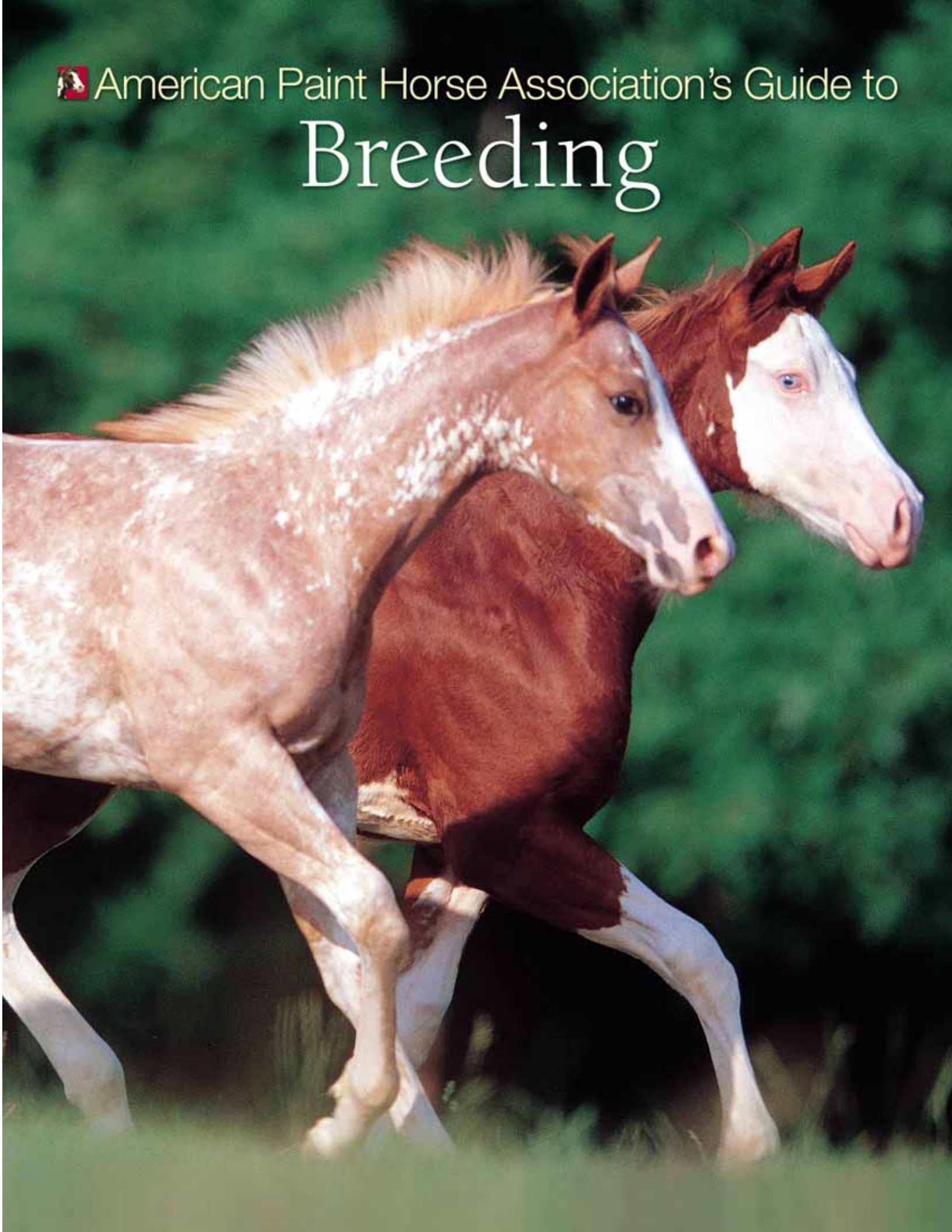

American Paint Horse Association's Guide to
Breeding

Contents

For more information on the
American Paint Horse Association
and what it can offer you,
call (817) 834-2742, extension 788.
Visit APHA's official Web site at apha.com.

History of APHA

The American Paint Horse Association has come a long way since its formation in 1962. With only a few hundred horses in the registry by the end of that year, it has grown to more than 800,000 American Paint Horses today. APHA is recording these registrations at a rate of about 50,000 each year, making it one of the fastest-growing breed registries in the world.

