


Trace Mineral Bioavailability

What it means to cow performance


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Agenda

- Different categories of trace minerals
- Why do we need trace minerals?
- How to measure bioavailability?
- Functionality of trace minerals
 - Health
 - Structural Integrity
 - Reproduction
 - Methionine value






General overview of types of trace minerals



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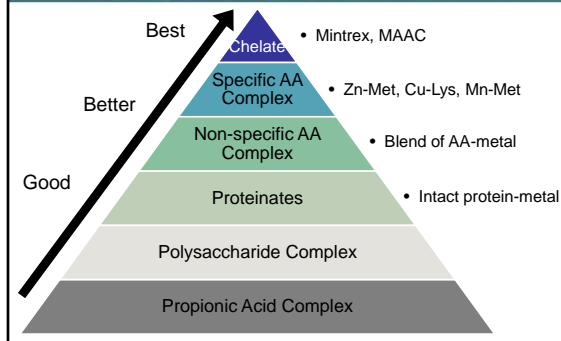
Classification

Trace Minerals

- Inorganic (ITM)
 - Metal ion bound to a salt
 - Sulfate or chloride
- Organic (OTM)
 - Metal ions chemically linked to an organic molecule
 - Has unique characteristics
 - Enhanced bond strength

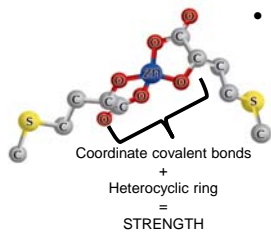


Types of OTMs



Mintrex

Unique AAFCO definition



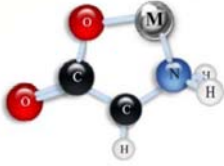
X-ray Crystallography done by Dr. N. Rath



- Metal Methionine Hydroxy Analogue Chelate
- Product resulting from reaction of a metal salt with HMTBa
- Chelated molar ratio of one mole of metal to two moles of HMTBa
- Forms coordinate covalent bonds

MAAC

Separate AAFCO definition



- Metal Amino Acid Chelate
 - Product resulting from reaction of a metal salt with glycine
 - Chelated molar ratio of one mole of metal to one mole of glycine
 - Forms coordinate covalent bonds



Absorption and Bioavailability of Trace Minerals

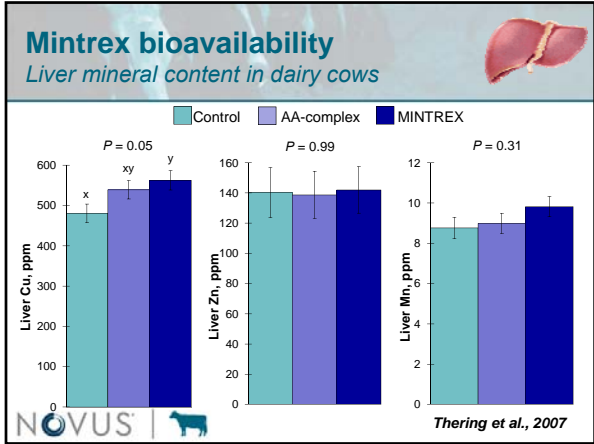
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Measuring bioavailability

Trace minerals

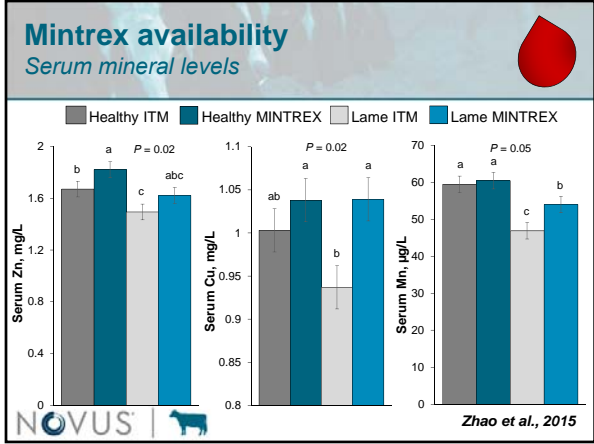
- Accumulation in tissues
 - Bone ash
 - Liver





