According to the American Horse Council, the number of horses in the United States has increased by 47 percent over the past 15 to 20 years. The number of horse owners has increased by 32 percent during the same period. This shows that there are many people committed to breeding, racing, showing, and riding horses.

Combined with this growth factor is the fact that the United States breeding industry is a dominant source for top breeding stock throughout the world. As a result of the tremendous growth of the U.S. horse population, many stallions are being retired from racing and performance circuits to enter the “breeding shed.” In many instances, these stallions are sold or syndicated for large sums of money without being subjected to a thorough fertility evaluation. Even stallions that have been used for breeding during several seasons are rarely evaluated for potential fertility, unless an abnormally high percentage of their mares fails to become pregnant. Many times, the breeding is well underway before the stallion is suspected of having poor fertility. This is especially true if he exhibits aggressive sexual behavior, mounts quickly, and copulates vigorously. All of these are desirable sexual behavioral traits, but they have little or no relationship to fertility.

Many owners or managers do not monitor the number of heat cycles per pregnancy, the number of breeding services per pregnancy, and the pregnancy rate by month and by cycle. These same owners and managers are frequently more concerned with getting a certain mare in foal, such as a stakes winner of a famous stallion’s dam, than they are with achieving overall reproductive efficiency. In many such situations, proper stallion management would make it possible to improve the overall foaling rate by several percentage points per year. At today’s stud fees, an increase in foaling rate by just a few percentage points could increase gross farm income by thousands of dollars. Most of this increase would be realized as profit. A greater awareness by the equine industry is necessary for maximum reproductive efficiency.

Reasons Why Fertility Examinations are Important

The reasons for conducting stallion fertility evaluations are to: 1) select those individuals capable of rendering at least 75 percent of 40 or more mares pregnant when bred naturally, or 120 mares when bred artificially, during one breeding season, given good management and mares of reasonably good fertility; 2) eliminate stallions with genetic defects; 3) eliminate from consideration for breeding those stallions incapable of achieving an above average level of fertility; and 4) alert owners regarding potential problems. The examination also helps identify causes of reduced fertility. Those findings can then be used to develop management guidelines to achieve maximum fertility.

Since natural fertility may vary over time, fertility predictions are made on the basis of findings at the time of examination. The best measure of stallion fertility is the foaling rate achieved with mares of normal fertility under optimal management conditions. The next best measure is made by comparing the results of physical and semen examinations with the same measurements from stallions of known normal fertility.

The examination may not always reliably predict the maximum fertility level a stallion can achieve under a multitude of management conditions.

Criteria for Evaluation

There is no single physical or seminal parameter which correlates satisfactorily with stallion fertility, and the best com-
bination of parameters remains to be determined. Parameters used for evaluation are designed to select stallions able to meet the 75 percent criteria on 40 or 120 mares, respectively. Conditions requiring the stallion to be used on more or fewer mares will require appropriate adjustments of the parameters used. These different criteria should be recorded on the veterinarian’s examination form and the final judgment rendered according to the stated criteria.

Full evaluation of these criteria are directly influenced by organic processes (physiology) regulating the reproductive system. The physiology of the stallion’s reproductive performance is controlled by hormones produced in the hypothalamus, pituitary, and gonads (testicles). It is also influenced by external factors, such as season (stallions seem to be more fertile during longer day length periods of the year), the environment, diet, artificial lighting systems, air temperature, and drugs (i.e., androgens, antibiotics, steroids).

Much information concerning a stallion’s fertility can also be gained by evaluating his past history. Breed, age, and previous use have significant effects on fertility level. Previous fertility can best be measured by services per pregnancy and the number of estrous periods in which the mare was bred by a particular stallion per foaling. The level of previous management of the stallion also has a major influence on his past fertility. Consider such factors as the number and class of mares that were serviced and the type of breeding program. Determine if pasture breeding, hand mating, or artificial breeding were used. Find out the breeding problems encountered. The stallion’s use prior to breeding; racing, showing, and other performance; and the time between previous use and breeding will also have a major influence on his fertility level. Previous illness and medications used, sight and description of the problem, duration of the illness, time since the illness, and the potential lasting effects of the illness also must be evaluated thoroughly before a current determination of potential fertility can be estimated.

