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BEEF CATTLE RESEARCH COUNCIL

#beefwebinar

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Managing a year-round mineral program that's right for you

Webinar held Nov. 4, 2014, 7:00pm MST

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#beefwebinar

Tonight's Agenda

Welcome

- Tracy Sakatch

Investments in Beef Research in Canada

- Reynold Bergen, Ph.D.

Managing a year-round mineral program that's right for you

- John McKinnon, Ph.D.

Questions

- from the audience

Closing Remarks

- and where you can find more information

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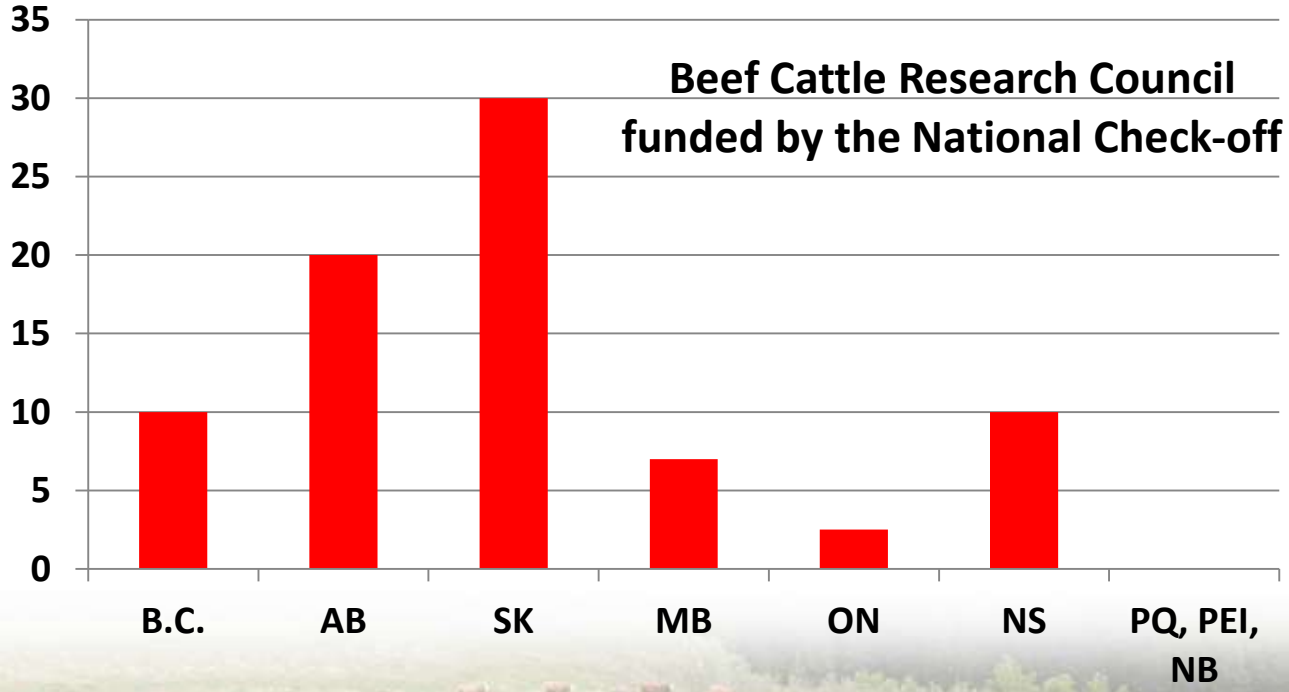
Beef Cattle Research Council

‘Managing a year-round mineral program that’s right for you’ webinar

November 4, 2014

Beef Cattle Research Council

- Funds research of priority to the Canadian beef cattle industry since the late 1990's
- Funded by 2.5 to 30% of the $1.00 National Check-off
- Each $ is leveraged to gain an additional $3.00 in funds
- Eleven representatives appointed by provincial associations



Team BCRC - Council

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BEEF CATTLE RESEARCH COUNCIL

Team BCRC - Staff

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Andrea Brocklebank, M.Sc. P.Ag

Science Director
Reynold Bergen, Ph.D.

Beef Extension Coordinator
Tracy Herbert, B.A.

Technical Administrator
Jock Buchanan-Smith, Ph.D.

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Producers pay two icheck-offs

Provincial Check-off

<u>Provincial</u> activities, including

- **advocacy**
- **policy**
- **research**
- **marketing**
- **promotion**
- **etc.**

CCA activities, like <u>(inter)national</u>

- **advocacy**
- **trade**
- **legal**
- **policy**
- **etc.**

E.g. R-CALF, COOL, CETA, TPP

National Check-off

Funds:

Canada Beef Inc.

