

HEALTH ZONE

Nutrition

Broodmare Care

BY HEATHER SMITH THOMAS

The future of a developing embryo/fetus depends upon the health and nutrition of the dam. This formative time for the foal can be adversely influenced by the uterine environment if the mare is exposed to certain diseases, toxins, or a poor diet.

What a pregnant mare eats during gestation—quantity and quality of various nutrients—can have long-lasting effect on her foal. Nutrients in early gestation are more important than we once thought. Most of the important organs and body systems of the foal are being formed during that time. Metabolism, muscle mass, skeletal structure, and other important factors that become permanent traits for that foal are also influenced by what the mare eats. Studies have shown that nutritional management of pregnant mares can also affect the development of body systems controlling glucose and insulin dynamics in the foal.

Most of the individual traits/characteristics of a foal, lamb, calf, or human baby are pre-determined by genetics (genotype, or inherited traits). But the ultimate expression of those genetics can be altered

Fetal Programming: The Importance of Nutrition in Pregnancy

by environmental influences—especially early on—as the embryo/fetus develops. This can result in different phenotypes (appearance, etc.) even in closely related individuals. An example would be identical twin equine embryos placed in two different recipient mares, such as a pony and a draft mare. Not only will those foals be a different size at birth, but some of their differences will be evident for the rest of their lives. Similarly, foals born from dams that are on different types of diet or nutrient levels will be different. The uterine environment, which includes nutritional factors, plays an important role in what we now term “fetal programming.”

Dr. Tania Cubitt, an equine nutritionist in Middleburg, Va., with Performance Horse Nutrition, said horse owners frequently ask about growth problems in foals.

“In order to address their concerns, I ask them about the maternal nutrition and what the dam was eating,” she said. “Once the foal is born, there’s not a lot you can do to change things. There are a few nutritional strategies you can try, but basically you are stuck with what you already have.”

The time to build the foundation for what that foal will be is during gestation when the embryo/fetus is developing. Damage may have already been done—that might result in development problems such as metabolic disease and insulin resistance, for example.

“Raising a foal is like building and painting a fence,” Cubitt said. “The fetus growing is like building the fence. You need to build it correctly. Once the foal is born, that’s like painting the fence. There’s not a lot you can do to cover up poor structure.

“Too many people think they can start feeding a foal the proper nutrients at weaning time. They think that up to that point it’s all up to the mare. Yes, it’s up to the mother, but what she eats can make a big difference in how that foal develops.”

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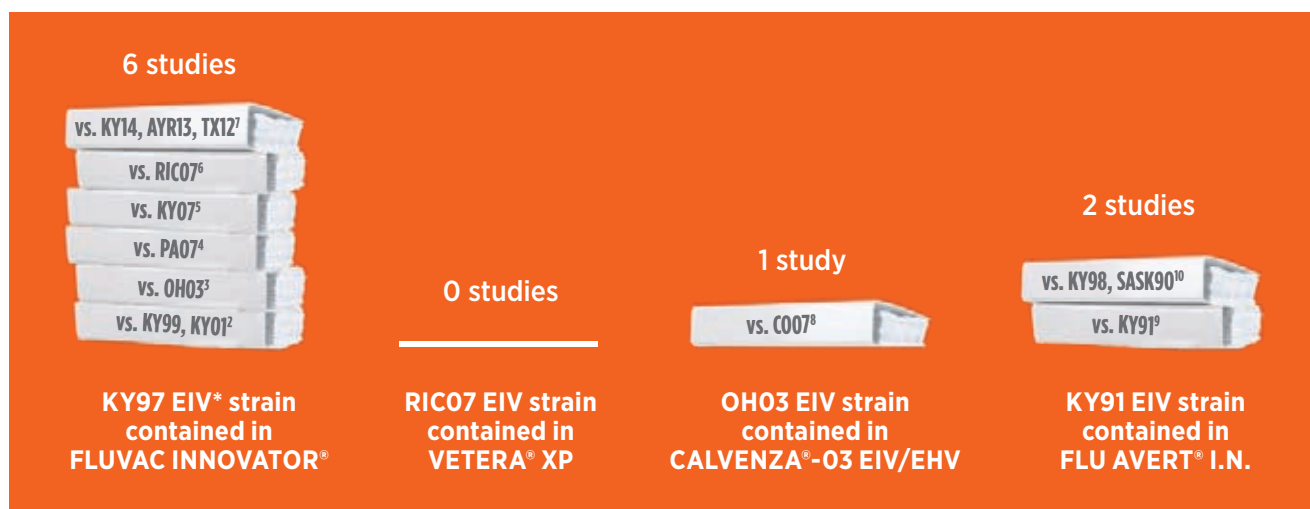
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¹ West Nile-Innovator and Fluvac Innovator MDI Sales Data as of 12/31/14. Zoetis. Dec. 2014.

²⁻⁷ Data on file, Study Report No. 671-02-001R, 671-08-004.R, 766-09-002.R, 100REQBIO-01, 140REQBIO-1 and 15EQRGBIO-02, Zoetis Inc.

⁸ Calvenza vs. C007 ACVIM 2011 abstract reference.

⁹ Townsend HGG, Penner SJ, Watts TC, Cook A, Bogdan J, Haines DM, Griffin S, Chambers T, Holland RE, Whitaker-Dowling P, Youngner JS, and Sebring RW: Efficacy of cold-adapted, intranasal, equine influenza vaccine: challenge trials.

