Breeding Season Procedures

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W. Thomas Riddle, D.V.M.

I provide the following information to my clients at the beginning of each breeding season. Each veterinarian has their own preferred policies and procedures. Please note that your veterinarian is the best source of information for your particular breeding program. He/she is in the best position to advise you.
BREEDING SEASON PROCEDURES

W. Thomas Riddle, DVM

The following is a brief description of routine procedures utilized in my practice. Terminology and the abbreviations used for recording reproductive examination findings are included.

**Barren Mares**

After mares go under lights in December and begin cycling, each mare should be evaluated on 2 heats before beginning breeding. Evaluations must be done when mares are in heat. Transitional heats may not be adequate for proper evaluation because of cervical tightness and lack of uterine edema.

**Evaluation should include:**

1. **Rectal palpation** – checking ovarian size and consistency, follicle size and consistency, uterine tone, cervical relaxation, pelvic structure
2. **Ultrasound** – checking ovaries, follicles, corpus luteum (CL), uterine edema, fluid, cysts. *Endometrial cysts should be mapped* prior to breeding to avoid confusion with pregnancy. I prefer to do this when the mare is not in heat because uterine edema can affect the ability to adequately the size and shape of cysts. Shape and size (in millimeters) of cysts may be entered on a “cyst map”, or the size and location may be listed, such as LA 25 (indicating a 25 mm cyst in the lateral division of the left horn).
3. **Uterine culture** – swab – checking for bacterial or fungal infection. (Fluid aspirate / small volume lavage may be indicated in some cases – chronic endometritis, chronic infertility, or cases with positive cytology and negative swab culture)

4. **Uterine cytology** – smear from culture swab cover cap (Cytology is the study of the cell types from the uterus.) The presence of increased numbers of neutrophils (pus cells) indicates inflammation and likely uterine infection. The inflammation will be graded; moderate and severe are causes for concern. Cytology is also an excellent way to check for fungal infection as yeast cells may be seen. I do not recommend a cytology on maidens prior to breeding because the unbred maiden is extremely unlikely to have significant inflammation. If the maiden has clinical signs suggesting inflammation, then a cytology should be done.

5. **Speculum exam** – cervical color, relaxation, integrity of cervix (checking for tears or adhesions).

6. **Manual exam of cervix** per vagina– necessary to fully evaluate cervix for defects such as lacerations or adhesions. (Cervix may have been damaged during a

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Left horn

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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Body

G

H

Right horn
previous foaling.) This exam should be done when mare is out of heat. Unless questions arise, only one manual exam is needed.

Results of all examinations will determine whether treatments are necessary. To meet breeding shed requirements and to better ensure that mare is clean for breeding, mare should have a culture and cytology within the 30 days prior to first breeding.

When breeding has begun, mare should be palpated and ultrasounded when she comes into heat. We will be recording follicle size and consistency, uterine edema, intra-uterine fluid and degree of cervical relaxation.

**Follicle size** is measured in millimeters and **consistency** is graded firm (F), firm to medium (F-M), medium (M), medium to soft (M-S), soft (S) and flaccid (FL). If follicle has ovulated, we record which ovary (left or right) and OV. When a follicle ovulates, the structure is called a corpus hemorrhagicum (or CH) for the first 5 days and it is then referred to as a corpus luteum (or CL).

Examples:

L20F - (left ovary has 20mm firm follicle)

ROV - (follicle on right ovary has ovulated)

LCL – (corpus luteum on left ovary)

Some follicles may contain flecks of blood and are referred to as hemorrhagic. In many cases these follicles are not healthy (atretic) and will not ovulate normally. Occasionally a normal follicle will become hemorrhagic shortly before (12 to 24 hours) a normal ovulation. **Hemorrhagic follicles** are subjectively graded 1, 2, or 3, based on the
amount of “flecks” present (for example – Hemo 1 indicates a small amount of hemorrhage). As the follicle approaches ovulation (24 to 48 hours), the wall will thicken (become thick-walled), which will be designated “TW” (for example – L40 TW).

**Uterine edema** is graded 0, 1, 2, 3, 4

0 – no edema
1 – small amount
2 – moderate amount
3 – large amount
4 - excessive edema

Edema grade 4 may be an indication of poor lymphatic drainage. (More research needs to be done to understand the significance of excessive edema and to determine the best means of treatment).

