A Century of Breeding Horses

How breeders can follow the King Ranch techniques for success.

By Lauren Dobson, Steven Lukefahr, Jared Lee, Scott Moore and Dave Delaney

NEARLY 100 YEARS AGO, THE KING RANCH IN SOUTH TEXAS began an ambitious breeding program to develop a superior line of ranch horses. The program involved line breeding to concentrate genes for desired traits from outstanding animals.

However, it was line breeding accompanied with meticulous selection and ruthless culling that was the master stroke of the program.

How It Began

IN 1915, OLD SORREL WAS FOALED, THE NAMELESS HORSE DESTINED to become the foundation sire of the King Ranch line of American Quarter Horses. At the time, his paternal grandsire, Peter McCue, and his sire, Hickory Bill, were the most influential sires in the line of American Quarter Horses going back to the Colonial period.

Early accounts attest that Old Sorrel was a truly remarkable horse with respect to beauty, disposition, intelligence, cow sense, agility, stamina and speed, so the ranch decided to design a linebreeding program to highlight this amazing ranch horse.

For example, Solis, a son of Old Sorrel, was mated to daughters of Old Sorrel. Wimpy P-1, who had Old Sorrel on the top and bottom sides of his pedigree, was likewise often mated to daughters of Old Sorrel.

Many of Old Sorrel’s offspring and grand-offspring were as exceptional as he was. Direct descendants of Old Sorrel include sires Babe Grande, Macanudo, Peppy, Solis and Wimpy P-1.

A Texas A&M University-Kingsville study aimed to determine historic ancestry and to find genetic relationships and inbreeding for the current King Ranch breeding population of Quarter Horses (based on extensive pedigree information) so the results could be considered to maintain the integrity of the King Ranch line of Quarter Horses for future generations.

Early Influences

THE THOROUGHBRED INFLUENCE WAS REPORTED IN EARLY BREEDINGS of the Quarter Horse to contribute genes for body size and speed that the early Quarter Horse lacked. As many as 97 percent of the horse pedigrees analyzed for the King Ranch traced back to at least one Thoroughbred ancestor.

Old Sorrel was at least 56 percent Thoroughbred, and King

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<th>TABLE 1</th>
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<td><strong>FOUNDATION</strong></td>
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<td>Statistic</td>
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<td>Average</td>
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<td>Max. Value</td>
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Percent genetic relationships to foundation, Thoroughbred, Three Bars (TB) and Doc Bar for King Ranch stallions and mares used for breeding in 2007.
Ranch breeders weren’t afraid to keep the Thoroughbred influence in the early breeding program.

On the King Ranch, horses with Thoroughbred blood have been preferred roping horses because of their larger body size and speed, helpful for roping larger calves, cows or bulls on the 825,000-acre ranch. The Thoroughbred influence for King Ranch Quarter Horses born between 1941 and 1942 was determined to be 65.8 percent Thoroughbred and 34 percent registered Quarter Horse.

A 1983 study (MacCluer et al.) examined pedigrees on Standardbreds and stated that genes from superior animals can be maintained by line breeding. If used properly, line breeding ensures that desired traits of common ancestors will not be lost through time.

Line breeding is a mild form of inbreeding. Geneticists tend to call inbred those animals resulting from parent-offspring matings or full brother-full sister matings. Opinions vary, but when inbreeding values get above 15 percent, that is leaving line breeding and approaching inbreeding.

Through planning, culling and careful use of line breeding and minimizing inbreeding — the King Ranch had outstanding results.

**Genetic Relationships**

The study was based on eight-generation pedigrees of 16 stallions and 74 mares that were used for breeding on the King Ranch in 2007, allowing the researchers to trace breeding lines to Hickory Bill and examine more than 100 years of breeding practices.

The study found the genetic relationships of King Ranch stallions and mares to the foundation sire Old Sorrel, and also to American Quarter Horse Hall of Fame stallions Mr San Peppy and his son, Peppy San Badger. The study also looked at the relationships of Doc Bar and Three Bars (TB) to the King Ranch breeding bands (see Table 1).

“The King Ranch can use this information to retain relationships to our most-famous cow-minded lines of horses,” says Scott Moore, an area manager on the King Ranch.

The folks at the King Ranch were primarily interested in learning the average inbreeding values for the horses, because when inbreeding gets to certain levels (around 25 percent), it can, for example, decrease fertility in offspring and lead to increased abortion rates in mares. Scott thinks the information from the study “will enable us to continue breeding our genetics for years to come without attaining high levels of inbreeding.”

Scott and the King Ranch were surprised to see that the average inbreeding for the ranch’s horses (see Table 2) was lower than expected. It is important to note that these inbreeding values are based solely on ancestry by Old Sorrel or Hickory Bill within the King Ranch line, and are not referring to total inbreeding found across all common ancestry lines in the herd — different lines bring in different genetics. In general, these results suggest only a mild degree of inbreeding, implying low genetic relationships between parents. The King Ranch was able to see that past breeding strategies were able to keep inbreeding low within the King Ranch line.

Genetic relationships can be used to help maintain genetics to horses that a breeding program is known for. For the King Ranch, these lines trace back to Peppy San Badger, Mr San Peppy and mainly Old Sorrel.

