

Crossbreeding for the Commercial Beef Producer

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Breeding cattle of different breeds or breed composition is a practice used by beef producers to optimize productivity. Most commercial cattle producers know that mating cattle of different breeds results in increased performance in the crossbred calves, particularly when calves are kept as replacement females. However, market price differences and perceptions about some breeds and color patterns have led many beef producers to drift away from a sound crossbreeding program. The purpose of this publication is to illustrate the benefits and economic importance of crossbreeding to the commercial producer.

The two primary reasons to crossbreed are (1) heterosis (hybrid vigor) and (2) breed complementarity, meaning that breeds have characteristics that complement each other and fit the environment. When crosses are made, one breed's strengths can complement the other breed's weaknesses. Because no one breed is superior in all traits, a planned crossbreeding program can significantly increase herd productivity.

Heterosis

The greatest impacts on profitability from heterosis are the increases in overall production and the longevity of crossbred cows. When production is measured as weaning weight of calves produced per cow exposed, which takes into account reproductive rate, calf survival, milking ability, and growth, the increase in production is 20 to 25%. By maximizing crossbreeding, the effects of heterosis alone would increase income by more than 20% compared to a straightbred herd of similar genetics.

The benefit of increased longevity should not be underestimated. Crossbred cows will stay productive longer. Cows are most productive between five and 10 years of age. From an

economical standpoint, it is best to have a high percentage of the cow herd in the five- to 10-year age group and to minimize the number of replacement heifers that are retained each year.

It is difficult to maximize heterosis in small herds. One- or two-bull unit herds would have to change the breed of bull every two years to achieve maximum heterosis, which is not recommended. Producers should try to utilize a crossbreeding system that achieves a high level of heterosis while using a maximum of three breeds. As a goal, try to keep replacement females that do not exceed 75% of any one breed.

Breed Complementarity

Breed complementarity has more to do with the choice of breeds that go into the cross. Beef breeds in the United States have different characteristics for performance traits. Finding a combination of breeds that will perform optimally in your environment (management) is critical to developing a successful breeding program. Producers with both high quantity and quality of feed can utilize high-producing breeds more efficiently than producers with more limited feed supplies. Under normal conditions, most Kentucky operations do very well in supplying nutrition to their cattle and maintaining an adequate level of condition. However, under adverse conditions, such as drought or harsh winters, the nutrition level is not adequate to maintain condition, and reproductive performance suffers. In general, moderate production levels in the cow herd are what most Kentucky operations can sustain.

Do not be fooled into thinking that if you use crossbreeding, you no longer need to buy good bulls. Conversely, do not think that buying good bulls or making the right breed choice will offset the benefits of crossbreeding. Crossbreeding and selection are complementary and should be used together in commercial herds.

Crossbreeding Systems

Crossbreeding systems must be planned for each operation depending on herd size, potential market, level of management, and facilities. A long-term plan is necessary to gain maximum benefits from crossbreeding. There are also considerations such as whether to purchase or raise your own replacements. Purchasing replacement females can be the simplest and fastest method of obtaining maximum hybrid vigor, but there needs to be an available supply of high-quality, disease-free females. The advantages and disadvantages of various crossbreeding systems are listed on the following pages.

Trait	Heterosis
Conception	high
Calf survival	high
Longevity	high
Birth weight	moderate
Weaning weight	moderate
Yearling weight	moderate
Milking ability	moderate
Carcass traits	low

Two-Breed Terminal Cross

This system uses straightbred cows and a bull of another breed. It is a terminal cross if stopped at this point. An example would be Angus cows bred to Charolais bulls. In this system, replacements must be bought from another source, or part of the herd (perhaps heifers and young cows) would have to be bred to Angus bulls to generate replacement heifers. This is not a desirable system because it does not realize any heterosis in the cow since she is a straightbred.

Terminal Cross

This system uses a crossbred cow and a bull of a different breed (Figure 1). It produces maximum hybrid vigor in the cow and calf. This is an excellent system because hybrid vigor is realized for both growth rate and maternal ability. Replacement females for this system must be purchased or raised from another source. This is a good system for any size herd if high-quality replacement females are available.

