

Maternal nutrition in ewes affects offspring body size and organ development, according to study

By Alyssa Condon

For agricultural producers, the main goal is to raise animals that generate a quality product as efficiently as possible. However, few realize that the growth of production animals can be influenced as early as gestation. Dr. Kristen Govoni and her lab recently released a study published in *Translational Animal Science* which explored the effects of poor maternal nutrition on lambs while they are still in utero. In order to study factors such as fetal growth and organ development at different points during gestation, the researchers separated pregnant ewes into three groups categorized by the diet they would be fed. The control group was fed 100% of required total daily nutrients. One group was fed a restricted diet of 60% of required total daily nutrients and another group was overfed a diet of 140% total daily nutrients. These values simulated occasions in which ewes may not have access to proper nutrients during pregnancy. For example, in autumn, when most ewes are pregnant, nutrient availability in pastures is less than optimal. On the other end of the spectrum, ewes may be overfed before breeding to increase the number of eggs that the ewes ovulate, a process known as flushing. In this case, ewes would be overfed throughout early gestation. In this study, at different points during gestation and very shortly after parturition, selected ewes and offspring were evaluated and tissue samples were collected to evaluate several factors. The variables assessed included several measurements of fetal growth as well as organ development.

The authors observed reduced body weights and body condition scores in ewes fed a restricted diet in comparison to the control group, and greater bodyweight and over-conditioning in the overfed ewes. These maternal qualities can have an effect on the nutrient availability for the fetus during gestation. Increased amounts of perineal fat were observed in both the offspring of the under-fed and over-fed ewes, which is undesirable as producers want a product with more muscle than fat. In addition, offspring bodyweight differed significantly at birth, but not during gestation, with offspring of both under- and over-fed ewes weighing less than the control group. In contrast, offspring organ size differed early on in gestation but not at birth. The offspring of over-fed ewes demonstrated larger kidneys than the other groups at 45 days of gestation, but not at later times in gestation or at birth. Similarly, fetal liver size in the restricted group was larger at day 45 of gestation than the control or over-fed group, but those changes were not observed after day 45. These results are consistent with the timing of organ development in fetal lambs, as organogenesis occurs very early on in gestation.

Dr. Govoni expects that these findings will help producers manage the efficient growth of their animals. She states: “Improper maternal diet during gestation can affect fetal development within 2 weeks of dietary changes and our findings, along with others, suggest these changes can lead to long-term negative effects to growth and metabolism of these offspring. With the global demand for increased food production and healthful products, it is critical that we find ways to mitigate these negative effects or best practices for managing offspring from poorly fed mothers to optimize their growth and health.”

The entire article can be found here:

Pillai, S. M., A.K. Jones, M.L. Hoffman, K.K. McFadden, S.A. Reed, S. A. Zinn & K.E. Govoni. (2017). Fetal and organ development at gestational days 45, 90, 135 and at birth of lambs exposed to under- or over-nutrition during gestation. *Translation Anim. Sci.* 1, 16-25. 10.2527/tas2016.0002