

Supplementation Strategies for Beef Cattle Consuming Low-Quality Forage

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A supplementation program is a powerful tool that beef cattle producers can use to increase the utilization of low-quality forage and improve animal performance. The productiveness of a supplementation program, however, can be influenced by variation in supplement intake, how well overall supplement intake meets projected supplement consumption, and the costs of supplementation (e.g., labor and special equipment).

Strategies have been developed, consequently, that attempt to improve our ability to supplement low-quality forage and decrease associated costs. These include frequency of supplementation and method of supplement delivery (hand-fed vs. self-fed).

A successful supplementation program should take advantage of the operation's available resources, with major emphasis on long-term management and economics. Therefore, economics and sustained production rather than maximal animal productivity should decide the most appropriate supplementation strategy.

Low-Quality Forage Supplementation Scenarios

Two circumstances arise when supplementing cattle grazing low-quality forage (<6 to 8 percent crude protein; CP). In the first, forage intake is not limited by forage availability. In the second, forage intake is limited by low forage availability, usually the result of drought and/or overstocking.

Adequate Forage Availability

Forage availability does not limit intake, but poor forage quality (usually low protein content) does not allow an animal to consume forage to its intake potential. As a result, nutrient intake is depressed and cattle performance fails to meet expected production goals. A supplementation program should provide the nutrients limiting animal performance in addition to stimulating forage intake (Fig. 1).

Limited Forage Availability

Both poor forage quality and inadequate forage availability limit forage intake and cattle performance. Management alternatives include (1) reducing animal numbers so that forage quantity does not limit intake or (2) initiating a supplementation program that reduces for-

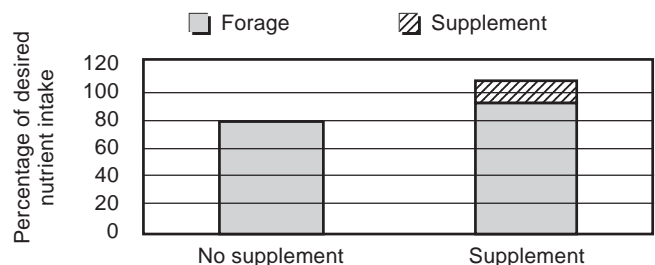


Fig. 1. A supplementation scenario that can arise when availability of low-quality forage is not a limiting factor. Supplementation stimulates forage intake and increases total nutrient intake.

Portions of this article were obtained from data compiled by the Western Region Coordinating Committee on improvement of forage utilization by ruminants in sustainable production systems in the western region.

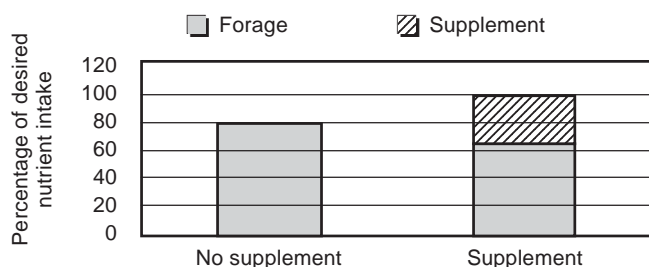


Fig. 2. A supplementation scenario that can arise when availability of low-quality forage is a limiting factor. Supplementation decreases forage intake while increasing total nutrient intake.

age intake while increasing the total consumption of nutrients necessary to meet a desired level of production (Fig. 2). This type of supplementation program, however, rarely yields economic returns and only prolongs an unsustainable ecological condition.

Frequency of Supplementation

Supplementation of beef cattle consuming low-quality forage is an accepted practice, however, the labor involved in dispensing the supplement can be a major expense. A means of decreasing these labor costs is infrequent supplementation. This does not mean less of a nutrient is supplemented. The total quantity of nutrient supplemented each week should remain the same.

Protein

Daily protein supplementation of cattle grazing low-quality forage is an effective means of improving forage utilization and animal productivity. Because ruminants have the ability to “recycle” absorbed nitrogen back to the rumen, however, infrequent protein supplementation is an option to consider when designing a supplementation program.

Research has demonstrated that supplementing at intervals of 2, 3, 4, or 7 days can be an effective means of providing protein to ruminants without adversely affecting animal performance. Studies have shown less variation in animal weight change and supplement intake with less frequent supplementation. These effects are attributed to less competition for the supplement when greater quantities are provided in a single feeding.

It appears that infrequent feeding of a protein supplement is an acceptable and safe practice. Extreme caution should be used, however, with infrequent supplementation of non-protein nitrogen (e.g., urea) due to a lack of related research and the problems associated with over-feeding non-protein nitrogen (urea toxicity).

Energy

Daily energy (grain) supplementation of cattle grazing low-quality forage can yield beneficial results if care is used in determining the type and amount of supplement to be used. High-grain supplements, however, normally reduce the intake and digestibility of

low-quality forage. This is most likely due to a decrease in ruminal pH, which decreases the activity and/or number of fiber-digesting microorganisms. This depression of microbial activity may be greater with infrequent feeding. In addition, infrequent feeding of high-energy supplements can result in grain overload (acidosis) and impair animal performance. Therefore, infrequent feeding of high-energy supplements should be used with caution.