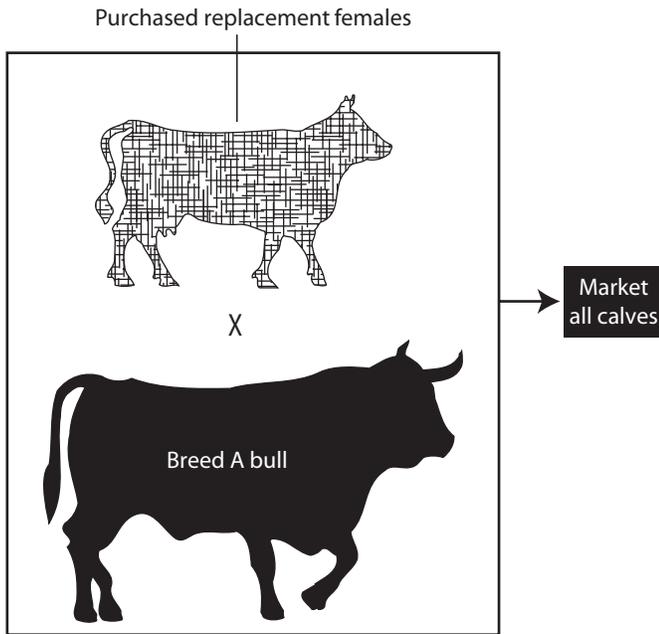


Figure 1. Terminal cross.

Two-Breed Rotation or Crisscross

This is a simple crossbreeding system involving two breeds and two breeding pastures. A two-breed rotation is started by breeding cows of breed A to bulls of breed B. In each succeeding generation, replacement heifers are bred to bulls of the breed that is the opposite of their sire (Figure 2). Two breeds of bulls are required after the first two years of mating.

In order to track which females should be bred to which bulls, a simple ear tag system can be used. All calves that are sired by breed A should receive one color tag (i.e., yellow), and all calves sired by breed B should get a different color tag (i.e., red). Then all yellow tag females should be mated to breed B bulls, and all red tag females should be mated to breed A bulls.

Because replacement heifers are being retained and bred to the herd bulls, caution should be taken to ensure calving ease in the bulls. Purchase bulls that have acceptable Calving Ease or Birth Weight EPDs for breeding to heifers. If using larger breeds, greater caution should be exercised. An alternative would be to purchase one calving ease bull and mate all first-calf heifers to him regardless of breed type.

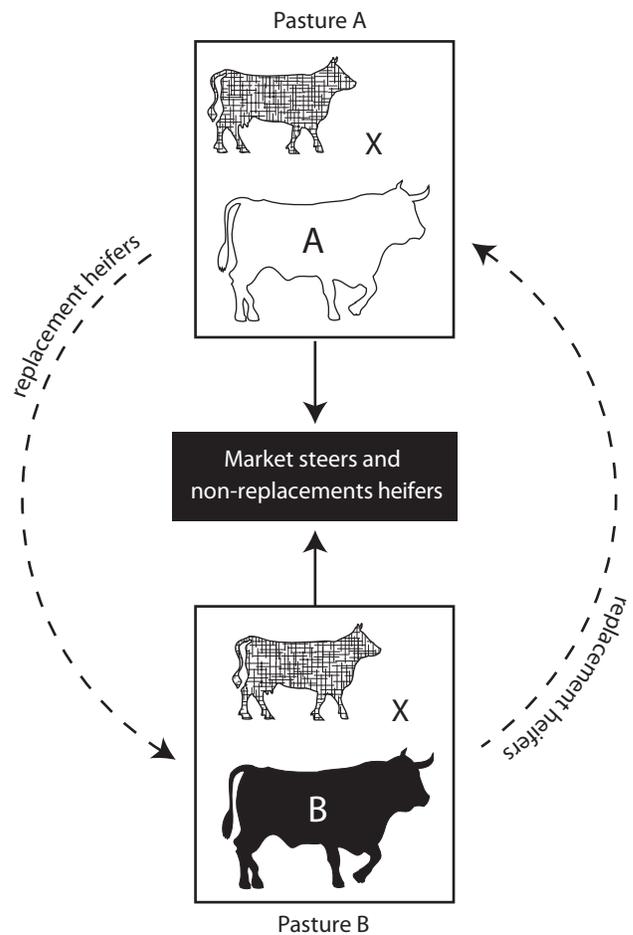


Figure 2. Two-breed rotation.

