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Salt to Limit Intake of Protein and Grain Supplements

Homer B. Sewell

Department of Animal Sciences, University of Missouri-Columbia

Cattle grazing stalk fields and winter range or young cattle that are being fed grain on summer pastures eat too much protein supplements and grain if they are fed these items free choice. Mixing salt with the concentrates and protein supplements has been a reliable way to regulate the intake of these feeds.

A salt mix was superior to the intermittent feeding of a concentrate supplement in a Kansas trial to control the amounts cattle would eat. Using salt to limit the intake to 3 pounds of concentrate per head daily for 440-pound steers wintered on stacked milo stalk gave daily gains of 0.61 pound. Daily hand feeding gave 0.76 pounds daily gain and feeding the same amount twice weekly gave 0.47 pounds daily gain.

Safety

The National Research Council recommendation (1976) states that the requirement for salt appears to be met by including 0.10 percent salt in the ration dry matter of cattle. The amount of salt cattle consume when given free access to it will vary with the size of the cattle and the type of ration. When they are grazing pasture grasses, they consume more than twice as much salt as when they are being fed dry feeds. Cattle grazing immature forage eat more salt than those that are grazing the drier mature forage. Cattle fed silage or high roughage rations eat more salt than those that are fed high-concentrate rations.

Some cattle feeders worry that their animals will be harmed by high salt consumption when they are fed salt mixes. But the extra salt will not be dangerous if the cattle have access to plenty of water. In an Arizona State University study, cows drenched with 2 pounds of salt showed signs of salt poisoning and eventual death if water was denied. But there were no signs of toxicity when free access to water was allowed after the salt drench. Cattle needed to drink extra water to excrete the salt in the urine.

They found the kidneys of cattle could not concentrate more than 2.3 percent salt in urine. Thus, 5 gallons of urine was necessary to eliminate 1 pound of salt. If drinking water was restricted, the extra urine needed to excrete the salt could not be produced and salt built up in the blood to toxic levels.

Cows fed 1 pound of salt daily for the last 2 to 3 months of pregnancy have had no difficulties, so long as they had access to all the water they wanted. Lactating cows fed 1 pound of salt daily have not increased the salt content of their milk and there has been no harmful effect on nursing calves. High salt levels do not decrease the digestibility of nutrients in cattle rations.

Be certain that the drinking water does not ice over and cause a shortage of water for cattle that are being fed salt mixes in winter.

Level of salt to include

Salt has been used successfully to control the intake of protein and grain supplements both on range and in dry lot. The percent of salt needed in the mixture will vary with how well the cattle like the taste of the feed you are trying to limit and with the characteristics of the remaining ration, and other factors.

Cattle tend to consume daily about 0.1 percent of their body weight in salt when oil meals and grains are mixed with salt and offered free-choice. A 500-pound calf will eat about 0.5 pound and a 1,000 pound cow will eat about 1 pound of salt daily. This amount of salt needs to be mixed with daily allowance of oil meal or grain that is to be limited.

Table 1 gives the pounds of salt eaten daily by cattle of various body weights if the consumption is 0.1 percent of body weight. Also given in Table 1 in the columns at right are the percentages of salt needed in a mix to get different pounds of feed consumed daily. To illustrate, if 2 pounds of soybean meal are to be fed daily to a 600-pound steer, the free-choice mixture should contain 23 percent salt: $[0.6 \div (0.6 + 2.0)] \times 100 = 23\%$.

Table 1. Percent salt needed to control intake.

	Pounds of feed intake per head per day							
	1	2	3	4	5	6	7	8
Cattle weight: 400 lb. (daily salt intake = 0.1 percent of body weight, or 0.4 lbs.)	Percent salt in mixture							
	29	17	12	9	7	6	5	--
Cattle weight: 500 lb. (daily salt intake = 0.1 percent of body weight, or 0.5 lbs.)	Percent salt in mixture							
	33	20	14	11	9	8	7	6
Cattle weight: 600 lb. (daily salt intake = 0.1 percent of body weight, or 0.6 lbs.)	Percent salt in mixture							
	38	23	17	13	11	9	8	7

Cattle weight: 700 lb. (daily salt intake = 0.1 percent of body weight, or 0.7 lbs.)	Percent salt in mixture							
	41	26	19	15	12	10	9	8
Cattle weight: 800 lb. (daily salt intake = 0.1 percent of body weight, or 0.8 lbs.)	Percent salt in mixture							
	44	29	21	17	14	12	10	9
Cattle weight: 900 lb. (daily salt intake = 0.1 percent of body weight, or 0.9 lbs.)	Percent salt in mixture							
	47	31	23	18	15	13	11	10
Cattle weight: 1,000 lb. (daily salt intake = 0.1 percent of body weight, or 1.0 lbs.)	Percent salt in mixture							
	50	33	25	20	17	14	13	11
Cattle weight: 1,100 lb. (daily salt intake = 0.1 percent of body weight, or 1.1 lbs.)	Percent salt in mixture							
	52	35	27	22	18	16	14	12
Cattle weight: 1,200 lb. (daily salt intake = 0.1 percent of body weight, or 1.2 lbs.)	Percent salt in mixture							
	55	38	29	23	19	17	15	13
Cattle weight: 1,300 lb. (daily salt intake = 0.1 percent of body weight, or 1.3 lbs.)	Percent salt in mixture							
	57	39	30	25	21	18	16	14
Cattle weight: 1,400 lb. (daily salt intake = 0.1 percent of body weight, or 1.4	Percent salt in mixture							
	58	41	32	26	22	19	17	15

