TECHNICAL BULLETIN
COW/CALF

QLF QUALITY LIQUID FEEDS

EARLY GESTATION: MATERNAL NUTRITION IS IMPORTANT IN THE FIRST 90 DAYS

365 COWHERD NUTRITION BY QLF

Reproductive performance is the largest determinant of income in a livestock enterprise. In the U.S. cow/calf industry, embryonic and fetal deaths during pregnancy account for over 35% of the total number of fertilized ova. This embryonic mortality results in a loss of pregnancy, decrease in dam productivity and reduced producer profitability. Nearly 80% of these losses have been reported to occur before day 17 of pregnancy (Geary, 2005). Only a small percentage of embryos are inherently non-viable in the beef cow, which would suggest that the majority of early embryonic losses can be prevented.

Embryonic losses in cattle have been associated with numerous environmental and physiological factors. Most commonly, abnormal or imbalanced hormonal concentrations have been identified as factors to prenatal loss. These hormones are important for optimizing the uterine environment and ensuring proper development of the placenta during early pregnancy. External environmental factors such as temperature, nutrition and disease may also influence embryonic survival and development.

Maternal nutrition plays a critical role in reproductive physiology, including hormonal production, oocyte quality, fertilization and embryonic development. Maternal nutrient delivery during pregnancy has been shown to program the growth and development of the placenta and fetus throughout pregnancy and later in adult life (Funston et al., 2010).

The Placenta

The first 90 days of pregnancy are important for proper placental and fetal establishment. During this timeframe, placental attachment, growth and vascularization occur. The placenta is responsible for transferring all nutrients, respiratory gases, and wastes between dam and fetus. Proper formation of the placental vascular bed is important early in pregnancy to support fetal growth, especially during late gestation. Data would suggest that nutritional status of the dam programs the development of the placenta (Funston et al., 2010). As pregnancy progresses, uterine blood flow will increase by 4.5 fold (Reynolds et al. 1986). Improper placental development results in reduced blood flow to the fetus. Reduced blood flow negatively impacts the nutrition the fetus receives throughout gestation, potentially impacting calf performance long-term (Reynolds and Redmer, 1995).

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Early Organ Development

Establishment and development of vital organs occurs concurrently with placental development. The beef fetal heartbeat is apparent as early as 21-22 days post ovulation. Limb development occurs near day 25, followed by establishment of pancreas, liver, thyroid, brain, spleen and kidneys. Reproductive tissues are prevalent by day 50-60 of gestation (Hubbert et al., 1972). Maternal diet during early gestation may alter development and function of major organ systems in the fetus (Funston et al, 2010). Results indicate that maternal diet restriction may affect future follicular activity, fertility and reproductive longevity of the female offspring (Grazul-Bilska et al., 2009). A recent study evaluated reproductive organ development of heifer calves born to cows experiencing nutrient restriction during early-to-mid gestation (Long et. al, 2012). Cows that underwent nutrient restriction lost body weight ($P = 0.05$) and condition ($P = 0.002$). Calf birth weight, weaning and slaughter weights did not differ ($P \geq 0.19$). Maternal diet restriction altered reproductive organ development. Heifer calves born to nutrient restricted cows had lighter luteal tissue and smaller ovaries ($P < 0.05$). Maternal nutrient restriction during the first half of pregnancy could be detrimental to offspring fertility and longevity within the herd.

Conclusion

Embryonic loss may represent the single greatest economic loss for cow/calf producers. Proper cowherd nutrition may enhance early uterine environment, making it more ideal for embryonic survival and proper development. Feed cost typically represent 50 – 75% of cow/calf production costs. Forage quality and quantity may vary during the first 90 days of gestation, during which cows may undergo periods of undernutrition. Therefore, matching nutrient supply to cowherd requirements is warranted to maximize return on supplement investment. QLF cow/calf supplements are formulated to complement forage-based diets and provide needed nutrients to support herd productivity as well as early placental and fetal establishment.

Citations

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