

# Fetal Sex Determination in the Mare Between 55 and 150 Days Gestation

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The use of rectal ultrasound examination to determine fetal gender between 55 and 150 days gestation is an accurate procedure and a useful service in the management of mares. Author's address: Hagyard-Davidson-McGee Associates, PSC, 4250 Iron Works Pike, Lexington, KY 40511-8412. © 2000 AAEP.

## 1. Introduction

This presentation is to instruct practitioners in the accurate procedure for fetal sex determination in mares between 55–90 days gestation by identifying the genital tubercle and from 90–150 days by identifying the external genitalia.

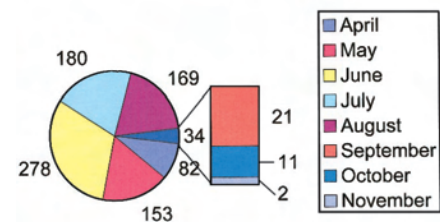
The knowledge of fetal gender enables the owner to improve management of the broodmare band by aiding with cash flow management decisions, insurance coverage, mating lists, sales decisions, sales reserves, pre-purchase lists, foaling locations, loan collateral limits, and possibly different stud fees for fillies and colts. Mastering this procedure provides a valuable service to clients, which in turn creates a new revenue source for practitioners (Figs. 2 and 3).

## 2. Materials and Methods

Materials needed for the examination include:

1. Pregnant mares between 55–150 days gestation.
2. Quality ultrasound machine with a 5-MHz linear ray rectal transducer.
3. Portable viewing stand for close eye-level viewing.

Fig. 1. Monthly Demand for Procedure in 1999



4. Materials and restraint for rectal palpation.
5. Printers to document findings and increase confidence.
6. Diminished lighting.
7. Fly repellent to minimize mare movement.
8. Book for recording findings.

## 3. Results

Over twenty-five hundred determinations were made over an eight-year period with two reported wrong determinations. Data has been verified from contact with farms, Jockey Club reg-

## NOTES

## Incidence of Increasing Demand

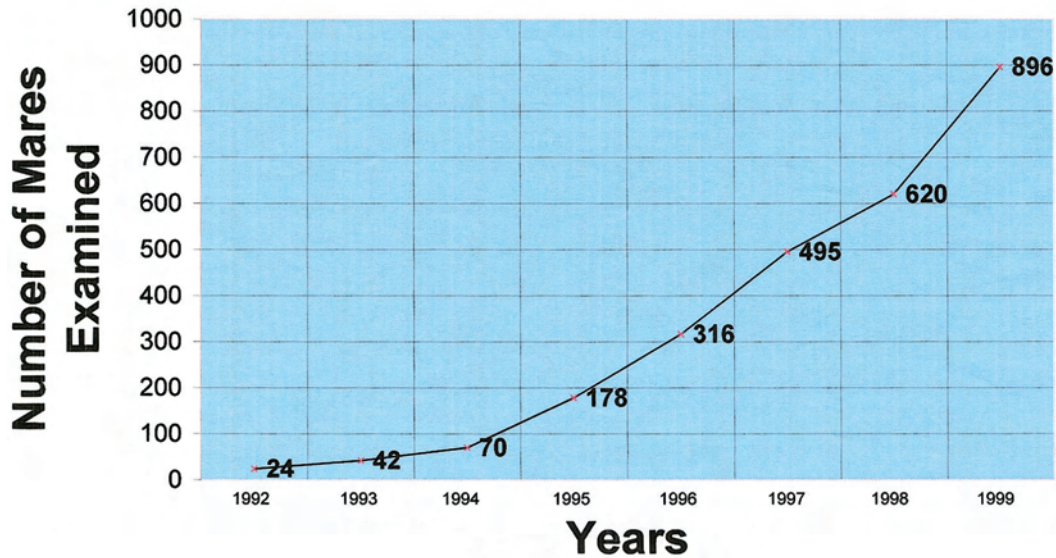


Fig. 2. Incidence of increasing demand for fetal sex determination, from 1992 to 1999.

