



Livestock Water Quality and Quantity: Collaboration and Communication Of University Information

USDA – CSREES Water Conference
February 6, 2008

Roxanne Johnson
Extension Water Quality Associate



Areas of Concern

- Minerals in livestock water.
 - Determining maximum tolerable levels (MTL).
- Quantity of water for livestock.
 - Various quantities given.



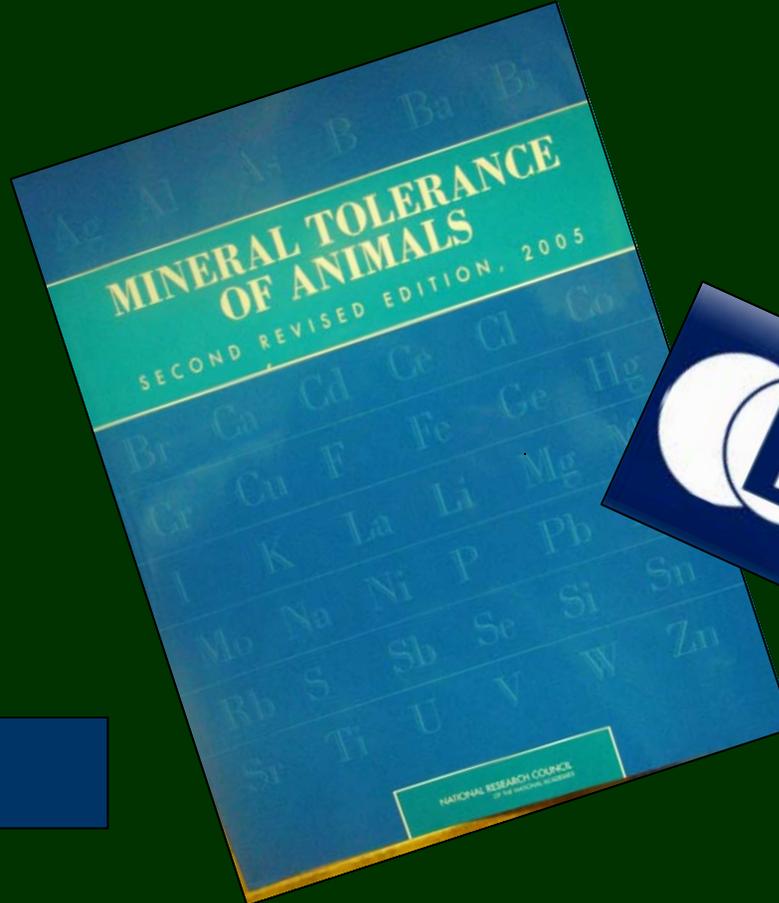
Region 8 Initiative



Source: Roxanne Johnson

Determine source of maximum tolerable
levels commonly stated
for minerals in livestock water.

I Started Researching...



Mineral Tolerances of Animals

- References given did not produce the desired information
- Most research is done on feed
- Recent research is scant....except nitrates & sulfur
 - Some even from the 1930's, 40's, 50's

Embry, L.B., M.A. Hoelscher, and R.C. Wahlstrom.
1959. Salinity and livestock water quality. SD Agric.
Exp. St. Bull. 481:5-9.

Mineral Tolerances of Animals

- Environment Canada
 - They wanted... “guidelines based on scientifically-defensible toxicological data....”
 - They got... “values independently derived, but very old and the bases of the derivation are not known.”
 - “...value adopted from the 1968 Report of the Committee on Water Quality Criteria “Green Book” from the US Federal Water Pollution Control Administration.”

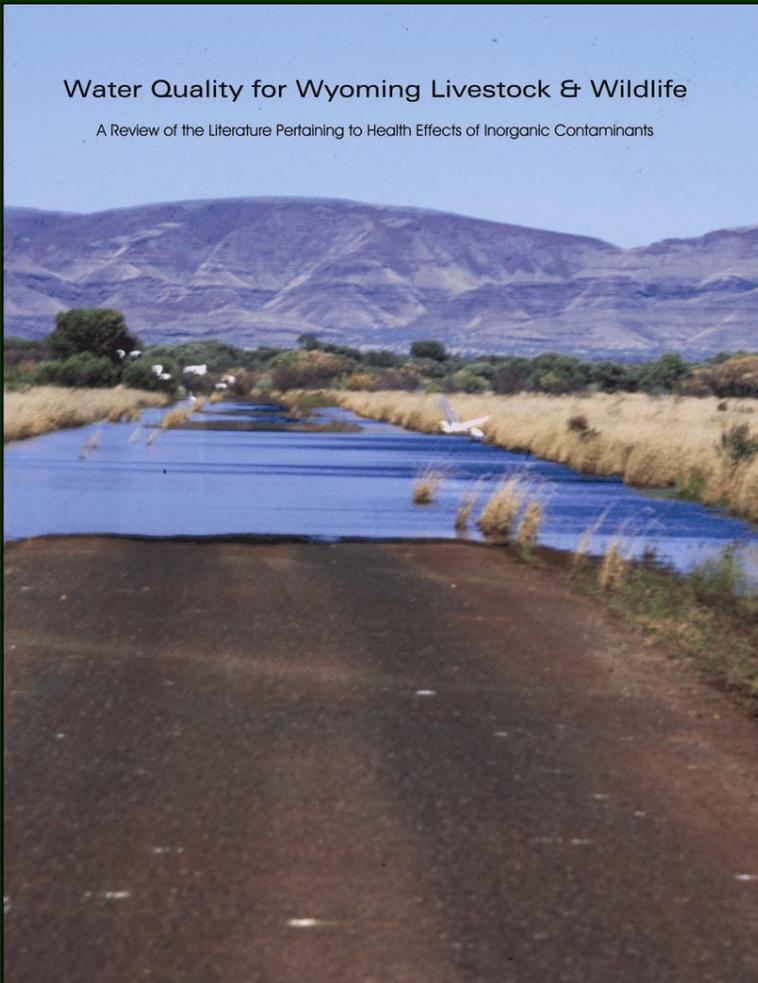


Mineral Tolerances of Animals

- ...information perpetuated over time
- ...once entered into literature has not been verified
- ...we desperately need research on the effect of minerals in water on animal performance and health

