



Cattle Producer's Handbook

Nutrition Section

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Supplementation of Beef Cattle Consuming Forage-Based Diets

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Forages represent the predominant class of feed for beef cattle operations. Due to differences in plant variety, stage of maturity, and management practices, forages vary significantly with respect to quality parameters such as dry matter (DM) digestibility, crude protein (CP) concentration, and palatability. Also, most ruminants consume low-quality forages for extended periods during the year. To meet the nutritional needs of these animals, supplementation is often provided to increase forage intake and digestibility, weight gain, and reproductive performance.

Supplementation can be expensive; consequently, a reoccurring problem faced by beef producers is when, and with what, to supplement forages. The answer depends on a number of variables including the physiological state of the cattle, the nutrients required for a desired level of production, the nutrient content of the forage, the quantity of forage available, ranch infrastructure and facilities, and management objectives. The nutrient requirements of beef cattle are well documented and readily available to producers (see fact sheet 300). A supplementation program can be defined as a program that provides a portion or all of the difference between the nutrients required by the cattle and the nutrients provided by the forage.

Is Supplementation Necessary?

The first step in preparing a supplementation program is to determine if supplementation is necessary. This involves obtaining an estimate of forage quality, which can be obtained from historical records, observation and experience, or, preferably, from analysis of a representative sample of the forage source to be used (pasture, hay, etc.). Once this information has been collected, along with animal nutrient requirements, a beef producer can determine if supplementation is

necessary to meet an expected level of performance (see 310). This will assist in minimizing the chance of over- or under-feeding supplemental nutrients; thereby, reducing supplementation costs and/or improving the efficiency of the supplementation program.

Protein Supplementation

Type of Protein Supplement

Protein supplements can be classified as natural (animal or plant origin) or non-protein nitrogen (NPN), such as urea and biuret. In addition, CP is divided into rumen degradable protein (RDP) and rumen undegradable protein (RUP). Rumen degradable protein is broken down within the rumen by ruminal microorganisms to yield ammonia and amino acids that they use to stimulate ruminal fermentation and synthesize microbial protein (the main source of protein for grazing ruminants). Rumen undegradable protein is not broken down by ruminal microorganisms and “escapes” ruminal degradation for potential enzymatic degradation in the small intestine.

Because ruminants have the ability to recycle nitrogen back to the rumen, absorbed RUP not utilized for growth or production can be converted to urea and used as a source of RDP. Therefore, microbial protein and dietary RUP are the protein sources available for use by the ruminant.

When forage availability is not limiting, the first priority in designing a protein supplement should be meeting the requirement for RDP. The reasons for this include: (1) ruminal microorganisms can use RDP to produce microbial protein; (2) sources of RDP are normally less expensive than RUP sources; (3) RDP may improve ruminal fermentation and digestion; and (4) RUP supplementation of low-quality forage does not appear to elicit substantial improvements in beef cattle performance compared with RDP.