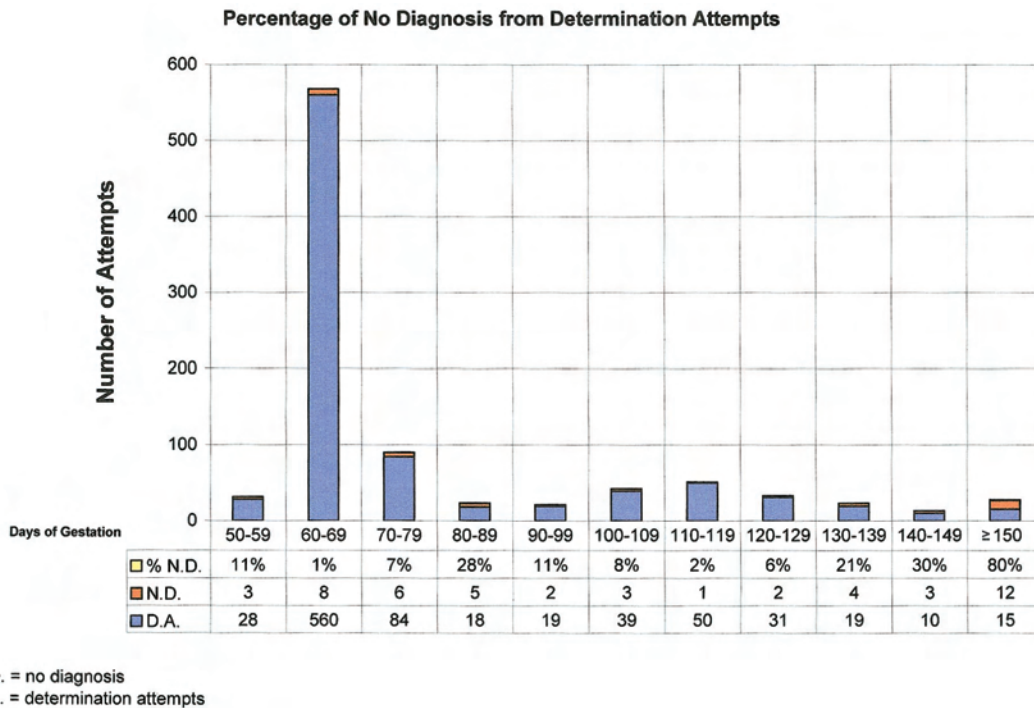


Fig. 3.

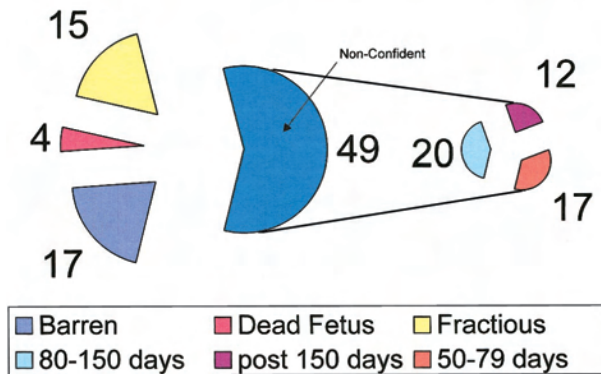
istrations, and refunds offered for any wrong determination.

#### 4. Discussion

Determinations are made in utero by locating the genital tubercle and defining its position relative to

other fetal structures. The genital tubercle is the precursor to the penis in a male and the clitoris in a female. It is sonographically visible as a hyper-echoic, bilobulated structure about 2 mm in diameter that develops on the ventral midline between the hind legs. Around day 55 of gestation, the tu-

Fig. 4. Various Reasons for no Diagnosis on First Attempt



Number of Mares Without Determination at First Attempt.

85 No Determination 1<sup>st</sup> Attempt  
896 Total Mares Examined = 9.5%

36 Not Possible = Barren, Dead Fetus, Fractious

17/666 Not Confident @ 50 - 79 Days (2.5%)

20/215 Not Confident @ 80 - 150 Days (9.3%)

12/15 Not Confident > 150 Days (80%)

Fig. 5.

bercle begins to migrate toward the umbilical cord in a male and toward the anus in a female. Genital tubercle migration must occur in order to determine the sex of the fetus, therefore attempts prior to approximately 60 days of gestation have proven to be difficult. Sex determination is most easily diagnosed on a 60–75-day-old fetus (Figs. 4 and 5).

