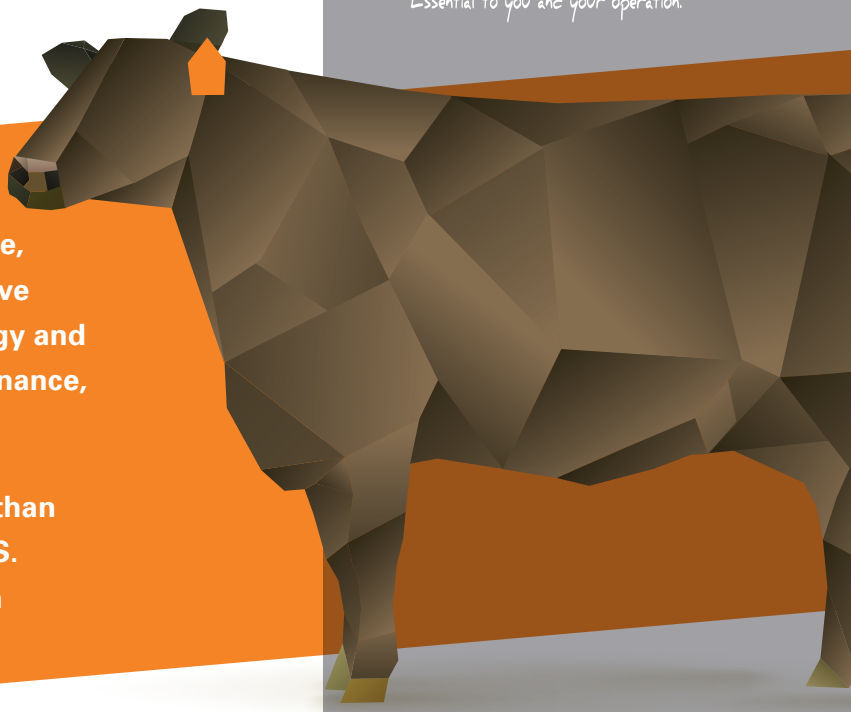
MUD STRESS

KemTRACE® CHROMIUM
Essential to you and your operation.



KemTRACE® Chromium is a highly bioavailable, organic source of chromium that helps improve glucose utilization for increased cellular energy and function. This results in better animal maintenance, growth and immunity.

KemTRACE Chromium is supported by more than 20 years of Kemin research and is the only U.S. Food and Drug Administration-reviewed form of chromium propionate.

EFFECTS OF MUD ON ANIMAL PERFORMANCE

Mud has a detrimental effect on cattle performance due to an increase in energy expenditure. During winter, lots can become muddy quickly when animals are active after moisture falls. Mud caused from heavy rains in temperate regions also increases maintenance energy requirements which are already excessive from high temperatures. Research is clear on the negative effect of muddy conditions on animal performance.

- Bond et al. (1970) reported that mud reduced daily gains of animals by 25%-37% and increased the amount of feed required per pound of gain by 20%-33%.[1]
- The National Research Council reported that small amounts of mud (4 to 8 inches deep) can reduce feed intake of animals by 5%-15%, while larger amounts of mud (12 to 24 inches deep) can decrease feed intake by up to 15%-30%.[2]
- The University of Nebraska estimated the effect of mud on animal performance based on temperature conditions in the range of 21 to 39°F (Figure 1).[3]
- Smith (1971) also reported that animals in areas of muddy conditions have an increased need for energy to sustain their maintenance requirement (Table 1).[4]

