



BEAR RIVER ZEOLITE BRZ™



Beef Cattle Research Review

This document was prepared to provide information from third party clinoptilolite research studies. Benefits from studies cannot be claimed by Bear River Zeolite, Co. due to U. S. and Canadian government restrictions.

Clinoptilolite inclusion in feed has shown:

- Increased carcass weight, fat thickness, lower ribeye area and dressing percentage
- Up to 11.56% increase in total weight gain per animal
- Positive impact on energy efficiency with an increase in ruminal propionate, a more direct energy source*
- Improved average daily gain and feed utilization
- Increased total tract digestion of starch and organic matter (OM)
- Increased rumen pH
- Reduced fecal nitrogen
- Reduced aflatoxin B1, M1, B2, G2, zearalenone, and ochratoxin
- Reduced intestinal flora levels, including *salmonella* and *E. coli*
- Reduced liver abscesses
- Reduced experimental feedlot lagoon ammonia emissions



Aspergillus flavus (B₁)



Salmonella

Reproduction

Milk fever occurrence in beef cows has increased with improved genetics.

- **33% reduction in the incidence of milk fever (hypocalcemia) with clinoptilolite inclusion starting at 4 weeks before calving**

Ketosis generally occurs in beef cows during late pregnancy.

- **Long term feeding of clinoptilolite has been shown to decrease the incidence of ketosis by up to 33%**

Newborn calves rely solely on immunoglobulins from colostrum to support their immune system in the first 24 to 36 hours of life.

- **Clinoptilolite inclusion in colostrum resulted in 20% healthier calves and a lower incidence of diarrhea**
- **An increase of immunoglobulin G (IgG) levels by 40% and higher level maintained over 48 hours when compared to the control**



* More detailed information on page 2



How it works

Efficient nitrogen utilization

Clinoptilolite has the ability to capture ammonium from feed through its cation exchange capacity (CEC).

- Clinoptilolite adsorbs nitrogen overload.
- During cud chewing, sodium in saliva exchanges with ammonium held in the clinoptilolite. The ammonium is returned to the rumen for further digestion and conversion to an energy source.

*Energy efficiency

Carbohydrates from feed are a primary source of energy for beef cattle. Microorganisms convert carbohydrates to VFAs (volatile fatty acids) during fermentation in the rumen. Three VFAs are produced; acetate, butyrate, and propionate. Butyrate and acetate conversion involves carbon (energy) loss and ketone buildup, which leads to ketosis. Propionate does not lose a carbon and therefore has a higher energy value (109%) than butyrate (78%) or acetate (62%). This higher energy value increases animal performance without ketone build up.

- Clinoptilolite increases ruminal propionate production, which is absorbed through the rumen wall and into the blood stream and converts to glucose for energy.
 - ✓ Possibly due to stimulation of starch and sugar digesting bacteria in the rumen by the release of calcium from clinoptilolite.

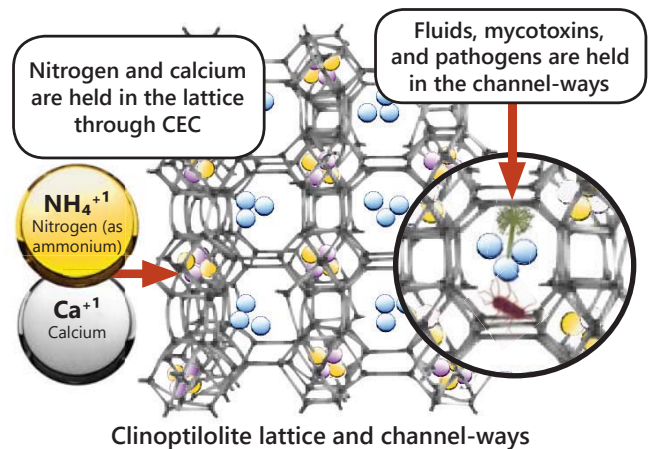
pH

High calcium clinoptilolite has a buffering effect.

NH₃ emissions and odor

The high cation exchange capacity (CEC) of clinoptilolite enhances the capture of ammonium before it vaporizes to ammonia (gas).

- Slurry treated with 6.75% clinoptilolite reduced NH₃ (ammonia) losses by about 55% over 96 hours.
- Clinoptilolite also reduced water-soluble P (phosphorus) losses by 35%.
- Clinoptilolite holds 55% of its weight in water and reduces the fluidity of slurry for easier handling.



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