Objectives

1) To introduce the management practice of rectal palpation for pregnancy diagnosis in cattle and horses and to provide an understanding of why it is used to make management decisions.

2) To provide “hands-on” experience in rectal palpation for pregnancy determination in cattle.

Why is rectal palpation used to determine pregnancy status?

1) The primary reasons rectal palpation is used to determine pregnancy status is because it is an inexpensive and highly accurate method of detecting pregnancy at most stages of gestation.

2) The convenience of using ultrasound to detect pregnancy tends to decrease as cattle and horses enter their second trimester of pregnancy. As a result, it is easier and more practical to determine pregnancy using rectal palpation.

3) Pregnancy status can be detected accurately with a lab test in a most large and small animal species. However, this process is expensive and time consuming. Therefore, it is more practical and takes less time to determine pregnancy status by rectal palpation.

Why do we want to determine pregnancy status in cattle?

1) Allows for identification of pregnant females to retain in the breeding herd. In order for a cow to be a productive member of the cowherd, she must have a calf about every 365 days.

2) Allows for identification of cows to be culled from the breeding herd including non-pregnant (aka “open”) cows or cows that became pregnant very late in the breeding season. Open cows are unproductive since they will not provide a calf during the next calving period and become an economic liability to maintain until the next breeding season. Cows that become pregnant very late in the breeding season are less productive and have a difficulty having a calf every 365 days. Culling practices such as these are common for beef, dairy, sheep, and swine producers but would not be a common practice in companion animals and horses.

3) Allows producers to better assess the reproductive performance of their operation. This would include when cows became pregnant during the breeding season, whether there are herd health problems based on the stages of pregnancy and (or) increased number of open animals, or there are sub-fertile bulls resulting in a high percentage of open cows after the end of the breeding season.

Why do we want to determine pregnancy status in horses?

1) Allows for identification of pregnant or non-pregnant (open) mares early in breeding season.

2) Knowledge of pregnancy status allows the brood mare manager to cease teasing of mares for breeding purposes, which allows for more efficient use of labor and resources during the breeding season.

3) Provides additional information relative to the reproductive status of the mare based on findings of palpation (i.e., uterine or ovarian status).

4) Allows for identification of twins early in gestation which allows manager to make the decision to eliminate one twin before gestation is too far along. Twins are not desirable in horses.

5) Allows for monitoring of pregnancy during early gestation. If a mare is palpated open, she can be evaluated and rebred expeditiously.

6) Allows for monitoring of pregnancy during mid and late gestation. This is important in mare’s that are known to have had a history of maintaining a late term pregnancy.
Methods of Pregnancy Diagnosis: Cattle

1) Milk and Blood Progesterone Tests
   - Measured in blood and (or) milk samples taken 21 to 24 days after a known breeding date.
   - Elevated progesterone concentrations > 1 ng/mL would be indicative of a cow with a CL and possibly pregnant; whereas, progesterone < 1 ng/mL is indicative of no CL present.
     * Milk test results are known within hours but blood test results can take days.
     * The test can lead to false positives due to prolonged luteal phases and retained CL. Therefore, it is not a commonly used management practice. The test is actually more effective in telling you an animal is open due to low progesterone (< 1 ng/mL).

2) Pregnancy Specific Protein B (PSPB) Test
   - Requires a blood sample taken 30 days after a known breeding date.
   - Elevated levels are indicative of an early pregnancy. PSPB are produced by placenta.
   - Expensive and time consuming process that takes days to get results.
   - BioTracking is one of the commercial companies that conducts this test (http://www.biotracking.com/index.php)

3) Ultrasound (See ultrasound handout)
   - Transrectal ultrasonography after day 25 of pregnancy. Results are known immediately.
   - Detection of amniotic vesicle, fluid, fetus, and fetal heartbeat.
   - Sex fetuses from approximately day 55 - 70 of pregnancy.

4) Rectal Palpation
   - Palpation of pregnancy through the rectal/uterine walls. Results are known immediately
   - Technician palpates for fetal membranes, amniotic vesicle, cotyledons and fetus.
   - An experienced technician can determine pregnancy 35 to 40 days after insemination.

Methods of Pregnancy Diagnosis: Horses

1) Blood progesterone test
   - Performed 18 to 20 days after known breeding/ovulation dates.
   - Known breeding dates, detect for presence or absence of corpus luteum (CL)
     * Low progesterone (< 1 ng/mL): mare is not pregnant due to lack of CL
     * High progesterone (> 1 ng/mL): mare could be pregnant but can lead to false positives due to pseudopregnancy, retained CL, prolonged luteal phase.