Measuring bioavailability

- Accumulation in tissues
 - Bone ash
 - Liver
- Proxy measures for tissue accumulation
 - Plasma/Serum
 - Expression of mineral transporters
 - Metallothionein (MT)

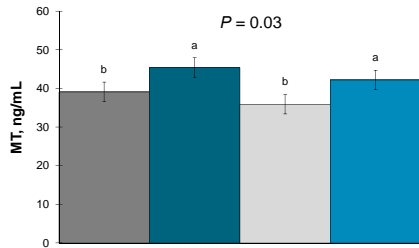


Mintrex bioavailability

Expression of MT in serum



Healthy ITM Healthy MINTREX Lame ITM Lame MINTREX



Zhao et al., 2015

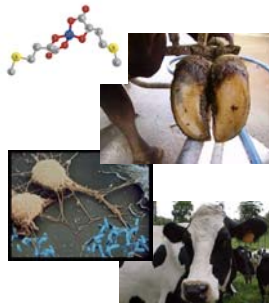
Key takeaways

- More bioavailable source of trace minerals
- Increased bioavailability suggests
 - Decreased dietary inclusion rate
 - Improved response in key measures

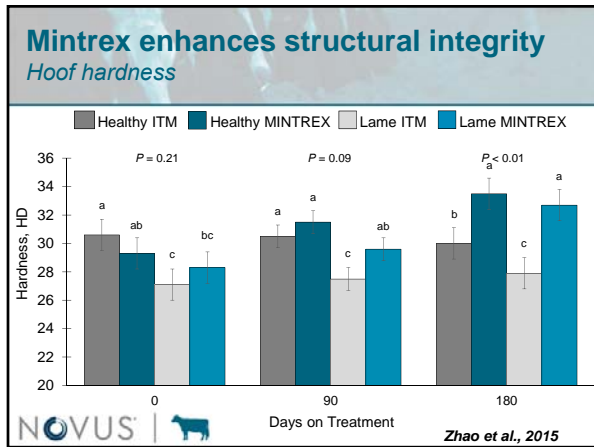


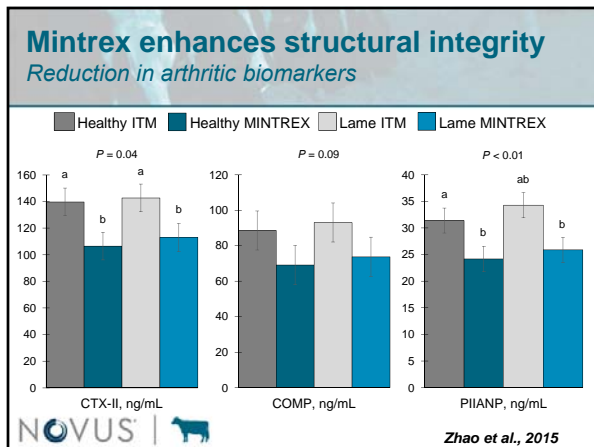
Benefits in ruminants

- Structural Integrity
 - Improved hoof hardness
 - Reduced lameness
- Improved reproduction
- Health and Immunity
 - Reduced SCC
 - Developed immune response
 - Improved antioxidant status
- Methionine value
 - Improved milk components









Mintrex in Spanish Dairies

Benefits

- Study done in collaboration with IRTA
 - Cooperative of 30+ dairy farms
 - Fed a common TMR prepared at a single site
- 1 month of pretrial data collection
- 5 months treatment
- 15 ITM herds
- 12 MINTREX herds



