

Breeding Systems and Selection

By Mimi Busk-Downey

From Pasos on the Web. Originally printed in the Peruvian Digest

Forward

There are many systems for breeding horses, and each has advantages and disadvantages. Breeders, regardless of how large or small their herds, strive toward certain production goals. We look for a uniform type of horse of high quality that will reproduce in a predictable way. The methods used to achieve these goals are common to all breeds, but specific applications to the Peruvian horse are discussed here.



In the breeding and promotion of horses the positive aspects should be emphasized. I have great enthusiasm for the Peruvian breed and its future. As a long time breeder and student of genetics, however, I think it is important to be aware of problems in any chosen breed and try to eliminate them. By choosing appropriate selection procedures we can increase the breed's appeal in future generations.

Definitions

~ **Outcrossing** is the mating of unrelated horses. The Peruvian breed is small and generally closely related. We can consider that a foal is the result of a complete outcross if no ancestor appears on both the sire and the dam side of a four-generation pedigree. The same horse may appear any number of times on one side of the pedigree, but if it does not appear on the other, the foal is an outcross.

~ **Hybridization** is also the mating of unrelated individuals, but by a specific formula and method. In Peruvian horses thirty or forty years ago, there were several major strains that had been geographically isolated from each other. (Northern, Southern, Lima, Cayalti, Musante and Casa Grande were examples.) Usually hybrid means a cross between different breeds or species, but in Peruvian horses a hybrid effect was obtained by crossing these unrelated strains.

~ An **F1 hybrid** has a sire and dam which are each of pure, unrelated strains. An **F2 hybrid** results when two F1 hybrids are bred together. In a continued program, the **F3** and **F4** levels will emerge, and by this time with proper selection a new strain will have been created. The breeder may then employ the process again by infusing a third strain, or employ one of the other breeding methods.

In 1974, when the author began breeding Peruvian horses, hybridization between established strains was still possible and one of the best ways to produce good Peruvian horses. At this writing in 1997, there is little potential left for hybridization in this breed. Bloodlines have been mixed together as transportation has become available and few breeders have employed a long-term plan to produce seed stock of a particular strain. Those who have followed a good plan of hybridization in the past twenty years may now be able to offer horses of an identifiable "type," which should be used as foundation stock when quality warrants.

~ **Like to Like** is the mating of individuals that are similar to one another, and may or may not be related.

~ **Inbreeding** is a general term that means the breeding together of related individuals. It is used here to refer to extremely close family breeding, such as the mating of father to daughter, mother to son, or full brothers and sisters.

~ **Linebreeding** is the mating of individuals with a common ancestor, and can have a variety of intensities. Close linebreeding would be the breeding of half-siblings, grandfather to granddaughter and so on. More distant linebreeding would be the mating of horses with one or more ancestors in common in a four-generation pedigree. Remember that an animal is only linebred if the same ancestor appears on **both sides** of its pedigree.

The author has observed an unfortunate scenario in breeding which occurs when a breeder obtains a group of outstanding horses, but then breeds them together haphazardly without regard for any of the established methods. (**This is called the "Monkey With a Typewriter" System!**) Sooner or later some good individuals will be born, but the herd will lack consistency. The better animals which do result will like lack prepotency. It is not sufficient to be able to recognize and purchase fine horses: a breeder must know the goals for the next generation and how to achieve those goals.

Effects

Outcrossing and hybridization both decrease the chance that an individual's offspring will be similar to itself. In a breeding program where outcrossing is used generation after generation, outstanding horses may emerge, but they will not be prepotent for type. Uniformity will be very difficult to achieve in a herd of constantly outcrossed horses. Outcrossing is, however, very beneficial and necessary to "refresh" the blood of most breeding programs. Some very successful breeders linebreed, then outcross for one generation, then go back to the family for the next generation. Alternating in this manner can be an excellent

It is not sufficient to be able to be able to recognize and purchase fine horses: a breeder must know the goals for the next generation and how to achieve those goals.

way to avoid the pitfalls of constant linebreeding while maintaining a high level of uniformity in an established herd.

The hybrid effect, achieved in the past by crossing the separate strains of Peruvian horses, produces an animal more vigorous than either of the pure-strain parents. They are often fast-maturing animals that attain more size than might be expected from the mating. They are hardy with few health problems, good bloom and usually all the athletic ability that could come from the breeding. All these effects are more pronounced in the first cross (F1 generation) than in subsequent (F2 and F3) crosses.

