An Alternative, Sustainable System of Beef Production in South Texas – Part 2: Cattle Breeding Program

by Steven Lukefahr PhD

Editors note: This is the second of three articles that will be published in consecutive SGF issues. This first installment focused on the author's forage production system, this article features his cattle breeding program, and the last article will disclose his future business plans.

KINGSVILLE, Texas: In the Gulf Coast region, most breeds of cattle are Brahman-influenced (e.g., Beefmaster, Brangus, and Santa Gertrudis). The reason is that breeds of Zebu cattle (*Bos indicus*), such as Brahman, possess critical genes for heat tolerance and resistance to specific insect-borne diseases. However, a growing general criticism is that Brahman, and Brahman-influenced breeds, have become excessively large in mature body size (and less efficient from both a reproductive and feed utilization standpoint), have delayed age at puberty, and have beef marbling and tenderness issues when conventionally fed grain in feedlots.

Another breeding issue, Black Angus is the most popular breed in the beef cattle industry. This is largely because of its reputation for marbling and tenderness. This association explains why a black-colored calf in the auction ring usually brings at least 5 to 10 cents more per pound than a calf of a different color of similar quality. However, the breeding of black-colored cattle of any breed in the Gulf Coast region should be generally avoided because they fare poorly in hot climates. Black Angus cattle were developed in Scotland – Here's your sign!

Simply, black-colored animals have higher body temperatures due to increased absorption of solar radiation (infra-red rays). Palpate black cows on a hot summer afternoon and you will see what I mean! During the summer especially, there is the potential problem of lower fertility in black-colored bulls and higher embryonic mortality in black-colored cows. Other characters can be adversely affected, too, such as growth and development and daytime mating and grazing behaviors.

The purpose for this second article is to present alternatives to breeding with *Bos indicus* and breeding for black color that involves a crossbreeding program used by the author that is suitable for either small or large producers.

BENEFITS OF CROSSBREEDING

Hybrid vigor, also called heterosis, is especially critical for successful cattle production in adverse environments such as the Gulf Coast region. A major advantage of crossbreeding is hybrid vigor, which often yields superior performance results. Most commercial cattlemen know of the economic value of hybrid vigor by producing both crossbred cows and calves that result from planned matings involving a judicious choice of parental breeds. But what causes hybrid vigor? Basically, all traits are affected by genes which are inherited in pairs (one member from each parent). Crossbred animals can have high levels of "heterozygosity", meaning that the genes being inherited as pairs from different parental breeds can be very dissimilar. Often, one gene is more favorable than the other gene for a given pair, such that the favorable gene displays "dominance" by masking the expression of the unfavorable gene. This property of dominance often prevents genetic problems from occurring that are more prevalent in purebreds, such as missing enzymes, insufficient antibody production, hormonal deficiencies or imbalances, and

structural abnormalities. In general, crossbreds are more hardy and productive for traits of economic value, such as fertility, disease resistance, survival, milk production, and growth rate.

Another major advantage of crossbreeding is breed complementation. The basis for breed complementation is that no breed exists that is superior for all traits. Breed complementation is defined as the combination of breed strengths. To give a generic example, Breed A is known for rapid growth, depth of muscling, and carcass marbling, while Breeds B and C are known for foraging, mothering, and milking abilities. When a Breed A bull is mated to a B X C crossbred cow, the result is a growthy and well-muscled calf due not only to outstanding genes from the sire, but also because the calf benefited from a good maternal environment. Certainly, a better example for SGF readers would involve breeds suitable for a grass finishing program; however, more research is needed to determine which breeds yield the most hybrid vigor and produce breed complementation when crossed to other breeds. More later on hybrid vigor and breed complementation.

CHOICE OF CATTLE BREEDS

Red Angus serves as the basis of my breeding program. Red Angus cattle share the same original genetic foundation as Black Angus cattle, but red rather than black color is simply a better option in the Gulf Coast region. By crossing Red Angus with the Senepol and Tuli breeds, benefits from hybrid vigor and breed complementation may well be realized from the infusion of genes for even greater tolerance to high temperatures and resistance to insect-borne diseases.

In my search for suitable breeds, I conducted an extensive review of the literature. Studies have shown that Senepol cows have comparable body temperatures to purebred Brahman cows, and that Senepol have lower fly and tick counts than other common breeds. Also, the Tuli

X Angus crossbred cow is more efficient than a Brahman X Angus cow because she is early-maturing and more fertile, has a lighter mature body weight, and weans a calf that is heavier in proportion to her own body weight. In short, she is a more efficient animal. In addition, recent USDA studies have shown that meat tenderness scores in Senepol X Angus and Tuli X Angus crossbred steers are both comparable to purebred Angus steers. This makes sense because both Senepol and Tuli are early-maturing *Bos taurus* breeds.