Founded by horsemen and -women who loved the ability and speed of the Western stock-type horse, but who also appreciated the extra eye-appeal of a colorful coat pattern, APHA's heart lies in its members. That is why the association strives to develop and sponsor programs that reflect their interests and their love of the American Paint Horse.

Breeding Practices

To be eligible for registration, a foal must be produced by one of APHA's five accepted breeding methods: live cover, artificial insemination (AI), transported cooled semen, frozen semen or embryo transfer. Each of these breeding methods has its own set of rules and requirements that must be met for the resulting foal to qualify for registration.

Currently, about 86 percent of foals registered are conceived through live cover, the oldest and perhaps simplest breeding method. Another 9 percent result from AI. Transported cooled semen accounts for just over 5 percent of registrations and less than 1 percent result from embryo transfer or frozen semen.

Live Cover

Live cover has a slightly better conception rate than do the other breeding methods. However, there is a greater chance of the mare and stallion causing injury to one another because of biting, kicking or pawing. The live cover breeding method is performed in two basic ways: pasture breeding and hand breeding.

Pasture Breeding

Using this method, the stallion is turned loose in a pasture with the mare(s) the owner wants him to breed. The stallion then breeds the mares during the natural breeding season, generally considered to be March through September.

Pasture breeding could be considered the most "natural" breeding method, because human assistance is not required. Generally, half of the reported pasture breedings result in an APHA registered foal.

Hand Breeding

The second type of live cover breeding is called hand breeding. This method requires at least two handlers—one to control the mare and one to control the stallion. While one handler steadies the mare, the other handler allows the stallion to mount the mare for breeding. Breeding hobbles are often placed on the mare to protect the stallion from kicking. Many times, the stallion is muzzled or a thick neck drape is placed on the mare to protect her from biting. Generally, over half of reported hand breedings resulted in an APHA registered foal.

The American Paint Horse

Both bloodline and color requirements determine a horse's eligibility for registration. First, a Paint's sire and dam must be registered with the American Paint Horse Association, the American Quarter Horse Association or the Jockey Club (Thoroughbreds). Then, depending on the amount of white present on the horse, it is placed in one of two APHA registries, Regular or Breeding Stock. To be eligible for the Regular Registry, the horse must exhibit a minimum amount of white hair over unpigmented skin within a prescribed zone and have at least one registered Paint parent. The Breeding Stock registry is made up of those horses with at least one Paint parent but no qualifying white present on their coat.

Artificial Insemination

Artificial insemination is widely used in the horse industry today. AI has been accepted by APHA for more than 20 years, and many breeders find this method preferable to live cover, despite the technological expertise needed, and the time and expense involved. This is because the potential for injury due to fighting between the mare and stallion is eliminated.

To artificially inseminate a mare, a stallion's semen must be collected. The usual method of collection is to first wash the stallion's penis to remove any contaminants, then allow him to mount a phantom mare (mounting dummy). Another handler directs the stallion's penis into a collection device known as an artificial vagina (AV). The stallion's penis is washed again afterwards.

Once the semen is collected in the AV's collection bottle, it is removed from the AV and maintained at 100˚ F in a water bath or incubator. The gel fraction found in ejaculate is removed from the semen by straining through gauze or aspirating with a syringe. Removing this gel allows the AI technician to accurately divide the semen into even doses.

Usually, a sample of the semen is analyzed using a microscope to determine motility, concentration and morphology. The semen can be used raw to inseminate the mare, or it can be extended with a dilutor. The purpose of a dilutor is to add volume to the semen dosage to aid in handling. Extenders also often contain nutrients and antibiotics that aid in keeping the semen motile and contamination-free.

Before the actual insemination process takes place, a technician prepares the mare for the procedure by cleansing the perineal area of the vagina with a mild soap solution to remove any contaminants.

Once the mare and the semen have both been prepared, the semen dosage is placed into a sterile syringe for insemination into the mare.

AI is performed using one of two methods. In the first method, the technician inserts a sterile speculum into the mare's vagina and passes a plastic pipette or a sterile catheter into the uterus. The syringe containing the semen dosage is then attached to the end of the pipette or catheter and the semen is deposited into the uterus.

