Several years ago my father, Fred G. Gist, wrote the following regarding his philosophy on breeding horses. "Philosophy" comes from a Greek word that means "love of wisdom". My father looked to the wisdom of legendary horse breeders and geneticists as he strove to hold together foundation blood in the American Quarter Horse. The article below and the horses my father produced are the result of many years of study, observation, and implementation of basic breeding principles. Please take advantage of the wisdom and knowledge in this article and in others in our Library. Build your breeding program, whatever its size, on proven success instead of the trends that are eroding away the foundation blood that made the American Quarter Horse great.

The Wagon Wheel Ranch Breeding Program

Fred G. Gist

The Wagon Wheel Ranch breeding program is primarily designed to concentrate the blood of specific legendary sires, i.e. King P-234, Joe Hancock, Red Man, Buck Hancock, Blue Valentine, Two Eyed Jack, Leo, Bert, Mr San Peppy; Three Bars, TB; and Top Deck, TB. To accomplish the above, we breed King bred stallions to King bred mares; Joe Hancock bred stallions to Joe Hancock mares, etc. This inbreeding allows us to hold, and in some cases, to increase the percentage of this blood carried by foals produced from these breedings. When horses are inbred, their progeny have one or more matched pairs of chromosomes, out of the thirty-two (32) pairs which all horses have. The significance of one or more matched pairs of chromosomes in a breeding horse is that each chromosome carries hundreds of genes. Genes carry the elements by which hereditary characters are transmitted from parent to progeny. Theoretically, each mature reproductive cell carries a gene for every inheritable characteristic (the progeny receives a set of genes from each of its parents). Therefore, when a breeding horse has even one pair of chromosomes matched, the consistency of that type produced in its foals increases, notably! As the number of matched pairs of chromosomes in a breeding horse increases, so does the uniformity of foals produced! Practically speaking, I have found that twelve (12) matched pairs of chromosomes is the maximum attainable (the foals produced by the very few horses which have twelve matched pairs of chromosomes are "rubber stamp" like in their uniformity).

The number of matched pairs (or lack of any) is referred to as homozygosity, and is abbreviated HZ in our horse descriptions. The higher the HZ is, the more likely the horse noted will be able to reproduce itself (and the characteristics of the legendary sire to which the horse is inbred). Ordinarily, as HZ increases, the other trait which we watch, Hybrid Vigor, declines. Hybrid Vigor, abbreviated HV in our horse descriptions, is the extra vitality exhibited in a horse when no defective genes are expressed (the horse's defective genes, which most horses carry, are present in the reproductive cells, but do not exhibit their presence in any observable physical traits of the horse) allowing an individual to exhibit more size, bone, muscling, speed, etc. than either of the parents exhibit. Ed Heimann, when doing genetic research at the University of Missouri, figured the average HV in running bred quarter horses at a negative 1.2% to a positive 1.75% (however, he took only the top 65% of running quarter horses, of

that era, into consideration; thus automatically raising the average figures). Maximum HV is attained by breeding intensely inbred horses of one family to intensely inbred horses of another family, i.e. King P-234 to Leo, etc. We have found that a positive 34% HV is the highest which we can produce with our breeding herd.

Excellent mothering ability is one of the traits expressed by mares carrying above average HV. Performance potential/athletic ability is another resulting trait and is the primary goal in our breeding the true two way hybrid (progeny of two parents which are inbred to different families). Although true two way hybrids rarely have matched pairs of chromosomes, they usually will produce uniformity in their foals more consistently than other horses which have no matched pairs of chromosomes, and whose parents had no matched pairs of chromosomes (known as "shotgun" bred horses). The reason that they will do so is probably because both of their parents are inbred, thus narrowing the diversity of their ancestors' genes, compared to the "shotgun" bred horse's wider diversity of ancestors.

The inbreeding program which we pursue, and others now and earlier have or are pursuing, is more hazardous (and thus more expensive) than line breeding (a less intense form of inbreeding, which doesn't allow for longer term concentration of blood), breeding the "best" to the "best" (as practiced by the late dean of early quarter horse breeders, Ott Adams of Alice, Texas) or the majority who run here, there, and yonder with their "shotgun" bred mares to this or that popular stallion who may or may not be genetically equipped to produce foals like himself on a consistent basis. The reason for the more hazardous nature of inbreeding is, at the same time, the reason for practicing it in the first place! The reason being that inbreeding concentrates blood (the gene pool), which can be good when no defective genes (which are concentrated along with the desirable genes) are expressed in the horse resulting from inbreeding. However, inbreeding (in our experience) invariably results in a higher percentage of the resulting foals physically expressing conformational, and/or mental defects, which are such that these individuals must be culled from the breeding program, at the least; and euthanized, at the worst. (Therefore, breeders, who cannot stand such financial pressure should not practice inbreeding, for the most part). Those who do practice inbreeding usually come to a point in their program where they must outcross their inbred horses with horses from another family (usually, but not always, inbred themselves). We, for the most part, are constantly out crossing our inbred horses to produce true two way, and sometimes three way, hybrids with excellent performance potential.

Through experience, we found that when an inbred female has as many as eight or nine matched pairs of chromosomes (produced by breeding fathers to daughters or sons to mothers) she will tend to abandon her first foal at birth and/or be a very poor mother with below average milk production. To help this situation, we have learned to breed such inbred females to an inbred stallion of another family for her first foal. This technique produces a foal which is a true two way hybrid carrying so much hybrid vigor that it can persevere in the face of its dam's poor mothering ability, and eventually (usually with some creep feeding) attain normal size, weight, etc. Subsequently, the inbred mare can be bred to inbred stallions of her own family, due to her increasing maturity.

Another "problem" with inbreeding is, sometimes, a loss of size and bone. We say, sometimes, because there is usually a way to avoid loss of size and bone (and to avoid increasing percentages of defects in

foals produced). That way, in our experience, is to strive to breed "genetic super horses" (horses with both above average homozygosity, and above average hybrid vigor). To accomplish this, one must breed inbred horses of the same family to a member of the opposite sex, which goes back to the blood being concentrated through as many different paths as possible. For instance, breed an inbred King stallion which goes back to King P-234 through Poco Bueno, Roper Boy and Red Bud L to an inbred King mare who goes back to King P-234 through Bimbo Hank, and King Hankins. This procedure usually results in a superior foal, which is still carrying a very high percentage of King blood, yet not physically showing any defective genes (which it may be carrying in its reproductive cells).

Inbreeding is a dirty word in the vocabulary of many horse breeders (due to a lack of knowledge, and/or listening to those who have no more knowledge of genetics than themselves). However, a study of the pedigrees of many great horses will reveal their inbreeding. Some of the great horse breeders had formal training in genetics (those in charge of the Robert Kleberg, Jr. era of quarter and thoroughbred breeding at the famed King Ranch, for example), but many of them learned to inbreed through experience, and acute powers of observation (the Hankins brothers, Jess, Lowell and J. O.; Guy Ray Rutland, Walter Merrick and Hank Weiscamp, for examples). A study of the pedigrees of the horses bred by these men, and others, quickly reveals careful inbreeding which resulted in the Peter McCues, Old Sorrels, King P-234s, Leos, Easy Jets, Skipper Ws and other legendary sires.