**Uterine fluid** is graded based on the average vertical measurement (in centimeters) of the fluid within the uterine lumen (the channel within the uterus)

For example: F2 indicates 2 cm of fluid.

If fluid has particles in it (cloudy or echogenic), we indicate this with the plus sign (+).

The particles are generally an indication of infection (pus) although occasionally urine, blood, or air in the uterus make the fluid appear to have particles in it.

The amount of cloudiness (echogenicity) is graded:

+ = slight

++ = moderate
+++ = large

For example: F3+ indicates 3 cm of slightly cloudy fluid

**Cervical relaxation** is graded 1, 2, 3, 4, indicating the degree of relaxation of the cervix for the individual mare, with a 1 cervix (recorded as Cx1) being tight and a 4 cervix (recorded as Cx4) being completely relaxed.

Occasionally air may be seen in the uterus and should be noted. The air may be from a recent speculum exam or it may be an indication of windsucking (pneumovagina). **Air** is recorded as A1, A2, or A3, indicating a small, moderate, or large amount.

In some cases there may be an area in the uterus which contains a very white material which does not appear to be air. We will indicate this by denoting the location (left or right horn or body) followed by HE (for hyperechoic). Possible reasons for the hyperechoic areas include mucus, calcified endometrial cups, or a foreign object.

When breeding season arrives we will begin checking each mare as she comes into heat. It is helpful to have an objective way to classify teasing so that we each know what the other is talking about. A system I like is:

0 – Out of heat

1 – Change of attitude (for example-quieter, less ear pinning)

2 – Winking vulvar lips

3 – Breaking down (urinating) after a short time

4 – Breaking down immediately

It is important to know each mare’s teasing pattern. Some mares never tease better than a 1, while others will follow the rule book and progress from 1 through 2, 3
and 4 over several days. Based on teasing and cycling history the manager will decide when the mare should be checked.

After the mare has been evaluated rectally and by ultrasound and we have discussed teasing and history, we will make several determinations:

1. Are further tests (culture, cytology, etc.) needed?
2. Does mare need to be booked?
3. When should mare be re-examined?

Ideally we will breed each mare prior to ovulation but close to ovulation (within 24 - 48 hours). The majority of stallions have sperm that will live at least 48 hours. Many will live 72 hours or longer (in some cases as long as a week). If a mare does not ovulate within 48 hours, we will decide if a double is needed (breeding a second time on the same heat). Stallion availability for doubles is often very limited.

A few stallions are known to have sperm which live only a very short time. For those stallions we will breed as close to ovulation as possible. Breeding after ovulation can still result in conception, especially when breeding takes place within 4-6 hours of ovulation.

I recommend the administration of injectable delorelin or HCG to increase the likelihood that a mare will ovulate within a reasonable time after breeding. When a mare is booked and there are no circumstances that we are aware of that would prevent breeding (poor teasing, sickness or injury of mare or stallion, etc.), I will give deslorelin the day before breeding. The delorelin will in most cases cause the mare to ovulate within 36-48 hours (average 38 hours) of administration.
Following breeding, if the mare has a problem history (endometritis, excess uterine fluid, etc.) we may elect to lavage and/or give cloprostenol 4 to 6 hours after breeding. This is an effort to help the mare clean herself up. All mares become inflamed after breeding, with normal mares resolving the inflammation within 72 hours of breeding. Some mares have a reduced ability to resolve the inflammation which will decrease their ability to conceive and maintain a pregnancy. The lavage will help to physically remove any fluid/debris from the uterus. The cloprostenol is a synthetic prostaglandin which causes uterine contractions for approximately 5 hours. These contractions help to evacuate the uterus. An often-asked question is "Doesn't the flushing of the uterus after breeding remove the sperm and prevent the mare from getting pregnant?" This is a very reasonable question; however, the answer is "No". Research has shown that all the sperm that are capable of fertilizing the egg are in the oviduct (and therefore out of the uterus) within 2 hours. The lavage fluid will not enter the oviduct.