During the other common method, the technician wears a sterile arm-length glove and manually palpates the mare. He or she then guides the catheter through the cervix and into the uterus using a finger, and then attaches the syringe to dispense the semen dosage.

Artificial insemination should be performed only by veterinarians or trained, experienced breeding professionals. The reason for this is two-fold. First, AI has a lower conception rate than does live cover, so an experienced technician is essential to obtaining a successful breeding. Second, AI is an invasive procedure. During the insemination process, if the mare's rectum is accidentally torn, the injury can result in death.

To learn more about artificial insemination, the various products and instruments used, and methods of this breeding practice, you can contact your local equine practitioner or a veterinary teaching hospital. You may also want to contact local breeding professionals or research the many books available on the subject.

Transported Cooled Semen

The use of transported cooled semen has become an increasingly popular breeding practice in the Paint Horse industry. This is because there are some distinct advantages to breeding with transported semen, including opening a wider market for stallion owners and providing mare owners a world of breeding options.

However, use of transported semen means adding a few extra procedures during the breeding process. Not only must owners understand the technical aspects of shipping and long-distance artificial insemination, but guidelines set up by APHA must be carefully followed.

Fortunately, most of what the association requires involves filling out simple forms, which is relatively quick and easy.

In order to ship semen, the stallion owner, lessee of record, or authorized agent (all will be referred to as "stallion owner") must apply for a Transported Cooled Semen Permit. The APHA Field Services Department sends applications upon request. (All stallion owners who transported semen during the previous year automatically receive forms for the current year's permit.)

Applications can also be downloaded from APHA's Web site, located at apha.com.

After completing the application form, stallion owners send it and the required fee to APHA. Stallion owners must reapply for the permit each year, and must pay the appropriate annual fee.

Upon receiving the breeder's application, APHA checks that the stallion is listed for Paint breeding and that its DNA is on file. Once the application is approved, the stallion is assigned a permit number and the owner is sent 10 Collection and Insemination Reports. Owners can begin shipping semen as soon as they receive their reports. Though owners receive only 10 forms initially, they may request as many as they need during the year.

Each time semen is shipped to a mare, the stallion owner must fill out the collection (upper) portion of the Collection and Insemination Report, keep the gold copy for his or her files, and send the rest of the form with the semen shipment to the mare owner.

A stallion's semen can be shipped to a mare as many times as needed during a calendar year. However, if the mare does not conceive during that year, the

stallion owner must renew the permit the following year to continue shipping semen to that mare.

Since 1998, stallions have not been limited on the number of mares that can be exposed to transported cooled semen during the year.

Both collection and insemination must be overseen or conducted by a veterinarian or technician. The Collection and Insemination Report and required veterinarian certification are necessary for proper identification of the stallion and mare.

Mare owners do not need to fill out any forms before receiving semen, but they must complete reports after breeding.

After receiving the semen and inseminating the mare, mare owners must complete the insemination portion of the report, then mail the white copy to APHA and the yellow copy to the stallion owner at the time of shipment. The pink copy is for the mare owner's records.

Mare owners should have a signed agreement with the stallion owner in advance of the breeding. In addition to setting a breeding and shipping price, the mare and stallion owner should discuss the details of things such as use and shipment of the semen container and the method of payment.

Please note that breeding contracts are agreements between the mare and stallion owners only. APHA plays no part in these business arrangements.

When breeding by transported cooled semen, APHA rules require mares to be inseminated within 72 hours of collection. However, mare owners should not waste any time because most semen loses its viability when stored longer than 48 hours, even when cooled, stored and shipped properly.

Stallion owners should be aware that the stallion breeding report must include all mares exposed to transported cooled semen, whether or not the mare conceives.

Foals resulting from transported semen must be parentage verified (see page 5) before registration can be completed.

