



Mineral Supplementation for Beef Cow-Calf Operations

ASAS Southern Section
Agent Training 9/27/16

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Disclaimers

The information given herein is for educational purposes only.

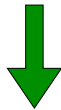
Reference to trade name is made with the understanding that no discrimination is intended and no endorsement is implied by the Texas A&M AgriLife Extension Service.

Only a partial listing of available products and companies is included and no discrimination is intended by the omission of a product.

Listed values do not guarantee current company specifications.

mineral nutrition impacts

- growth
- reproduction
- milk production
- health



PROFITABILITY



Components of a Complete Mineral Supplement

- salt
- macro minerals
- trace minerals (aka micro minerals)
- vitamins A, D, and E

Macro	Trace (micro)
% of diet	ppm or mg/kg
· calcium	· copper
· phosphorus	· zinc
· potassium	· manganese
· magnesium	· selenium
· sodium	· iodine
· sulfur	· cobalt
	· iron
	· others

Differences Between Companies

- formulation
- mineral source
- reputation
- palatability enhancers
- targeted intake
- weatherization

Common Formulations

- higher-calcium, lower phosphorus
- similar Ca & P levels
- winter pasture (higher Mg)



	Emerald	Bronze	Gold
Calcium	16	12.5	12.5
Phosphorus	5	8	2
Salt	15 - 16	15 - 17	13 - 15
Magnesium	5	3	13
Potassium	0.1	2	0.2
Copper	2,500	2,500	1,500
Zinc	4,500	6,000	4,500
Manganese	4,000	4,000	4,000
Selenium	26	26	26
Iodine	200	200	200
Cobalt	20	20	20
Vitamin A	100,000	100,000	100,000
Vitamin D	-	10,000	-
Vitamin E	100	110	100

Targeted Intake

2 or 4 oz.

- most are 4 oz.
- 2 oz. example: Moorman's Range Minerals

target of 4 oz.

- average intake of 3 - 4 oz. would be acceptable

Se level

- 4 oz: commonly 25 - 27 mg

Additive Options

Additives

researched

- IGR
- CTC
- bovatec
- rumensin

- bovatec is not labeled for cows



- All Season 7.5 Complete
- All Season 7.5 Complete **AU5600**
- All Season 7.5 Complete **ALT**
- All Season 7.5 Complete **AU5600-ALT**

Additives

researched

- IGR
- CTC
- bovatec
- rumensin

not well researched or limited/no benefits

- there is a long list of these
- be cautious of claims
- be aware of selectively reporting research
- many would not justify the added cost

Geographic & Forage System Considerations

Native Range

dormant forages

- most mineral concentrations decrease with time especially P & K

protein and energy supplement can greatly impact the Ca:P ratio of the mineral needed

consider K level in protein and energy supplements

product	intake, lbs	% P	gm P supplied
15:4 mineral	0.25	4	4.5
12:9 mineral	0.25	9	10.2
12:9 mineral	0.125	9	5.1
cottonseed meal	2	1.1	10.0
DDGS	2	0.7	6.4

Native Range

Calcium content of the soil

- just because the soil is high in Ca or is sitting on a limestone base doesn't mean the plant will take up more Ca
- bermudagrass average Ca: 0.43%
- native forages average Ca: 0.48%

Coastal Regions

mineral intake can be challenging

- try low salt formulations
- some examples:
 - ADM AMPT-T Low Salt
 - Purina Coastal Cattle Mineral
- some work from Florida would suggest we could put the mineral supplement in a cube and feed 1 time per week

Winter Pasture

grass tetany concern for cows

- need consistent intake of Mg
 - 5% or greater Mg level
- salt is important for absorption of Mg
- milk fever and grass tetany may both be involved in some cows
 - want higher Ca, lower P level

Poultry Litter

- inverted Ca:P ratio in forage
- milk fever and grass tetany concerns
- may need P free mineral