Three-Breed Rotation

This system follows the same pattern as the two-breed rotation, but a third breed is added (Figure 3). The three-breed rotation maintains a higher level of hybrid vigor than the two-breed system. Mating plans can be confusing, but individual cows are not moved from one breeding group to another. Three distinct groups of cows are eventually created, and they are mated to the sire to which they are least related. This scheme continues for the life of the cow.

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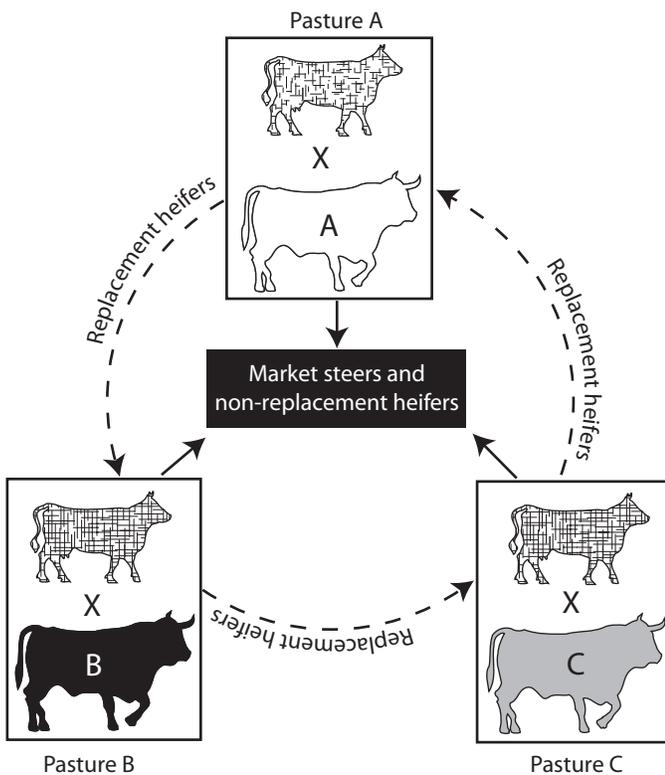


Figure 3. Three-breed rotation.

Modified Rotation

This system involves using a bull of one breed for a set number of years (recommendation of four years), then rotating to a different breed of bull (Figure 4). If a balance between good feeder calves and good replacement heifers is desired, switching between breed types would be desirable. In other words, use a British breed bull for four years, then switch to a Continental breed for four years, then switch back to the original breed. Try to save a larger number of replacement heifers in years that a maternal-type bull is used. Only one breeding pasture is required, and replacement heifers are generated within the herd. This system sacrifices some hybrid vigor when compared to a two-breed rotation but requires only one breeding pasture and is very simple to use.

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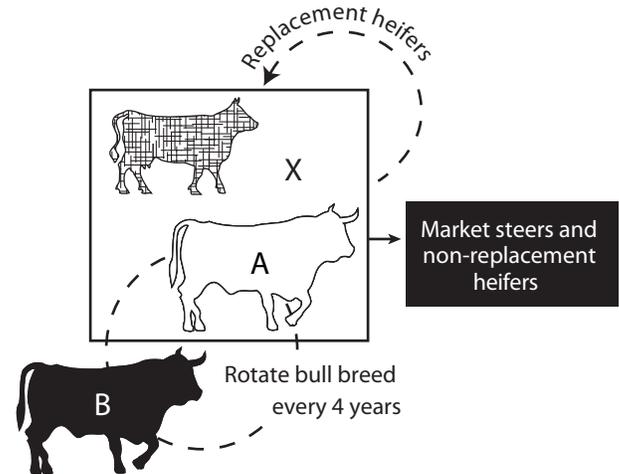


Figure 4. Modified rotation.

Rotational-Terminal Combination

This system involves the use of rotational mating of maternal breeds (breeds A and B) in a portion of the herd to provide replacement females for the entire herd and the remainder is bred to a terminal sire (Figure 5).

Breed all heifers and enough younger females to total about two-and-a-half times the number of replacement females you plan to keep the next year to an easy-calving, good maternal bull. For example, if 10 replacement females are desired the following year, breed 25 heifers and young females to this bull. Select all replacement heifers out of this group of calves. Breed the rest of the herd (older cows) to a high-growth, heavy-muscled terminal bull and market all of the calves (refer to terminal cross). This system allows the producer to get easy calving in the first-calf heifers and good maternal characteristics in the

replacement heifers and to maximize growth and muscling in the majority of the feeder calves. The only drawback is that there will be two differing steer types to market, but the benefits are usually worth it.