Advantages and Disadvantages of Transported Cooled Semen

For mare owners, the advantages include:

- avoiding the stress and cost of trailering a broodmare and foal to a breeding farm;
- reducing the costs for broodmare care at the breeding facility;
- decreasing the chance of injury during trailering to and boarding at the breeding facility;

- convenience of maintaining the broodmare at home;
- personal satisfaction gained by being involved in management of broodmares during the breeding process; and
- access to superior stallions to which they may not have otherwise had the option of using in their breeding program because of their location.

For stallion owners, transported cooled semen offers the advantages of:

- increasing the genetic pool by permitting wider use of stallions;
- allowing evaluation of spermatozoal quality and numbers used for insemination; and
- reducing the likelihood of transmission of venereal or general diseases between farms.

However, there are some disadvantages to breeding horses with transported semen that owners should consider when deciding whether or not to use this technology. Horse breeders should be aware that:

- the fertility of cooled spermatozoa from some stallions is reduced;
- the insemination dose (total spermatozoal number) must be increased with transported cooled semen to maximize the likelihood of achieving pregnancies; and
- the expenses and the time commitment associated with shipping semen and breeding mares with transported semen can be high, especially if repeat breedings are required.

Breeding with transported semen also requires that owners more intensely manage their broodmares to ensure that transported semen is ordered and inseminated at an optimal time during estrus.

Stallion owners and managers must increase their knowledge and skill in handling their stallions for the collection process. The breeding farm's veterinarian must also be well-trained in the process, due to the susceptibility of stallion spermatozoa to environmental injury.

In addition, the expenses incurred when purchasing equipment and supplies for preparing, evaluating and transporting stallion semen can increase a breeding program's overhead costs.

For additional information on the paperwork necessary for the use of transported cooled semen, please call APHA at (817) 834-2742, extension 777.

Frozen Semen

Twenty-five years ago, it wouldn't have seemed possible that a stallion could sire a foal halfway around the world without even leaving the breeding farm. In 2001, APHA approved the use of frozen semen indefinitely throughout a stallion's lifetime. With the association's acceptance of frozen semen, the Paint Horse breeding industry is now a global marketplace.

Processing Frozen Semen

First, semen is collected from the stallion. After it has been assessed for viability, motility and other quality characteristics, it is put in a centrifuge to separate the sperm from the seminal fluid.

After the seminal fluid is separated from the sperm cells, an extender is added to provide nutrients and protect the cells during freezing and thawing.

Depending on the concentration and viability of the sperm, the sample will be divided into smaller amounts for breeding dosages. These smaller amounts are stored in plastic straws that commonly hold .5 mm of fluid.

Next, the semen is sealed inside the straw, along with a small air bubble to allow for the expansion that occurs during thawing. Straws are labeled with indelible ink, identifying the stallion and the collection date. The straws are then placed on a stainless steel rack surrounded by liquid nitrogen vapor to await freezing.

Freezing the straws is done carefully. The temperature is dropped gradually to avoid shocking, and thus killing, the sperm cells. Once frozen, the straws are stored in a cryogenic container to control the temperature. The container is filled with liquid nitrogen at -196 degrees C, and this temperature must be maintained indefinitely to preserve the semen.

To thaw the frozen semen, the straws are placed in warm water baths of varying temperatures, depending on the thawing technique being used. The sperm is then ready for insemination in the mare.

Advantages and Disadvantages of Frozen Semen

Some of the benefits of frozen semen are that it:

- makes shipping semen overseas possible, which can help expand the Paint Horse's global market;
- allows owners to breed mares at the most appropriate time without the rush of overnight shipping or a long-term stay at a mare care facility;
- reduces semen transportation cost because there is no need for overnight shipping; and
- can provide extended income for stallion owners, even after the stallion's death.

Some negative aspects of this breeding method include:

- time and money spent on vet care and mare management increase;
- frozen semen often has a significantly lower success (pregnancy) rate than cooled semen or fresh semen; and
- frozen semen processing and storage can be expensive.

Transfers—Embryo, Oocyte and Fertilized Egg

Though these methods of transfer are not widespread practices in the equine industry, they are reproductive tools that have been used for many years. Keep in mind the donor mare must be enrolled in APHA's embryo program prior to the intended transfer.

Embryo Transfer

Embryo transfer is the process of taking a fertilized egg from a donor mare and placing it in a recipient mare. The recipient then carries the embryo through gestation, giving birth to a foal about 11 months later.

