Supplementation Strategies to Stretch Winter Forage Supplies for Beef Cattle

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Beef cattle represent the most important grazing livestock enterprise to Kentucky producers. They are raised on more than 40,000 Kentucky farms and in many cases represent the only method of converting forage to income for those producers. Most farm business records programs show that calves sold from beef cow herds will generate sufficient income to cover cash expenses but a net return over all expenses is generally not met. Data from the latest summary of the Kentucky Farm Business Management Program and SPA summaries from Michigan and Illinois for beef cow enterprises are shown in Table 1. Feed costs which Include purchased feed and the fair market value of home raised feed compose the majority of the costs of maintaining a cow yearly. Examination of the data from Michigan and Kentucky (Table 2) reveal that high net return herds have lower feed costs than low net return herds.

Forage, either grazed or harvested and stored for later feeding represents the basis of beef cow feeding programs. Producing and storing forages on the farm for winter feeding generally represents the least expensive way of feeding the cow; however, hay is not free as most producers seem to think. Data in Table 3 show the production costs per ton of forage fed from the herd analysis in the three states. The costs of production ranged from $40 to $46.28 per ton fed. Hay is certainly not free and in many cases, not inexpensive.

There are situations when additional feed needs to be purchased such as drought, crop failure or lack of quality to meet nutritional needs. Most often, a producers first reaction is to try to buy additional forage. Purchased forage often costs 80 or more dollars per ton especially if quality forage is sought. When purchasing, producers must be concerned about cost per unit of nutrient. Nutrient dense feeds are generally the best buy when this is considered. Cows do not have to be wintered on hay. A three year summary of limit feeding a high energy ration to cows is shown in Table 4. For this three year experiment, Simmental x Angus cows bred to Simmental bulls were used. Cows were wintered separately but lost slightly less body weight than cows on hay although both groups maintained condition well. Calf birth weight was slightly higher for the corn fed group but no calving difficulty was observed during the three year trial. Weaning weight was increased by 21 pounds and conception rate by 7% for the corn fed cows even though they were maintained on the same pastures during the grazing season.

Limit fed high energy rations can also be used to reduce forage needs for growing cattle. A comparison of using a limit fed, high moisture corn based ration and a traditional corn silage - supplement based ration is shown in Table 5. The limit fed cattle received no forage but were limited to 70% of the dry matter intake of the cattle with free choice intake of silage. Gain of the two groups was equal but the feed efficiency of the limit fed high energy group was greatly improved. Ration dry matter digestibility of the limit fed cattle was increased from 65 to 88.6

percent. As feed intake is reduced, passage through the digestive tract also slows, allowing for more of the feed consumed to be digested, thus the cattle maintained rate of gain on 30% less feed.

Many producers may not be able to manage the elimination of hay feeding with limit fed high energy rations, especially when corn is used. They may simply want to supplement some additional energy when hay quality is low or there is some supply but not enough to get through the winter. Many producers will simply feed a few pounds of corn per head daily to cows in the winter. This may not be the appropriate management decision especially if hay quality is limiting. Data in Table 6 illustrates this point. As small amounts of corn were increasingly supplemented to cows with lower quality hay, hay and total dry matter intake decreased except for the first unit of corn supplemented. As increasing amounts were fed, intake of digestible organic matter decreased. This was due to a greater than 1 to 1 substitution of hay and corn and to a large decrease in the digestibility of the organic matter from the hay. As increasing amounts of starch from corn were fermented in the rumen, pH was decreased and fiber digesting bacteria were reduced. As corn or starch was increased, the ability to digest the hay was lost.

Feed byproducts that contain only small amounts of starch but are highly digestible are available. The common ones available in Kentucky are soybean hulls and corn gluten feed. These products should add nutrients to the ration without large detrimental effects on fiber digestibility from hay. This effect is illustrated for soybean hulls in Tables 7 and 8. In Table 7, as increasing amounts of soybean hulls were supplemented, organic matter intake from hay only decreased at the highest level of SBH intake. Digestible organic matter intake continued to increase at all levels of SBH supplementation. This indicates that the digestibility of the hay organic matter was not decreased and that intake was decreased only as a result of substitution.

In Table 8 either a corn - soybean meal mixture or Soybean hulls were supplemented to an all hay ration to provide 25 or 50 percent of the TDN intake for the cattle. When both supplements comprised only 25% of the TDN intake, there was little difference in effect. When both supplements composed 50% of the TDN intake, there were differences. Cattle fed the soybean hull supplement consumed more dry matter and digestible organic matter and gained .42 pounds per day faster. Again, an indication that the high level of corn was interfering with digestibility of hay while the higher level of soybean hull supplement was not