Other Considerations

Too often, only blood lines are considered. They are certainly important, but they must be viewed in conjunction with a thorough evaluation of the stallion’s current general physical characteristics. One must be aware not only of conformation and body condition, but of temperament as well. This means observing the stallion around mares and other horses. It is important to observe the stallion while moving in order to determine lameness and physically limiting conditions. The presence of congenital defects (genetic or possibly genetic) must be considered. There are very few proven congenital defects which are known to have either a negative effect on fertility or are obviously detrimental. Eight genetic, or possibly genetic, conditions have been listed by the Society for Theriogenology for use by veterinarians in evaluating stallion fertility.

Cryptorchidism (at least one undescended testicle) is generally considered to be genetically controlled in all species. Some breed registrations, such as the American Quarter Horse Association, allow the permanent registration and breeding of cryptorchid stallions. Cryptorchidism, when bilateral (neither testicle descended into the scrotum), sterilizes the animal.

Combined immunodifficiency (CID) (deficient immune system) is known to be a genetic defect restricted to Arabian horses, thus transmitted by both sire and dam. Unfortunately, there is not a test for detecting the carrier state. When it is documented that a stallion has sired a foal with CID, that stallion should be considered an unsatisfactory prospective breeder.

Parrot mouth is a malformation of the mouth caused by upper jaw overgrowth and a short lower jaw. It has a genetic cause.

Hemophilia (abnormal bleeding) is a rare disease that is characterized by the appearance of hematomas (free, unclotted blood beneath the skin) over various parts of the body, especially around joints and bony prominences in young foals. There is a prolonged blood clotting time and a deficiency of anti-hemoglobin globulin (clotting factor). It is postulated to be a sex-linked genetic trait.

Complete mature cataracts are an opacity of the entire lens of the foal’s eye at birth. This condition is bilateral and causes blindness. Aniridia is a bilateral absence of the iris in the eye. This condition is also genetic.

The wobbler condition (instability of vertebrae in the neck resulting in spinal cord compression) is characterized by ataxia (abnormal gait control) of young horses. It is especially common in the rear legs. It is characterized by sudden or insidious onset with subluxation (partial offset) of cervical vertebrae.

Exotosis (excessive bone growth) involves numerous bony prominences with distinct tendency to be bilaterally symmetrical on or near long bone and joint junctions, as well as pelvic bones. The condition is genetic in origin.

Nongenital defects (not involving the reproductive system) which have an effect on breeding ability are usually detected during the general physical examination or the breeding act. Serious eye defects, including partial blindness, can interfere with a stallion’s ability to mount and stay mounted. Other nongenital problems affecting breeding ability might include: 1) hind leg lameness due to spinal cord damage or trauma, 2) the wobbler syndrome, 3) spinal cord inflammation, 4) inflammation of the posterior spinal nerve fibers (cauda equina), 5) severe laminitis (founder), and 6) viral spinal cord inflammation due to equine rhinopneumonitis. Sources of pain in the hind limbs, including but not limited to arthritis of the hip, stifles, hock, or lower leg joints, may not be as obvious. These conditions can, however, have significant effect. They may cause the horse to make several mounts before ejaculating.

Behavioral Problems

Stallion behavioral problems are often encountered. This can be particularly true with inexperienced stallions and racing stallions being considered for retirement to the breeding farm. During their racing career, stallions are often punished for sexual responses. As a consequence, upon presentation to a mare in heat, these stallions often exhibit difficulty in expressing normal sexual behavior because of the prolonged suppression. The normal horse should be eager and capable of mounting, seek and find the vulva (external opening of the female reproductive tract) or enter the artificial vagina, thrust, and properly ejaculate. When presented to a mare in heat, some stallions may show complete disinterest, apparent aversion, or even fright. Some inhibited stallions will fail to obtain an erection in the presence of a mare in heat and may be more interested in feed; yet, when left alone in a box stall, will masturbate. Other forms of abnormal behavior include greatly prolonged reaction time, mounting without erection, multiple mounts before intromission,
multiple insertions before ejaculation, and abusing the mare. Treatment of these stallions requires patient retraining for breeding. The length of time to reestablish normal breeding behavior may take days, weeks, or even months. The wide variation is probably dependent on the magnitude and duration of the altered behavior, as well as the stallion’s innate sex drive.

When abnormal sex steroid (hormone) levels are associated with behavioral abnormalities, serious ethical questions arise as to the handling of such problems. For instance, it is possible to raise low androgen (male hormone) levels directly by administering testosterone or indirectly by using other hormones. The elevated androgen levels do not necessarily guarantee erection and ejaculation. The primary question should be the cause of low androgen levels. If the low primary question are the result of a genetic defect, the animal should be considered an unsatisfactory candidate for breeding purposes. If the low androgen levels are the result of an acquired condition, some form of therapy may be morally justified. It is usually not possible to prove the genetic basis of such problems. Therefore, the only alternative is to reject the animal with abnormal steroid levels and abnormal behavior. This does not mean the stallion is sterile and, if the owner wishes to risk his time and money, many stallions may be able to get some mares pregnant.