For an embryo transfer to be successful, the donor mare and the recipient mare must first be synchronized in their estrous cycles. Once the mares are ovulating in sync, the donor mare is bred.

About a week later, the fertilized egg is collected through a process known as flushing, where the embryo is "flushed" from the uterus. The embryo is then transferred to the recipient mare.

Inside the recipient mare's uterus, the embryo attaches to the wall as it would in a normal pregnancy. The mare then carries the foal through gestation and birth.

Oocyte Transfer

Oocyte transfer is the process of removing an unfertilized egg from a donor mare and placing it into a recipient mare. The recipient mare is then bred.

Fertilized Egg Transfer

A fertilized egg transfer is the result of in-vitro fertilization.

APHA Requirements on Transfers

With any of these methods, APHA requires the mare owner to obtain a permit and provide notification of the intent to perform a transfer. The permit and fee must be submitted each year that a transfer is anticipated. For information, please contact APHA's Field Services Department at (817) 834-2742, extension 777.

DNA Testing

Identification of a horse sometimes requires more than a photograph and a breeding certificate. Paint Horse owners may need to have their horses genetically identified, or genotyped, using a DNA test.

In 1995, APHA changed from conventional blood typing to genetic typing when verifying a horse's parentage. This method, which examines DNA from the roots of the horse's mane or tail hair, provides more accurate results of a horse's genetic type than does blood typing, and hairs can be extracted more easily than can blood.

Four instances require owners to have their horse genetically typed. In order to breed, a stallion must have its genetic type on file with APHA. If a stud, such as a Quarter Horse or Thoroughbred, has already been typed, but not through APHA, the results will be accepted if they are from an APHA-recognized laboratory.

When breeding by transported semen, all three horses involved must have their DNA tested to verify parentage. While the foal cannot be tested until after birth, APHA recommends the mare be typed before foaling to speed the verification process.

Embryo transfers also require genetic typing of the stallion, donor mare and foal. When applying for the embryo transfer permit, owners should go ahead and type the donor mare in case she dies before the foal is born.

APHA may require positive identification by a veterinarian or APHA field representative of foals resulting from transported semen or embryo transfer. All Paint racehorse starters must be parentage verified.

Owners who need to have their horse genotyped may request a kit from APHA. The kit comes with easy-to-follow directions on its use and costs $60.

About 50 hairs are necessary for the sample. (Pulling 50 hairs will not leave a gap in the horse's mane.) The hairs should be pulled forward of the withers, because the hair near the withers may be too fine to be easily tested. Tail hair is acceptable, and actually preferred for young foals, whose manes are often too fine to provide a good sample.

Hair should be pulled close to the base so that plenty of roots are obtained for the sample. After the hair is pulled, the roots should be visible, especially if looked at through a magnifying glass. The root looks like a tiny bulb at the end of the hair.

Once the hair is pulled, it should be kept in a resealable plastic bag until it can be taped on the test kit. Make sure the hair is not tangled before affixing it to the card. Long hair may be trimmed, provided the ends containing the roots are not cut off.

After filling out the appropriate paperwork, the kit is sent to Maxxam Analytics, the APHA's testing facility, using regular U.S. Mail.

The lab uses only a few hairs to test the DNA. The rest are kept in case any future testing is needed. In the event retesting is required, it is done at no charge to the horse owner. Within three to four weeks after submission of the sample, the owner will receive notification from APHA that the horse's genetic markers have been filed, and, if applicable, that the horse's parentage has been verified.

For more information on DNA testing, call APHA at (817) 834-2742, extension 777.

Parentage Verification

If, in the opinion of APHA, there is reason to question the parentage of a foal, the association may require verification of parentage, also called pedigree certification. In such a case, the owner of the foal is required to pay for the foal and dam to be tested for identification of the DNA genetic markers.

APHA requires that all breeding stallions be tested for DNA genetic markers. However, it is possible that a stallion might not have this report recorded with APHA, in which case the foal owner is responsible for getting the stallion's DNA genetic markers report filed, as well.