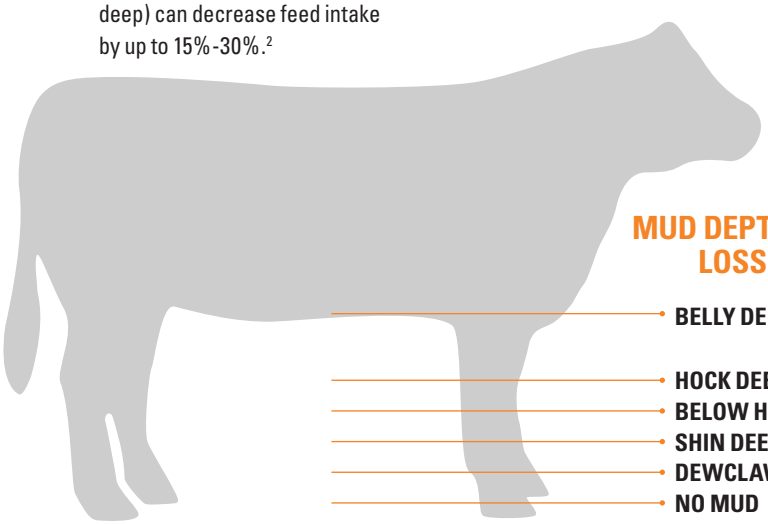


Figure 1: Risk potential caused by mud, 21 to 39°F.[3]

Table 1: Estimated effect of mud on net energy needed for maintenance requirements[4]

Lot condition	Multiplier for NEm[a]
Outside lot with frequent deep mud	1.3
Outside lot, well mounded, bedded during adverse (chill stress) weather	1.1
No mud, shade, good ventilation, no chill stress	1.0

[a]Net energy for maintenance

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EFFECTS OF CLIMATE ON ANIMAL PERFORMANCE

Cold, wet snow, and wind alone or together can create weather stress on cattle. Lower critical temperature (LCT) is the temperature below which an animal must burn extra energy to keep warm.[5] When the temperature falls below an animal's lower critical temperature or rises above the upper critical temperature, the animal must use more energy to keep warm or cool. Table 2 shows the percentage increase in energy required per degree (F) that the wind chill is below the lower critical temperature. The general rule of thumb is to increase winter ration energy 1 percent for each degree (F) below the lower critical temperature.[5]

Table 2: Comparison of wind chill effects on energy requirements of cattle with wet or dry coats[5]

Wind chill (°F)	Increased energy requirements of cattle with dry, winter coat	Increased energy requirements of cattle with wet coat
59	0%	0%
32	0%	27%
20	12%	39%
10	22%	49%
0	32%	59%
-10	42%	69%
-20	52%	79%

IMPACT OF CHROMIUM ON HEALTH AND IMMUNITY

Feedlot cattle are often faced with immune challenges demanding an increase in energy efficiency to prevent sickness. During these challenges, glucose metabolism increases, thus increasing chromium utilization and ultimately leading to a chromium deficiency. Research conducted at Texas Tech University suggests that supplementing the diet with chromium propionate enhances the immune response of steers to an immune challenge.[6]

Table 3: Chromium performance and morbidity

	Chromium inclusion level, ppb			Chromium improvement	
	0	300	Linear contrast (*P*-Value)	0 vs. 300 gain	%
Initial body weight, lbs.	509.3	507.1	0.29	-	-
Final body weight, lbs.	703.3	720.9	0.08	17.6 lbs. *	2.5%
Average daily gain, lbs.	3.46	3.84	0.03	0.38 lbs./d **	11.0%
Dry matter intake, lbs./d	14.70	15.52	0.12	0.82 lbs./d *	5.6%
Gain to feed	0.237	0.247	0.05	0.01 lbs. *	4.2%
Cattle treated at least once, %	25.85	7.48	0.07	18.37% **	18.37%

* A chromium effect ($P \leq 0.14$) was detected.
** A chromium effect ($P \leq 0.05$) was detected.

THE BOTTOM LINE

Mud presents additional stress on beef animals. Energy expenditure to compensate for the effects of mud decreases energy available for productive purposes, such as daily gain, immune system efficiency, reproductive function and/or milk production. Chromium acts to potentiate the action of insulin which ultimately allows more glucose availability at the cellular level. Additional glucose is used by the animal in a hierarchical manner to help reduce the energy demand from mud and to provide needed energy for productive purposes.

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