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THE MORGAN HORSE  
BREEDING GUIDE

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# A GUIDE FOR BREEDING THE OLDER MARE

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According to the 2021 AMHA Registrar's Report, the number of Morgans registered continues to be on the rise.<sup>1</sup> This increase is also reflected in the number of mares bred in 2021 (up over nine percent from 2020) and stallions used at stud (a 13 percent increase). These statistics, taken together, suggest there is a renewed interest in breeding Morgan horses.<sup>1</sup>

Industry trends suggest that the average age of mares producing these foals has gone up, and it is estimated that as much as 25 percent of the broodmare population in a normal breeding program is at least 16 years old.<sup>2</sup> This rise in the number of older mares being bred can be attributed to a variety of factors: breeders keen on preserving older bloodlines may find it difficult to find younger mares with the desired pedigrees; performance testing that results in a mare's most fertile years being spent in competition; or an old-

er mare bred for a replacement riding horse.

A young mare in the peak of her fertility (six to seven years of age) has approximately a ten to 20 percent better chance of getting into foal in a given heat cycle than a mare in her teens.<sup>3-4</sup> And while there are many stories of 25-year-old maiden mares conceiving in a single breeding and delivering a healthy foal without a hitch, this scenario is not the norm. Mares begin a gradual decline in fertility starting in their mid-teens, which can include negative effects on cyclicity, follicle development, embryo viability, pregnancy rates, and an increased chance of endometritis (inflammation of the lining of the uterus) after breeding.<sup>2-4</sup> Conformational changes, either as a result of genetics or due to the toll of previous pregnancies, can be exacerbated with age and older mares typically have an increased chance of pneumovagina ("windsucking") due to changes

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ABOVE: The birth of a foal remains miraculous even with modern technology.



**ABOVE:** Dr. Jessica Frischman performing a transrectal ultrasound on a mare's uterus. The ultrasound transducer sends out high frequency sound waves which show fluid and fluid-filled structures (e.g., follicles and embryonic vesicles) as dark images on the screen, while soft tissue structures present as varying degrees of white.

in the conformation of the vulva, which can predispose them to genital infections and infertility.<sup>3-5</sup>

The good news is that there is an arsenal of tools available to the experienced equine reproduction veterinarian to address these issues, and many mares conceive and deliver their first foal in their teens and even twenties. There are treatments and management strategies that help combat the effects of reproductive aging. For owners wanting to breed older mares, realistic expectations and financial resources are essential keys to success.

### BREEDING SOUNDNESS EXAMS (BSE)

A mare that is older, has trouble conceiving or maintaining a pregnancy, or has some other questionable reproductive past should

have a breeding soundness exam (BSE) performed a cycle or two before the anticipated breeding.<sup>4,6</sup> On average, a basic BSE can range from \$350 to \$500, but these prices often do not include drugs, sedation, administrative costs, board, or additional diagnostic tests that the clinician may request after the basic evaluation. Therefore, it is important to make sure you know what “extras” might be involved and how much they cost.

In general, a BSE is designed to evaluate whether a mare has defects that will negatively affect her ability to conceive, carry, and deliver a foal. The exam includes evaluation of basic health and management and an in-depth reproductive history. Externally, the mare's body condition, clitoral size, and appearance (disorders of sexual development, such as pseudo- or true hermaphroditism), and mammary gland conformation are examined. Evidence of staining on the hindquarters and tail that might be indicative of vulvar discharge or urine staining are also noted. Perineal conformation is also examined for the potential for pneumovagina (“windsucking”), which can be common in older mares and mares that have had multiple pregnancies.<sup>3-5</sup>

Pneumovagina refers to the aspiration of air and, in severe cases, feces into the vagina due to a poor vulvar slope and seal and can predispose the mare to endometritis (inflammation of the uterine lining).<sup>3-6</sup> For some mares, an increase in body condition can help resolve the problem, but for others the solution is a Caslick's operation (episioplasty) where the dorsal part of the vulvar lips is partially sutured closed to artificially maintain a good vulvar seal and is removed just prior to foaling.<sup>3-6</sup> Caslick's operations are low-risk and run \$75 to \$200, depending on your location, and are about half that price to be removed prior to foaling.