The daily intake of the salt mixture should be watched and the level of salt changed to get the correct amount of feed consumed. Cattle usually will eat less of the salt mixture at first. For example, in a University of Missouri trial, salt was used to control the intake of soybean meal for cows fed sorgo silage. The schedule needed to limit the soybean meal consumption to 2 pounds per head daily was: first week, 1 part salt, 4 parts soybean meal; second week, 1:3; third week and thereafter 1:2. Higher levels of salt are needed once the cattle become accustomed to salt.

Toxic levels of trace mineralized salt

Trace mineralized salts should not be added to a ration at high levels since some minerals could reach toxic levels. Use plain salt to control feed intake and add trace mineralized salt at no higher than 0.35 percent of the cattle's daily dry matter intake.

Cattle will consume daily from 2 to 2.5 percent of their body weight in dry matter on most rations. Therefore, keep the daily pounds of trace mineral salt intake about 0.00007 of the animals' body weight in pounds ($0.02 \times 0.0035 = 0.00007$). This would mean a 500-pound steer should receive no more than 0.035 pound (500×0.00007) and a 1,000-pound cow no more than 0.07 pound of trace mineralized salt daily.

If you want to supply some trace minerals with salt and the cattle are expected to eat 2 pounds of the salt-feed daily, trace mineralized salt could constitute 1.75 percent of the mixture for 500-pound cattle [$(0.035 \text{ lbs.} \div 2 \text{ lbs.}) \times 100 = 1.75\%$] or 3.5 percent for 1,000 pound cattle [$(0.07 \div 2 \text{ lbs.}) \times 100 = 3.5\%$].

Adding salt to a formula

It may be that you have a formula for 1,000 pounds of a supplement to which you wish to add 20 percent salt to limit cattle's intake of the feed. Don't go to the trouble of adjusting all of the feed ingredients to make a 1,000-pound mixture that includes 20 percent salt.

Instead add enough salt to the 1,000 pounds to have a final mixture with 20 percent salt. The total pounds of the final 20 percent salt mixture can be determined by dividing 1,000 by the fraction that it composes of the final mixture.

The salt will comprise 20 percent of the final feed and the formula feed will be 80 percent of the total (0.80). Divide 1,000 by 0.80 to get the total pounds of the mix ($1,000 \div 0.8 = 1,250$); therefore, you need to add 250 pounds of salt to the 1,000 pounds of supplement to have a final mixture with 20 percent salt.

Winter supplements for calves

A complex supplement to feed free-choice to 400- to 500-pound calves wintered on grass hay is shown in Table 2. This supplement was pelleted and contained 11 percent salt.

Calves weighing 500 pounds ate 5 pounds of the supplement and gained from 1.5 to 1.65 pounds per head daily when given free access to the pellets and grass hay.

Table 2. Supplement for 5 lbs. daily consumption.

(400-500 lbs. calves to gain 1.5 - 1.65 lbs. daily - grass hay)	
Ingredient	Percent
Corn, ground shelled	68.0
Salt, (evaporated)	10.0
Pellet binder (dura bond)	2.0
Soybean meal (44%)	15.69
Urea, prilled (281%)	0.76
Alfalfa meal, dehydrated (17%)	1.00
Salt, trace mineralized	1.00
Limestone	1.20
Potassium-Magnesium Sulfate (dynamate)	0.30
Vitamin A (30,000 Units/Gm)	0.05

A simple supplement containing 15 percent salt is shown in Table 3. A 400 to 500 pound calf should consume about 3.0 pounds of this supplement and gain from 1.0 to 1.25 pounds daily when grazing winter fescue pastures or receiving grass hay.

Table 3. Calves grazing winter fescue pasture.

(3 lbs. daily intake, gain 1.0 – 1.25 lbs.)	
Ingredient	Percent
Soybean meal	28.00
Ground shelled corn	56.23
Dicalcium phosphate	00.70
Plain salt ¹	15.00
Vitamin A (30,000 I.U./gm)	0.07
¹ = 1.0 lb. can be trace mineralized	

Limiting grain on pasture

Cattle on summer pasture are sometimes fed grain to finish them for slaughter. Limiting the grain to 0.8 to 1.0 pound of grain per 100 pounds of body weight often gives better use of the pasture than a full feed of grain. Adding 10 percent salt or 10 percent fat to the grain mixture will usually control intake to about 1 percent of body weight. Increasing the salt to 15 percent will likely reduce grain consumption to 0.5 percent of body weight. For more information, see MU publication [G2072](#), *Feeding Grain to Beef Cattle on Pasture*.

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