

Comments from Co-Author Phil Sponenberg, DVM, PhD, ACT (Honorary)

This is the subject of a chapter or two in the revised “Managing Breeds for a Secure Future” and some of the issues are pretty complicated.

“Kinship” is as (or even more) important as the inbreeding coefficient. That is, are there unrelated animals out there in the breed for every animal in the breed? Inbreeding back to popular animals is one way to sabotage this.

Another way to do it, though, is to constantly mate animals to the one they are least related to. This sounds good, but over several generations it basically “uses up” all the unrelated matings, with the result that everything is then related to everything else. Kinship captures this better than inbreeding. For example, a highly inbred animal may well be okay, as long as a completely unrelated mate is available. That takes the inbreeding back to zero in the next generation.

As to single-trait selection. That is generally flawed, BUT – if you choose “lifetime productivity and longevity” as the trait, then it actually can do quite a bit of good. Especially in criollo type cattle.

### **“Maintaining Genetic Diversity in an Endangered Species” A Simplified Approach**

By Frank Sharp, PhD

**1. Only Carefully** breed closely related animals together.

The closer related, the more this concentrates those common genetics, further eliminating valuable genes. Nothing can do more than this to hasten the time when our cattle are so inbred they are no longer viable as a breed. Close matings can be done – but **only** when there are unrelated animals available in the next generation.

**Do** breed animals together that are genetically diverse. Make sure unrelated matings are available at every generation.

**Comment:** It has been perceived as a positive thing to have an animal that is “double-bred” or “triple-bred” back to a “superior” animal. The negatives far outweigh any potential positive that may result, including producing an animal with a very limited

genetic makeup. In making this animal part of the CTLR registry, many valuable genetics are subsequently eliminated from our gene pool.

**Comment:** Regarding inbreeding, most people confuse the goal of PRODUCTION with the goal of PRESERVATION. It's true that some inbreeding may not appear on the surface to hurt the appearance, or productivity, of a Longhorn (even though it may negatively affect an animal more than is apparent).

While inbreeding is, to a point, okay when talking about production, regarding preservation, it is devastating to inbreed genetically endangered animals.

The next time you hear, "The old-timers said you couldn't inbreed a Longhorn," you need to think, "Yes, you can inbreed them to the point of extinction." This has happened too many times in other rare breeds to ignore the threat!

**Comment:** Running a multi-sire herd can be very detrimental to an endangered population. This is true because the correct sire of any offspring cannot be determined. This makes it easier to closely breed animals, like sire to daughter, mother to son, or brother to sister. This brings to mind the next comment:

**Comment:** Registration – and an accurate pedigree -- becomes more and more important to our efforts. For breeding purposes, knowing the pedigrees of our animals can tell us how closely related a particular bull is to a particular cow. Without this knowledge, we are "shooting in the dark," so to speak, and ultimately will miss what we are aiming for, making some detrimental choices in the process. Lack of registration means your animals cannot contribute broadly to the breed.

This is why our conservation registry no longer accepts "multi-sire" or unknown dams for subsequent registration. All cattle from unknown parentage must pass a full genetic analysis with results showing no evidence of impurity. The \$75 SkimSeek analysis can pinpoint related animals if all possible sires are named for comparison. This test therefore not only determines eligibility for registration, it can also identify inbreeding. Since all registered bulls are genotyped to determine registration eligibility, all bulls in service should have their genotype on file. Offspring from herds using any untested bulls are considered initial registrants that must pass visual inspection after two years of age and must also pass the SkimSeek analysis. Determining parentage alone is a simple \$21 SeekSire test. Both tests are performed by Neogen. The SeekSire results are sent to the registry and the SkimSeek results are sent to Invictus Informatics for analysis. Calves may be DNA tested at any age. It is not necessary to wait for their second birthday

before they are genotyped. Best practice is to test all young, intact bulls kept to grow-out in a herd. If a heifer from a multi-sire herd does not have a qualified sire determined by SeekSire, her DNA will have to be resubmitted for a SkimSeek test.

**2. Don't** pass around the same bull, using him in multiple herds. This does nothing more than concentrate his genetics . . . to the exclusion of other, valuable genetics.

**Do** use the offspring of a desirable bull. (Hopefully, not full-blood brothers.) This will incorporate the dams' genetics into the mix, lessening the genetic impact of the first bull. This leads us to point number 3:

**3. Don't** keep too many offspring out of the same bull or, for that matter, out of the same cow.

This, again, serves to concentrate a particular set of genetics and, again, excludes – eliminates – genes from our gene pool. The question, of course, will be: How many offspring from any one animal would be “too many?” That will depend on several factors, including what these animals are being used for, what the genetic impact of their offspring will be, how common the genetics in their pedigrees are, etc.

**Do** consider keeping offspring from animals that have fewer offspring in a herd, or from animals that have a more distant genetic pedigree. Consider culling offspring if they already have several siblings in the herd. Hopefully these culled animals can be sold for crossbreeding / commercial purposes -- anything other than for registered breeding purposes.

**Comment:** Think about limiting the number of offspring from any one bull or cow in our CTLR registry. This, in and of itself, will discourage the practice of passing around the same bull, as well as the practice of keeping too many offspring from any one animal.

**4. Don't** breed for a single trait. An example: Twisty horns are great, but breeding only for twisty horns will lead us – and the Longhorn breed – down the wrong path.

We have already changed the breed from its original ancestors by selection of the horn shapes we find most desirable. In addition, we have culled animals with aggressive behavior, those that jump fences, and frequently selected for color preferences and beef production conformation. This artificial selection has fabricated a desirable breed for mankind but perhaps to the detriment of loss of natural survivability traits.

**Do** look for an animal that is superior overall – meaning, one that is as genetically pure and historically correct as possible. Period. That is our mantra, our mission.

**Comment:** Breeding for a single trait, or a limited number of traits, takes us in the same direction as the TLBAA. First, they bred for bigger, beefier animals. Then, the “horn craze” started, and tip-to-tip horn-span was the only criterion for what made a “good” Longhorn. Look where that led them.

Focusing on twisty horns (in our example) can lead to the exclusion of valuable traits, and valuable genetics will be lost along the way. Breeding only for twisty horns will also put more value on, and lead to the increased use of, those sires and dams that produce it . . . , again, concentrating the genetics of these animals while allowing the genetics of the less-shapely-horned cattle to be lost.

**Final Observations:** We preach about Longhorn preservation while, at the same time, we complain about the other Longhorn associations changing the breed and “breeding out” valuable Longhorn genetics and traits. We must wake up as an organization and realize that -- by following certain breeding practices -- we are, in effect, doing the same thing.

Every effort must be made to maintain the genetic diversity that we have today. That is going to mean a renewed effort toward educating our members. Part of that education will be the realization that our animals are more endangered than previously thought. Even though we have an alarmingly small number of cattle left, the effective population might only be a small fraction of that number.

Cooperation and collaboration among our members will be vital. Maintaining complete and accurate registration / pedigree information will prove to be invaluable.