King Ranch can use information on genetic relationships among stallions to plan future matings. Table 3 illustrates the percentage genetic relationships between these stallions. If you had a mare by Play Red, looking at these relationships, which stallion would you want to breed her to so that you

### Table 2

<table>
<thead>
<tr>
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<th>Old Sorrel</th>
<th>Mr San Peppy</th>
<th>Peppy San Badger</th>
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<tr>
<td>Statistic</td>
<td>1.61</td>
<td>10.8</td>
<td>12.5</td>
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<tr>
<td>Stallions Mares</td>
<td>3.49</td>
<td>14.4</td>
<td>16.4</td>
</tr>
<tr>
<td>Average</td>
<td>6.05</td>
<td>10.8</td>
<td>12.5</td>
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<tr>
<td>Max Value</td>
<td>6.7</td>
<td>18.4</td>
<td>25.4</td>
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| Percent inbreeding and genetic relationships to Old Sorrel, Mr San Peppy and Peppy San Badger for King Ranch stallions and mares used for breeding in 2007.

### Table 3

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<th>Stallion</th>
<th>Laker Doc</th>
<th>Play Red</th>
<th>Marsala Red</th>
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<tr>
<td>Taquito Sugar</td>
<td>0.4</td>
<td>9.6</td>
<td>21.0</td>
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<tr>
<td>Laker Doc</td>
<td>0.2</td>
<td>0.2</td>
<td>54.4</td>
</tr>
<tr>
<td>Play Red</td>
<td>54.4</td>
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The numbers represent genetic relationship percentages between the stallions that can be used to plan breedings.
stay away from undesirable relationship levels that could lead to inbreeding? The relationship between Taquito Sugar and Play Red is 9.6 percent, which would mean that the relationship between Taquito Sugar and a daughter of Play Red is half that, 4.8 percent. That breeding would maintain low relationship levels.

Comparatively, the relationship between Marsala Red and Play Red is 54.4 percent, which would mean that the relationship between Marsala Red and a daughter of Play Red is 27.2 percent. That breeding would result in high relationship levels that would result in high inbreeding values.

Even lower relationship levels would be achieved using Laker Doc; his genetic relationship to the other stallions is below one half percent.

The study showed, for example, that Taquito Sugar, a King Ranch stallion, possesses the highest genetic relationship to Old Sorrel (14.8 percent) among the ranch’s stallions and is related to Mr San Peppey and Peppy San Badger by 14.2 and 25 percent, respectively. Despite these high relationships, Taquito Sugar has an inbreeding value of only 1.9 percent.

The King Ranch can use Taquito Sugar as a stallion to almost any mare on the ranch because although he does possess some relationship to Mr San Peppey and Peppy San Badger, he will not create offspring with high inbreeding. For instance, if a breeder wanted to breed Taquito Sugar to Peppy’s Sweet Sister (See hypothetical pedigree) the foal would have low inbreeding value but maintain a high genetic relationship.

In contrast to stallions, average genetic relationships of mares were consistently higher to Old Sorrel, Mr San Peppey and Peppy San Badger (Table 2). Most of the mares were born on King Ranch and were selected first for conformation, then ability under the saddle and third on pedigree.

Stallions tended to be chosen for pedigree more than performance records and to a lesser extent on the basis of their extended pedigree.

The relationships and genetics in King Ranch horses can primarily be found in mares, and to a smaller extent in stallions.

**Using King Ranch Techniques**

**How can horse breeders ensure the use of a good breeding program?** There are many different ways to maintain a well-planned line breeding program, which makes it possible to achieve low inbreeding levels, while maintaining high genetic relationships to outstanding ancestors.

To demonstrate one way, the inbreeding level is low in Peppy’s Sweet Sister, despite being double-bred to Mr San Peppey, because the influence of Mr San Peppey has been allowed to decrease. Breeders can practice this same breeding by looking at a pedigree and seeing where common ancestors occur, like what was done with Old Sorrel and his offspring in early matings of the King Ranch line.

Choosing the proper sire and dam mating is also important when trying to minimize inbreeding in herds. For example, if a mare was chosen with an inbreeding value of 16 percent and was mated to Taquito Sugar, (with no close relationship to each other), the inbreeding of the foal would be low, because of the inbreeding levels of the parents, but because the parents were not closely related. Breeders should be aware of the inbreeding levels of both potential parents to ensure that proper inbreeding levels are maintained.

A second way would be allowing outside sources to bring in new genetics into the herd. Outbreeding can also produce these low inbreeding coefficients through the periodic purchase and/or lease of outside stallions and mares from somewhat different genetic lines. The King Ranch has been able to do this and create an open population that has infused new genes for desired traits (i.e., show earnings for cutting ability) into their bloodlines.

Any breeder can be successful in creating a breeding program. The main focus should be on maintaining relationships, or blood lines, that the breeder is known for and keeping inbreeding low. The King Ranch has been able to do this for the past 100 years. With the information from the Kingsville study, the King Ranch can continue “to maintain historic, foundation, excellent cow-sense pedigrees while reaching toward the future” for many years to come.

Lauren Dobson was a graduate student at Texas A&M University-Kingsville who contributed to the research on the King Ranch American Quarter Horses. To comment, write to aqhajrnl@aqua.org. For copies of the full paper, send an e-mail to s-lukefahr@tamuk.edu.

Read more about the King Ranch’s history with horses - both American Quarter Horses and Thoroughbreds - in “All the King’s Horses” in the Journal’s digital supplement at www.aqha.com.