

Understand It's Worth Before You Give it Away...The Value of Heterosis

*By Bob Weaber, Ph.D., Cow-calf Extension Specialist/Professor,
Department of Animal Science and Industry, Kansas State University, Manhattan, Kansas*

The dramatic changes and volatility cow-calf production system input costs and calf values have many producers wondering about the value of heterosis in today's beef industry pricing structure. Many producers are seeking ways to improve cow-calf production efficiency and profitability. Profitability may be enhanced by increasing the volume of production (i.e. the pounds of calves you market) and/or the value of products you sell (improving quality). The reduction of production costs, and thus breakeven prices, can also improve profitability. Better yet, improving the input:output ratio should enhance profit. For commercial beef producers, the implementation of technologies and breeding systems that increase the quality and volume of production and reduce input costs is essential to maintain or improve the competitive position of the operation. Some producers are thinking of establishing a more conventional straight breeding system to improve end-product value traits and want to understand the value they are giving up as they sacrifice heterosis, while other producers are considering the establishment of a planned crossbreeding system to capture the value of hybrid vigor. Either way, to make an informed decision, producers need to know the value generated in their herd by heterosis or hybrid vigor.

To fully understand the trade-offs, it is essential to know what it is you sell and how you sell it. The lure of premiums for high quality beef carcasses is appealing; it gets lots of trade publication promotion and it can be profitable. No doubt growing the top-line of the beef value chain and satisfying customers is important. That said, if you are producer that sells calves at weaning you have very limited opportunity to capture the value of selection pressure you place on end-product quality at the expense of other traits or loss in heterosis. It is also true that even if you own the cattle to harvest and are paid on a grid, you only get a fraction of the value of the improvement, albeit bigger than the calf premium. Conversely, the value of heterosis affects every cow on your outfit and it is value that you can capture every year no matter how you sell calves. More importantly, it's not a \$20 or \$40 or \$60 premium per head you might get for selling calves or carcasses...the heterosis premium is much, much more.

The use of crossbreeding offers two distinct and important advantages over the use of a single breed. First, crossbred animals have heterosis or hybrid vigor. Second, crossbred animals combine the strengths of the parent breeds. The term 'breed complementarity' is often used to describe breed combinations that produce highly desirable progeny for a broad range of traits. With useful across breed EPDs and adjustment factors, we can effectively select for improvement in a wide range of traits including carcass traits, while seeking to build environmentally adapted cows that leverage the power and value of heterosis.

Improvements in cow-calf production due to heterosis are attributable to having both a crossbred cow and a crossbred calf. The two tables below detail the individual (crossbred calf) and maternal (crossbred cow) heterosis observed for various important production traits. These heterosis estimates are adapted

from a report by Cundiff and Gregory, 1999, and summarize crossbreeding experiments conducted in the South-eastern and Mid-west areas of the US. Heterosis generates the largest improvement in lowly heritable traits. Traits such as reproduction and longevity, essential for cow-calf profitability, have low heritability. These traits respond very slowly to selection but heterosis generated through crossbreeding can significantly improve an animal's performance. The largest economic benefit (roughly 66%) of crossbreeding to commercial producers comes from having crossbred cows (Table 2.) Crossbreeding has been shown to be an efficient method to improve reproductive efficiency and productivity in beef cattle.

A variety of crossbreeding systems yield 20-30% improvements in weaning weight per cow exposed not including the additional value generated through sire selection within breed. This represents a substantial change in output given relatively constant input. Simple examples of a 23% increase in weaning weight per cow exposed using a terminal sire/F1 (two cross) cow can generate \$150-200 additional revenue per cow per year. I'm not aware of any set of calves that have generated carcass premiums of \$200 premium per cow exposed regardless of breed or grid. In today's calf prices the value of heterosis for a herd of 100 cows is \$15,000 to \$20,000 per year and represents a decrease in breakeven costs of more than \$30/cwt on 600 lb calves.

A well-constructed crossbreeding system can have positive effects on a ranch's bottom line by not only increasing the quality and gross pay weight of calves produced but also by increasing the durability and productivity of the cow factory. As you make your decision to straight-breed or cross-breed make sure you don't give away a couple hundred dollars per cow to make a \$20-60 premium per calf sold at market or on the rail when you can go for both!

Table 1. Individual Heterosis

<u>Trait</u>	<u>Units</u>	<u>% Heterosis</u>
Calving Rate, %	3.2	4.4
Survival to Weaning, %	1.4	1.9
Birth Weight, lb.	1.7	2.4
Weaning Weight, lb.	16.3	3.9
Yearling Weight, lb.	29.1	3.8
Average Daily Gain, lb./d	0.08	2.6

Table 2. Maternal Heterosis

<u>Trait</u>	<u>Units</u>	<u>% Heterosis</u>
Calving Rate, %	3.5	3.7
Survival to Weaning, %	0.8	1.5
Birth Weight, lb.	1.6	1.8
Weaning Weight, lb.	18.0	3.9

Longevity, years	1.36	16.2
------------------	------	------

Lifetime Productivity

Number of Calves	.97	17.0
Cumulative Weaning Wt., lb.	600	25.3