Ideally the mare should be checked for ovulation the day after breeding. Rectal palpation and ultrasound should be performed. In most cases ovulation can be palpated rectally – the fluid-filled follicle feels as if it has ruptured. After ovulation the follicle will fill with blood within 24 hours (this structure is called a corpus hemorrhagicum or CH). If the ovulation check is done after this filling takes place it can be difficult to determine ovulation without ultrasound. The blood in the corpus hemorrhagicum will appear as a white mass with varying degrees of black "mottling", while a follicle will appear as a solid black balloon-like structure, with no white particles in the fluid except in the case of either an unhealthy (or atretic) follicle, or a follicle approaching ovulation.
The greatest benefit from checking for ovulation the day after breeding is the identification (by ultrasound) of excessive fluid in the uterus. Depending on the amount and appearance of the fluid, we may elect to lavage and start on oxytocin to help clean the uterus. The oxytocin acts much like cloprostenol, and causes uterine contractions which last for about 20 minutes. We may elect to put the mare on oxytocin injections for up to 3 days post ovulation. If excessive fluid was found at the time of the ovulation check, ultrasound should be repeated the following day to determine the success of our therapy. Lavage and oxytocin may be repeated for up to 3 days post ovulation.

Most often following lavage we will infuse the uterus with an antibiotic, generally one which is broad spectrum (effective against a large number of different types of bacteria), although we may use an antibiotic which is more specific in its actions if the mare has had a history of endometritis caused by a particular bacterium.

The use of antibiotic infusions post breeding is controversial. Some veterinarians feel that antibiotics should be used only when a known infection exists, while others feel that it is reasonable to use antibiotics to help prevent infections from setting up. All mares develop inflammation post breeding (even in breeds which permit artificial insemination), and because live cover is required in Thoroughbred breeding, we know that bacteria are always introduced in great numbers at breeding. While most healthy mares are capable of eliminating this inflammation / infection, some mares will likely benefit from the added help of an antibiotic.

One of the most important procedures we will perform in our effort to achieve conception and pregnancy maintenance is the Caslicks (the partial suturing of the vulvar lips, which reduces the size of the vulvar opening). Most thoroughbred mares in Central
Kentucky have been ‘sutured’. Suturing reduces the possibility of fecal contamination of the vagina and decreases the aspiration of air into the vagina. If the Caslicks is torn during breeding, it is important to suture the mare down again.

**Recommended pregnancy check dates:**

- 15 days post ovulation (which is usually 16 days post breeding) – ultrasound
- 17 days – ultrasound
- 28 days – ultrasound
- 42 days – rectal palpation or ultrasound
- 60 days – rectal palpation or ultrasound
- 90 days – rectal palpation
- September – rectal palpation
- December – rectal palpation

If a twin is eliminated (usually done on the first check – 15 days), the mare should be re-ultrasounded in 2 to 5 days. Banamine and progesterone will be given at time of elimination and mare should be started on 10cc of ReguMate on day of elimination and continued until day 60 of pregnancy.

Additional ultrasound checks may be needed for several reasons:

1. Vesicle too small
2. Late ovulations
3. No heart beat seen on 28 day check
4. Questionable twins

If fetal sexing is desired, the 60 day rectal palpation can be deleted and the determination of the sex can be done between 58 and 74 days (sometimes as early as 56 days, sometimes as late as 80). A second window of opportunity for fetal sexing is available between 110 and 130 days. Positioning is more difficult at this later time, which may necessitate a repeat examination.

On positive 15 day pregnancy exams blood may be drawn for a progesterone assay. Progesterone is the hormone produced by the corpus luteum (CL) and is necessary to maintain the pregnancy. I am happy with a level of 3 ng/ml of higher. If level is lower we will discuss the use of ReguMate or progesterone.

Mares, like all horses, thrive on a routine schedule. Any change could affect a mare’s cycling and her pregnancy maintenance. While we try to avoid disruptions in a schedule, occasionally this is not possible (for example: injuries, colics, shipping, change in pasture, weather, etc.). When a pregnant mare has a significant change, progesterone levels may be affected. In these instances we should always discuss whether the mare should be started on ReguMate.
Foaling Mares

Two weeks prior to the expected foaling date, blood should be drawn and submitted for an antibody screen. This test will identify those mares which are producing antibodies which, when passed in the colostrum, would cause destruction of the foal’s red blood cells (commonly referred to as a jaundiced foal). When a mare tests positive for types A, Q or U, precautions need to be taken (antibodies to other blood types are rare but should be viewed as significant). (Please note that mares which test positive for type C do not require special treatment — foals are treated normally.) When a mare has a positive antibody screen, the stallion’s blood type can be checked by submitting a yellow top tube from the stallion to our lab. If he does not have the blood type for which the mare tests positive, the foal can nurse normally.