One advantage that the low starch feed byproducts have over corn is that there is less danger of founder when limit feeding high levels in order to minimize or eliminate hay feeding. The effect of limit feeding corn gluten feed vs hay and a protein supplement is shown in Table 9. In this trial, cows were provided free choice access to a medium quality grass hay with 2 pounds of a protein supplement per head daily. For the other treatments, cows were fed an 80:20 % mixture of either corn or corn gluten feed and cottonseed hulls with no hay provided. Cows fed the corn - cottonseed hull mixture lost a small amount of body weight but maintained condition score. Cows fed the gluten feed - cottonseed hull mixture had positive weight and condition score gain while consuming only half the dry matter

intake of the hay fed cows. As the broiler industry continues to grow in Kentucky, increasing amounts of recycled poultry bedding will become available. When properly processed by deep stacking to allow heating to occur, this material can be mixed with an energy source and provide a very satisfactory feed for cattle. The results of mixing various combinations of corn and soybean hulls with recycled poultry bedding is are shown in Table 10. Growing cattle were grazing stockpiled tall fescue and provide free choice access to a mixture of 50% recycled poultry bedding and the combination of corn and soybean hulls shown. As the amount of corn was decreased and soybean hulls increased, feed intake and performance increased. This most likely is a result of improved fiber digestion occurring due to improved rumen pH as corn decreased and soybean hulls increased in the ration.

There are many times when producers need to stretch or substitute for the hay supply on the farm. Corn grain may be the choice of producers the most often but it may not represent the appropriate choice especially for the lower quality of hays. Feed byproducts that contain low or limited amounts of starch may provide the best utilization of hay and supplement fed.

Table 1. Costs of Maintaining a Beef Cow in Kentucky, Illinois or Michigan

State	Kentucky	Illinois	Michigan
Feed costs, purchased and home raised, $	191	227	238
Non-feed, cash costs, $	141	142	156
Total cash and value of home raised feed, $	332	369	394
Feed as a % of total	57.5	61.5	60.4

Table 2. Feed Costs ($) of High vs Low Net Return Beef Herds

State and %	High Return	Low Return	% Difference
Kentucky, 33%	$177	$201	12
Michigan, 50%	$190	$298	36

Table 3. Production Costs of Hay per Ton of Forage Fed to Beef Cows

State	$ per Ton Fed
Kentucky	40
Illinois	43.6
Michigan	46.28

Table 4. Limit Feeding Corn vs Traditional Hay Rations to Cows, 3 Year Summary

Ration	Corn	Hay
Weight Loss, lbs	-53	-72
Calf Birth Weight, lbs	102	96
Weaning Weight, lbs	634	613
Conception Rate, %	91	84
	Average Daily Feed Intake, lbs	
Hay	2.1	30
Shelled Corn	11.3	------
Supplement	2.5	------

Table 5. Limit Feeding High Energy Rations for Growing Cattle

Ration	Corn Silage + Supple.	H. M. Corn based
Head	40	40
ADG, lbs	1.94	1.94
DMI, lbs	13	9
F/G, lbs DM	6.69	4.65
DM Digestibility, %	65	88.6
JAS 68:3086		

Table 6. Effect of Increasing Amounts of Corn on Hay Intake and Digestibility

Corn, lbs/day	None	2.2	4.4	6.6
Hay DMI, lbs	19.3	18	14.1	11.2
Total DMI, lbs	20.9	21.1	18.6	17.2
DOMI, lbs	7.5	8.4	7.1	7.3
Hay, OM Digest., %	36.5	35.1	23.6	18.9
JAS 65:557				

Table 7. Effect of Increasing Amounts of Soybean Hulls on Hay Intake

SBH, lbs/day	None	2.2	4.4	6.6
Hay, OMI, lbs	21.4	22.3	21.6	19.9
DOMI, lbs	10.6	11.8	12.3	12.7
JAS 68:4319				

Table 8. Soybean Hulls vs Corn - Soybean Meal on Gain of Cattle fed Grass Hay

Ration	Hay	CSBM-25	SBH-25	CSBM-50	SBH-50
ADG, lbs	0.66	1.39	1.34	1.67	2.09
DMI, %BW	1.99	2.33	2.35	2.42	2.69
DOMI, lbs	6.67	9.13	9.68	11.1	12
JAS 75:1918					

Table 9. Limit Feeding Corn Gluten Feed vs Hay and Protein for Beef Cows

Ration	Hay + Supplement	Corn + Cotton Seed Hulls	Corn Gluten Feed + Cottonseed Hull
Fiber DMI, lbs	23.6	2.17	2.63
Concentrate DMI, lbs	2	8.98	10.5
Wt. Gain, lbs	92.4	-11	35.2
BCS Change	0.6	0.5	0.7
PAS 16:220			

Table 10. Soybean Hulls vs Corn fed with Recycled Poultry Bedding

Corn %	50	37.5	25	12.5
Soybean Hulls %	0	12.5	25	37.5
Int. Wt. lbs	526	511	491	510
Feed Intake lbs	19.7	23.5	23.6	25.1
ADG, lbs	1.83	2.09	2.06	2.19
Kentucky Research Report PR 417, p. 75				