Trace Mineral Considerations

- > copper
- > zinc
- > manganese
- > selenium
- > iodine
- > cobalt

Cu, Zn, and Mn

the copper race

- many products have way more copper than needed
- a few are at levels that are concerning

desirable ratios

- 1:4 or 1:3 for Cu: Zn
- 1:2 for Cu:Mn is probably sufficient

Copper

- female: no effect
- male: probably no effect

Zinc

- female: very little data in cattle, but important in ovarian remodeling and CL production
- male: impacts testicular growth

Manganese

- female: possible estrous effect
- male: no claims

Selenium

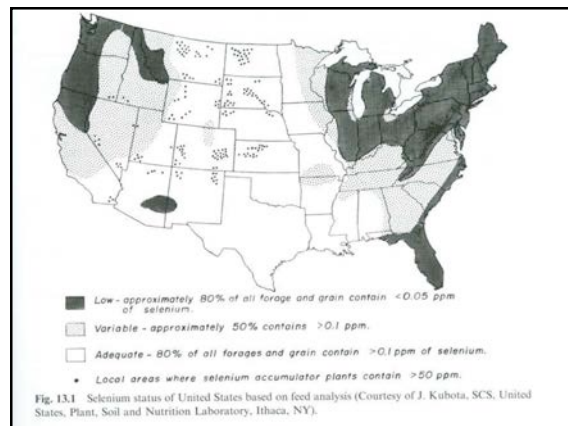
requirement

- 1.30 mg/d for 1250 lb cow

legal limit

- 3 mg/d
- that is 2.31 times requirement

Se has the smallest safety margin of any trace mineral; toxicity could be a concern if getting more Se from other sources



Iodine

preferred forms

- calcium iodate
- EDDI (organic form)

don't want

- potassium or sodium iodide
- less stable

too much calcium iodate has been reported to reduce weight gain and feed intake

Sources of Trace Minerals

inorganic

- ionic bond
- copper sulfate, zinc oxide, sodium selenite, etc.

organic (aka chelated)

- covalent bond to carbon-containing ligand
- mineral bonded to: amino acid, protein, or CHO
- zinc methionine, copper amino acid complex, cobalt glucoheptonate, etc.

hydroxy

- covalent bond to a hydroxy (OH) group
- zinc hydroxychloride, basic copper chloride, manganese hydroxychloride

inorganic vs. organic vs. hydroxy

research is inconsistent on animal growth, reproduction, and health

organic and hydroxy sources are likely safer for vitamins added to mineral supplements

availability of copper oxide is extremely low

Things to consider if you choose to feed a mineral with organic sources of trace minerals.


- What trace minerals are supplied by organic sources?
- How much of the trace mineral is supplied by an organic source?


How Much of the:
Cu, Zn, Mn, & Co
comes from an organic source?

PURINA® WIND AND RAIN® STORM® ALL SEASON 7.5 AVAILA® 4 COMPLETE

INGREDIENTS:

Dicalcium Phosphate, Monocalcium Phosphate, Calcium Carbonate, Salt, Processed Grain By-Products, Vegetable Fat, Mineral Oil, Magnesium Oxide, Iron Oxide, Vitamin E Supplement, Vitamin A Supplement, Silica Dioxide, Zinc Amino Acid Complex, Manganese Amino Acid Complex, Copper Amino Acid Complex, Ethylenediamine Dihydroiodide, Cobalt Glucoheptonate, Vitamin D₃ Supplement, Natural and Artificial Flavors, Sodium Selenite.

 Meets 100% of zinc, copper, manganese and cobalt trace mineral requirements using Zinpro® Availa® 4 complex trace minerals at a 4 ounce consumption rate.

 Contains chelated/organic trace minerals.

INGREDIENTS


Molasses products, monocalcium phosphate, dicalcium phosphate, magnesium oxide, dehydrated seaweed meal, hydrolyzed vegetable oil, calcium carbonate, manganous oxide, manganese sulfate, manganese amino acid complex, zinc oxide, zinc sulfate, zinc amino acid complex, copper sulfate, copper chloride, copper amino acid complex, ethylenediamine dihydroiodide, calcium iodate, cobalt glucoheptonate, cobalt carbonate, sodium selenite, vitamin A acetate, vitamin D-3 supplement, vitamin E supplement, thiamine mononitrate, menadione sodium bisulfite complex, riboflavin supplement, calcium pantothenate, niacin supplement, vitamin B-12 supplement, choline chloride.