As breeding animals, F1 hybrids are not usually able to reliably pass on their outstanding characteristics. However in the Peruvian breed one can find a percentage of hybrids that are surprisingly prepotent, probably because their sires and dams though unrelated had many characteristics in common (i.e. like to like). It should be noted that the infusion of more than two strains into a hybrid breeding program will greatly reduce the breeder's ability to predict the characteristic of his produce. It will add any generations to the number required to form a uniform herd. To have optimum success, a hybrid breeder must stay with just two strains and try to maintain close to a 50-50 percentage in all of his animals until his new type is set.

An example of a hybrid program for purebred Peruvian horses is the one the author began after three years of breeding, in 1977. Having chosen Cayalti (northern) mares which that were middle aged at that time, they were crossed with the pure Southern stallion **Piloto*, one of the only southern stallions which allowed the fine gait of a mare to come through. The offspring resulting from those crosses, *Soberano++*, *La Poetica*, *Porcelana CM*, and *Flor de Tejas*, were bred to others like them such as **Su Senoria*, a 50-50 stallion by *Sol de Oro V* out of a *Torre Ugarte* (northern) mare. The F2 and F3 horses, such as *Sobrante CM+* and *Mercedes CM++*, were still 50-50 with much the same qualities of their parents. Other examples of hybrid breeding programs were those of Jose Antonio Onrubia, Anibal Vazquez, Raul Risso and recently Manuel Sanchez. After two or three generations of hybridization, a type will begin to emerge.

Breeding **like to like** increases the chance that an offspring will have the characteristics of its parents and be prepotent as a breeding animal. When used as the sole breeding system, without regard for pedigree, it will not be very effective in producing a type. However, when used in conjunction with any other method, be it linebreeding, outcrossing or hybridization, it will improve herd uniformity and decrease the number of generations required to create a type. A breeder should always be mating Like to Like to an extent. The most knowledgeable breeders consider it unwise to mate extremes. For example, one should not breed a mare without terming to a stallion with maximum terming, since then it would be difficult to predict the inheritance of future generations. It would be preferable to breed the mare to a prepotent stallion with moderate and perfectly correct terming, hoping for a daughter better than the mare. One should breed toward the

ideal, but expect moderate, consistent improvement with each generation.

A case where breeding extremes is justified is where there is an urgent need to improve strength. If the pastern or the back of a mare is too long, breeding to a stallion that is very short in those areas will make dramatic improvement. The resulting offspring should then be bred to the ideal to continue the quest for strength.

An outstanding example of a "like to like" breeding program which then evolved into a set "type" was the program of Jose Musante H.

Sr. Musante explained to the author in 1977 how he had created exactly the Peruvian horse he wanted. Once his type was set, he explained how he would outcross one generation and then go back to the family for the next generation. Alternating generations in this way kept Sr. Musante's herd from becoming inbred, while maintaining his preferred type. He was so successful in setting his type that during the seventies it was widely known that when a Musante horse was crossed with any other Peruvian line, the result would still look like a Musante horse.

The effects of **inbreeding** and **linebreeding** are similar. Their aims are to produce horses that are of a type and which can reliably reproduce their characteristics in their offspring. This occurs quickly, because in linebreeding to a particular ancestor the chance that the ancestor's genetic material will be present in the foal is greatly increased. Family breeding, when practiced properly, can be a powerful tool in "setting" desirable characteristics in a herd.

Inbreeding and linebreeding are used by many breeders of Peruvian horses. Several of the breed's most outstanding horses have resulted from linebreedings. For example, the legendary *Piloto resulted from the mating of half-brother to half-sister, both his parents having been sired by the same stallion. This information was only documented in the late 1980's and helped explain why *Piloto was so prepotent. It also explained why *Piloto was so valuable in a "hybrid" program -the North-South cross with Cayalti and Pucala mares. This information was significant at that time because many people were doing intense linebreedings to *Piloto without knowing that he himself was already closely linebred.

When one inbreeds or linebreeds the goal is concentrating the genes for superior qualities in the next generations. Unfortunately undesirable characteristics are inherited just as easily as good ones, and can also become "fixed." Linebreeding may be considered only if the common ancestor is truly outstanding, and relatively defect-free. Any faults present in the common ancestor will become obvious in the linebred offspring. The faults will

**Once unwanted
genes have
become "fixed"
at least two
generations
(8-10 years)
will be required**

actually be even more serious in the progeny, since that generation is likely to be prepotent and will in turn pass on any defects or deficiencies. Once unwanted genes have been "fixed" at least two generations (8 - 10 years) will be required to correct the problem. Defects that would eliminate a horse from being the object of linebreeding include legs out of plumb, mouth defects, tendency to trot, landing close or wide in the front or rear legs, or any lack of bone and strength.

to correct the problem.