The early procedure involves palpating the mare for pregnancy at 60–80 days post-ovulation. Insert the transducer until a fetus is found. When the fetus is located, scan the entire fetus locating the head and determining the dorsoventral orientation of the fetus. The fetal positioning can be detected by finding the direction of the mandible (it points ventrally and posteriorly) or finding the heart on the ventral midline. Proceed posteriorly to the abdominal attachment of the umbilicus. Just posterior to the abdominal attachment of the umbilicus is the tubercle of the male fetus. The male tubercle can be identified from many different planes. To identify a female the most posterior area of the fetus must be scanned. The female tubercle is best observed in a plane including the tailhead and the distal tibias or hocks. It appears just under the tailhead within a triangle formed by the tailhead and the two distal tibias. An accurate identification of the female tubercle is difficult from any other plane.

After 75 days, the uterus is carried over the pelvic rim by the fluid of the pregnancy and the fetus moves to the most ventral part of the uterus, making the rectal ultrasound approach extremely difficult. As the pregnancy progresses, the uterus does not move more ventrally into the abdomen. This allows the fetus to be viewed sonographically around 90–95 days, as it extends back (due to growth of the fetus) into the pelvic cavity. Sometimes, fetal sex determinations can be done between 80–90 days if the fetal position reveals the proper cross-sectional view. At 90–150 days of gestation the fetus has grown considerably and can be diagnosed about 85% of the time. During these later stages a determination is made based upon external genitalia (glans penis, prepuce, mammary gland, teats, clitoris, etc.) rather than the genital tubercle. The external genitalia are frequently difficult to distinguish because they are not well developed until around 110 days. After 150 days the view necessary to make a determination becomes increasingly more difficult, however; 3 were obtained in 15 attempts.

Making fetal sex determinations at 90 to 150+ days requires the practitioner to learn to differentiate between vastly different structures than those used with earlier determinations. External genitalia is often more difficult to distinguish from other surrounding tissues, and genitalia 90–110 days are not very well developed.

In the female, the mammary gland is the most readily identifiable structure. It is found slightly more posterior to the abdominal attachment of the umbilicus than the prepuce. It begins to become visible around 90 days of gestation as two hyperechogenic teats on a bilobed triangle of tissue that is slightly more dense than the surrounding tissue. If a mammary gland is found, it is recommended to further confirm the diagnosis by finding teats or the clitoris. The clitoris will be a small hyperechoic structure on the posterior ventral midline at the upper midtail level.

In the male, the prepuce is found in the same region as the mammary gland in the female. The structure is cone-shaped off the abdominal wall, just posterior to the abdominal attachment of the umbilicus. The prepuce begins to be visible at about 85–90 days of gestation. The ventral hyperechoic point of the cone is caused by a prominent ventral median raphe of the prepuce. Frequently, the glans penis can be seen as a hyperechoic mass within the anterior part of the prepuce.

Gender determination between 90–150 days of gestation is difficult primarily because of the inability to differentiate between tissues. Large bones cast sonographic shadows over areas and occasionally the positioning of the fetus is not conducive for viewing the posterior region. A diagnosis can be made about 85% of the time at this later stage and usually requires 2–10 min per determination. In contrast, at 60–75 days a diagnosis can be made

## REPRODUCTION

99% of the time requiring 10 sec to 2 min per determination.

After 140 days, the fetus is so large it is difficult to achieve the proper positioning necessary. Few landmarks will be visible in one field of view. Many sonographic artifacts can appear very similar to genitalia when seen alone and not in relation to other fetal structures. At 150 days, the fetus is beginning to assume anterior presentation with the pelvic area out of reach.<sup>1</sup>

With practice, a practitioner can be very accurate with fetal sex determinations at 60–80 days of gestation, and from 90–150 days gestation. Accuracy should remain high from 55–150 days, but the percentage of diagnosis decreases from 80–140 days. Accuracy of the sex determination of the fetus and the time required for the procedure is dependent upon the experience of the practitioner. Prior to attempting a determination, adequate time should

be spent learning the ultrasonographic cross-sectional anatomy of a 55-day to 150-day fetus. The optimal method to learn cross-sectional anatomy is to begin doing 60-day pregnancy exams with the ultrasound, charging the client for a routine pregnancy palpation exam.

The importance of good record-keeping should not be understated. Good records are essential to negate any potential clerical errors. If a determination cannot be made, guessing is not advised. Guessing leads to errors and errors lead to a loss of confidence in the procedure. Emphasis should be made that determinations are done for identification of gender only and not to control gender.

**Reference**

1. Ginther OJ. *Reproductive Biology of the Mare Basic and Applied Aspects*. 2nd ed. Cross Plains, WI: Equiservices, 1992;410.