2) Blood test for equine chorionic gonadotropin (eCG)
   - Secretion of eCG by endometrial cups from day 40 to 100 of gestation.
   - Commercial kits used to be available to test for eCG in blood and they are no longer used.
   - Limited usefulness since it will not allow determination of pregnancy < 40 d post breeding.

3) Estrogen concentrations (blood or urine)
   - Estrogens are high in middle/last trimester of pregnancy.
   - An enzyme-linked immunosorbent assay (ELISA) can be used to determine estrone sulfate concentrations in horses, which can be used to determine pregnancy status 70 days after breeding. BioTracking is one of the commercial companies that conducts this test (http://www.biotracking.com/index.php)
   - Cuboni’s test measures presence of conjugated estrogens in urine.
   - Thanksgiving Day Test measures elevated blood estrogens.
     * Typically done to confirm pregnancy in late fall, hence the nickname.
4) **Ultrasound** (See ultrasound handout)
   - Transrectal ultrasonography after day 14 of pregnancy. Results known immediately.
   - Detection of amniotic vesicle, fluid, fetus, and fetal heartbeat.
   - Sex fetuses from approximately day 55 - 70 of pregnancy.

5) **Rectal Palpation**
   - Palpation of pregnancy through the rectal and uterine walls. Results known immediately.
   - Technician palpates for changes in uterine tone, shape of uterus, and presence and size of the amniotic vesicle. Pregnancy can be determined 20 days after insemination.

**Steps of Rectal Palpation: Cattle**

1) **Utilization of proper palpation equipment.**
   - A protective sleeve is put over the arm used for palpation.
   - It is important to use a non-irritating lubricant that is placed on the palpation sleeve, which assists the palpator in getting their arm into the rectum of the cow.

2) **Visual assessment of the rear end of the cow.**
   - Make sure that she has two external outlets under the tail, otherwise you’ve been had!!
   - Check the cow’s body condition. Extremely thin cows are usually open.
   - Look for signs of recent estrous activity.
     * Rubbed tail head or a scab.
     * Mud on the animal’s sides and (or) rump.
     * Clear mucus discharge from the vulva.

3) **Determination of internal structures of the reproductive tract and pelvis** (Figures 1 & 2)
   - **Cervix:** landmark structure that is palpated first as it leads to the uterus
     * Find cervix by sweeping the floor of the pelvis from side to side.
     * Caution, location of the cervix should not be used as a primary criterion for pregnancy.
   - **Uterine horns:** primary anatomical structure palpated to determine pregnancy status.
     * **Size:** uterine horns increase in size as gestation advances.
     * **Location:** in relation to pelvic rim, advances in anterior direction.
     * **Tone:** pregnant horns have a flaccid feeling to them.
     * Within the uterus the presence of fluid, embryo/fetus, and placentomes are palpated for to assist in determining the pregnancy status of the animal.
   - **Chorionic membrane**
     * Detected by grasping the uterine wall between thumb and forefinger and lifting slightly; called “slipping the membrane”. **CAUTION,** this can terminate pregnancy if too much pressure is used and the chorion is damaged.
     * By mid-gestation, the placentomes are large enough to palpate
   - **Ovaries**
     * Presence of a corpus luteum (CL) which produces progesterone.
     * Use the CL to determine the side of pregnancy up to 120 days.
     * A smooth ovary with no significant structures (follicles, CL) is an indication that the female is probably anestrous or non-cycling; hence, she is probably not pregnant.
   - **Uterine artery palpation** (During mid to late gestation pregnancy)
     * Found on the right side near the forward edge of the pelvis. The artery is enlarged and when pressure is applied to it, it generates a “BUZZ” in the fingers of the palpator.
     * Increased diameter allows for increased blood flow, which is coincides with an increase in the size of the placenta and fetus.
4) Pregnancy staging to determine the age of the pregnancy

- **30 to 45 days**
  - Cervix & uterus are usually in the pelvic canal.
  - One horn is slightly enlarged and fluid-filled. CL is on the same side as gravid horn.
  - Membrane slip technique used to detect pregnancy. **Proceed with caution because damage to membrane can cause pregnancy to be terminated.**

- **45 to 60 days (60 days is A in figure)**
  - Cervix is typically in the pelvic cavity.
  - Pregnant uterine horn begins to fill with fluid with little fluid in non-pregnant horn.
  - **Amniotic cavity is about the size of a hen egg.**
  - Use membrane slip technique. Caution: too much pressure can damage membranes

- **60 to 90 days (90 days is B in figure)**
  - Cervix moves in anterior position; torsion evident when you attempt to pick up the tract.
  - Pregnant horn is at the anterior part of pelvic brim and may start to fall over the rim.
  - **Amniotic cavity is about the size of a grapefruit & fetus about size of a small rat.**
  - Difficult to move hand completely around the pregnant uterus.
  - This stage of gestation is the earliest stage that most individuals like to start to palpate pregnancy with a high degree of accuracy.