An example of when parentage might be called into question is when a tobiano foal does not have a tobiano parent. As it is genetically impossible for two overo-patterned Paints to produce a tobiano-patterned foal, such a foal's parentage would be in question. The first step APHA takes in such a case is to request photographs of the parents. If the pictures show that one parent is a tobiano, the registration process can continue.

If both parents are clearly overos, then DNA genetic testing is required. If the tests fail to verify that the horses listed on the application are the correct parents, then the foal is declared ineligible for registration until the foal owner can prove parentage.

Breeders Trust

Established in 1994, the American Paint Horse Association's Breeders Trust provides added incentive for Paint Horse owners to exhibit their horses in the show arena or on the racetrack. Breeders Trust pays cash dividends for points earned by nominated horses at APHA-approved events and races.

The Trust is designed so that everyone responsible for the success of an outstanding foal is rewarded. The stallion owner, foal nominator and horse's owner all share in the profit.

In brief, the Breeders Trust program works like this:

- Stallions are subscribed annually for their highest advertised breeding fee. Stallions must be enrolled by November 30 prior to the start of the breeding season. Stallions that are standing for their first season may be enrolled without penalty until March 31 of the breeding season.
- Offspring resulting from that stallion's breedings can then be nominated for life for a one-time enrollment fee, ranging from $100 to $800. The fee varies, depending on the age at which the horse is enrolled.
- No horse will be accepted into the program after its 2-year-old year, or if it has earned points in APHA competition.
- Trust money is divided and paid annually, beginning when a subscribed stallion's foals reach their yearling year. Payouts are based on the total number of point-earning horses enrolled in the program and the number of points earned by those horses during a given year.
- The stallion subscriber and foal nominator receive 20 percent and 10 percent of the dividend, respectively, while the recorded owner of the foal receives 70 percent.

For additional information on the Breeders Trust, call (817) 834-2742, extension 416.

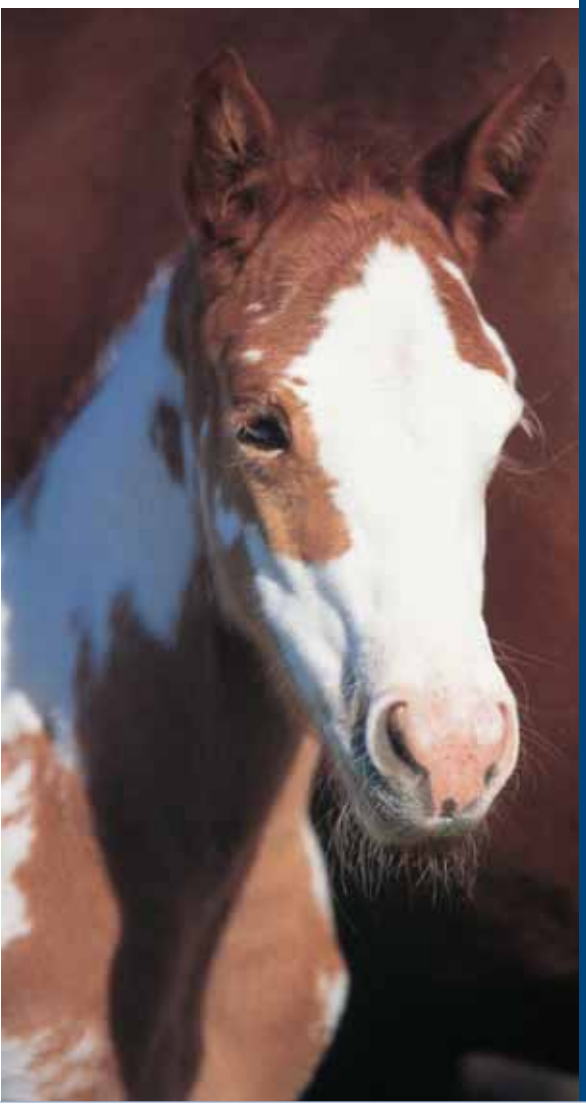
Methods of Breeding Horses Based on Pedigrees

There are two main methods of breeding horses: outcrossing and linebreeding. Defining the two, and understanding the differences between them, is an easy task.

