

CONSIDERATIONS IN FEEDING BEEF CATTLE

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Should beef cattle grazing good pasture need additional supplementation? Forage can meet most all of beef cattle requirements given the following conditions: 1) Forage for grazing or hay is in optimal maturity; 2) Forage quantity is adequate to maximize dry matter intake; 3) The endophyte is not present if the forage is fescue and 4) A mineral – vitamin supplement is available at all times. If any of these conditions are not met or if the producer wishes to increase carrying capacity or individual performance beyond that available from forage only, then supplementation will be necessary.

When supplementation is necessary, producers must decide the correct supplement to use. A forage analysis will assist in determining the limiting nutrient and type of supplement to use. A complete macro and trace mineral supplement may be all that is necessary if forage management is good and/or cattle performance expectations not too high. The most common supplement to cattle on pasture is generally grain. It may not be the best one for the situation, however. Data in Table 1 show the effect of increasing corn supplementation to growing steers grazing fescue. Supplementation at .25% of body weight increased gain

Table 1. Corn Supplementation to Steers Grazing Fescue			
Lbs Corn/hd/day	ADG, lbs	ADG increase	F/G, lbs
0	1.32	-----	-----
1.4	1.75	.43	3.25
2.8	1.75	0.0	-----
4.2	2.0	.25	11.25
Kentucky 1995			

significantly with an excellent conversion of supplement to additional gain. An increase in supplement level to .5% of body weight provided no increase in animal gain. With the final increase in supplement level to .75% of body weight, an additional increase in gain was obtained but the conversion of additional feed to gain was uneconomical.

When the first incremental increase of corn yielded significant increases in performance, why did not additional increases of grain also yield improvements in gain and conversion? Data from a supplementation trial with cows shown in Table 2 will provide answers. As corn supplementation increased, hay dry matter intake decreased, for a substitution effect as would be expected. Starch intake also increased as corn supplementation increased. What was not expected was that Digestible Organic Matter intake decreased beyond the first increment of corn supplementation. Producers should consider DOMI as the portion of the feed containing the

nutrients with the exception of minerals. Simply put, as more corn was supplemented, fewer nutrients were taken in.

Corn, lbs	None	2.2	4.4	6.6
Hay, DMI, lbs	19.3	18	14.1	11.2
Hay, % B. Wt.	2.3	2.14	1.66	1.32
Total DMI, lbs	20.9	21.1	18.6	17.2
Starch Intake, lbs	-----	1.48	2.95	4.74
DIP Intake, gm	153	130	106	84
DOMI, lbs	7.5	8.4	7.1	7.3
Hay Digestibility %	36.5	35.1	23.6	18.9

JAS 65:557

Three lines on the table provide us with the reason that fewer nutrients were taken in as corn supplementation was increased. Starch intake increased as corn supplementation increased. Bacteria in the rumen that digest starch are not the same bacteria that digest fiber. As starch digestion increases, rumen pH is lowered and the fiber digesters are slowly killed off. Thus as starch intake increases, fewer bacteria to digest the hay or pasture are available. Secondly, DIP or degradable intake protein decreases as corn supplementation increases. Rumen bacteria need DIP to supply nitrogen in order for maximum bacterial metabolism in the rumen to occur. If DIP is limiting, rumen function decreases and fiber digestion lessens even more. The results of these factors are shown in the last data line, a 50% reduction in hay digestibility. This is why fewer total nutrients were available to the cow as corn supplementation was increased.

If grain is not the best supplement for pasture or hay based rations, what should be used? The ideal feed or supplement would be one that was low in starch but high in energy and supplied adequate amounts of DIP for optimal rumen function. Many of the so called by-product feeds fit these requirements. The most commonly available products meeting the requirements in this upper south region are soybean hulls and corn gluten feed. These two are low in starch and high in fiber compared to corn grain but the fiber is virtually completely digestible. The same bacteria that digest pasture and hay also digest soy hulls and corn gluten feed, thus there is little negative effect on rumen function. Data comparing commodity feeds to corn-soybean meal based rations for preconditioning calves are shown in Tables 3 and 4. When calves were allowed free-choice intake of both hay and conditioning feed, they consumed more of the commodity based ration. This may have been due to

Ration	Corn/Soybean Meal (9:1)	Soyhulls/Soybean Meal (9:1)
Initial Wt. lbs	558	527
Final Wt. lbs	674	693
ADG, lbs	2.42	3.46
Supplement Intake, lbs/da	12.8	17.4

\$/pound gain	\$.314	\$.254
Hay free choice, Corn \$2.50/bu; SBM \$195/ton; SBH \$75/ton; Hay \$60/ton		

preference or possibly to less starch in the rumen thus less acid produced which could have resulted in the increased feed intake. Gains were improved by 1.04 pounds daily due to the increased feed and likely better utilization of the forage consumed. Cost per pound of gain was also reduced for the commodity based ration.