An internal evaluation of reproductive structures during a BSE includes confirming the mare is not pregnant, determining where the mare is in her cycle, examining of the reproductive tract for damage or abnormalities, and noting the presence of any endometrial cysts. Depending upon what is found by the basic BSE and the mare's reproductive history, additional diagnostic tests may be suggested, such as endometrial biopsies, uterine cultures, and uterine cytology.<sup>4,6</sup>

Uterine (endometrial) biopsies help to evaluate the condition of the uterine lining through microscopic evaluation of small samples of endometrial tissue using a scoring system which describes the frequency, type, and level of abnormal glandular changes and associated fibrosis in the endometrium.<sup>6-7</sup> A Grade I Biopsy score shows no abnormalities and mares in this category have the best chance (> 80 percent) of conceiving and maintaining a pregnancy. Conversely, a mare with a Grade III Biopsy score has a 10 percent or less chance of carrying a foal to term.<sup>5,7</sup> The cost for biopsies generally includes the procedure itself (\$70 to \$150) plus sedation, and any laboratory fees for processing and reading the actual sample by an outside lab (\$100 to \$200). Especially with mares with a

**AUTHOR'S NOTE:** Prices cited in this article have been sourced from stallion contracts, private practices, and accredited veterinary colleges that offer reproductive services. The wide range for services is a reflection of the geographic location and facility type. Prices do not include administrative or travel costs and are general estimates only.



history of failed pregnancies, uterine biopsies are one of the most important diagnostic tests as they give a strong indication of the condition of the uterus regarding supporting a pregnancy.

Pre-breeding exams can also include a uterine culture and cytology to look for the presence of pathogens and immune cells associated with uterine infection.<sup>6,8-9</sup> A culture is done preferably when the mare is in estrus, so it may or may not be appropriate to culture a mare at the time of the BSE and the culture may need to be scheduled later. A uterine culture and cytology can help diagnose subclinical infections as well as the cause of acute infections that can result, if left untreated, in more permanent damage. Like uterine biopsies, cultures and cytology fees generally include the cost of swabbing the uterus to take the sample (\$70 to \$100), plus any laboratory fees for bacterial culture and sensitivity (if pathogenic organisms are found) and reading the cytology slide (\$20 to \$30).

Keep in mind that the overall prognosis for whether a mare is a good candidate for breeding considers her reproductive history, the clinical findings from the BSE, and results from additional tests such as biopsies and uterine cultures. It is not uncommon to find that some problems, such as a uterine infection or need for a Caslick's operation, once addressed, will significantly improve the initial prognosis.

While expensive, a BSE can also help avoid financial and emotional investments by identifying mares that have a very poor prognosis of getting in foal and maintaining a pregnancy. When the cost is contrasted against a non-refundable stallion fee and the expense of multiple, unsuccessful breeding cycles, it is money well spent.

## BREEDING MANAGEMENT

### START EARLY

Older mares often require additional cycles to become pregnant, so it can be wise to start early in the breeding season. The exact meaning of "early" will depend upon both the mare (when she begins to cycle), stallion (how early and late he is available for breeding), and desired month for foaling. In the Northern Hemisphere, mares generally begin cycling in April or early May, but an older mare may

take two or more cycles to get in foal, so starting earlier rather than later in the breeding season may be helpful to accommodate this.

Mares should be allowed to cycle at least once (preferably twice) with ovulation confirmed before breeding. The first observable heat of the season after transitioning out of winter anestrus can be erratic and may not result in an actual ovulation. Older mares also tend to have delayed first ovulations; on average, ovulating about two weeks later in the spring than younger mares.<sup>4</sup> It is important to keep these transitional changes in mind when scheduling a BSE and confirming subsequent breeding dates to make sure the mare is ovulating regularly.