- **marketing**
- **promotion**

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- **Research**

NOT THE CCA

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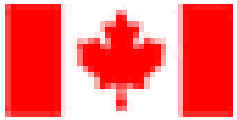
The Beef Science Cluster



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SINCE 1874
Alberta Beef Producers

Government of Saskatchewan

MANITOBA BEEF PRODUCERS

Beef Farmers of Ontario

ALBERTA CATTLE FEEDERS' ASSOCIATION

PIONEER.

ALMA
Alberta Livestock and Meat Agency Ltd.

Grey Wooded Forage Association
"Creating an Awareness of Forages"

Fédération des producteurs de bovins du Québec

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UNIVERSITY OF SASKATCHEWAN

Mineral Feeding is a Year Round Program
Beef Cattle Research Council Webinar
November 4, 2014

J.J. McKinnon

University of Saskatchewan

Managing the Mineral Program

What Program is Right for You?

1. Lots of choices
   - 1:1; 2:1; Blocks; tubs, boluses, fortified screening pellets and cubes, protein supplements
2. Unique formulations / concentrations / prices
   - Protein
   - Ca / P and or Mg
   - Trace minerals
   - Bioavailability

Managing the Mineral Program

What Program is Right for You?

3. How well do You Know Your Operation?
   - Soil types
   - Soil mineral concentrations – Molybdenum content
   - Water quality – Sulfate levels
   - Forage mineral levels – macro and trace – need to have your forages feed tested

Managing the Mineral Program

What Program is Right for You?

4. Recognize that the cow's requirements change with stage of pregnancy as well as with lactation and breeding
   - Two critical periods
     - 60 days pre calving through the breeding season
   - Summer and fall grazing / winter feeding

Loose Mineral Programs

- Calcium / Phosphorus minerals
  - Designed to match your forage type
    - Vary in ratio / concentration of Ca and P
    - Vary in magnesium content
    - May or may not supply salt
  - Programs offered that are designed to match forage quality and animal requirements

Calcium Requirements of 600 kg Cow DMI @ 2% body weight (DM basis; NRC 1996)

- **Calcium**
  - 2nd trimester 0.17% or 20 gm day
  - 3rd trimester 0.27 % or 32 gm day
  - Post-calving 0.25 - .35 % or 30 - 40 gm day

Phosphorus Requirements of 600 kg Cow - DMI @ 2% body weight (DM basis; NRC 1996)

- **Phosphorus**
  - 2nd trimester 0.12% or 14 gm day
  - 3rd trimester 0.17 % or 20 gm day
  - Post-calving 0.17 - 0.23 % or 20 - 27 gm day

Typical Calcium & Phosphorus Content of Canadian Feeds

- Legume and Grass/Legume forage:
  - High in Ca (1 - 2 % >) and low in P (0.15 - 0.25)

- Grass type forage
  - Intermediate Ca (0.4 - 0.5%) and low P (0.1- 0.2%)

Typical Calcium & Phosphorus Content of Western Canadian Feeds

- Cereal green feed / silages
  - Intermediate in Ca (0.2 - 0.3%) and low in P (0.1 - 0.2%)

- Cereal grains
  - Low Ca (<0.1%) and intermediate in P (0.3 - 0.4%)

Magnesium (Mg) and Potassium (K)

- Both essential in their own right
  - Mg requirement for lactating beef cows 0.2% (DM basis)
  - K requirement for pregnant beef cows 0.5 to 0.7% (DM basis)
- K deficiency is typically not an issue in Canada
- Magnesium deficiency can be associated with grass tetany (forages less than 0.2% Mg or high levels of K)

Loose Mineral Programs

- Calcium / Phosphorus minerals
  - Designed to match your forage type
    - Vary in ratio / concentration of Ca and P
    - Vary in magnesium content
    - May or may not supply salt
  - Supply trace minerals (vary in concentration and availability)
  - Supply vitamins ADE / medications(?)
  - Vary in susceptibility to weathering
  - Vary in palatability
  - Vary in price

Trace Minerals

- zinc
- copper
- iodine
- cobalt
- iron
- selenium
- manganese

Trace Minerals

- Requirements expressed as mg/kg diet DM:
  - Copper 10 mg per kg diet DM
  - Zinc 30 mg per kg diet DM
  - Selenium 0.1 mg kg DM