In his classic college textbook, *Horses and Horsemanship*, Dr. M. E. Ensminger defines outcrossing as ". . . the mating of animals that are members of the same breed but which show no relationships close up in the pedigree." (See Example 1.)

Linebreeding, he explains, ". . . is the mating of animals . . . usually directed toward keeping the offspring closely related to some highly admired ancestor, such as half-brother and half-sister, female and grandsire, and cousins." (See Example 2.)

Although he includes it as a form of linebreeding, Ensminger further defines close breeding as "the mating of closely related animals, such as sire to daughter, son to dam, and brother to sister." (See Example 3). This method is also known as inbreeding.



Outcrossing

Of the two breeding methods, outcrossing involves the least amount of risk. By mating horses that are unrelated, the chance of intensifying undesirable traits is minimized. Unfortunately, due to the heterozygous, or dissimilar, genetic nature of a group of unrelated horses, the chance of intensifying desirable traits is likewise diminished.

The breeder's craft comes into play here, in honestly and accurately assessing the strengths and weaknesses of the breeding herd, and making the crosses that will accentuate the strengths and offset the weaknesses.

At its best, outcrossing can be highly successful. A classic example is the Sonny Dee Bar AQHA and Red Sonny Dee AQHA line of Paints and Quarter Horses. Blaze-faced, stocking-legged sorrels, Sonny Dee Bar and Red Sonny Dee were so dominant genetically that they had the ability to consistently sire carbon-copy replicas of themselves out of a wide variety of mares.

Often, the most consistent results in an outcrossing program are obtained when the outcross stallion is, himself, a strongly linebred individual.

An example of this was Leo AQHA. Sired by Joe Reed II, by Joe Reed P-3, and out of Little Fanny, by Joe Reed P-3, Leo was one of the most potent sires in the history of the Quarter Horse breed in terms of consistently stamping his characteristics on his foals, no matter what type of mare he was bred to.

To carry the outcrossing method one step, or generation, farther, once an outcross is made within a heterozygous band of horses, the results are a generation of horses that carry 50 percent of the same blood. If the outcross has been successful, the offspring should resemble each other to a greater degree than do their unrelated dams.

The next challenge lies in finding the best possible outcross stallion to breed the first-generation fillies to. The ultimate goal would be to find a stallion that "nicks" with the fillies.

In Ensminger's words, "So-called successful nicking is due, genetically speaking, to the fact that the right combinations of genes for good characteristics are contributed by each parent, although each of the parents within itself may be lacking in certain genes necessary for excellence.

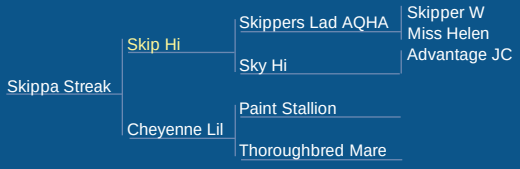
"In other words, the animals nicked well because their respective combinations of good genes were such as to complement each other."

As an example, when the Paint stallion Mr Norfleet was bred to the daughters of Sonny Dee Bar and Red Sonny Dee, it resulted in one of the most successful nicks in the history of the Paint breed.

The same can be said of Doc Bar AQHA and the nick that was achieved when he was bred to the daughters and granddaughters of Poco Tivio AQHA. The combination literally rewrote the history of the modern-day cutting horse.

Ensminger is quick to point out, however, that all outstanding animals arising from this method of breeding should be carefully scrutinized from a breeding standpoint, because, with their heterozygous origins, it is unlikely that they will breed true.

Example 1



Foundation sire Skippa Streak was the result of the outcross breeding between Skip Hi and the totally unrelated Cheyenne Lil.

Linebreeding

Linebreeding is built on the principle of "breeding like to like to get like." It affords the serious horse breeder the opportunity to set a type in the shortest amount of time.

The late Hank Wiescamp of Alamosa, Colorado, was the undisputed king of the linebreeders. Utilizing Skipper W. AQHA as the cornerstone of his program, Wiescamp linebred a "family" of Paints, Quarter Horses and Appaloosas that were so easily distinguishable by coloring and type that they are more often described as "Wiescamp horses" than as members of any single breed.