Dr. Jim Linn

University of Minnesota



Wyoming Study

M.F. Raisbeck DVM, PhD,
DABVT

S.L. Riker BS

C.M. Tate DVM, PhD

R. Jackson PhD

M.A. Smith PhD

K.J. Reddy PhD

J.R. Zygmunt BS

http://deq.state.wy.us/wqd/WQD_home/Announcements/final%20draft_1.pdf



Water Quality for Wyoming Livestock & Wildlife

Selenium – horses → cattle → sheep & goats

Nitrates – while much is known, there is a need for further research.

Feed + water under 400 mg/L okay.

Barium – further research. Even 10 mg/L for short periods can be harmful.

pH – levels based on corrosion of plumbing. Ranges are excessively conservative. Further research.

TDS

Sulfates

http://deq.state.wy.us/wqd/WQD_home/Announcements/final%20draft_1.pdf



Field Days 2007

NDSU
Extension
Research
Center

Dickinson,
North
Dakota

“Clean Water
Options
for Cattle”



Source: Roxanne Johnson



Minimum Daily Water Needs

	NDSU	MSU	Clemson State	Virginia Tech	Midwest Plan Service
Milking cows	24-27 gal/hd	17 gal/hd	26-36 gal/hd	20-25 gal/hd	35-50 gal/hd
Dry cows	6-14 gal/hd	14 gal/hd	18-22 gal/hd	10-25 gal/hd	20-30 gal/hd



“Clean Water Options for Cattle”

Source: Roxanne Johnson



Recommended levels of Dissolved Solids for various animal species (ppm)

Species	Excellent	Good	Fair	Poor	Limit
Humans	0-800	800-1600	1600-2500	2500-4000	5000
Horses-working	0-1000	1000-2000	2000-3000	3000-5000	6000
Others	0-1000	1000-2000	2000-4000	4000-6000	10000
Cattle	0-1000	1000-2000	2000-4000	4000-6000	10000
Sheep & Poultry	0-1000	1000-3000	3000-6000	6000-10000	15000
Chickens	0-1000	1000-2000	2000-3000	3000-5000	6000
Swine	(young pigs and market pigs appear to tolerate less than cattle)				

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Swine	(young pigs and market pigs appear to tolerate less than cattle)				

Water Quality Report

LIVESTOCK WATER REPORT

DAIRYLAND LABORATORIES, INC.
P.O. Box 580
St. Cloud, MN 56379

Merdel Nagel 2977
PO Box 203

Lehr, ND 58460 REPORT DATE..... 9/13/2007

SAMPLED FOR: Merdel Nagel
SAMPLE #: 5653
DESCRIPTION: Well
DATE SAMPLED: 9/10/2007

	YOUR LEVELS	POSSIBLE PROBLEMS
NITRATE-N	0.61 ppm	> 50.00 ppm
pH	7.40	< 5.5 or > 8.3
CALCIUM	401.021 ppm*	> 200.000 ppm
MAGNESIUM	> 999.000 ppm*	> 80.000 ppm
PHOSPHORUS	0.529 ppm	> 0.700 ppm
POTASSIUM	35.925 ppm*	> 20.000 ppm
COPPER	0.014 ppm	> 0.500 ppm
IRON	0.146 ppm	> 0.300 ppm
ZINC	0.153 ppm	> 25.000 ppm
SODIUM	692.048 ppm*	> 150.000 ppm
MANGANESE	0.183 ppm*	> 0.050 ppm
CHLORIDE	204.000 ppm*	> 200.000 ppm
SULFATES	7144.896 ppm*	> 300.000 ppm
TOTAL DISSOLVED SOLIDS	10655.000 ppm*	> 1000.000 ppm
WATER HARDNESS	5115 ppm 301 gpg (Grains Per Gallon)	

Dairyland Laboratories - St. Cloud is certified by the Minnesota Department of Health to perform the analyses for: Fecal Coliform Bacteria, Total Coliform Bacteria, E.Coli, Nitrate-Nitrogen and Fluoride.

This report was sent electronically. Official results are available at Dairyland Labs.

* Levels exceed the guidelines. Caution is advised as possible problems or reduced performance may occur.

-----INVOICING INFORMATION-----
SAMPLED BY: Merdel Nagel Invoice: 349222
SAMPLED FOR: Merdel Nagel Date: 9/10/2007
DESCRIPTION: Well Sample: 5653

\$ 37.00 W3-LIVESTOCK WATER
\$ 37.00 TOTAL INVOICE

SULFATES

1,756 ppm

TOTAL DISSOLVED SOLIDS

2,980 ppm

- Within maximum tolerant level for TDS but over sulfate level (1000ppm)
- Does not include sulfate from DDG's or or other high sulfate feed



Summary

- Double check accuracy of borrowed information.
- Cite all references and the check the validity of stated references.