Ration	Corn/SBM (88:12)	SBH/CGF (67:33)
Initial Wt. lbs	517	516
Final Wt. lbs	628	655
ADG, lbs	2.48	3.08
Supplement Intake, lbs/da	10.4	10.4
Hay Intake, lbs/da	11.8	15.1
\$/pound of gain	\$.33	\$.27
Feed costs of Corn \$2.50/bu; SBH \$70/ton; CGF \$120/ton; Hay \$50/ton		

When the preconditioning rations were fed at the same amount per head daily, cattle fed the commodity based ration ate more hay and had increased ADG of .6 pounds compared to the traditionally fed calves. This data certainly indicates a positive effect of the commodity based ration in the rumen.

Supplement	Corn/Soybean Meal (86:14)		Soybean Hulls	
	Stockpiled	Hay	Stockpiled	Hay
Initial Wt. lbs	648	626	629	629
Supp. Intake lbs	7	7	7	7
ADG, lbs/da	1.4	1.8	1.8	2.2
KY PR-417, p. 86-88, 2000				

Steers fed equal amounts of soybean hulls or a corn-soybean meal based supplement had differing gains whether grazing stockpiled fescue or consuming rolls of fescue-clover hay. Steers consuming the commodity based rations had an improvement in gain of .4 pounds daily regardless of forage source. This data shows that soybean hulls can more than replace a corn-soybean meal mixture on a pound for pound basis when forage is a primary diet ingredient. Highly digestible fiber sources are in general a better supplement than grain based supplements for cattle consuming pasture or hays.

Other types of supplements may also be useful for cattle on forage diets. The role of high fat supplements on reproduction of beef cattle has been extensively studied. Results are mixed but fats appear to be beneficial beyond their nutritional value when cattle are under a nutritional stress. Work from Kentucky has shown that a high fat supplement is beneficial to reproduction when cattle are on high endophyte fescue. Cattle were fed MIX-30, a high fat liquid supplement twice weekly for free choice consumption. A corn-soybean meal mixture was fed daily to a second group of cattle to provide equal intakes of ME and crude protein. Any effect would be

due to the source of nutrients and not the amount of nutrients. Results are shown in Table 6. Cattle fed the high fat supplement had improvements in body condition, body temperature, serum thyroxine levels and pregnancy rates compared to the positive control fed cattle. Fat helped the cattle overcome the effect of fescue toxicities on reproduction.

Table 6. Effect of MIX-30 on Reproduction of Beef Cows Grazing Endophyte Fescue		
Treatment	Corn – Soy mixture	MIX-30
Change in BCS	-.18	+.22
Change in Body Temp. °F	+.15	-.5
Serum Thyroxine, ng/ml	40.2	35.1
Pregnancy %	56.4	75.3
KY SR-2004-2 p. 33		

Additional products are also available to help off-set the effects of toxic fescue. Results of feeding FEB-200 to cows with nursing calves grazing toxic fescue are shown in Table 7. Cow-calf pairs consuming FEB-200 had increased weaning weights compared to the control and corn based supplement only.

Table 7. Effect of FEB-200 on Beef Cows Grazing Toxic Fescue			
Treatment	FEB-200	No Supplement	Corn Supplement
ADG, lbs	2.09	1.98	1.93
Gain, lbs	290	275	268
Wn. Wt. lbs	512	497	490
JAS 81 (Supplement 1):168			

Many considerations must be thought about when supplementing cattle on pasture. Should the supplement be grain based on commodity feed based. Remember that some commodity feeds are not well balanced in their mineral content and could cause problems if used in excessive amounts. Even if additional nutrients are not needed, supplements may still be useful to carry compounds to cattle that will improve production and reproduction.