

Basic Linebreeding

By Gene Carr

The past thirty years, I have studied the processes of linebreeding of successful livestock breeders. Two well-known breeders of horses have been very successful in their efforts-H.J. Wiescamp and the King Ranch. Hank Wiescamp used linebreeding with his Quarter Horse and Appaloosa breeding programs. The King Ranch used linebreeding to establish their family of Quarter Horses through the foundation sire Old Sorrel. Another important program that I followed was a foundation Charlois breeder from Kansas. Recently, I came across a small book that embodies most everything that I have observed in successful linebreeding programs. The book *The Basis of Linebreeding* by J.H. Lents. Another writer that makes the reader aware of linebreeding in a pedigree of a horse is Larry Thornton.

The October, 1991 issue of *The Cuttin' Hoss Chatter* had an article by Larry Thornton entitled "Pedigree Notes". The article states. "Horse breeding is an inexact science. We never really know just how good the foal will turn out when we plan the mating of the sire and dam. This makes horse breeding an exciting and interesting phase of our industry."

One area that can the breeder make sound mating decisions is the use of the pedigree. The pedigree is a genetic history of your horses and it can be a good source of information for your breeding plan. The pedigree can even give you a genetic history of your foals before they are conceived. This will allow you to see how commercially popular or stylish these foals will be for the open market.

Stylish pedigrees often follow the opinion that it is desirable to breed the best to the best to hopefully get the best. This is not enough. The horseman that follows this philosophy should also have a good working knowledge of the pedigree as a management tool.

A discussion of pedigrees as a management tool begins with the examination of breeding systems know as inbreeding and outcrossing. Outcrossing of quarter horses must include the crossbreeding found in the thoroughbred/quarter horse cross.

The genetics text *Genetic Principles of Horse Breeding* by John Lasley, Professor Emeritus at the University of Missouri, defines inbreeding as "the production of offspring by parents more closely related than the average of the population." His examples of inbreeding include parents to offspring, full sisters to full brothers, half sisters to half brothers and cousins to cousins.

The general definition of a breed is "a group of animals that have certain inherited characteristics that they pass on generation after generation. The root or bottom line in a group of animals ability to pass these traits on is the genetic condition known as homozygosity. We inbreed to set the desired characteristics by increasing homozygosity, which allows breeds to pass their traits on generation after generation."

Mr. Lents' book made me aware that the origin of linebreeding is recorded in the Bible. Chapters one and two of Genesis tell of the creation of Adam and Eve and God's command for them to be fruitful and populate the earth. Therefore the sons of Adam and Eve would have taken their sisters, the daughters of Adam and Eve, as wives. The resulting third generation would have been double grandsons and granddaughters of Adam and Eve. Therefore, the third generation of the race would carry the same relationship to Adam and

Eve as the second generation as each would carry 50% of the genes of Adam and 50% of the genes of Eve. All succeeding generations would carry the same concentration of the genes of Adam and Eve.

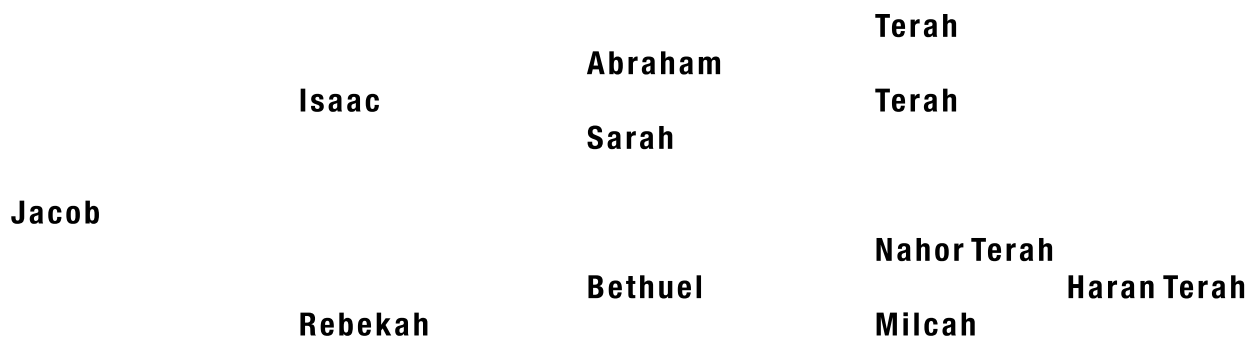
The sixth chapter of Genesis records the flood which came upon the earth and that the only survivors were Noah and his wife, their three sons-Shem, Ham and Japheth-and their three wives. Starting with the twelfth chapter of Genesis the patterns of linebreeding are explained in depth. Abraham was a descendent of Shem. It was through Terah, the father of Abraham, that God concentrated the blood for the Hebrew descendants. Therefore, both Abraham and his wife Sarah were half brother and half sister as they had a common father in Genesis 21:3.