Thorough pedigree research is important in linebreeding. One must investigate which ancestors contributed to the bloodline and as many details about those ancestors as possible. Making a linebreeding without realizing it or when little is known about the ancestors can have very serious effects. It is possible that a horse in question had weaknesses that were not passed to its offspring due to proper breeding selection. When linebreeding to the horse though, the faults will appear in the offspring. A breeding that looked good when comparing the horses would have become a step backward.

Another pitfall in linebreeding is attempting to "recreate" a particular horse. One should always be willing to move ahead in a breeding program. No horse is perfect, and if breedings are selected correctly, each successive generation should bring certain improvements. Even if a person felt that a particular horse embodied his ideal and wanted to recombine most of that horse's genetic material in a descendant, the probability of success would be slim.

A universal effect of linebreeding or tight continued linebreeding is a **loss of vigor**. There are more abortions from all causes associated with this breeding plan. More foals will be born weak or frail. In growing horses the lack of vigor may be noted in a slower maturation and less "bloom" in the appearance. ("Vigor" refers to the hardiness of the animal, not to its energy. Linebred horses can have as much **brio** as any others.) Linebreeding intensifies the incidence of many defects. Extremes of size can also result, mostly smaller.



A little linebreeding can help a breeder who is willing to analyze objectively. The breeder must cull ruthlessly and use disappointing breedings to learn which crosses to avoid.

With so many problems associated with linebreeding, one might wonder why it is practiced at all. The answer is that it is the quickest way to produce a prepotent and uniform "type". It is an especially valuable way to intensify recessive characteristics, such as gait. It can also serve as a test of the depth of gait present. If you have made a linebreeding to a what you think is

a well-gaited horse and the foal is "trotty", the gait may have been more trained than natural. Linebred descendants of **naturally** well-gaited horses will be "gaiting fools" and will in turn pass on those gaiting genes.

If a breeder is considering a program with inbreeding or linebreeding, he should use the many resources available and study the possible consequences. In addition to academic sources it is essential to talk to other breeders, especially those who have followed a similar plan. It is wise to ask other breeders to help analyze the chosen stock objectively. One must use horses which are excellent not just as show horses but also as producers. Two horses should never be bred together on pedigree alone -- they should appear to be a good match, regardless of their lineage. Sentimentality should never enter into a decision to linebreed. Again, one should try to learn as much as possible about **all** of the ancestors of his horses.

When a breeder is starting out, it is a good idea to become involved with an already established breeding program. It is far safer and easier to purchase an excellent linebred horse than to produce one. This leaves the higher risks to the more seasoned breeders. Having purchased a good linebred mare, a breeder can outcross during his first generation while becoming more knowledgeable about the breed. "Piggy backing", or repeating crosses pioneered by an established breeder, is a smart move when becoming involved in any breed.

When linebreeding it is important to keep in mind the relative safety of the cross. Full brother to full sister is the most dangerous mating and should be avoided. Father to daughter and mother to son are the next most dangerous. Half-brother to half-sister is a little safer, and grandfather to granddaughter is one of the better tight linebreedings. Matings less close than these mentioned are fairly safe ways to begin family breeding.

A linebred or inbred animal will vary in its ability to produce well depending on how it is mated. A good linebred horse that has been a mediocre producer because its owner has continued to breed it to its own family can become a gold mine in the hands of a breeder willing to outcross.

The effects of the "**Monkey With a Typewriter**" system will be twofold:

- 1) The produce will often **not be as good** as either parent.
- 2) Any given horse will have several "famous horses" in their immediate background but **will lack** the outstanding qualities of all of them.

If you have purchased a group of winning horses but your breeding program is going nowhere, get help. Seek out a breeder who has uniform horses you admire and ask

questions. Have judges look at your herd and tell you the two characteristics that need the most improvement, then breed to a stallion proven to correct these. Many people fail to heed the good advice at their disposal and then lose interest as they fail to achieve their goals.

Inherited Defects

Inheritance controls almost every aspect of the Peruvian horse. This is the fact about the breed which has led to the saying "**a great Peruvian horse is born - not made.**" It is why breeding these horses can be so rewarding; a breeder can learn to predict his future generations and enjoy a fascination with producing them that will last a lifetime.

One must learn to determine the heritability of all the characteristics of his horses. Often an owner imagines that all of his horse's good qualities will pass to its progeny, while excusing serious faults as having been caused by environment. (i.e: a bad-natured horse "must have been mistreated" or one with crooked legs suffered from "improper trimming".) A breeder should reject this type of thinking. Unless there is positive proof that a defect has some other cause, it must be considered heritable to a large degree. This concept is crucial in any breeding program.