There is no foundation to the argument that you should not keep a heifer out of a heifer. In contrast, this system is one of the best available to maximize efficiency. In herds that have more than one bull or where artificial insemination (AI) is a possibility, this is a productive crossbreeding system.

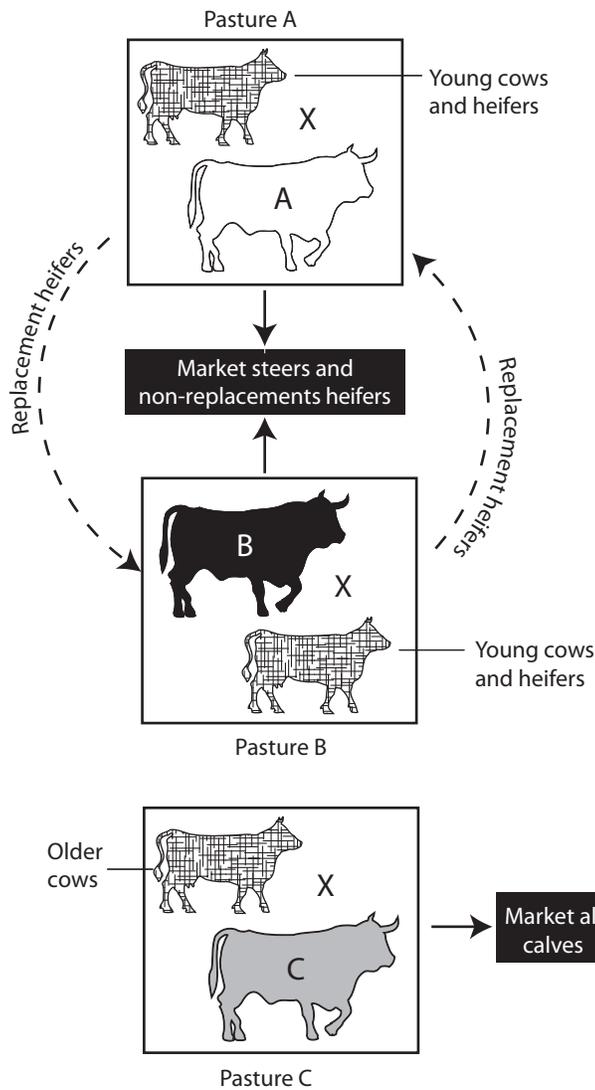


Figure 5. Rotational-terminal combination.

Modified Rotational-Terminal Combination

This system is identical to the rotational-terminal combination except you will use a modified rotation to generate the replacement females (Figure 6). The bull breeds used in the young female mating rotation should be easy calving, maternal type breeds. The older cows will be mated to a terminal type breed with more emphasis on growth and muscling. Females sired by the terminal bull should not be kept as replacements. This is a very efficient crossbreeding system for producers with at least two breeding pastures.

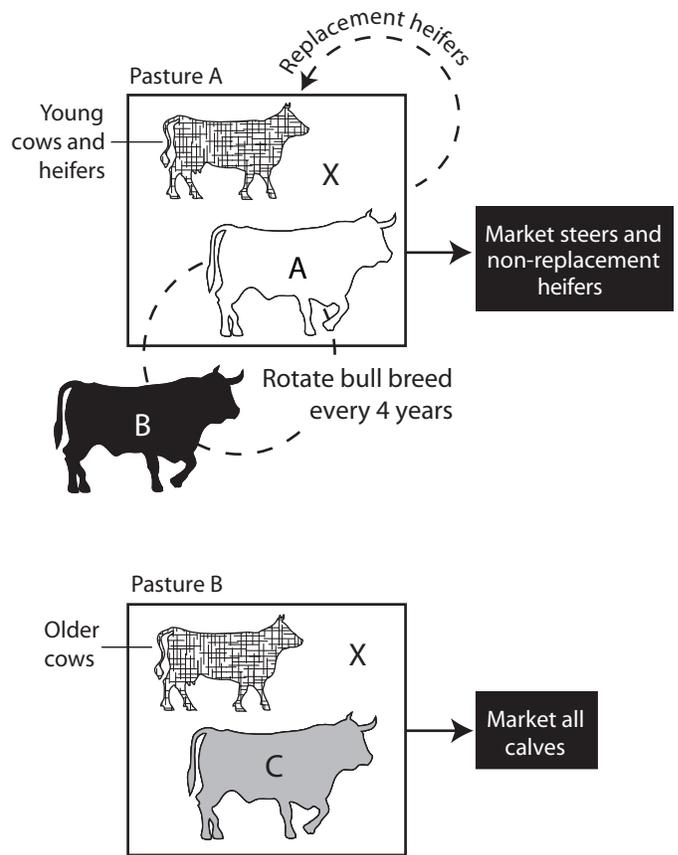


Figure 6. Modified rotational-terminal combination.