As mares age, so do their ovaries, and it is not unusual for their estrous cycles to be longer (four to five days). This is thought to be caused by a slower growth rate of developing follicles.<sup>4</sup> Mares over 20 years of age can demonstrate more erratic heat cycles and those over 25 years old may stop cycling altogether (ovarian senescence). These differences translate to a need for more nuanced management for the older mare when compared to her younger counterparts.

### NATURAL COVER VERSUS ARTIFICIAL INSEMINATION

There have been countless conversations comparing natural breeding versus artificial insemination (A.I.) breeding, and no doubt the discussion will continue as long as horses are bred. However, when it comes to older mares, which technique is best will depend on a variety of factors, including the mare, the stallion, and the management of both.

How the mare is bred is an important consideration: natural or onsite insemination (fresh) or transported semen (cooled or frozen). One of the main trade-offs between natural cover and transported semen is the cost of transporting the mare (and sometimes foal) to and from the stallion and subsequent board (\$15 to \$30/day, on average) for on-farm natural cover, versus collection fees (\$350 to \$600/cycle) and overnight shipment costs (roughly \$300 coast to coast for each shipment) for cooled semen. This is in addition to veterinary costs for more intensive mare management for transported semen. Usually, none of these fees are included in the stud fee.

Many farms suggest not transporting a pregnant mare until a

## BREEDING THE OLDER MARE CHECK LIST

### BREEDING SOUNDNESS EXAM

A mare that is older or has a questionable reproductive history should have a breeding soundness exam performed a cycle or two before the anticipated breeding.

### ANTICIPATE PROBLEMS

Identify problems early and treat them accordingly. Persistent Breeding-Induced Endometritis and uterine infections are more common in older mares but can be managed and treated. Correct conformational defects, such as pneumovagina (Caslick's), when appropriate.

### START EARLY

Older mares may require additional cycles to become pregnant, so plan on starting earlier in the breeding season; however, make

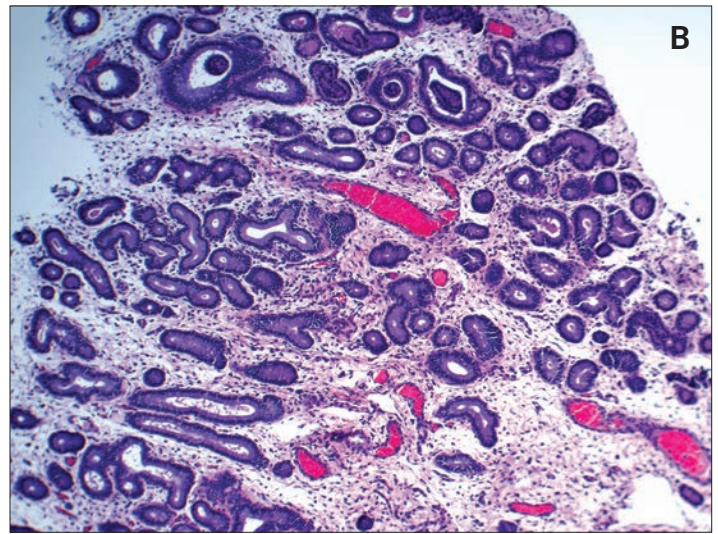
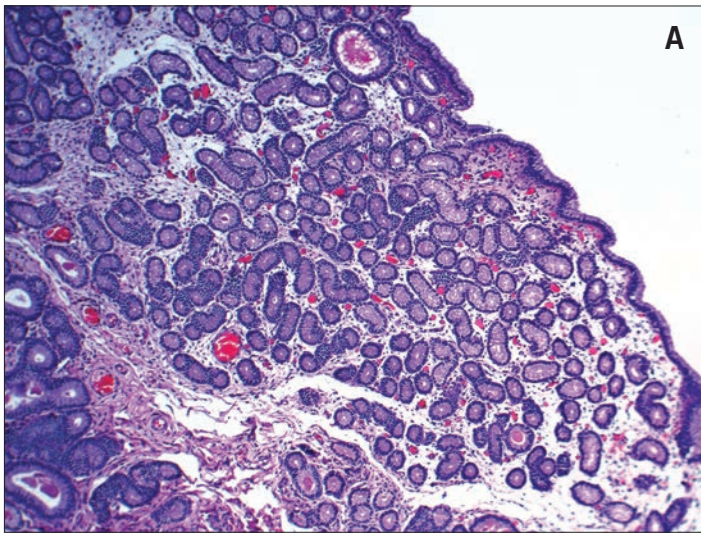
sure the mare has begun to cycle regularly (ovulated at least once) before you start breeding.