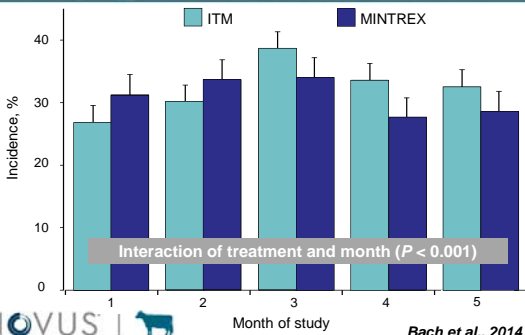
From Premix (at 0.2% of TMR dry matter)	Zn (ppm)	Cu (ppm)	Mn (ppm)
Control			
Total	57	9	27
Mintrex	0	0	0
Inorganic trace minerals	57	9	27
Mintrex			
Total	57	9	27
Mintrex	25	6	10
Inorganic trace minerals	32	3	17



Bach et al., 2014

Mintrex lowers prevalence

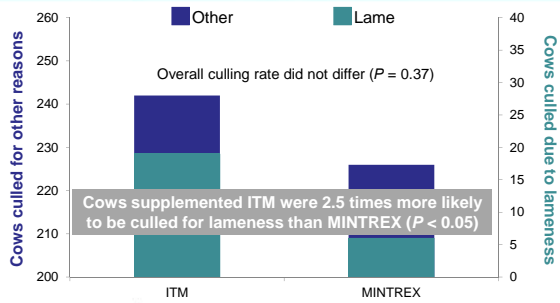
Effect of time x Mintrex on lameness



Bach et al., 2014

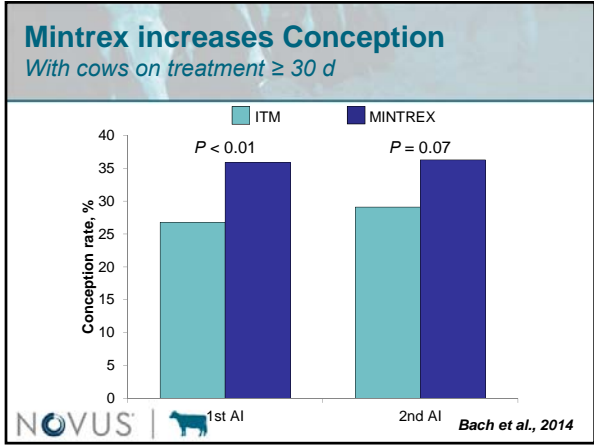
Mintrex lowers odds

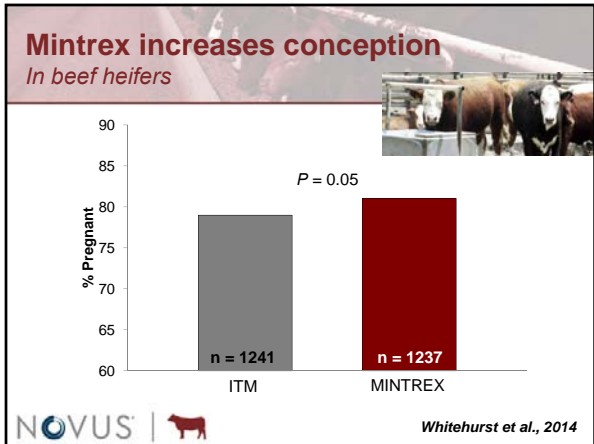
Culling due to lameness

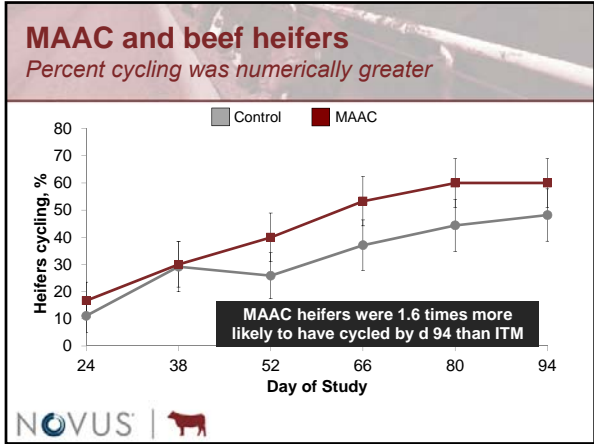


Bach et al., 2014

