

DOUBLE TROUBLE

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TWINNING IN MARES

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What's better than one beautiful, healthy baby? *Two* beautiful, healthy babies, right? And in any other domestic species besides the horse, this would be true, for the most part. Cattle don't generally have twins, but they can handle them. Sheep and goats are expected to have at least twins, if not triplets or more. And then we have the litter-bearing species like dogs, cats, and pigs. But horses can't safely give birth to more than one baby at a time.

Often, in conversations about twins in horses, you will hear someone state that they knew someone, usually someone like their grandmother's cousin's neighbor's friend, who had a mare that had twins and one went on to win the Preakness and the other was sire to a Kentucky Derby winner. This dubiously authenticated hearsay must, then, prove that twins in mares can be a good thing. While I have my doubts about the validity of these apocryphal stories, I can say that I personally have witnessed a very small number of twin births that have resulted in the live birth of two foals. In every case, the foals were unsurprisingly small and unthrifty. As adults, they do not catch up to their singleton peers.

More often, by far, I have witnessed twin pregnancies that result in the abortion of both foals (figure 1) or dystocia (serious foaling complications; figure 2). I am well-connected with my peers in equine reproduction around the world, and I feel very comfortable in saying that these observations are universally accepted among equine reproductive specialists.

Figure 2. Near-term fetuses resulting in dystocia in the mare. Both fetuses shared a roughly equal portion of the uterus, but still not sufficient enough to allow a healthy pregnancy and normal foaling.



Figure 1. Near-term aborted fetuses. The larger fetus managed to secure a larger portion of the uterus for its placenta, but it was still not sufficient to allow it to develop and foal normally.

So why is this the case with horses, but not with other domestic animals?

It comes down to the relative size of the newborns and the type of placenta that supports them. Cows, sheep, goats, dogs, cats, and even humans, for that matter, have specific areas of the placenta where there is interface, to one degree or another, between the mother and the fetus(es). Anyone who has grown up on a farm would have noticed the differences when they examined the *fetal membranes* (the "afterbirth") of the respective animals. Cows, sheep, and goats have distinct button-like structures located all along the fetal membranes called *cotyledons* (KOT-il-EE-dons). These structures actually attach to matching structures in the mother's uterus called *caruncles* (KAR-uncles). When attached, they form a structure called a *placentome* (PLA-sent-ome). These placentomes are the structures that allow exchange of nutrients and waste products between the mother and fetus.

Dogs and cats, our little carnivorous companions, have a

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different attachment scheme. Their placentas attach in a belt-like fashion around the middle of the placenta. Only in the pig and the horse does the attachment between the fetal part of the placenta and the maternal part of the placenta occur over the entire surface of the placenta. Discreet areas of attachment are not sufficient to maintain the life and growth of the fetuses in these species, so placentomes or the belt-like design of the other species would not offer sufficient support for fetal development in sows and mares.

How, then, are pigs able to have so many babies and mares can only handle one? This is where size becomes important. Pig babies are tiny little things compared to their mothers. A sow may weigh between 500 and 600 pounds, yet each piglet averages around 3 pounds, less than 1% of their mother's weight. The average mare probably weighs around 1200 pounds, with babies that weigh at least 120 pounds at birth; that's 10% of their mother's weight!

Sows have a very long, tortuous uterus with lots of relative room to provide nourishment for many babies. Mares have a very simple, T-shaped uterus. The result is that horse fetuses need every bit of attachment they can get from the uterus to support their impressive growth. Sharing with a twin cuts the available resources in half. In most cases, this is not sufficient and one or both twins die. If both are lucky enough to survive, they are typically small and weak.

Studies have shown that the uterine environment plays a critical role in an individual's development, not just during the fetal period, but with influence throughout that individual's life. These twins never do catch up to their singleton counterparts.

