Effects of supplementing beef cows grazing spring pasture on performance and reproduction

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Many producers turn lactating beef cows out on pasture in early spring, just prior to breeding attempts. At this time, early forage growth tends to be characterized by a relatively high ratio of crude protein (CP) to total energy, and dry matter (DM) is at its lowest level (Kirchhof et al., 2010). As the season progresses and the plant matures, CP as a percent of DM declines, while total percent DM increases (King et al., 2012). Indigestible fiber, in contrast, is fairly low in early spring, increasing throughout the season (King et al., 2012). Acid detergent fiber (ADF) and neutral detergent fiber (NDF) are measures of indigestible fiber. Because spring pasture is so moist, gut fill can become an issue; if the cow is unable to consume more energy than she expends, she experiences a negative energy balance, possibly lowering weight and body condition. This can also be due to excess protein in the diet, as may be the case in early forage growth (Gross et al., 2011).

While in a negative energy balance, the cow may have to mobilize body reserves to generate metabolites that can be used for energy (Gross et al., 2011). These alternative fuels are often the result of catabolism, usually reducing weight and body condition (Cincović et al., 2012). To generate these energy compounds, the cow’s body may initiate lipolysis and ketogenic processes (Cincović et al., 2012). Due to breakdown of fat and suppression of lipid production, concentrations of non-esterified fatty acids (NEFA) in the blood rise (Cincović et al., 2012). NEFA can be utilized for energy or oxidized to ketones, like beta-hydroxybutyrate (BHBA), in the liver (Cincović et al., 2012).

Blood urea nitrogen (BUN) is another indicator of negative energy balance, as it can denote insufficient energy or excess protein. When microbes in the rumen metabolize protein, ammonia is released, and in cases of a negative energy balance, there is an excess of ammonia (Simili da Silva et al., 2014). Both low energy and high protein feeds are associated with a negative energy balance (Simili da Silva et al., 2014). Without enough available energy, the microbes are unable to convert the abundant ammonia to amino acids and protein products, so the ammonia builds up in the rumen (Hammond, 1998). It passes into the blood stream and circulates through the body (Hammond, 1998). The liver converts ammonia to urea, which continues to circulate in the blood (Simili da Silva et al., 2014). Some urea is filtered through the kidneys for excretion, while the rest cycles back to the rumen (Hammond, 1998). Because of this cycling process, high concentrations of urea nitrogen in blood is indicative of a negative energy state, denoting feed that is low in energy, high in protein, or both (Hammond, 1998). In a study by Ferguson et al., a serum urea nitrogen concentration above 20 mg/dL was associated with a decreased conception rate in dairy cattle (1993).

Therefore, cattle on diets with a high CP to total energy ratio, such as early spring pasture, present the possibility of weight loss and reduced body condition, along with decreased reproductive success. This study considers how increasing intake of DM and indigestible fiber with a supplement may alleviate those possible negative effects by increasing the total DM intake and decreasing the CP to total energy ratio.

This 70-day study was conducted at the Orr Research & Demonstration Center in Baylis, Illinois, starting 28 April 2014 (d 0) and concluding 7 July 2014 (d 70). 120 individually tagged Angus and Simmental-Angus lactating cows with calves at side were randomly assigned into 6 allotments of 20 cows each. There were 3 replicates of control and 3 replicates of the treatment. The cows were 61 days post-partum on average.

The control replicates (CTRL) grazed on pasture for the duration of the study. The supplemented treatment groups (SUP) grazed on pasture in addition to receiving the dry supplement. The supplement was a dry, high-fiber mixture that consisted of 45% ground corn cobs, 45% soy hulls, and 10% dried molasses for palatability. The supplement was given at a rate of 4 pounds/head/day, so each SUP group received 80 pounds of supplement/day. Supplement was delivered in large buckets and poured into common troughs for cattle to consume.

The addition of the supplement while grazing lush, spring forages had little influence on NEFA and BHBA concentrations. BUN concentrations however seemed to support the hypothesis that the supplement could alleviate nutritional imbalances between protein and energy in lush, spring forage. There were no differences in cow weight or body condition score between treatments. Although this trial did not show a statistical advantage in first-service conception rates, it is important to see the numerical difference (CTRL = 38.5% vs SUP = 51.7%) that exists and the potential economic relevancy of the supplement treatment. The number of cows in this trial and the fact pen is used as experimental unit poses some challenges in gaining enough statistical power to confidently show reproductive differences. Thus, more investigation is needed into the result of the supplement on first-service conception rates.
**References**