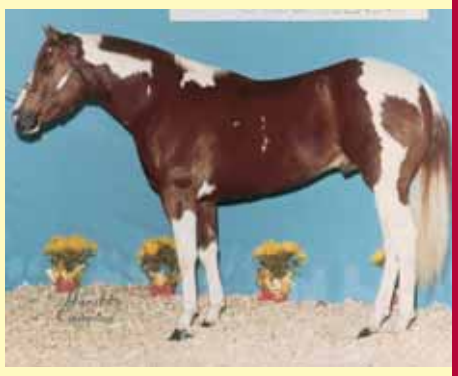
The greatest danger in a linebreeding program is that it intensifies all of the genes—good and bad. In other words, if you have a line of inherently gifted racehorses, breeding like to like—speed to speed—should result in an ever-faster line of horses.

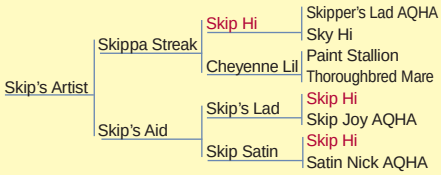
If, at the same time, this line of horses is consistently bad-tempered, breeding like to like should result in an intensified line of poor-dispositioned horses.

In a linebreeding program, you, as the breeder, find out what is good and bad about your program in a hurry.

The only way to offset the intensification of undesirable traits in a linebreeding program is to ruthlessly cull the undesirables from the herd.

Example 2





Leading sire Skip's Artist was the product of a concentrated linebreeding cross between Skippa Streak and Skip's Aid.

Inbreeding

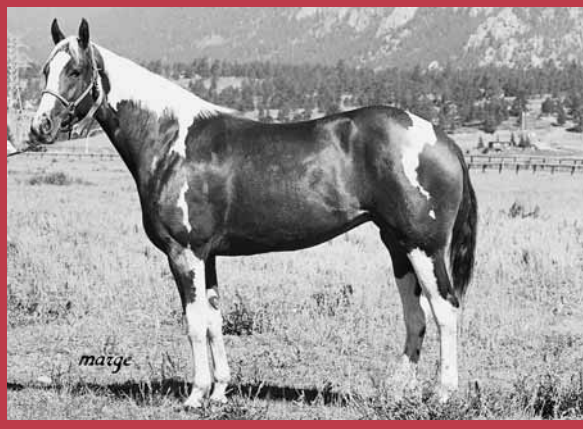
As explained earlier, inbreeding is an intensified form of linebreeding, with the sole difference being in the genetic closeness of the horses being bred to each other.

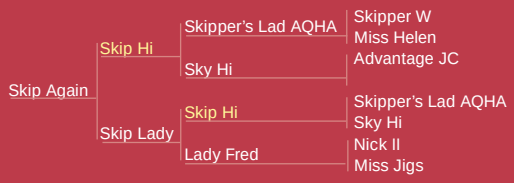
Among the advantages of inbreeding, according to Ensminger, are that it affords the surest and quickest method of fixing and perpetuating a desirable characteristic or group of characteristics, it tends to create lines or strains of animals that are uniform in type, and it keeps the closest possible relationship to a desirable ancestor.

The disadvantages of inbreeding, Ensminger states, are that it almost certainly increases the proportion of undesirable breeding stock, with genetic abnormalities often appearing with increased frequency.

Inbreeding, Ensminger concluded, ". . . requires skill in making planned matings and rigid selection, thus being most successful when applied by 'master breeders.' "

Example 3





Skip Again, an early APHA Champion, was the product of an inbreeding cross between Skip Hi and his daughter, Skip Lady.

The success of an outcrossing program is often determined by the potency of the stallion at the program's head. Red Sonny Dee AQHA was the type of sire who stamped his get with a consistent look (top). When the daughters of both Red Sonny Dee and his sire, Sonny Dee Bar AQHA, were bred to the Paint stallion Mr. Norfleet, a "nick" was achieved (bottom) that resulted in an even higher degree of consistent quality.

Craft or Science?

Whether you decide to build your program on the principles of outcrossing or linebreeding, or a combination of the two, it is important to remember that, scientific discoveries notwithstanding, horse breeding remains much more of an acquired craft than an applied science.

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