angus which were pure-bred and used as baseline for rankings) in these trials is shown in Table 3

Table 3 Performance of crossbred (crossed with Angus or Hereford) cows (Morris et al. 1993)

Sire of crossbred dam	Puberty (days)	Cows Pregnant (%)	Calves born alive (%)	Calves weaned (%)	Productivity[1] (kg)	Efficiency[2] (kg)
[3]Angus	395	84	93	73	110	29
[4]Jersey	339	87	96	78	141	38
Hereford	382	85	91	90	118	29
Friesian	347	88	95	79	150	36
Limousin	423	75	95	68	107	27
Blonde Aquitaine	417	78	94	68	110	26
South Devon	398	80	96	73	130	31
Maine Anjou	394	83	93	74	128	30
Simmental	393	79	93	69	123	29
Charolais	418	77	93	67	116	27
Chianina	432	73	95	63	102	24

[1]Productivity = weight of calf weaned/cow joined
[2]Efficiency = weight of calf weaned kg/100 kg of cow liveweight mated.
[3]Angus x Angus
[4]Hereford x Angus

This research highlighted the potential of beef cross dairy animals as suckler cows. Friesian and Jersey cross Angus or Hereford outperformed all other crosses. These breed rankings are similar for other breed comparison trials conducted elsewhere in the world.

Other comparisons carried out on hill country at Whatawhata showed that over all age groups the Hereford cross Friesian were about 30% superior to Angus for productivity (Morris and Baker 1987). Advantages in reproductive performance can occur at all ages although it is greatest when mating heifers at 15 months due to the earlier onset of puberty in the dairy cross heifers. Differences in calf weaning percentage between traditional and dairy cross breeds are probably small if yearling heifer mating is not carried out. Some farmers have observed low in-calf rates at second mating in Friesian cross cows and this probably relates to a combination of high milk production and less than optimum feed allowances delaying post partum oestrus and ultimately rebreeding.

Extra Feed Requirements

There is no doubt that the more productive Hereford cross Friesian cows are often heavier and will therefore require extra feed. Winter feed requirements can limit the number of beef cows able to be run in a hill country grazing beef herd. McMillian and McCall (1991) modelled the feed requirements of Hereford cross Friesian dams compared to Angus dams and found the total weight of calf weaned per unit of winter feed required was increased by between 10 –15 %.

Research therefore points to the Friesian cross cow a being more productive as a beef breeding cow in most environments. The exception may be in hard hill country with large paddocks where the beef breeding cow is the pasture control mechanism and her body condition is the “supplement” to get through feed deficit periods. The British breeds may be more efficient at this weight gain over summer and controlled weight loss over the winter. In these types of environments mating heifers at 15 months may not be adopted and hence the reproductive advantage of dairy cross cows may not be realised. However where management is seeking more productive cows then Friesian

cross cows can give considerable lifts in productivity and profitability provided cow liveweight is not increased disprortionately to the potential extra calf production.

In Table 4 the annual feed consumption (kg dry matter/head/year) for three different cow liveweight types (small, medium and large) are calculated using the Brookes model (Brookes et al 1993). The different cows are assumed to wean claves at a liveweight equivalent to 50% of their dam autumn live weight. The stock unit comparison of three different sized cows highlights the pitfalls of using a single stock unit conversion factor for different sized beef cows. If each of these cows rears 50% of their own autumn liveweight to sale as weaner calves they are then all are equal in terms of $return per kg of feed eaten and/or per stock unit. If we considered these three types of cows were run on a farm where there was a fixed amount of feed, then f 100 cows of the small type, 92 of the medium and 79 of the large type cows could be farmed.

Table 4. Seasonal liveweights and production data for three different beef breeding cows type (note liveweights excludes the weight of conceptus)

	Small	**Medium**	**Large**
Weaning (kg)	430	470	550
Mid-winter (kg)	380	420	500
Pre-calving (kg)	380	420	500
Mating (kg)	410	450	530
Calf wean wt (kg)	215	235	275
Feed eaten kgDM	2880	3131	3657
Stock units	5.2	5.7	6.6
$Return/kg feed	0.186	0.187	0.187
Number of cows	100	92	79
$GM/Stock unit	105	107	108

Table 4 illustrates that there are a range of cow types that can give similar productivity and returns. When a farmer is considering a change to beef cross dairy bred cows the following points need to be noted.

1. They will wean heavier calves.
2. They will have better reproductive performance if mated as yearlings.
3. They will return more $ if cow liveweight is not increased substantially.
4. There is a range of breeding systems suitable and those wishing to use a terminal breeding programme should definitely consider dairy cross animals.
5. If feed management is not up to scratch then gains may not be greater than those achieved by the use of the traditional British breeds.

References

Baker, R.L.; Carter, A.H.; Morris, C.A.; Johnson, D.L. 1990. Evaluation of eleven cattle breeds for crossbred beef production: Performance of progeny up to 13 months of age. Animal Production 50: 63-70.

Brookes, I.M.; Morris, S.T.; Parker, W.J. 1993. Computer spreadsheets for predicting feed requirements and feed budgeting. Proceedings of the New Zealand Grasslands Association 55: 209-210.

McMillan, W.H.; McCall, D.G. 1991. Are yearling heifers mated and more productive cow breeds worth while use of winter feed? Proceedings of the New Zealand Society of Animal Production, 51: 265 - 269.

Morris, C.A.; Baker, R.L.; Hickey, S.M.; Johnson, D.L.; Cullen, N.G.; Wilson, J.A. 1993. Evidence of genotype by environment interaction for reproductive and maternal traits in beef cattle. Animal Production 56: 69-83.

Morris, C.A.; Baker, R. L. 1987. Beef cattle breeds and crosses. Proceedings of Ruakura Farmers Conference 38: 7- 9.

Morris, S.T.; Brookes, I.M.; Parker, W.J.; McCutcheon, S.N. 1994. Biological efficiency: how relevant is this concept to beef cows in a mixed livestock seasonal pasture supply context? Proceedings of the New Zealand Society of Animal Production 54: 333-336.