Alternative supplementation strategies

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Supplements can be broadly categorized into the following classifications; 1) vitamin/mineral, 2) energy, and 3) protein. Price, local availability, storage requirements, and spoilage characteristics will impact how different energy and protein supplements fit into an operation.

Vitamin/mineral Supplements. Feed companies have developed vitamin/mineral formulations for different types of diets. Most producers purchase and offer a free choice formulation to balance vitamin/mineral needs of cows as they move through their production cycle. The cheapest vitamin/mineral supplement is not always the best buy. Lower cost supplements often include vitamin and mineral forms that are less available to the animal. In general, the oxide form of most minerals (magnesium oxide is an exception) is not readily utilized by the animal. Look at the feed tag to identify the level and form of important vitamins and minerals. Consult with the local Extension educator or state beef specialist as needed for help in interpreting feed tag information and how it might best fit into your rations. In addition, lower cost supplements are sometimes formulated for higher daily intake, which can result in over-consumption and increase the overall cost of supplementation.

High energy supplements. Historically, corn has been one of the cheapest sources of energy and the energy source of choice for finishing cattle in the Midwest. When corn is used as an energy source in a high forage diet, it should not exceed 0.3% of body weight on a dry matter (DM) basis (example: 1200 lb cow x .003 = 3.6 lb corn DM, or 3.6 ÷ .88 = 4.1 lb as-fed corn) because higher levels can have a negative effect on fiber digestion by lowering rumen pH. When corn prices are high, producers begin searching for cheaper energy sources, such as byproducts.

Soybean hulls (SBH) have become a popular energy source for cow-calf producers. They are a highly digestible fiber resource which contain about 12% protein, but virtually no starch. This lack of starch makes SBH an excellent energy source to balance high forage diets. In general, SBH can be substituted pound for pound with corn as an energy supplement on high forage, maintenance or grower-type diets. Although SBH can be used in
most rations as an energy source, it does have limitations. Pelleted SBH expand six to eight
times in size when they come in contact with the rumen liquid and can cause bloat when fed
at high levels. They should be fed at levels not to exceed 1% of body weight on a DM basis
(i.e. 1200 lb cow x .01 = 12 lb DM, or 12 ÷ .88 = 13.6 lb as-fed). In growing diets (creep
feed, early wean rations, heifer and bull development rations, etc.), forage quality, level of
SBH, and amount of other feed ingredients in the diet interact to affect animal performance.
Some starch (corn, oats, wheat) will likely be needed to maintain the desired level of
performance in both young calf rations and in feedlot finishing rations.

Wheat midds are a by-product of the flour industry and contain 14 to 18% protein
(DM basis) that is about 77% rumen degradable and can contain 17 to 45% fine starch. In
general, wheat midds can substitute pound for pound with corn as an energy source, but
contain more protein, phosphorus, potassium, copper, zinc, magnesium and selenium. To
prevent the possibility of digestive upsets, cattle should be adapted to wheat midds by slowly
introducing them into the ration and they should not exceed about .5% of body weight (DM
basis) in forage based diets. Corn skins are a similar byproduct to wheat midds and can be
variable in their starch content from load to load.

Hominy feed is a byproduct from the manufacture of pearl hominy, hominy grits, or
table meal from corn. It is similar in appearance to ground corn, but has slightly more energy
(about 56% starch and 4-12% fat) and crude protein (about 10%). It can substitute pound for
pound for corn up to a suggested upper inclusion level of 0.5% of body weight (DM basis)
because of the starch and fat content.

**High protein supplements.** Corn distiller’s grains plus solubles (DGS; wet and dry) are a
byproduct of the dry corn milling process which is used by many of the newer generation ethanol
plants in the Midwest. This byproducts is often available in a dry (about 90% DM), wet (about
30% DM), or modified wet (about 50% DM) form. The price of dried distiller’s grains + solubles
(DDGS), in particular, is often closely tied to the price of other traditional feeds (corn and
soybean meal) and its use in rations does not always reduce the cost of production. Wet
distiller’s grains (WDGS) are typically a cheaper source of energy and protein than the DDGS,
but shelf life and spoilage can be a concern if not used in a timely manner. When DGS are used
in cow rations, producers need to be aware that there are limitations in how much can be safely fed. The levels of protein (nitrogen), fat, sulfur, and phosphorus in DGS should be considered when balancing rations to minimize any negative effects on reproduction, calf birth weights, animal health, and carcass quality. In general, the recommendation for DGS has been to include them in diets at levels that meet the animal’s protein requirement, but not exceed 0.5% of bodyweight on a dry matter basis.

Nutrient excesses can become a problem when feeding higher levels of DGS (i.e. as a primary energy source). The availability of distiller’s grains at bargain prices have been, for the most part, limited to those plants that market WDGS, or when plants have a breakdown/shutdown and must relinquish excess supplies quickly. To capitalize on this opportunity, a producer needs to be able to quickly accept, store, and feed semi-load quantities of WDGS in a short period of time before the product spoils.

Co-ensiling WDGS (30-50% DM) with a forage resource (corn silage, haylage, dry hay, straw, corn stalks) can be an option. Co-ensiling allows delivery of semi-load quantities of wet byproduct, stabilizes the product for longer-term storage, and reduces the bulk density which allows the use of large sealed upright, horizontal or plastic storage structures. In general, the key to co-ensiling WDGS is to blend the ingredients together in a ratio that results in a moisture level (35-55% DM) to optimize fermentation. Re-ensiling (mixing previously ensiled corn silage with another feed, such as WDGS) is another strategy, like co-ensiling, that can be used by producers to capitalize on semi-load quantities.

Corn gluten feed (CGF; wet and dry) is a byproduct of the wet corn milling process that is often a “good buy” when nutrient content, local availability and price are considered. In general, the same nutrient limitations described with DGS on how much can be added to cow diets applies to CGF. However, since CGF contains slightly less protein, fat, and sulfur than DGS; slightly more CGF than DGS can be added to the diet with a suggested upper inclusion level of 0.6% of body weight on a DM basis. The recommendation for brewer’s grains (wet or dry) is similar to that of CGF since they contain about the same level of protein as DGS; but less energy, fat, sulfur, and phosphorus than CGF.
**Commercial supplements.** Commercial supplements are an option to add needed nutrients and to stretch limited forage supplies. In most cases, commercial supplements contain a combination of energy, protein, vitamins and minerals. The challenge for producers is to find the correct supplement at the appropriate time to meet, without significantly exceeding, the nutrient requirements of their animals in a cost effective manner. When evaluating commercial protein supplements alternatives, compare them on a cost per unit of protein ($/lb protein) basis. For example, if soybean meal is $300/ton and it is sold containing 45% protein (as-fed basis), the cost is $0.33/lb protein:

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[2000 \text{ lb /ton SBM}] \times [0.45] = 900 \text{ lb protein/ton SBM}
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\frac{\$300/\text{ton SBM}}{900 \text{ lb protein/ton SBM}} = \$0.33/\text{lb protein}
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Many commercial supplements have been created in the form of pellets, cubes, tubs, blocks, lick tanks, etc. to improve feeding flexibility and convenience, but the cost per unit of protein typically increases as level of processing and convenience increase. The value of convenience must be evaluated by each producer.