Trace Minerals: Daily Requirement

- A 600 kg cow consuming 12 kg (2% body weight DM basis) dry matter daily requires on a daily basis:
  - 12 kg DM x 10 ppm = 120 mg of copper
  - 12 kg DM x 30 ppm = 360 mg of zinc
  - 12 kg DM x 0.1 ppm = 1.2 mg of selenium

Trace Mineral Deficiencies

- **Zinc**
  - reduced growth, feed intake, feed efficiency
  - reduced testicular growth (abnormal sperm production),
  - skin abnormalities
  - weak hoof horn

Trace Mineral Deficiencies

- **Zinc**
  - reproductive disorders (abnormal sperm production), skin abnormalities, reduced growth and poor feed efficiency
- **Copper**
  - rough, off colour hair coat (depigmentation),
  - leg abnormalities and stunted growth in calves,
  - sudden death due to cardiac failure
  - Poor reproductive performance
    - Delayed or depressed estrus

Trace Mineral Deficiencies

- **Zinc**
  - reproductive disorders (abnormal sperm production), skin abnormalities, reduced growth and poor feed efficiency
- **Copper**
  - general unthriftiness, rough, off color hair coat, infertility in cows, leg abnormalities, stunted growth, sudden death due to cardiac failure
- **Selenium**
  - in calves white muscle disease, unthriftiness, poor growth, lameness, reduced immune response
  - in cows increased incidence of retained placenta

Understanding Your Mineral Tag

Comparison of Two Mineral Sources

Brand A (Se 30 ppm)	
Ca	15%
P	12%
Na	5%
Mg	4%
Co	20 ppm
Cu	1300 ppm
Zn	3300 ppm
Mn	3000 ppm

Brand B (Se 30 ppm)

- Ca 20%
- P 11%
- Na 10%
- Mg 4%
- Co 40 ppm
- Cu 2000 ppm
- Zn 7200 ppm
- Mn 5400 ppm

What is Supplied in the Feed?

- Mixed hay analysis of 10 ppm Cu
  - i.e. 12 kg x 10 gm / kg = 120 mg Cu from hay

- Meets requirements right?
- What about availability ?
  - Copper availability in rumen ranges from 0 to 5% in cattle post-weaning
- Fortunate to have 6 mg from feed!

Understanding Your Mineral Tag

- Label indicates expected mineral consumption
  - Example 1 - 15 gm / 100 kg body weight
    - 600 kg cow should consume 90 gms or

      3 ounces per day
  - Example 2 - 100 gms / day

(1 oz = 28 gms)

Understanding Your Mineral Tag

- Mineral tag Brand A
  - 15 gm per 100 kg body weight = 90 gms (0.09 kg) expected consumption
  - tag indicates Cu = 1300 ppm or 1300 mg/kg
  - copper intake = 0.09 kg mineral x 1300 mg/kg = 117 mgs per day

- Copper intake = 117 mgs from mineral versus daily requirement of 120 mg

Understanding Your Mineral Tag

- Mineral Tag Brand B
  - 100 gms (0.1 kg) expected consumption
  - tag indicates Cu = 2000 ppm or 2000 mg / kg
  - copper intake = 0.1 kg mineral x 2000 mg/kg = 200 mgs per day

- Copper intake = 200 mgs from mineral versus daily requirement of 120 mgs

Brand "A" Fed at 15 gm per 100 kg body weight (90 gm) to 600 kg cow (3rd trimester)

Concentration	Amount Supplied	Daily requirement
Ca 15%	14 gm	32 gm
P 12%	11 gm	20 gm
Na 5%	5 gm	10 gm
Mg 4%	4 gm	16 gm
Co 20ppm	2 mg	1.2 mg
I 65ppm	6 mg	6 mg
Cu 1300ppm	117 mg	120 mg
Zn 3300ppm	297 mg	360 mg
Mn 3000ppm	270 mg	480 mg
Se 30ppm	2.7 mg	1.2 mg

Brand "B" Fed at 100 g day (3rd trimester)

Concentration	Amount Supplied	Daily requirement
Ca 20%	20 gm	32 gm
P 11%	11 gm	20 gm
Na 10%	10 gm	10 gm
Mg 4%	4 gm	16 gm
Co 40ppm	4 mg	1.2 mg
I 120ppm	12 mg	6 mg
Cu 2000ppm	200 mg	120 mg
Zn 7200ppm	720 mg	360 mg
Mn 5400ppm	540 mg	480 mg
Se 30ppm	3 mg	1.2 mg

How Do I know How Much Copper I Need?

- Copper requirements are not static – moving target:
  - Molybdenum content of feed
  - Sulfur content of feed / water
  - Iron content of feed / water
  - Zinc content of feed

How Do I know How Much Copper I Need?