Evaluating the Reproductive Organs

Even if all of the above factors appear normal, the genitalia (reproductive organs) must be evaluated along with an examination of the semen. The scrotum is rarely a location for disease processes. Abnormalities in this area are usually the result of trauma. The penis and sheath are more frequently injured than the scrotum and must be examined closely. In addition, the penis should be carefully examined for evidence of abnormalities of the shaft and urethral (urinary) opening. Such penile changes may be associated with coital exanthema (equine herpes virus), summer sores, and various tumors and growths. Each testicle and its attached epididymis must be thoroughly evaluated. The normal stallion has two descended scrotal testes. Blockage of the epididymis due to sperm granulomas or abscesses are two of the few problems of this structure.

A direct correlation has been shown between testicular width, weight of the testicle, and sperm production. Thus, combined testicular and scrotal width can be utilized in estimating sperm producing potential. Estimates of the texture and shape of the testicle as a means toward evaluating the normalcy of the testicular interior are also important. Abnormalities of the testicles, such as adhesions within the scrotum, testicular neoplasms or abscesses, cryptorchidism, testicular hypoplasia (small testicles), or testicular degenerative atrophy (shrinkage due to disease or trauma), become extremely important in estimating future fertility of a given stallion. The physical examination of the genital organs is best performed following the first semen collection, because the organs are relaxed and the stallion is more tractable.

The actual semen evaluation is accomplished by allowing the stallion to mount a mare in heat or a phantom (artificial mare). The usual procedure utilizes an artificial vagina (a latex rubber tube filled with air and water to simulate the temperature and pressure of a normal mare’s vagina) for the collection of semen. Once the semen has been collected, it is evaluated closely for color, degree of opacity, and consistency. Further evaluation determines the number of progressively motile sperm, semen sample pH, morphology (cell characteristics) of the individual sperm, sperm count (total sperm number), and longevity (the length of time the sperm lives outside the stallion). Normally, two ejaculates, one hour apart, are collected to establish a representative semen sample. At the time of the semen collection, cultures for bacteria are taken from both the urethra and semen samples to determine the presence of infective bacteria that may potentially damage the sperm or be transmitted to mares bred by the stallion.

Many stallion reproductive problems relate not only to physical abnormalities, but also to stallion reproductive management. In the past, there has been a lack of selection of stallions based on fertility parameters. Many stallion owners have failed to recognize the importance of the stallion in the breeding program; to evaluate the stallion prior to the breeding season; to use sound information on reproductive problems in the stallion; to understand the influence of season on fertility; to obtain the necessary information to conduct proper semen evaluations; and to use artificial insemination on some farms and in some breeds, which permits disease control, allows semen evaluation at each collection, and allows mares to be bred at the most opportune time of their cycle. Buyers also have failed to demand thorough breeding exams.

General Recommendations

There are several recommendations that can be made to stallion owners and veterinarians conducting stallion fertility evaluations. The semen of stallions should be evaluated before the breeding season and prior to purchase. One week of sexual rest should be allowed prior to semen evaluation. Two semen collections, one hour apart, are recommended for routine evaluation. More collections will be needed for determining the daily sperm output. The total sperm concentration in each sample should be measured by a standardized method. Progressive motility for the sperm should be determined by conducting subjective motility assessment on raw semen within five minutes of collection. At least 200 sperm should be counted on stained smears from the ejaculate and the percent of normal and abnormal sperm recorded. Cultures from the penis, prepuce, pre-ejaculatory urethra (when accessory gland fluids are present), dismount urethral swab, and semen samples should be analyzed. The stallion owner and veterinarian should consider seasonal variability on seminal values obtained. The most common cause of abnormal stallion sexual behavior is mismanagement and, especially, overuse of the young stallion.

Summary

Stallion fertility evaluations and a thorough understanding of the various factors that can affect stallion fertility can provide a valuable foundation for making logical decisions. Such information can help determine which stallions to purchase, the number of mares that should be booked to a given stallion, and possibly the individual mare to which a stallion should be bred, based on that mare’s blood lines and inherent fertility.
The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; home economics; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective and based on factual information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

This fact sheet was revised from a previous version prepared by Jerry R. Rains and Steven H. Slusher.