¹⁰ Chambers TM, Holland RE, Tudor LR, Townsend HGG, Cook A, Bogdan J, Lunn DP, Hussey S, Whitaker-Dowling P, Youngner JS, Sebring RW, Penner SJ and Stiegler GL: A new modified-live equine influenza vaccine: phenotypic stability, restricted spread and efficacy against heterologous virus challenge.

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EARLY PREGNANCY IS A CRUCIAL TIME

Many people still think the most important time to make sure the pregnant mare has adequate nutrition is during the last trimester when the fetus is growing fastest.

“Actually all that’s happening in that part of the pregnancy is that the fetus is laying down more tissue and fat,” Cubitt said. “All of the critical organs are already developed.”

Cubitt points out that the heart is one of the first organs formed.

“You can see the heartbeat of the embryo on ultrasound by 18 to 20 days’ gestation,” she said. “The heart is a very important organ—especially for an animal that will have an athletic career—and if it’s already functioning and beating, that early, critical growth has already been occurring.”

The first 30 days of pregnancy are crucial, especially in terms of early embryonic loss. If the mare is thin, or expending

energy trying to stay healthy (fighting disease or some other problem) she may not continue the pregnancy. This early stage is when you want to make sure everything is going properly, with adequate nutrition for optimum health of the mare.

“You can’t just suddenly start feeding her properly after you know she’s pregnant because by that time you are already well into that first crucial phase of gestation,” Cubitt said. “There are feeding and management factors that are crucial at the very beginning. You don’t want to stress the mare by underfeeding, or excessive exercise, or transport.”

The embryo is floating around until it implants into the uterine lining, and is at a very vulnerable stage of existence.

“Many mare owners need to give more consideration to maternal nutrition,” she said. “If the goal of your breeding program is a strong, healthy foal, you want the early uterine environment to be optimum. The first thing a doctor tells a woman when she finds out she’s pregnant is to take pre-

natal vitamins. Humans and horses are not that different.”

The mare doesn’t need a lot of extra calories during that initial stage, but she definitely needs all of the important vitamins and minerals that are crucial to embryonic development. She needs a well-balanced diet that has the right amount of selenium, copper, and other important trace minerals, along with vitamins A, E, etc. You don’t want any deficiencies at that point in her pregnancy.

“Having your mare on a ration-balancer supplement or a balanced plane of nutrition (whether the basic diet is pasture or hay) is absolutely critical during early gestation if you want to give her foal the best chance of being healthy and strong,” Cubitt said. “A lot of the research in fetal programming comes from human medicine; we know that what the mother is eating can predispose children to diseases later in life—problems that may not even show up until those children are adolescents.

“Even though there’s no direct research that shows you could cause OCD (osteochondritis dissecans) problems in a foal by improper feeding of the mare, I think we can definitely make this connection.”

The way some mares are overfed or underfed certain nutrients can have long-lasting effects.

OVERFEEDING CAN BE AS HARMFUL AS UNDERFEEDING

Overfeeding calories is never healthy—whether in humans or horses. This could lead to problems with obesity and insulin resistance in the offspring.

“There’s also the issue of sheer physics,” said Cubitt. “There’s only a certain amount of space in the uterus. If you have a big, fat mare and she’s eating a lot and putting too much nutrition into the foal, it will grow very large and this may result in birthing difficulties or contracted tendons at birth because there wasn’t enough room for those long legs to move in the uterus.

“The bottom line is that the mare needs an adequate supply of vitamins and minerals, and good, quality protein—aside from the calories.”

Some mare owners overfeed their mares from the beginning, and this can lead to other problems.

“When we say that a mare should be on a good nutritional program, this doesn’t

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necessarily mean more calories," she said. "Typically people associate a better-quality diet with calories, but this is not the case."

The diet simply needs to be balanced to include all the important nutrients. If you feed the mare too many calories, she will

not only get too fat, but you also may harm the fetus. Fat is never healthy. Overfeeding can be detrimental to the future health of the foal, leading to problems later in life.

"We have not yet done the long-term research in horses to confirm this, but we suspect it to be true because long-term research has been done in humans," she said. "There are many studies that show that obese women may predispose their offspring to certain metabolic disorders later in life, like diabetes and insulin resistance. Young males may be infertile. Even though we haven't done similar research in horses we must not ignore the fact that obese, overfed mares could potentially have the same detrimental effects on their foals."

Overfeeding calories may predispose a mare's offspring to potentially being at higher risk for metabolic disorders, which then creates higher risk for laminitis or growth problems like DOD (development orthopedic disease). It's not worth that risk. It's better to have mares in optimal body condition—neither thin nor fat.

The extra weight on an obese mare can also put her at risk for problems as she becomes heavier in late pregnancy. All that weight is carried on four tiny feet. There is much more stress on feet and leg joints.

"During my graduate program at the MARE center (Middleburg Agricultural Research Extension) in Virginia, we had a mare that developed laminitis during her career as a show jumper," said Cubitt. "She was retired and came to us to have foals. Every pregnancy, during her third trimester, she would get sore feet, just because of the extra weight of pregnancy. To have that mare obese would have been a disaster.

"You need to make sure you are feeding a mare what she needs. That's when the ration-balancer pellets are ideal because you can feed her a pound per day of those and know she is getting everything she needs, and adjust the total amount of energy (from the hay) accordingly. You could give a little alfalfa along with the grass hay if she needs more calories, for instance, or add a little oil or rice bran to the supplement pellets. If she's an easy keeper, all she'll need is the hay and ration-balancer."

Getting lots of calories doesn't mean she's getting adequate nutrition, Cubitt stressed. **BH**

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