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Supplementation Needs for Gestating and Lactating Beef Cows and Comparing the Prices of Supplement Sources

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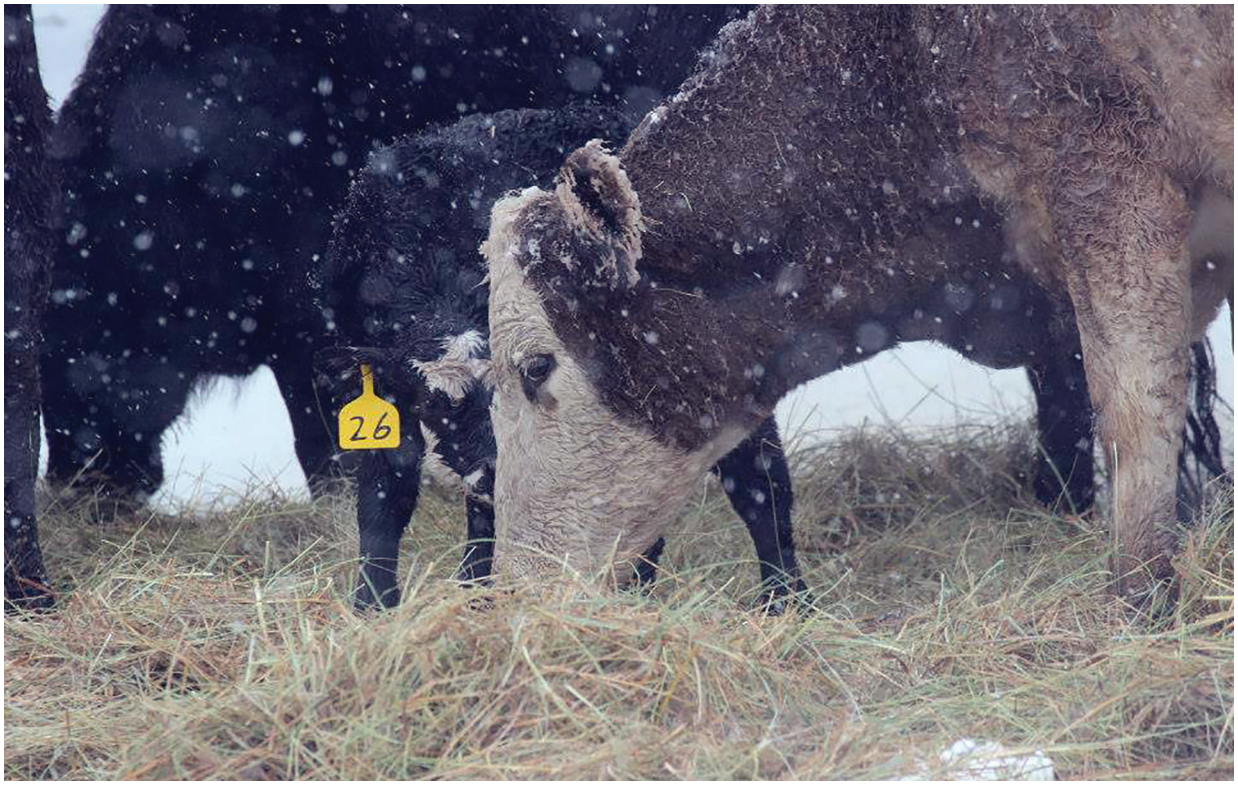
Formulating rations for the cow herd is important. Accurate nutrient compositions for feed ingredients are needed to prevent expensive errors.

Feed costs are a major expense for any cow/calf operation so most producers want to make sure that money is spent wisely. Knowing what type of supplement is needed, when it is needed, and how to compare supplements based on nutrient content will help producers make better decisions on supplement purchases.

Energy Supplementation

Time of calving, the age of breeding females, and the quality of the base diet determine if and when supplementation is necessary for a cow herd during late gestation and lactation. A spring calving cow will be in late gestation—and possibly peak lactation—prior to pasture turnout in the spring, depending on calving date and forage availability. Thus, supplementation may be necessary to meet the cow's nutritional needs.



In late gestation the energy requirements of a mature, 1,200 lb cow are relatively low (9–11 lb total digestible nutrients or TDN per day, 2 lb crude protein per day). As that cow grazes dormant range or low-quality forages, supplementation of 2–2.5 lb of a 20–25 percent crude protein (CP) source would meet the cow's maintenance demands at this state of production. This supplemental protein cube will supply rumen microbes with protein, allowing them to digest the low-quality forage and provide needed energy to the cow, thus meeting her nutrient requirements during this stage of production.