### ARTIFICIAL OR NATURAL COVER

Which technique is best will depend on the mare, the fertility of the stallion, and the management of both. Whatever method, breed as close to ovulation and as few times as possible.

### USE AN EXPERIENCED VETERINARIAN

Using veterinarians that have a strong focus in reproduction and/or are board certified in Theriogenology (specialist in animal reproduction) is a plus. Using clinics that will board a mare for breeding will make more intensive management common to older mares easier for everyone.



**ABOVE:** Representative histological sections (100x magnification) of mare uterine (endometrial) biopsies. Mare “A” is an example of a Grade I according to the Kenney-Doig grading system, suggesting a greater than 80% chance of conceiving and maintaining a pregnancy. Mare “B” was assigned a Grade III (a 10% or less foaling rate) and had a concurrent bacterial infection at the time of sampling. Slides courtesy of the Oregon Veterinary Diagnostic Laboratory.

fetal heartbeat has been confirmed (approximately Day 25–30), so monthly board for a farm stay can be from \$450 to \$900 per cycle. Conversely, after spending a week or less at a veterinary clinic (or none if being managed on farm) mares are usually housed at home after being bred with transported semen, so board bills are much lower. The increased level of stress to the mare (and foal) from travel, as well as disease exposure, is also important to take into consideration when breeding if transporting to a stallion.

For older mares, there are other cautions in using natural service. Traditionally, a mare is bred starting on the third day of standing heat and then every other day until she goes out of estrus. For a mare that is pre-disposed to endometritis, frequent breeding can add an extra insult to an already compromised uterus. Breeding once and as close to ovulation as possible can help reduce the number of bacteria and debris introduced to the uterus, and subsequent monitoring for post-breeding intrauterine fluid accumulation is also important.<sup>3-5</sup>

Conception rates are comparable for natural cover versus artificial insemination with fresh semen, but the use of cool and frozen semen adds another layer of complexity and commonly has lower fertility than with fresh semen, particularly with older mares. While veterinary costs associated with the mare tend to be higher with artificial insemination, many clinics offer “Breeding Packages,” with a base per cycle price for breeding using cooled/shipped (\$385 to \$700) or frozen semen (\$440 to \$1,000). The wide price range reflects differences including geographic location, the type of clinic (hospital versus private), and what “extras” are included. Typically, these packages include multiple transrectal palpations/ultrasounds, insemination, some drugs, and pregnancy diagnosis. They often do not include board, diagnostic tests, uterine lavage, additional diagnostic tests (e.g., culture/cytology or uterine biopsies), drugs for sedation, or medications. It is important to ask

ahead of time what is included in a breeding package and what is extra, including inquiring how much an “average” cycle has cost for other mares who have been brought in for breeding management. As older mares tend to need more intensive management and may take more than one cycle to become in foal, it helps to have a complete picture, especially regarding total costs.

