

Crossbreeding Beef Cattle

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CROSSBREEDING BEEF CATTLE

Crossbreeding among different breeds of beef cattle is receiving more attention by researchers and cattle raisers alike in recent years. Why this interest in crossbreeding? What does crossbreeding have to offer the beef cattle producer? Breeds of beef cattle are crossed primarily to take advantage of heterosis (hybrid vigor) in some of the traits of economic importance in commercial beef production. Crossbreeding is also used in attempts to combine desirable characteristics of established breeds into new breeds. And perhaps a less common use, crossbreeding is a method of changing from one breed to another in commercial herds.

The crossbreeding pros and cons go on and on, but it appears that crossbreeding has proven to be weight-gainers for producers finding the right combinations.

Agricultural Research Service experiments show that crossbreeding yields 3 per cent more calves that are 5 per cent heavier at weaning and return nearly \$9 more in carcass value. Hybrid vigor, the response in an animal from the cross of parents carrying many unlike genes, is the reason for the increase. Why hybrid vigor occurs is not completely known. It may result from unlike genes for the same trait contributed by the two parents or from undesirable recessive genes in each breed that are masked by dominant genes of the other breed. In general, crossbred calves are more vigorous and grow faster than straightbred calves because of the added boost given by new gene combinations.

Advantages and Disadvantages

Crossbreeding does have both advantages and disadvantages. Crossbreeding is not new. One of the earliest experiences in crossbreeding by producers of high-quality beef cattle to be widely publicized occurred somewhere around 125 years ago. Beef cattle producers in Ireland bred Angus cows to white Shorthorn bulls to produce the famous Irish blue-gray cattle which were in great favor by Scottish and English feeders who fattened them in stalls, largely on roots, oat straw and linseed meal. They did well for the feeder.

Crossing of the beef breeds received some attention from American cattlemen soon after the English breeds became established in this country. Periodically over the years from these early beginnings up to the present, there have been waves or cycles of a few years of growing interest, followed by periods of receding interest in which the practice all but disappeared for a time. Just now we are in the midst of another upward surge in crossbreeding.

Temporary and permanent results from crossbreeding should be surveyed, and the basic and practical genetic laws appraised. The F₁, or first-generation hybrids, usually are superior to either parent in several respects. This is a result of what is known as heterosis, or hybrid vigor. Calves of this composition usually are larger, grow somewhat faster and gain more efficiently. In some

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cases they are more hardy than one parent breed and less so than the other.

Likewise, if the hybrids are bred, possibly more often than not they are more fertile, but in some cases may not be more fertile than both parent breeds. Claims for other advantages, such as better carcasses have been made, but it is questionable whether this can always be substantiated by carcass studies and measurements.

Selecting Replacements:

First-cross heifers, because of hybrid vigor, usually will be better milkers and will have a larger calf crop. However, in the F_2 , or second generation, hybrids, the hybrid vigor generally not only has disappeared, but the quality level has receded below that of the original straight-breed grandparents, especially if undesirable sires have been used.

Size:

There is often little relationship between the size of a cow and the size of her calf at weaning time. Milking and mothering ability are of prime importance in the beef cow. A fast-growing bull with large size, because of genetic background, can be expected to sire faster gaining calves than a small or medium-sized bull. Faster gains from birth to slaughter weight usually means more efficient gains.

Heterosis:

Breeders can get heterosis by mating widely-related strains or bloodlines within their own breed just as effectively as by crossbreeding, and do it without inducing numerous, widely fluctuating and uncontrollable varieties of contrasting characteristics which swing from one extreme to the opposite, with all degrees of intermediate variations between. Avoid using extremely large heavy, boned bulls, regardless of breed, on first calf heifers.

Crossbred Calves:

In recent cooperative trials at Agricultural Research Service and state agricultural experiment stations, scientists compared the performance of crossbred calves with that of straightbred calves sired by the same bulls and raised by comparable cows.

Cows for the project came from herds in Nebraska, Montana, and Colorado, and bulls originated

from an even greater variety of sources, making for a broad genetic representation of each breed.

Four years of tests showed that the average overall performance of the crossbred offspring was better than that of the superior parental breed, not just the average of the two parental breeds.

Crossbred calves weighed 437 pounds, or 5 per cent more, than straightbreds when weaned at 200 days, and 3 per cent more crossbred calves lived to reach weaning.

Herefords, Angus, and Shorthorns were used in the crossbreeding trials at the Fort Robinson Beef Cattle Research Station in Nebraska. Herefords crossed with Angus and Shorthorns showed about the same amount of hybrid vigor, but Angus-Shorthorn calves had less hybrid vigor than the other two breed crosses.

Herefords, Angus, and Charolais were crossbred at the U.S. Range Livestock Experiment Station at Miles City, Montana. In limited trials there, Brown Swiss cows also were mated to beef bulls.

Charolais crosses did best because they had fast, early growth. Highest returns came when Charolais were the female parents. Crossbred calves from Brown Swiss cows gained well because these cows provided ample milk for their calves.

Crossbred Steers:

Crossbred and straightbred steers produced at Fort Robinson were fed individually from weaning to slaughter. When steers were 15 months old, crossbreds were 29 pounds heavier than straightbreds.

During the feeding period, average daily gains of crossbred steers were about 3 per cent larger than those of straightbred steers, but the advantage narrowed toward the end of the feeding period. Differences in feed efficiency between crossbreds and straightbreds were small.