As a mature cow enters calving and lactation, her protein and energy requirements increase. A lactating cow at peak lactation (60–80 days postpartum) has an energy demand of 15–16 lb of TDN per day. There is a shift in the cow's first limiting nutrient from protein to energy. In the example diet above, 2–2.5 lb of a 20–25 percent CP cube would not meet the 1,200 lb cow's energy demands. Simply increasing the amount of supplement from 2.5 to 8 lb of supplement will still not meet the mature cow's energy demands either. Because this increase in supplement will provide only 13.4 lb of TDN daily, it will not meet the energy demands of the lactating cow.

Protein Types

There are essentially two forms of protein to consider when supplementing cattle. Protein can either be **rumen degradable protein** (RDP), also formerly known as degradable intake protein (DIP), or **rumen undegradable protein** (RUP or by-pass protein, escape protein, or undegradable intake rumen). Rumen degradable protein is used by rumen microbes to produce volatile fatty acids and bacterial crude protein (BCP). Bacterial crude protein then leaves the rumen to be further digested in the lower digestive tract. Rumen undegradable protein bypasses digestion in the rumen and is digested in the lower digestive tract.

When BCP and RUP progress to the lower tract for digestion, they are referred to as metabolizable protein (MP), the form of protein that is actually used by the beef animal itself. The MP requirement for mature cows grazing dormant native range during mid- to late gestation could be met by supplying a urea-based supplement. At times, even though distillers grains provides more MP than necessary, it is more economical than a urea-based supplement. However, market volatility makes it necessary for producers to evaluate protein supplement economics yearly.

Caring for the First and Second Calf Heifers

Independent of the season for calving, a first-calf heifer needs to be supplemented with crude protein (both RDP and RUP sources) and energy in the last trimester of pregnancy and into the breeding season. The heifer is not at her mature weight prior to her first calf being born so she will need supplemental protein and energy for muscle deposition, milk production, and body condition maintenance. Research has shown supplemental metabolizable protein prior to calving in spring-calving heifers is needed to increase the pregnancy rate on the second pregnancy.

Similar responses have been documented for supplemental energy, suggesting MP and energy needs are hard to separate for the young cow. Every effort should be made to ensure first-calf heifers have a body condition score of 6 at calving and at least a 5.5 going into their second breeding season.

Separating heifers from the mature cows in the herd should be done at least three weeks prior to calving. First-calf heifers decrease their daily dry matter intakes by 17 percent in the three weeks prior to calving. Feeding an energy and protein dense diet to heifers is necessary to compensate for this reduced intake at calving. According to Rick Rasby, Nebraska Extension Beef Specialist, in *Feeding First Calf Females After Calving*, a first-calf heifer should be consuming a diet that is at least 62 percent TDN and 10–11 percent crude protein post-calving. Winter range, grass hays, or meadow hays will not meet the heifer's nutrient requirements alone. Supplementing high-quality alfalfa, distillers cake, or other non-bulky supplements that are high in energy and protein will help meet the nutrient requirements of the heifers in the herd.

Both the mature cow and first-calf heifer have high energy requirements during lactation. If cows are turned out at pasture greenup, the grass will likely meet the energy needs of the cow. However, if peak lactation occurs before pasture turnout, supplementation must occur if the base diet is dormant range or low- to medium-quality hay. Providing a supplement that is high in protein and energy would be ideal. For example, dry distillers grains (or distillers-based pellets) is an excellent source of protein and energy. If the lactating cow's feed is supplemented with 5 lb per day of distillers grains, her energy needs would be met (*Table 1*). Some areas of western Nebraska do not have access to dry distillers grains, but do have access to high-quality hay. Alfalfa hay and corn can make an acceptable ration to meet the needs of mature lactating cows (*Table 2*).

Early summer calving herd cows (April/May) will be in peak lactation when grasses in pastures are vegetative

and high in nutrient quality. Supplementation during this time will not be needed. However, during the breeding season (July/August), the range will be maturing and the nutrient quality of the grass will be declining. Supplementing young cows during the breeding season with 1.5–2 lb of distillers grains may increase the number of cows achieving a second pregnancy.

TABLE 1. Example rations for first calf heifers in peak lactation

Ingredient	Actual lb to feed	% DM	%TDN	% CP
Ad libitum winter range	12.5	80	50	8
Medium-quality hay	12.5	80	56	12
Dried distillers grains	4.5	89	108	30
Total TDN, lb			14.4	
Diet CP, %				13.6
Alfalfa hay*	22	85	58	18
Corn	4.5	88	83	10
Total TDN, lb			14.4	
Diet CP, %				16.6

*The diet containing alfalfa hay has more crude protein but less metabolizable protein for the young cow because alfalfa is lower in undegradable protein than distillers and will support less growth for the young cow.

