



# Cattle Producer's Handbook

Genetics Section

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## Applying Principles of Crossbreeding

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One of the most powerful tools available to cattle producers to improve the efficiency of production in a herd is through the use of crossbreeding. Effective use of a crossbreeding system allows producers to take advantage of heterosis (hybrid vigor), complementarity, and breed differences to match cattle to available feed resources and to predominant market preferences.

Failure to adequately think through a crossbreeding program can be potentially devastating. It could result in nothing more than a mongrel herd, which lacks both uniformity and the ability to produce under a given set of available resources.

### Heterosis

Heterosis is the superior performance of an offspring over the average of the parental breeds. It can have a marked effect on the profitability of a cattle operation. Heterosis, or hybrid vigor, is greatest when crossing two parent animals of totally unrelated ancestry. Hybrid vigor can be exhibited through a variety of traits including increased survivability and growth of crossbred calves or higher reproduction rates of crossbred cows.

The main reason a producer enters into a crossbreeding system should be to optimize cattle performance and quality. The amount of heterosis that is maintained in a herd depends on the type of crossbreeding system the producer decides to take advantage of.

### Breed Differences and Complementarity

Generally speaking, the amount of variability between breeds for most traits is comparable to the amount of variability one would expect to find between individuals within a breed. All breeds manifest superiority in some of the economically important traits, but no breed can boast excellence in all traits.

A crossbreeding program should be designed to capitalize on those traits that each of the parent breeds bring to the mix. This is known as complementarity, or a cross that combines the strengths of different breeds. Complementarity helps match the genetic potential for all the economically important traits such as growth rate and carcass composition with climate, feed resources, and market preferences. Simply put, breed complementarity means that the strengths of one breed can complement or mask the weaknesses of another breed.

In practical terms, a producer looking to utilize complementarity would choose a bull breed that would pass on rapid growth and desirable carcass traits to crossbred cows that would provide adequate milk for the rapidly growing calf and produce a live, healthy calf each year.

In poorly conceived crossbreeding programs, complementarity could have negative effects on productivity. For example, if a large, terminal sire breed were bred to small, immature, or "hard-calving" cows, the result would probably be an increase in dystocia problems.

Cattle breeds can be separated into different biological types, with each type exhibiting differing levels of production for various production characteristics. Table 1 lists some breeds grouped by biological type.

One extreme crossbreeding example that demonstrates breed differences and complementarity is a scheme that was popular in some areas of the country 20 years ago. A Jersey bull would be crossed onto Angus cows to produce medium frame, high milking  $F_1$  females. These were then crossed with Charolais bulls to produce terminal calves. The Jersey provided the genes for milk production and marbling ability; the Angus, the genes for carcass quality; and the Charolais, the genes for superior growth.