(Figure 1)

Selection is another tool of linebreeding and that Noah and his sons were selected when the genetic base of mankind was narrowed by the flood. God did not choose to use Ishmael, the other son of Abraham, but of a mother named Hagar whose ancestry is not given.

To maintain the purity of the line of Terah and strengthen this line, Genesis 24 shows that Isaac was to be married to a girl of the lineage of Terah. Isaac and Rebekah produced twin sons of which Jacob was chosen to carry on the linebreeding process through Terah. (see figure 2)



(Figure 2)

Jacob carried 34.375% of the genes of Terah of which he inherited-25% from Isaac and 9.379% from Rebekah. Jacob continued the linebreeding process as he married two full sisters, Rachel and Leah, who were the daughters of Laban, the brother of Jacob's mother Rebekah. From the sisters Rachel and Leah came the eight sons and one daughter of Jacob. Jacob also had four sons from the two handmaidens of Rachel and Leah named Zilpah and Bilhah. The two handmaidens were unrelated so their sons carried 17.187% of the genes of Terah. This provided a mild outcross. The eight sons of Rachel and Leah carried 21.875% of the genes of Terah. These twelve sons of Jacob were the patriarchs of the twelve tribes of Israel and the start of the Jewish Race.

Studying the pedigrees of the eight sons of Jacob, one can see that the ancestral places are filled with common ancestors as the linebreeding program progresses. One can see that each succeeding generation possesses even greater prepotency if the selection process is implemented.

Jacob and his family which consisted of seventy persons were then taken to Egypt where they

and their descendents lived for 430 years which is about 16 or 17 generations. They multiplied in the Land of Goshen in northern Egypt which was bounded by the Mediterranean Sea to the north, the Red Sea and the Sinai Desert to the east and the Sahara Desert on the west. The only contact that they had with other people was the Egyptians to the south. Genesis 46:34 records that the Israelites were an abomination unto the Egyptians as the Israelites were herders of sheep and cattle. If methods and patterns of mating as set by God were followed in the 430 years of isolation which produced an end result of 600,000 people, a pure race would have developed which would have characteristics fixed with the prepotency to consistently pass on those characteristics.

PLANNING WITH POAS

Linebreeding is a simple concept that can be made to seem complicated. One must remember that linebreeding is a program that produces animals from a single line of descent from a common ancestor. It is a long ranged plan that a breeder is required to have an ideal animal firmly fixed and must be willing to pursue that ideal regardless of any breeding fads that might dictate otherwise.

With linebreeding the breeder must use selection as a rigid tool in the process. Unless this is adhered to, the breeder will never attain his goal and the program will be doomed to failure. There are very few constructive linebreeding programs and very few bloodlines that can be successfully linebred. The characteristics that must be maintained are conformation, soundness, fertility, disposition, coat color, refinement, and females that exhibit the ability to raise healthy foals.



Santee Lancer

The most significant part of the selection process begins with the foundation sire and foundation females that have common ancestry with the foundation sire. This will make the journey towards the ideal animal shorter. Otherwise the breeder will experience extra generations of breeding if the ancestry is not common among the foundation sire and females. Many breeders of success believe that the females are the strongest part of the linebreeding program and the stallions are providers of the necessary genes.

The first step in linebreeding is the mating of half brothers and half sisters which are produced by mating the foundation sire with the foundation females. The result of the half brother and half sister matings will be the second generation with the resulting offspring being double grandsons and double granddaughters. If the foundation females held common ancestry with the

foundation sire a uniformity will be apparent.