TABLE 2. Example rations for mature 1,200 lb cows in peak lactation

Ingredient	Actual lb to feed	% DM	% TDN	% CP
Ad libitum medium-quality hay	27–28	80	50	8
Dried distillers grains	5	89	108	30
Total TDN, lb			15.8	
Diet CP, %				11.8
Alfalfa hay	28	85	58	18
Corn	2.7	88	83	10
Total TDN, lb			15.9	
Diet CP, %				17.3

Cost Comparison for Protein and Energy Supplements

When comparing sources of supplemental protein or energy to feed the herd, calculating the cost of the supplement on per pound of protein or per pound of energy basis is key. A description of how to calculate these values is illustrated in Example 1:

Example 1

Protein Source	Alfalfa Hay (Good)	Dry Distillers Grains (DDGS)
Cost (as is basis)	$80 per ton	$183 per ton
DM	90%	90%
CP	18.4%	30%
TDN	59%	108%

Purchases Cost of Nutrient

Alfalfa Hay

Cost per pound: $80 per ton (2,000 lb) = $80/2,000 = $0.040/lb

Cost per pound of DM: $0.040/0.9 (DM content) = $0.044/lb of DM

Cost per pound of protein: $0.044/0.184 (protein content) = $0.24/lb protein

Cost per pound of energy: $0.044/0.59 (TDN content) = $0.07/lb of TDN

Dry Distillers Grains with Solubles

Cost per pound: $183 per ton (2,000 lb) = $183/2,000 = $0.092/lb

Cost per pound of DM: $0.092/0.9 (DM content) = $0.102/lb of DM

Cost per pound of protein: $0.102/0.30 (protein content) = $0.34/lb protein

Cost per pound of energy: $0.102/1.08 (TDN content) = $0.09/lb of TDN

Example 2

Protein Source	Alfalfa Hay (Good)	Wet Distillers Grains (WDGS)
Cost (as is basis)	$80 per ton	$70 per ton
DM	90%	35%
CP	18.4%	30%
TDN	59%	108%

Purchases Cost of Nutrient

Alfalfa Hay
Cost per pound: $80 per ton (2,000 lb) = $80/2,000 = $0.040/lb
Cost per pound of DM: $0.040/0.9 (DM content) = $0.044/lb of DM
Cost per pound of protein: $0.044/0.184 (protein content) = $0.24/lb protein
Cost per pound of energy: $0.044/0.59 (TDN content) = $0.07/lb of TDN

Wet Distillers Grains with Solubles
Cost per pound: $70 per ton (2,000 lb) = $70/2,000 = $0.035/lb
Cost per pound of DM: $0.035/0.35 (DM content) = $0.10/lb of DM
Cost per pound of protein: $0.10/0.30 (protein content) = $0.33/lb protein
Cost per pound of energy: $0.10/1.08 (TDN content) = $0.09/lb of TDN

Not only should the purchase price per pound of protein and energy be calculated, but delivery costs, costs associated with feeding, and costs associated with grinding, shrink, and storage also need to be accounted for. The more in-depth the calculations, the more valuable the comparison will be. An Excel template titled *The Feed Cost Cow-Q-Lator*, created by UNL agricultural economists, allows producers to make protein and energy supplementation comparisons easily through simple value inputs. This template also has the capability to calculate dollar per pound of protein or energy by including the "other costs" listed above. The Ag Manager's tool can be found at http://westcentral.unl.edu/agecon3.

Other Supplementation Considerations

Formulating rations for the cow herd is important, and accurate nutrient compositions for feed ingredients are needed. Otherwise, expensive errors can result. Sampling forages fed will ensure that nutrient requirements are being met accurately through supplementation and unnecessary costs associated with an error do not occur. Refer to the NebGuides *Sampling Feeds for Analysis* (G331) and *Understanding and Using a Feed Analysis Report* (G1892) for assistance.

When formulating gestating cow rations, another important consideration is the knowledge of the difference between dry matter (DM) and as-fed weight values. Dry matter is the amount of feed ingredients devoid of water, which is the form in which rations are formulated. The weight of feed on an as-fed basis means just that—water is accounted for in as-fed values, and this is the form with which ingredients actually comprise a ration. The Nebguide *Understanding and Using a Feed Analysis Report* (G1892) also illustrates how to convert feed weights between a DM and as-fed basis.

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