**....breeding
these horses can
be so rewarding
....a breeder can
learn to predict
his future
generations and
enjoy a
fascination with
producing them
that will last a
lifetime.**

When doing pedigree research it pays to talk to people who have ridden or worked with the horses in question. Any horse with an ancestor of poor disposition within three generations should be eliminated. If breeders do this at the beginning, their reward is horses that are easy to handle and salable to a broader market. Horses with true brio will not be knot-headed, stupid or dangerous.

In the 1970's the author resisted acquiring several major bloodlines that were popular but whose temperaments seemed nasty. In the 23 years of working with these horses, she has never been kicked, bitten or thrown by one of their own horses. It is recommended not to breed to a stallion unless you have stood with him in his stall for a time and observed his behavior. If you can also arrange to ride him, all the better.

Some serious inherited defects that are not too hard breed out are: long backs, long pasterns, weak loins, general frailty (cannon bone circumference should be at seven inches per thousand pounds of body weight). These defects can be eliminated in one or two generations.

Defects that are more difficult to eliminate are: crooked legs, landing base wide in front or rear, rafter hips, inability to overstep, laziness, tendency to hard trot or hard pace, and high tail set. These defects require two or three generations.

Some of the defects that are very difficult to breed out are: aggressive behavior toward people - (biting, kicking, striking, bucking), parrot mouth, landing close in front, cryptorchidism (retained testicle), low neck set, carrying the tail. These characteristics will reappear after many generations of correct breeding.

Congenital abnormalities are not generally inherited but rather caused by environment or mutation. These include hermaphroditism, missing limbs, dummy foal syndrome, etc. A few congenital abnormalities such as bulldog mouth may or may not be heritable in horses.

It is important to differentiate between functional defects and aesthetic defects. A horse with a low neck set and a carried tail may be aesthetically not pleasing but still be perfectly functional. A horse which lands wide in front and has a parrot mouth, no matter how spectacular, should not be bred. We always have to be much harder on stallions than on mares, due to their relative influence on the breed. A mare might produce fifteen foals in her lifetime, while a stallion can sire twice that many every year.

Selection

Regardless of the breeding system used, if a breeder is seeking to produce a particular type or quality of animal, he must cull. Culling is not just discarding the really poor animals. It is the method by which a breeder selects toward type and enhances the virtues of his herd. It is important to remember that in Peruvian horses, even a breeder's culls must be of sufficient quality to be used as pleasure animals. They cannot be economically destroyed, or sold for meat the way cattle can. In Peru 40 years ago, horses without enough quality to breed were relegated to the work string or used to produce mules. Today in North America nearly all mares are bred, and many stallions of poor quality are siring foals. Even if a breeder begins with excellent stock, he should geld a large percentage of his colts for the benefit of the breed, rather than sold to some less knowledgeable breeder as a "stallion prospect". Rather than ask "should I geld this colt?" the breeder should ask "what does this colt offer that is very special, and is there any reason not to geld him?"



"The Black Stallion Syndrome" is present in every breed. This afflicts owners by allowing them to see only stallion's magnificent presence rather than realistically viewing the conformation, gait and character of the animal. Stallions need not be black in order for owners to see them through this fantasy "filter" -- palomino, chestnut/flaxen or any

other color can be someone's dream horse. Consider the time and money invested in your foals by the age of four. If you are breeding to a stallion for its beauty and ignoring crooked legs, a questionable disposition or lack of natural gait, you are wasting your resources.

Females should also be evaluated and culled, always keeping the ones closest to the breeders ideal. Sometimes a ranch with a good breeding program will be able to offer horses that are of fine quality and value because another superior generation is appearing. For example, a mare with fine gait but only moderate brio might be culled from the herd of a breeder looking for more energy. The same mare could be a valuable purchase for someone who has lots of brio in their herd but needs to improve gait. On the other end of the scale, there are "breeders" who produce in the puppy-mill style, with horses so lacking in strength or quality that they are not functional Peruvian horses. If a breeder selects knowledgeably, even his culls will be functional, salable horses and a credit to the breed.

The Long Haul

When evaluating the progeny of a stallion or mare one must wait until the offspring are four or five to make the final assessment of quality. Some horses look very good while young but later do not fulfill their promise. Others only really come into their own under saddle but have enduring quality. The Peruvian horse is meant to be ridden. A horse that reaches its peak as a youngster at halter and then goes downhill in performance in later years is of much less value than one that improves until middle age. The results of a breeding program, then, cannot be fully known until a given generation has reached maturity.

Whatever system the breeder uses he must have a great deal of patience. He has to be honest with himself and encourage others to help detect potential problems in his chosen program. He must constantly maintain an open mind about the results of the breeding program he is designing. This is difficult to do because as breeders we all become attached to our horses and to our dreams about them. A breeder who persists in separating the dreams from reality will be rewarded with a consistently high level of success. ~~~~