#### FROZEN SEMEN

While frozen semen offers many significant advantages and can be an excellent choice for many mares, it is not always the best choice for older and problem mares. Mares older than 16 years consistently demonstrate lower pregnancy rates per cycle than young, fertile mares (54 percent for mares less than 16 years of age, and 45 percent for mares 16 years of age and older).<sup>10</sup> Due to the cryopreservation process, frozen semen also tends to cause a more severe post-breeding inflammation when compared to fresh or cooled, which can lead to endometritis.<sup>5</sup>

As breeding with frozen semen is more complicated than with fresh or cooled, the procedure is more expensive than either fresh or cool/shipped, generally costing close to \$1,000 per cycle, plus any costs associated with shipping and storage of the straws. It is also important to recognize that not all stallions freeze well, so for problem and older mares where fertility is already impaired, it is important to choose stallions that have good post-thaw motility and have produced foals using frozen semen. The Select Breeders Service website is an excellent resource for questions on the use of frozen semen.<sup>11</sup>

#### PERSISTENT BREEDING-INDUCED ENDOMETRITIS (PBIE)

Regardless of which method of breeding is chosen, a very common issue in older mares is persistent breeding-induced endometritis



(PBIE). PBIE is presumptively diagnosed via ultrasound when fluid is seen in the uterus during estrus or 48 hours post-breeding.<sup>2-5</sup> Post-breeding endometritis is a normal, transient, uterine inflammatory response whose purpose is to clear excess sperm, bacteria, and other contaminants from the uterus after breeding to prepare for the embryo.<sup>2,5</sup> Most young, reproductively normal mares clear these debris within 24 to 48 hours post-breeding.<sup>5</sup> However, older mares can struggle with cleaning up their uterus after being bred due to a variety of reasons: poor lymphatic drainage, a tight cervix (particularly with older maiden mares), or a uterus that is more pendulous and dropped over the pelvic rim (common in mares that have had multiple foals).<sup>2,5</sup> Persistent breeding-induced endometritis has been recognized as one of the major causes of subfertility in horses.<sup>2</sup> If PBIE is not resolved, the embryo will not survive when it enters the uterus five to six days post ovulation.<sup>3-5</sup>

Fluid accumulation from persistent breeding-induced endometritis isn't always apparent in a mare that has not been bred, so may or may not be obvious at the BSE. As such, it is prudent to monitor for PBIE each time the mare is bred and budget for the cost of treatments such as administration of oxytocin<sup>5</sup> or prostaglandin (generally less than \$20/day) or uterine lavage (\$75 to \$125)<sup>3</sup>, all of which are relatively inexpensive and effective in most instances.

## EMBRYO TRANSFER

Multiple studies have shown that as mares age their oocytes become less fertile.<sup>12</sup> This decline is reflected in embryo collection rates, which decrease significantly in older, subfertile mares (30–40 percent per cycle versus as high as 70–80 percent for young, fertile mares),<sup>12</sup> as well as in the rate of embryonic loss as aged, subfertile mares have an increased embryonic loss rate when compared to young, normal mares.<sup>4,12</sup> While embryo transfer removes some of the effects of age in the older donor mare (e.g., the embryo would be put into a younger mare's uterus), it does not address aging of oocytes and subsequent reduced viability of embryos.

Exploring the feasibility of embryo transfer must include the breeding management of several potential recipient mares in addition to the donor, veterinary fees for collection and transfer of the embryo, as well as leasing or purchasing of the recipient mare. Equally important is finding a veterinarian who is experienced in embryo transfer, which may mean additional travel and boarding costs if one is not available close by. This, plus the decreased fertility of older oocytes and decreased embryo collection rates in aged mares make embryo transfer a less than ideal option, especially if the mares are in their late teens and older.

## SUMMING IT UP

There is no question that older mares have more of an uphill battle to become pregnant and carry a foal to term, but these issues don't mean that producing a foal from a mare in her later years is impos-

sible. However, having a clear idea of the potential problems and being pro-active in treatments and management can significantly help increase the chances of a successful breeding season and a healthy foal in the spring. ■

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