Boneless, closely trimmed retail cuts from crossbred steers had the same composition and grade as meat from straightbreds fed to the same market weight. Overall value of the meat from crossbreds, based on 1964 prices, was \$8.81 greater after taking feed costs from weaning to slaughter into account.

Crossbred Mothers:

Replacements for the beef herd on a cross-breeding program may come from crossbred heifers, whose hybrid vigor helps the next generation to a good start.

At birth, crossbred replacement heifers start with a 3 pound weight advantage; at 18 months, they average 50 pounds heavier than their straightbred half-sisters, according to ARS data.

Although the hybrid vigor of a heifer can help give her calf a healthy start, a hybrid dam cannot pass hybrid vigor to her offspring. Hybrid vigor has to be regenerated for each individual calf by mating cows and bulls of unlike breeding.

On a crossbreeding program, as on a straight breeding program, breeders have to select replacements for superior growth, feed efficiency, ability as mothers, and indications of capacity to produce good beef.

ARS researchers fed part of the crossbred and straightbred heifers $4\frac{1}{2}$ pounds of concentrate per head per day plus liberal rations of hay during their first winter to bring them to puberty early. The crossbreds reached puberty 41 days earlier.

Geneticists say that hybrid vigor acts directly to advance puberty; the higher gains, which also help advance puberty, were responsible for one-fourth to one-half of the advance in date of puberty.

Scientists compared crossbreds and straightbreds as mothers by breeding both types of cows to the same bulls of a different breed.

Preliminary data from 3 years of trials show that 92 per cent of the crossbred cows became pregnant during a 70-day breeding season, while 86 per cent of the straightbreds became pregnant during that time.

About 65 per cent of the crossbreds became pregnant on the first service, compared to 54 per cent of the straightbreds. As a result, the calving season of the crossbreds was less strung out; 64 per cent of the crossbreds calved the first 20 days of the season, compared to 57 per cent of the straightbreds.

Crossbred mothers weaned 17 per cent larger calf crops than straightbred mothers the first year of trial and 6 and 10 per cent larger the next 2 years. At the same time, calves from crossbred mothers averaged 17, 20, and 31 pounds heavier at weaning.

ARS scientists K. E. Gregory, J. E. Ingalls, O. F. Pahnish, J. J. Urlick, and J. N. Wiltbank; and Nebraska Agricultural Experiment Station researchers C. W. Kasson, R. M. Koch, J. A. Rothlisberger, W. W. Rowden, L. A. Swiger, and L. J. Sumption took part in various phases of the crossbreeding studies.

Using Crossbreeding Programs:

How can a commercial beef cattle producer make maximum use of crossbreeding in his operation? First of all, a plan must be worked out which will fit the particular farm or ranch. Once the breeding plan is formulated, the producer must follow it closely to get maximum advantage from crossbreeding.

Crossbreeding programs for beef cattle are more difficult to follow than for other species of farm animals because of their slow rate of reproduction. In most cow herds, only 15 to 20 per cent of the cows are replaced each year. Using a system called rotational crossbreeding, close to the maximum amount of heterosis can be obtained with swine or poultry. The same plan will not work well with cattle because the slow reproductive rate prevents obtaining enough replacement heifers of the right kind when they are needed. Crossbreeding in poultry and swine is much less complicated than in cattle because the females can be completely replaced each year if necessary.

Crossbreeding System:

Many beef cattle producers may be in a position to take some advantage of crossbreeding and still maintain and improve a straightbred cow herd. If production records are maintained on the cow herd, these records can be used to divide the cows into a top producing group and a low producing group.

The number of cows in each group depends upon how many cows would be needed to produce straightbred replacement heifers for the herd. Probably about 60 per cent of the cows would be in the top producing group and would be mated to top purebred bulls. The remaining 40 per cent of the herd would be mated to bulls of a second breed to produce crossbred calves. Such a system has two main advantages. The first advantage is that only the best performing straightbred cows would be used to produce replacement heifers and the second advantage is that the production of crossbred calves would make the bottom end of the cow herd more productive.

Performance Testing:

Performance testing of beef cattle herds continues to be important whether working with a cross-

bred herd or a straightbred herd. Regularity of calving, good milking ability, heavier weaning weights, ability to gain and to make economical gains must play an important role in any beef cattle program. The carcass, the end product, must be of desirable quality. This includes thickness of natural fleshing or muscling, particularly in the regions that produce the cuts of greatest value (back, loin, rump, and round), marbling and the amount of outside fat relative to muscular development. Above all, it must be a product that is acceptable to the consumer.

Summary:

Crossbreeding is a system of mating to take advantage of heterosis or hybrid vigor in the commercial production of beef. Crossbreeding is not a substitute for good management, nor is it a cure-all for unproductive cattle. The merit of a group

of crossbred animals is determined more by how good their parents were than by the fact that they are crossbred.

Current research information indicates that productivity per cow can be increased by up to 15 per cent by a planned crossbreeding system. However, a producer must pay a price to obtain this increased productivity. He must follow a rather specific breeding plan which may involve additional breeding pastures and maintaining bulls of different breeds.

A breeding program designed to maintain maximum heterosis is not well designed for making permanent genetic improvement in beef cattle. Therefore, crossbreeding is limited to only a portion of the total population of beef cattle. Crossbreeding should have much to offer beef cattle producers who are mainly interested in producing more pounds of beef per cow unit.

The writer wishes to give credit to the following, whose materials he used in preparing this circular:

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