One must not try to linebreed to more than one common ancestor. The double grandsons and granddaughters will be genetic sons and daughters of the foundation sire. If each parent gave the next generation 50% of their genes, the double grandsons and granddaughters would carry 50% of the genes of the foundation sire. But because of the random division of genes in the

parents, the influence of the four grandparents may not be transmitted in equal proportions. The offspring may bear a relationship to any one of the grandparents greater or less than the normal 25% relationship. An example of the double grandson or granddaughter is Exhibit 4 depicting the pedigree of Santee Lancer, 1990 Tulsa State Fair Grand Champion Stallion.

EXHIBIT 4



Another example of attempting to maintain the same relationship as the double grandson or double granddaughter is mating a double grandson and double granddaughter. The result would have the same great-grand sire with four different great-grand dams and the relationship would still possibly be a genetic son or daughter of the great-grand sire. Exhibit 5 is an example of this cross.



Santee Skip Mama

EXHIBIT 5

	TOUGH PLAUDIT	GOLD PRINCE
SANTEE TWISTER		TUFF SAMPLE
		DEBBY'S TOP BAR
	TWISTY BAR DEB	LOPEZ TWIST
SANTEE LANCER		GOLD PRINCE
	TOUGH PLAUDIT	TUFF SAMPLE
SANTEE SILVER LECHE		STEWARD'S DANNY BOY
	TOMAHAWKS GITCHIE GUMMIE	CRIBAN TIRWAN BABETTE
		GOLD PRINCE
	TOUGH PLAUDIT	TUFF SAMPLE
SANTEE BAKER		BAR SUPREME
	SANTEE FLICKA	BAKER'S FLICKA
SANTEE SKIP MAMA		GOLD PRINCE
	TOUGH PLAUDIT	TUFF SAMPLE
SANTEE SCHOOL MAMA		PLAUDIT BAR
	SANTEE PLAUDIT NAN	MISS BAR NAN

Exhibit 5 shows an example of using a foundation female that is closely related to the foundation sire. Santee Plaudit Nan is a granddaughter of Red Plaudit who is also the grandsire of Prince Fury, the grandsire of Tough Plaudit, the foundation sire.

Dr. Jay Lush of Iowa State University stated, "The more superior a breeder's herd or flock is to the average merit of its breed, the more reason he has to practice linebreeding to his very best animals or to the very best of the recent ancestors."

The tool selection requires the breeder to eliminate many of the offspring developed in a linebreeding program therefore more males will be eliminated than females in each generation. As one uses the linebred males it will be found that some males produce better daughters and others better sons. This will also make a selection another option as to the needs of the breeding herd.. It will be found that only a few male lines from the foundation sire will survive the process of selection over a long period of time.

A breeder should not allow more than 50% of the genes of the foundation animal appear in any individual in the herd as this will avoid incestuous relationships. Other mating patterns can be the method of maintaining 37.5% of the genes from the foundation ancestor. An example of this is easiest explained as an aunt-nephew or uncle-niece mating which is a daughter of the foundation animal mated to a grandson of the foundation animal or a son of the foundation animal mated to a granddaughter of the foundation animal. An example of the 37.5% pattern or uncle-niece pattern is shown in Exhibit 6.

EXHIBIT 6

		GOLD PRINCE
	TOUGH PLAUDIT	TUFF SAMPLE
SANTEE SAILOR		PLAUDIT BAR
	SANTEE PLAUDIT-NAN	MISS BAR NAN
SANTEE TINY TIM		TOUGH PLAUDIT
	SANTEE TWISTER	TWISTY BAR
		DEB
SANTEE TWISTY LADY		TIM BAR NONE
	PH'S RED LADY	PH'S ROCKET
		RED FEATHER

There are many methods that may be used to accomplish these patterns but one must stay close to the foundation. The linebreeding pattern will continue with each succeeding though a few sons of the foundation sire and then again through another few sons of probably one or two stallions and continue that way down the line. The same can be said of a prominent female that may occur and one wants to preserve this bloodline. It is similar to weaving a prize rug and only a master breeder will survive the process. It will be found that after a lifetime of linebreeding only the surface will be "scratched".