Supplement Delivery Method

Critical to the success of a supplemental feeding program is selecting a delivery method that will provide a desired amount of feed to the herd while minimizing the variability in supplement intake among individuals within the herd. Therefore, choosing a delivery method is an important consideration in developing an effective supplementation program.

The time and labor available to the beef producer must also be considered when selecting a delivery method. For this discussion, supplement delivery methods are classified as either hand-fed or self-fed.

Hand-Fed

Hand feeding allows the beef producer to control the amount of supplement provided to the cattle. There is little control over individual supplement intake, however. Hand feeding daily allows aggressive animals (usually older and more dominant) to consume disproportionately greater amounts of supplement compared with those that are more submissive.

Research indicates that providing about 3 feet of trough or feeding space per animal can minimize the effects of dominant animals. Less space excludes some animals from consuming supplement, and more space appears to increase the impact of aggressive animals. Producers may find that hand feeding greater amounts of a supplement at less frequent intervals may be less disruptive and reduce variation in supplement intake.

Self-Fed

Self feeding allows animals continuous access to supplement, thereby decreasing competition and the number of non-feeders. Realize that variation in supplement intake can be as great or greater than with hand-fed supplements.

Research with self-fed supplements (e.g., liquid, blocks, and tubs) has demonstrated a large degree of variation in individual animal intake. Also, most self-fed supplements are more expensive than hand-fed supplements when expressed per pound of supplemental nutrient. Consequently, the “cost of convenience” should be calculated and considered when deciding to use self-fed or hand-fed supplements.

The cost per pound of nutrient (protein and/or energy) for each supplement should be calculated in addition to the cost of associated delivery equipment. The

resulting monetary difference between self-fed and hand-fed supplements can be considered the “cost of convenience.”

The primary advantages of self-fed supplements include ease of application, minimal investment in equipment, and a relatively low labor requirement. Types of commonly used self-fed supplements include (1) blocks, (2) tubs, (3) liquid, and (4) salt mixtures.

Over consumption of supplement can be a problem unless a reliable method of limiting feed intake is used. Some of the measures used to control intake are block and tub hardness, type and amount of protein, fats and/or oils, calcium chloride, additives (e.g., monensin and phosphoric acid) and salt.

Generally, sources of non-protein nitrogen are less palatable than natural proteins. Also, animal byproduct proteins (blood meal, fish meal, poultry byproduct meal, etc.) are less palatable than plant proteins (soybean meal, cottonseed meal, corn gluten feed, etc.).

Fats and oils are often used by the commercial feed industry to limit supplement intake. Avoid ruminal disturbances, however, by not allowing levels of the total ration to exceed 5 to 10 percent. Fats and oils are best used in conjunction with some other method of limiting intake.

Calcium chloride has been shown to limit supplement intake by yearling cattle to 1 percent of body weight when included at 2.5 to 5 percent of the supplement. A major drawback of calcium chloride is its corrosive nature and high calcium content.

Forage based diets are normally low in phosphorus, therefore, use of calcium chloride to limit supplement intake will increase the calcium:phosphorus ratio. Dietary calcium:phosphorus should range from 2:1 to 7:1 to avoid metabolic problems and depressed animal performance.

Feed additives can also be used to limit supplement intake. Two of the more common are monensin and phosphoric acid. Supplements containing monensin generally depress intake by about 10 percent compared with those without monensin. Also, feed companies sometimes use phosphoric acid in liquid supplements to limit intake.

Salt is another compound that is routinely used to limit supplement intake. Cattle will normally consume

.10 to .15 pound of salt per 100 pounds of body weight daily, however, salt tolerance can vary by animal. Most successful salt-limiting supplements contain from 20 to 35 percent salt. Concerns with salt-limiting feeds include its corrosive nature, the ability of cattle to adapt to the salt (therefore requiring greater amounts to maintain intake at a desired level), and an increased requirement for water.

Hand-Fed vs. Self-Fed

By providing a supplement delivery system that optimizes uniformity of consumption and minimizes economic inputs, the beef producer can effectively improve his/her supplementation program. Therefore, economics and value of convenience should be considered when determining the method of choice.

Pasture size and accessibility, along with available time, labor, and equipment, will dictate which supplement delivery method is most appropriate for an individual program. Delivery method is not as important in small pastures or holding facilities as in extensive situations. This is because pasture topography and site of supplementation have less affect on grazing distribution and grazing time. Daily hand feeding in large pastures, however, may affect grazing activity by decreasing grazing time and impairing the ability to uniformly graze the entire pasture.

Either self feeding or infrequent hand feeding may reduce the anticipation of being fed and encourage longer grazing times, thereby improving livestock distribution and forage utilization. Also, research has shown cattle can be lured to areas of underutilized rangeland by strategic placement of self-fed supplements.

Conclusion

Numerous supplementation strategies are available to increase animal performance and improve the utilization of low-quality forages. No specific supplementation program is perfect for everybody. Supplementation strategies can vary from one operation to the next depending on (1) the quantity of forage available; (2) the nutrient(s) being supplemented; (3) the availability of feedstuffs, labor, and equipment; (4) the size, extent, and type of operation; and (5) the desired goals of the beef operation. Thus, a supplementation program should be tailored to the conditions of a particular ranch for a particular year with careful consideration of the desired goals and expectations.



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