Due to differences in how horse embryos develop, nearly all twins in mares are thought to come from two ovulations (non-identical twins) rather than one embryo that splits (identical twins). The incidence of twins varies with the breed of horse and reflects the frequency of double ovulations. Thoroughbreds and draft breeds have the greatest incidence of double ovulations, at around 20%. Quarter Horses have about a 10% incidence and double ovulation is rare in pony breeds. If a mare does have a double ovulation, there is an 80% chance she will conceive twins. And if twins are conceived and nothing is done about it, there is about a 40% chance that both of the twins will establish themselves and this almost always ends poorly.

The responsible thing to do, then, is to prevent twins whenever we can. Fortunately,



Figure 3. Ultrasound image. The black circular structures are twin embryonic vesicles right next to each other between 13-15 days of gestation. At this stage, they may be easily separated from each other and one vesicle crushed, leaving the other unharmed.

we have a very effective way to eliminate one twin while preserving the other. Your mare should be checked for pregnancy between 13 and 15 days after ovulation (figure 3). The embryos drop from the oviduct into the uterus between 5 and 6 days after ovulation. From that point, the embryos move around freely within the uterus until between day 16 and 17 when they fix in place. If twins are detected before they fix in place, they can be manually separated from each other through transrectal manipulations. Once they are in different parts of the uterus, pressure can be placed on one of them until it essentially pops. The other embryo, far away in another part of the uterus, is unharmed, and greater than 90% of the time continues to develop normally. This method, called the “twin crush” is, by far, the easiest, least invasive, least expensive, and most successful way to control twins. But it must be done before day 16 of gestation.

Waiting until after day 16 to check for twins means running the risk that the embryos will fix in place right next to each other. The result: the twin crush becomes nearly impossible to perform without harming both embryos.

Other options do exist that can be performed later. Benign neglect can be tried for a few days to see if Mother Nature will cause a natural reduction of one of the twins. If no difference is noticed at around a month of gestation, it is unlikely that the situation will resolve itself.

At around 30-45 days gestation, an ultrasound-guided needle can be passed through the vaginal wall and into the uterus

with the goal of disrupting one twin and not the other. This is a difficult technique to learn, is relatively invasive, and has only about a 30% success rate of not disrupting and killing both embryos.

Between 60 and 90 days of gestation, a technique that has been delicately named “craniocervical dislocation” can be performed. Essentially, this technique involves the veterinarian sticking their arm through a surgical incision in either the flank or the vaginal wall and grasping the fetus through the uterus. The head of the fetus is located and pressure is placed on the fetal neck to separate the head from the neck. Decapitation, in essence. This is a relatively new technique, believe it or not. Most vets have never performed this technique and it does require some know-how. Success is still being determined, but in practiced hands it appears to be around 70% successful (one twin dying and the other living).

Between 90 and 100 days of gestation, a long, ultrasound-guided needle may be passed through the abdomen of the mare and into the heart of one of the twin fetuses. The fetal heart is then injected with a substance that will euthanize the fetus. This technique has about a 40% success rate (again, success being defined as one twin dying and one living, instead of both dying). The difficulty with this technique is not knowing if you have chosen the twin with the greater share of the placental attachment or not. If you inject the fetus with the greater placental share, the surviving fetus will likely not survive long, anyway, due to the lack of placental attachment.

Aborting the whole pregnancy and starting over is also an option, but only before 37 days of gestation. After that, structures known as *endometrial cups* form in the uterus. These endometrial cups will prevent the mare from cycling for months, regardless of whether or not she remains pregnant. After they form, even if the pregnancy fails, the mare will essentially not cycle for the rest of the breeding season. Inducing a complete abortion before 37 days is effective and inexpensive in and of itself, but costs the owner of the mare weeks or months of lost time in the breeding season.

Prevention of twin pregnancies is the best management tool. It is simple and inexpensive. It requires only that every owner of a broodmare knows when she ovulates and has the mare checked for pregnancy between 13 and 15 days after ovulation. Any twins that result can be easily and efficiently managed at this stage with very good success.