LOW COST COW/CALF PRODUCTION

The Bulletin ***For Alumni Of The School***

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Superfluous

One of the keys to the Low Cost Cow/Calf Program is Precise Nutrition. It means providing supplemental nutrients that account for forage deficiencies relative to animal requirements - ***no more/no less***. An excess of one nutrient in a supplement mixture can limit the consumption of the remaining nutrients, rendering them at least marginally deficient. A good example, with which we are familiar, is the destructive practice of salt limitation. Generally, an oilseed meal-containing supplement is loaded up with about 30% salt (sodium chloride). The cattle consume the supplement to a level that meets their maximum tolerance for either sodium and/or chlorine. The limitation does not have to be that dramatic when it comes to the trace or micro minerals. An excess of any of the macro minerals such as sodium, phosphorous, potassium, etc., in the supplement can limit the consumption of a trace mineral unless the cow is willing to overconsume the macro mineral. Since the forage usually contains some level of all trace minerals and the supplement did provide at least a small quantity, there will not be an absolute (zero) deficiency. Instead, there will be a marginal deficiency.

Brinkmanship

Marginal nutrient deficiencies are difficult to diagnose. There isn't anything that is blatantly obvious. Tails don't fall off and the cattle do not lose their hair coat. Instead, calves do not gain quite as well, forage energy is a bit more poorly converted, conception rates are slightly lower, etc. Seldom will a marginal nutrient deficiency be detected in blood and tissue analyses.

Galvanizing

An excellent example of what may occur (when cattle experience marginal deficiencies) recently was reported[1] by researchers at Colorado State University. Forty Hereford X Angus heifers, weighing about 450 lb, were used in the study. The study consisted of three phases. The first was a 28-day adaptation phase during which the calves were penned together. They were fed a diet consisting mostly of bromegrass and alfalfa hays. The diet naturally contained 17 ppm of zinc. It was fortified to a level of 40 ppm (recommended nutrient allowance) with zinc sulfate ($ZnSO_4$). At the conclusion of the adaptation phase, all cattle had a similar zinc status (as indicated by the plasma and liver levels shown in the following table). The calves then were allocated to four groups for the 21-day depletion phase. One group served as a control and continued to receive the diet containing 40 ppm of zinc. The remaining three groups were fed the same diet without added zinc (17 ppm Zn). Feed consumption did not decline with the reduced zinc intake (NEm, Mcal/d) but average daily gain certainly did. Naturally, this resulted in a reduced efficiency of energy utilization. Further, plasma and liver zinc levels remained as they were during the adaptation phase.

Effects of zinc depletion and repletion with different sources of zinc.

						Zn levels	
Treatment	Zn mg/d	NEm Mcal/d	Gain lb/d	NEm/lb gain	Plasma mg/L	Liver mg/kg
Adaptation 28 d						
1	$ZnSO_4$	236	9.4	1.23	7.65	.94	108
2	$ZnSO_4$	224	9.0	1.23	7.26	.89	112
3	$ZnSO_4$	236	9.4	1.23	7.65	.96	100
4	$ZnSO_4$	240	9.6	0.99	9.68	.85	110
Depletion 21 d						
1	$ZnSO_4$	244	9.8	1.26	7.77	.97	106
2	0	121	11.4	0.73	15.61	.73	100
3	0	105	9.9	0.68	14.52	.96	97
4	0	111	10.4	0.71	14.74	.82	106
Repletion 14 d						
1	$ZnSO_4$	244	9.8	1.10	8.85	.95	109
2	ZnLys	264	10.6	0.90	11.68	.87	110
3	ZnMet	228	9.1	0.86	10.61	1.07	101
4	$ZnSO_4$	264	10.6	1.19	8.87	.90	111

High dollar stuff

The final phase of the study was a 14-day repletion phase. The diet again was fortified to contain 40 ppm of zinc from either $ZnSO_4$, zinc lysine (ZnLys) or zinc methionine (ZnMet). *Lysine and methionine are amino acids, the basic component of protein. When a mineral is combined with an amino acid, it is termed a proteinated mineral. Some use the term chelated.* With the supplementation of $ZnSO_4$, daily gain equaled that of the control group. Repletion with ZnLys and ZnMet improved daily gain but not to the extent of the $ZnSO_4$ treated group. In a second similar study, the researchers observed a significant increase in urine excretion by the zinc-deficient calves. Also, the urine of the deficient calves contained more sodium and less potassium, suggesting that zinc deficiency may cause a sodium/potassium imbalance.

A really fun thing to do

With somewhat tongue-in-cheek, we've commented often that the most difficult task confronting a Rancher is collecting a forage sample and having it analyzed. It is expensive as well. It is suggested (strongly) that samples be taken monthly for three years in order to have a reliable database. Without such information, how can the Rancher *provide supplemental nutrients that account for forage deficiencies relative to animal requirements*? How can the Nutrition be Precise? Is the risk of marginal nutrient deficiencies worth taking?

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[1] Engle, T.E., C.F. Nockels, C.V. Kimberling, D.L. Weaber and A.B. Johnson. 1997. Zinc repletion with organic or inorganic forms of zinc and protein turnover in marginally zinc-deficient calves. J. Anim. Sci. 75:3074.