Tubs


- ## Thoughts
- most need separate source of salt
 - most have a similar Ca:P ratio
 - most have less Ca then loose supplements

	Mineral-lyx	IGR Max
Calcium	3.5 - 4.5	5 - 6
Phosphorus	4	5
Salt	none	none
Magnesium	3.0	5.0
Potassium	1.7	1.5
Copper	500	1,000
Zinc	1,500	3,000
Manganese	2,000	4,000
Selenium	8.8	13.2
Iodine	25	50
Cobalt	5	10
Vitamin A	100,000	200,000
Vitamin D	10,000	20,000
Vitamin E	100	200

recommended intake mineral-lyx: 4.8 to 12 oz.
IGR max: 4 oz.



	AS 4 CP add Zn& Cu	MAG Mineral Tub
Calcium	4.5	5.5
Phosphorus	4	4
Salt	10	0
Magnesium	1	5
Potassium	1	2
Copper	1,250	650
Zinc	3,750	2,375
Manganese	1,250	1,250
Selenium	10	10
Iodine	68	68
Cobalt	30	30



recommended intake 4 to 8 oz.

need to put salt out with the "MAG" tub

Blocks



	Big 6	Se-90	Iodized	Sulfur
Calcium				
Phosphorus				
Salt	96 - 99	95 - 98.5	97 - 99.7	95 - 97
Magnesium				
Potassium				
Sulfur				3
Copper	260 - 380	280 - 420		
Zinc	320	3,500		
Manganese	2,400	1,800		
Selenium		90		
Iodine	70	100	100	
Cobalt	40	60		
Vitamin A				
Vitamin D				
Vitamin E				



American Stockman Big 60 Trace Mineralized Salt is the most popular in the eastern half of the United States. With the six core micro-minerals required for animal health - zinc, manganese, cobalt, copper, iodine and iron - it's the first choice for weight gain, feeding efficiencies and overall herd performance. For all classes of beef and dairy cattle, pigs and horses.

Ingredients:
Salt, Manganous Oxide, Ferrous Carbonate, Magnesium Oxide, Copper Oxide, Zinc Oxide, Calcium Iodate, Cobalt Carbonate, Red Iron Oxide for Color.

Guaranteed Analysis:
Salt (min.) 96.0%, Salt (max.) 99.0%, Manganese (min.) 2,400 ppm, Iron (min.) 2,400 ppm, Copper (min.) 260 ppm, Cobalt (min.) 40 ppm, Zinc (min.) 320 ppm, Iodine (min.) 70 ppm, Cobalt (min.) 40 ppm.

Feeding Instructions:
Allow livestock free access to this feed salt.



Ingredients:
Salt, Sulfur, FD&C Yellow #5 Dye for Color.

Guaranteed Analysis:
Salt (min.) 95.0%, Salt (max.) 97.0%, Sulfur (min.) 3.0%.



American Stockman Sulfur Salt Block, 50 lb.

American Stockman Se-90 Trace Mineralized Salt with Selenium Block, 50 lb.

American Stockman Big 60 Trace Mineral Salt Block, 50 lb.

American Stockman Iodized Salt Block, 50 lb.