- **90 to 120 days (120 days is C in figure)**
  - Cervix is at the pelvic brim.
  - Uterine body enlarged & fluid-filled about the size of a football. Uterus usually dropped over the pelvic brim.
  - **Fetus is the size of a small cat.**
  - **Start to feel the placentomes.**

- **120 to 150 days (150 days is D in figure)**
  - Cervix is almost completely over the pelvic brim.
  - Uterine body and horns are not easily palpated.
  - **Placentomes about the size of quarters or larger.**
  - **Fetus is the size of a large cat.**

- **150 to 180 days**
  - Cervix is well over the pelvic brim.
  - Entire uterus is stretched and fluid-filled and well down into the body cavity.
  - Very hard to palpate fetus if you have short arms.
  - **Placentomes are about the size of a fifty-cent piece.**
  - There is a nice buzz to the uterine artery.

- **180 to 210 days (150 days is E in figure)**
  - Pregnancy easy to detect. Fetal head is at or near pelvic cavity and can be palpated.
  - **Fetus about the size of a beagle dog.**
  - **Placentomes are about the size of a silver dollar.**
  - There is a very strong buzz to the uterine artery.

- **> 210 days to term**
  - Pregnancy is easy to detect.
  - Fetal calf quite often located in pelvic cavity and its head is easy to feel.
  - Very strong buzz to the uterine artery when digital pressure is applied to it.
  - **Bounce fetus like a basketball.**

Photo: M Drost; See Drost Project (http://drostproject.org/)
Figure 1. Side view of where arm is located during rectal palpation of a cow in late gestation (>200days). Note how the arm is positioned through the pelvic canal and over the brim of the pelvis which allows for palpation of the head of the fetus. This technique also allows the individual to feel for the presence of placental membranes, placentomes, and fluid accumulated within the placenta. The same technique would be used to palpate pregnancies that are shorter in gestation (See Figure 2) where the pregnant tract may actually be sitting in the floor of the pelvis. (Image from Drost Project [http://drostproject.org/]).

Figure 2. Dorsal view of a pregnant reproductive tract on left and non-pregnant reproductive tract on the right. Note the swelling of the gravid or right horn of the pregnant tract. The swelling represents the conceptus, which contains the placental membranes, fetus, and fluid. Note that the left or non-gravid horn does not have any appreciable fluid accumulation. For the non-pregnant tract, note the absence of swelling of either uterine horn. (Image from Drost Project [http://drostproject.org/]).
**Steps of Rectal Palpation: Horses**

1) **Physical restraining of mare**
   - Make sure that the mare is restrained to provide safety for mare and handlers
   - Prepare tail to keep tail hair out of the way of the palpation process

2) **Palpate for anatomical land marks of reproductive tract**
   - Remove excess feces from rectum to allow for better palpation of reproductive tract
     * The rectum of the mare is much more sensitive than the cows. Therefore, care must be taken when palpating the mare.
   - Palpation of cervix, uterus, and ovaries
   - Location and size of uterus may provide early indication of pregnancy status

3) **Pregnancy staging**
   - **Day 16**
     * Increased uterine tone with firm and tubular uterus
     * Cervix becomes long, firm and rope-like
   - **Day 20**
     * Palpation of embryonic vesicle (30 to 40 mm diameter)
     * Central bulge in uterus, typically located at base of horn
   - **Day 28**
     * Embryonic vesicle size of egg
   - **Day 35**
     * Embryonic vesicle size of lemon
   - **Day 42**
     * Embryonic vesicle size of orange
   - **Day 49**
     * Embryonic vesicle size of grapefruit
     * Uterine horns start to lose their tubular tone
   - **Day 56**
     * Embryonic vesicle size of cantaloupe
     * Conceptus starts to occupy nearly the entire uterine horn and ½ uterine body
   - **Day 60 - 100**
     * Uterus increases in size and starts to be drawn over pelvic brim and into abdomen
     * Day 60 conceptus: 12 – 15cm long
     * Day 85 the fetus becomes palpable
   - **Day 120 – 150**
     * Fetus is readily palpated
   - **Day 150 – 210**
     * Difficult to palpate fetus because it is deep in abdominal cavity.