A brief breed history lesson, Senepol was developed on the island of St. Croix in the Caribbean, based on crossings of N'Dama cows to Red Poll bulls. N'dama, also referred to as Senegalese cattle, is a breed from West Africa. Tuli originated in Zimbabwe in southeast Africa. Both N'dama and Tuli breeds evolved in Africa for over 5,000 years, being subjected to the harsh elements of the tropical environment, including prolonged droughts and endemic parasites. As a consequence to intense natural selection, these cattle became genetically molded into highly adapted breeds. Both breeds are classified as *Bos taurus* and so are more similar genetically to European than to Zebu breeds (*Bos indicus*). Useful websites are available that contain more information on both breeds. (http://www.senepolcattle.com/ and http://www.tuli.co.za/).

In Africa, I have observed, first-hand, herds of N'dama and Tuli cattle. Mostly, I was impressed by their high fertility and fleshing ability under natural conditions, and very gentle dispositions. Traditionally, N'dama and Tuli cattle are never fed feed supplements; they fatten off grass. There is no extremism in degree of bone, flesh or body size or in milk production level, which exemplifies functional, easy care cows. Their body conformation, hair and skin color, hide structure and sweating properties, etc., are also designed for effective thermoregulation, as well as control of external parasites.

DEVELOPMENT OF THE CROSSBREEDING PROGRAM

At Lukefahr Ranch, Red Angus, Senepol, and Tuli breeds are used in a rotational crossbreeding program. The genetic melting pot produces a crossbred with a combination of desirable traits that include: the polled condition, yellow to red coat colors, slick hair coats, early age at puberty, light birth weights and(or) calving ease, small-sized teats, optimal milk production, low parasite infestation, and superior marbling and tenderness. This combination of desired traits defines breed complementation. To illustrate, in Photo 1, both heifers are three-breed crosses. From the Senepol breed, they each inherited a gene for a slick hair coat, as well as genes for numerous vertical skin folds that increase body surface area, which aids in evaporative cooling. The heifer to the right is yellow-colored due to a gene that was transmitted from her Tuli maternal grandsire that diluted red to yellow color.

The choice of Red Angus, Senepol, and Tuli breeds has also resulted in most of my cows weighing between 1,000 and 1,100 pounds. In 2006, average weaning weight (205-adjusted) was 625 pounds, demonstrating remarkable cow efficiency. I believe that a higher proportion of the feed consumed by the cow goes to the development of her calf than to herself as opposed to a 1,600 to 1,800 pound cow. Another reason is that the cattle are better heat adapted; afternoon grazing during the summer is common. Yet another reason is hybrid vigor.

My crossbreeding program is largely based on use of artificial insemination (AI). Bulls used as AI sires are representative rather than extreme specimens of the three breeds. Although EPD information is available and in many cases useful, the use of extreme animals is not justified because I know that it will come at a high cost later (e.g., increasing mature weights resulting in less efficient cows). Each year, I use semen from the same bulls of each of the three

breeds so that my cattle can also benefit from linebreeding in terms of uniformity, while minimizing any inbreeding. I pay no more than $15 a straw for semen.

Specifically, each replacement heifer is inseminated to a bull of that breed that appears farthest back in her pedigree (i.e., as the maternal great-grandsire). For example, if a heifer is Red Angus-sired and her dam was by a Senepol bull, then the heifer will be inseminated to a Tuli bull (Figure 1). Heifers calve-out as 2 year-olds, hence, a new "maternal" generation is turned over every 2 years. In Photo 2, a Red Angus-sired cow (left) appears with her Senepol-sired heifer calf. This same calf is shown later as a 2 year-old (right) with her Tuli-sired heifer calf. All three animals were the result of AI. Only AI heifer calves are saved as cowherd replacements, whereas AI bull calves are not castrated but sold to area ranchers for breeding. About 1 in 8 cows is culled annually. After raising their first calf, heifers are joined to a cow herd where they are naturally mated to leased bulls, some of which were born in my herd.

The three-breed rotational crossbreeding program works well for me because all of my heifers are managed as a single group, and again only they are inseminated. This way, I do not need to separate my mature cows into different pastures so that they can be mated to a different breed of bull, which otherwise would be considered as a major disadvantage of this crossbreeding system.

After a few generations of three-breed rotational matings, the combined proportions of "tropical genetics" infused by Senepol and Tuli sires is never below 43%, considered adequate to impart desired heat-tolerance and/or adaptation qualities. Also, a high level of hybrid vigor (86%) is realized because of my choice of genetically divergent breeds. Further, due to combined hybrid vigor and linebreeding, all my cows are becoming more closely genetically-related and hence more uniform. While hybrid vigor provides a boost in performance, linebreeding improves

the predictability of performance. In other words, linebreeding will help ensure that the crossbred bull or cow will breed more like a purebred.

Next month's issue will run the last article on my future business plans, which includes opportunities of converting rotational crossbreeding into a composite breed program.

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