- NRC 1996 Copper requirement of 10 ppm is based on following assumption:
  - Molybdenum content of feed < 2 mg/kg DM
  - Sulfur content of feed / water does not exceed 0.25%

How Do I know How Much Copper I Need?

- Copper requirements not static – moving target:
  - Molybdenum content of feed
    - Cu:Mo ratios less than 3:1 are indicative of a copper deficiency situation;
    - Ideally dealing with ratios > 5:1
  - Sulfur content of feed / water
    - Cu availability decreases with increasing dietary sulfur content increases from 0.20 to 0.45% or greater;

How Do I know How Much Copper I Need?

- 600 kg beef cow consuming 12 kg DM; drinking 45 litres of water daily :
  - Copper feed concentration = 10 ppm
  - Sulfur feed concentration = 0.15% DM
  - Molybdenum feed concentration = 1 ppm
  - Water sulfate level = 100 mg/L

How Do I know How Much Copper I Need?

- 600 kg beef cow consuming 12 kg DM; drinking 45 litres of water daily :
  - Copper feed concentration = 10 ppm
  - Sulfur feed concentration = 0.35% DM
  - Molybdenum feed concentration = 5 ppm
  - Water sulfate level = 500 mg/L

Managing a Mineral Program

- Mineral intakes highly variable
  - “eat me out of house and home”
  - “cattle won’t stop eating mineral”
  - “eating it like candy”

  - “ the cows won’t touch that _ _ _ t!”

Managing a Mineral Program

When was the last time cattle had mineral ?

- Might be a reason why it tastes like candy?
- Need to give cattle a period to adjust to availability of a mineral – let them adapt

Managing a Mineral Program

Numerous factors influence mineral intake

- **Palatability of mineral**
  - Composition of mineral – phosphorus content
  - Salt content
  - Flavoring agents

Managing a Mineral Program

Numerous factors influence mineral intake

- Palatability of mineral
  - Composition of mineral – phosphorus content
  - Salt content
  - Flavoring agents

- Access to salt
- Water quality – sulfate / salinity levels

Managing a Mineral Program

Numerous factors influence mineral intake

- **Location of mineral feeder**
  - Relative to water source
  - Relative to salt source
  - Location in pasture

Managing a Mineral Program

Numerous factors influence mineral intake

- **Management of mineral feeder**
  - Exposure to wind
  - Exposure to rain / snow
  - Increased use of weatherproofed minerals
  - How often do you check / fill the mineral feeder

Managing a Mineral Program

Trouble shooting a mineral program

1. Don't wait for a wreck to evaluate

- Producers tend to call professional help once a wreck is experienced

- Clinical symptoms
  - Lameness
  - Milk fever / downer cows
  - Retained placentas / white muscle disease

Managing a Mineral Program

Trouble shooting a mineral program

1. Don't wait for a wreck to evaluate

- Producers tend to call professional help once a wreck is experienced
- Sub-clinical symptoms
  - Increased incidence open cows / first calf heifers
  - Poor growth, poor doing animals
  - Increased morbidity

Managing a Mineral Program

Trouble shooting a mineral program

2. Is the issue mineral related?

- Delayed heat / poor conception / open cows
  - Mineral deficiency or energy / protein
  - Thin cows – why?
  - Fertility issues in bulls?
  - Health issues?
  - Reproductive management?

Managing a Mineral Program

Trouble shooting a mineral program

3. **Monitor Intakes – how much mineral is actually being consumed**
   - Day to day variation expected
   - Also see variation due to season, stage of gestation, pasture maturity, water quality
   - Need to know what they are consuming
     - Monitor intakes over at least a 3 to 4 week period

Managing a Mineral Program

Trouble shooting a mineral program

4. **Are you using the right mineral?**
    - Forage mineral content
    - Knowledge of soil mineral characteristics
    - Knowledge of water quality – sulfate / iron levels
    - Strategic feeding of chelated minerals may be an answer

Managing a Mineral Program

Trouble shooting a mineral program

5. **Confirming a mineral deficiency**
   - Work with your veterinarian
     - Serum samples for analysis
     - Liver biopsies (i.e. open cows)

Summary

- Mineral Deficiencies are real
- Have productive, herd health and economic consequences
- A sound mineral feeding program targets the cow's nutritional needs for stage of pregnancy as well as lactation
  - Geographic location / soil type
  - Water quality
  - Forage mineral content

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Please type your question(s) into the box on the side of your screen.

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