When it is necessary to prevent nursing, the foal should receive colostrum (which has been tested negative for antibodies to red blood cells) either by bottle or tube. It is important that the colostrum be the first milk ingested by the foal. Following colostrum the foal should be bottle-fed an appropriate milk replacer. Bottle-feeding the foal can result in aspiration pneumonia if the foal receives more milk than it can swallow. Be sure to have a small enough hole in the nipple to require vigorous sucking, and take care to keep the bottle at an angle such that the foal’s muzzle is only slightly above horizontal. For an average size foal, give 8 oz colostrum once an hour until 16 oz colostrum is given. Then begin milk replacer at a dose calculated by multiplying the foal’s weight by 5% and giving that number in ounces to the foal once an hour (for example, a 120 pound foal’s dose would be 120 x .05 = 6 ounces once an hour). There is just as much danger, or likely more, in giving the foal too much milk rather than too little. When not feeding the foal, it
is imperative that it be muzzled to prevent nursing from the mare until the milk is compatible. While the foal is kept off the mare, the mare should be milked out at least 1 – 2 times per hour.

Those **mares which have had a Caslicks must be opened** prior to foaling. A reasonable time to open is 2 weeks before the expected foaling date (when blood is drawn for the antibody screen), although some managers prefer to wait until the mare is closer to foaling (usually this judgement is made based on the appearance of the udder and the mare’s history). If too much time elapses between opening and foaling, it is possible for the vulvar lips to reattach. After opening, daily gentle cleaning and topical Vaseline will help prevent the reattachment. In some cases it will be necessary to re-open the mare.

I like to **examine newborn foals** the day following foaling. The exam will include auscultation of heart and lungs, palpation of ribs to check for fractures, palpation of umbilicus and inguinal area, examination of eyes, mouth (checking for overbite, cleft palate, mucous membrane color and hydration) and limb conformation. Blood will be drawn for a CBC (complete blood count) on my first visit, and for an IgG at least 12 hours following first nursing. In a **healthy** foal I am happy with an IgG of 400 or greater. If less, plasma should be administered and the IgG rechecked. Please note that some insurance companies require IgG levels higher than 400.

**If the mare retains the placenta** greater than 4 hours after foaling, oxytocin should be given unless mare is cramping badly (1/2 cc oxytocin intramuscularly every 30
minutes for 4 injections). If the placenta remains attached after this regimen, I may elect to administer an intravenous drip of oxytocin in saline or LRS. In most cases the placenta will then be passed within 1 hour of administration of the IV oxytocin drip. Mares which retain their placentas 6 hours or more will be placed on antibiotics, and Banamine, and their uterus will be lavaged for 1 to 3 days. Because placental retention can cause laminitis, the mare’s feet should be carefully checked for heat, increased pulse, and lameness.

All placentas should be carefully examined for completeness and for abnormalities. The non-pregnant horn (thinner and more wrinkled than the pregnant horn) is the part most likely to be retained and should be checked very closely. The tip of the horn should be complete and will resemble the end of a sock. If there is any question about a placenta, please save for me to examine.

During the 1st week following foaling the mare may require a reproductive exam in the following cases:

1. placenta retained; 2. heavy purulent or bloody vulvar discharge; 3. colic; 4. excessive swelling around vulva; 4. fever; 5. depression. We may elect to” help” the mare empty herself by lavaging the uterus for several days and administering ½ cc oxytocin twice a day. In the mare with no abnormal clinical signs, we will do our 1st reproductive exam at 7 to 10 days post foaling. This will include: 1. rectal palpation; 2. ultrasound; 3. speculum examination of the cervix. If excess intra-uterine fluid is found, the mare will go on ½ cc of oxytocin twice a day (IV or IM) for 3 - 5 days. Uterine lavage may also be utilized.
Mares which were opened prior to foaling will need to be resutured (Caslicks). For mares which have no significant vulvar discharge or swelling, a Caslicks may be done on day 2 or 3 post foaling. However, when the mare is sutured within several days of foaling, the suture line may be more susceptible to infection and subsequent dehiscence (coming apart). For this reason, I recommend suturing after the 7 day examination (unless there were abnormal findings on this exam which would indicate more time is needed.) After suturing it is best to avoid rectal or vaginal examination for at least 5 to 7 days because of the risk of disrupting the suture line before it has healed.