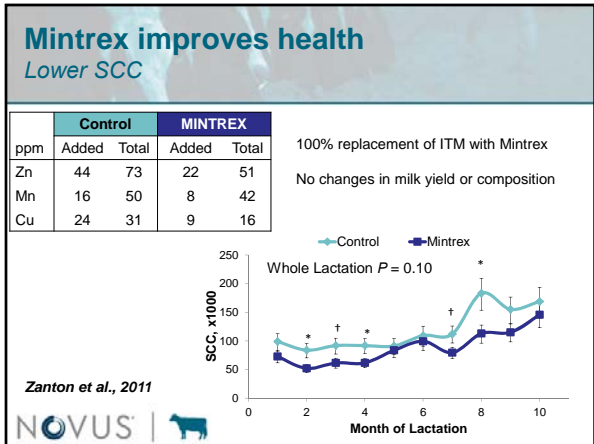
Reproductive Performance





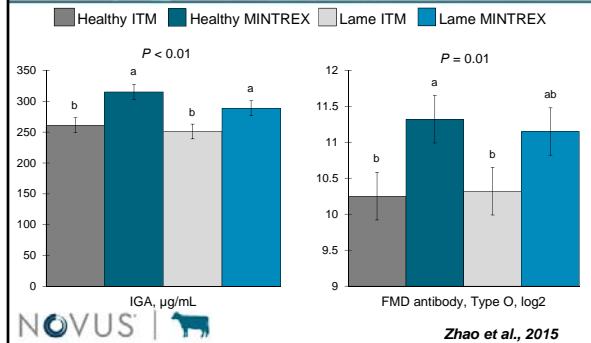






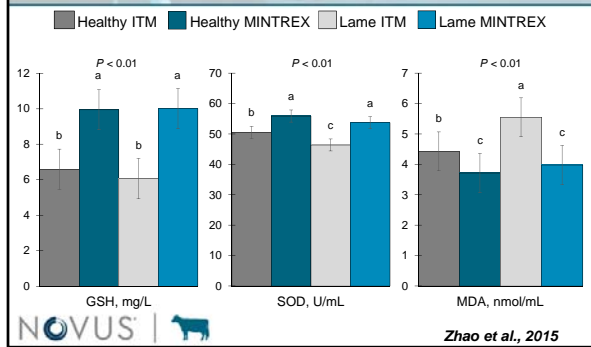
Mintrex and immune response

Status improved



Mintrex and AOX

Status improved



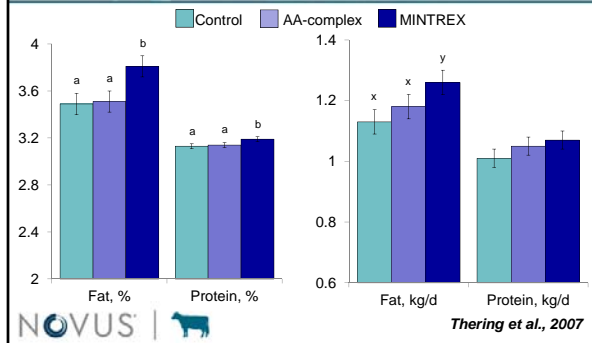
Methionine Value

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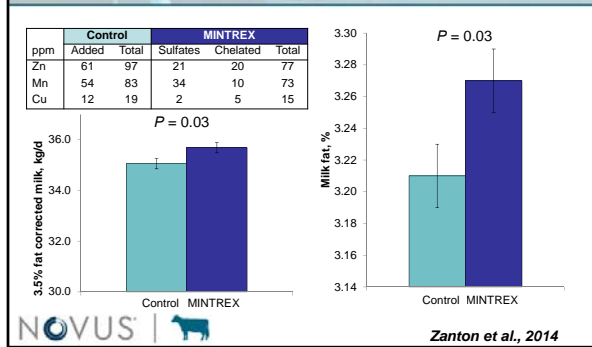
Mintrex provides Methionine

Increases milk components



Mintrex provides Methionine

Increases milk components



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Questions?

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