AI Rotational-Terminal Combination

This system usually uses a very strict synchronization program, and all cows and heifers are mated to a maternal-type/heifer-acceptable bull using AI. All cows (excluding virgin heifers) are then exposed to a terminal-type bull (Figure 7). Virgin heifers that do not conceive by the first mating can be inseminated a second time, or pasture exposed to a calving ease, maternal bull, or a larger number of replacements will need to be retained through pregnancy testing each year. Heifers are only retained from the AI matings. A potential drawback is an extremely good or poor conception rate on the AI service. Good AI conception results in too many of the lighter steers and cull heifers and poor AI conception results in too few replacements.

Summary

Crossbreeding in the commercial beef industry is an important management practice. The benefits in increased production are not always obvious, but increases in reproduction and calf weights result in a combined benefit of more calves to market that are heavier. This translates into more income without an increase in cost. As with any business, you have to weigh the benefits and cost for each practice that you do. If you choose not to crossbreed, for marketing or other reasons, be certain that the benefits you are seeking are greater than those that are given up.

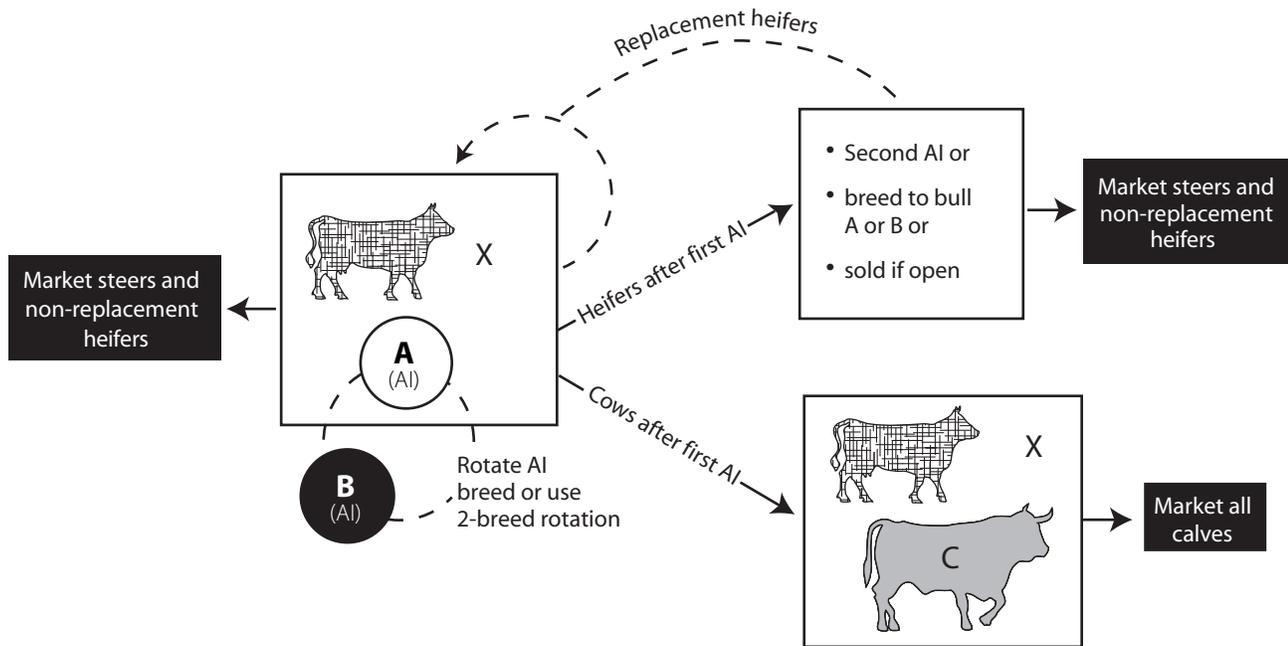


Figure 7. AI rotational-terminal combination.