In most cases I do not recommend breeding on the foal heat because the mare is still recovering from foaling and is likely inflamed and infected, and her uterus needs to involute further (return to normal size). Some mares will conceive on foal heat breedings but the conception rate is less than on later breedings, and there is a greater risk of subsequent pregnancy loss. Some breeding sheds will not breed foal heat mares, because of the decreased likelihood of success. In some cases (such as very late in the season), if the mare had a normal foaling, passed the placenta normally, had no abnormal findings on her 7 day exam, and does not ovulate before 10 days post foaling, we will consider breeding on the foal heat. An important indicator of readiness for breeding at this time is the absence of intra-uterine fluid.

Short cycling or giving prostaglandin after foal heat is an alternative to foal heat breeding which will allow breeding approximately 10 days before the mare’s 2nd natural
heat. Mares can be given prostaglandin 5 days after a known ovulation or 5 days after going out of heat (if she is an honest teaser). By letting the mare go through her foal heat and waiting 5 days, the uterus has more time to recover from foaling. Results from breeding on short cycles are comparable to breeding on the "30 day" heat; however, some mares do not respond well to prostaglandin after foal heat and will wait until about 30 days post foaling before coming into heat.

Prior to breeding the foaling mare, we will evaluate her reproductive tract just as described for the barren mare: rectal, ultrasound, speculum exam, culture and cytology. Procedures for breeding the foaling mare are the same as for the barren. Please refer to the section on breeding the barren mare. Management of the maiden mare is like the barren mare with the following exceptions: 1. No cytology is necessary prior to the first breeding; 2. Palpation of the cervix per vagina is not necessary.

If a mare is bred and does not conceive, a complete evaluation is done when she returns to heat. This would include: 1. Rectal palpation; 2. Ultrasound; 3. Culture; 4. Cytology. Abnormalities identified will determine if treatment is needed, or if mare may be rebred on that heat.
Rood & Riddle Palpation and Ultrasound Gradings

<table>
<thead>
<tr>
<th>Follicles -</th>
<th>Measured in millimeters.</th>
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<tbody>
<tr>
<td>Left or Right Ovary</td>
<td>L or R</td>
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<tr>
<td>Consistency -</td>
<td>Firm F</td>
</tr>
<tr>
<td></td>
<td>Firm to Medium FM</td>
</tr>
<tr>
<td></td>
<td>Medium M</td>
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<tr>
<td></td>
<td>Medium to Soft MS</td>
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<tr>
<td></td>
<td>Soft S</td>
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<td></td>
<td>Flaccid FL</td>
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Hemorrhagic - (Echogenic Fluid)
- Hemo 1 Small Amount
- Hemo 2 Moderate Amount
- Hemo 3 Large Amount

Thick Walled TW
Multiple Small Follicles MSF
Multiple very Small follicles MVSF

Ovulation OV
No Significant Structure on either ovary NSS
Hemorrhagic anovulatory follicle HAF
Leuteinized follicle LUT

Corpus Luteum - CL
- Inactive or questionable CL CL?
- Regressing CL Reg CL

Edema -
- No Edema E0
- Small Amount E1
- Moderate Amount E2
- Large Amount E3
- Excessive Amount E4

Fluid -
- The average of the vertical measurement in centimeters.
- If the fluid is echogenic, this is designated by a +. Increased echogenicity is indicated by ++, +++.
  e.g. F3+ indicate 3 cm of slightly echogenic fluid.
  ++ = moderately echogenic
  +++ = very echogenic

Air -
- A1 small amount
- A2 moderate amt
- A3 large amount

Hyperehoic substance in the uterus HE preceded by the location

Calcified endometrial cups CEC

Pregnancy - Measured in millimeters.
- PLH pregnant left horn
- PRH pregnant right horn
- PB pregnant body
- To indicate heart beat seen- location and size followed by HB
If twins are adjacent - Adj
Anembryonic vesicle - ANV

Cervix - Graded 1 through 4
Cx1
Cx4

Efflux - Gross examination

- Cervix:
  - Graded 1 through 4
  - Cx1
  - Cx4

- Tight
- Relaxed (on floor)

- Clear
- Slightly cloudy
- Moderately cloudy
- Very cloudy

- Particulate matter:
  - Small amount +
  - Moderate ++
  - Large +++

- Color:
  - Yellow
  - Pink
  - Red