Things That
Don't Make Sense
To Me

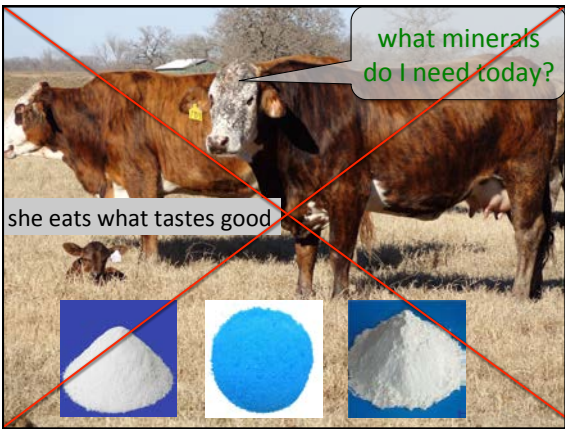
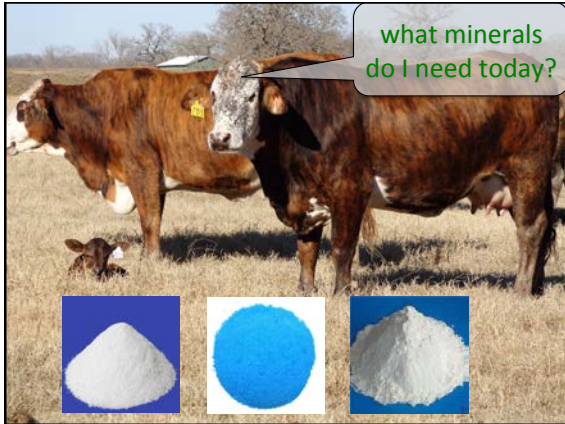
- having more P than Ca in the mineral
- not having any Ca in the mineral
- putting sodium bicarbonate in a mineral
- adding sulfur to the mineral



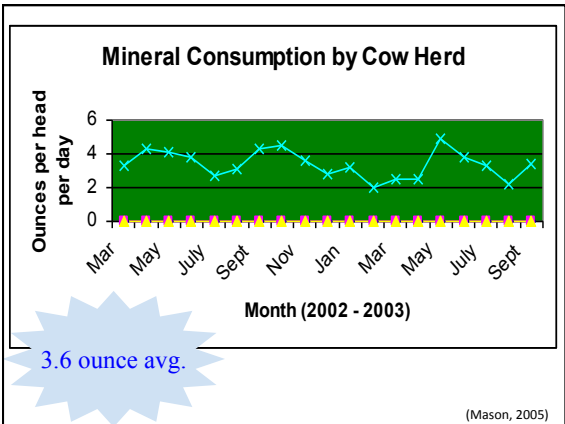
Mineral Feeders



Mineral Intake



- 2 or 4 oz. average consumption
- intake varies over time
- lactation may increase intake, 2 to 2.5x



- if intake is high
 - provide free choice salt
 - check location of mineral feeder
 - reduce amount of mineral fed
- if intake is low
 - determine if cattle are receiving salt from another source
 - check location of mineral feeder

- salt
 - initially encourages intake
 - as salt consumption increases mineral intake is reduce
- phosphorus
 - generally decreases intake
- magnesium
 - generally decreases intake

additives that stimulate intake

- molasses, yeast, other flavoring agents
- mineral oil and weatherization products



Calculating Mineral Intake

- > 35 cows
- > put 50 lbs of mineral in an empty feeder
- > mineral lasts for 6 days
- > $50 \text{ lbs} \div 6 \text{ days} = 8.33 \text{ lbs per day for the herd}$
- > $8.33 \text{ lbs per day} \div 35 \text{ hd} = 0.24 \text{ lbs/hd/d}$
- > $16 \text{ oz.} \times 0.24 \text{ lbs} = 3.8 \text{ oz./hd/d}$

When and What Do I Feed

Reputable Company with a
Nutritionist on Staff

Consider Flexibility

When should I feed a cow-calf mineral?

- year round is best
- last 3, first 3
- provide salt at other times

introduced pasture and hay

- higher Ca, lower P

winter pasture

- higher Ca, lower P
- 5% or more Mg, make sure intake is good

growing native range

- higher Ca, lower P

dormant native range (with protein/energy supplement that has some P)

- higher Ca, lower P
- if possible get protein/energy supplement with added K

dormant native range (no protein/energy supplement)

- similar Ca & P levels
- make sure intake is adequate



Mineral Supplementation: Stockers Grazing Winter Pasture

basically the same as for the cow herd with a few exceptions

Ca needs increase as ADG increases

- want at least 10 gm/d of added Ca intake

Mg level is not really a concern, don't want it to high

Nutrient Requirements

500 lb steer calf

ADG	% TDN	% CP	% Ca	Ca, gm	DMI, lb
1	56	10.0	0.36	20.0	12.5
1.5	60	11.5	0.44	25.6	12.8
2	65	12.7	0.55	32.2	13.0
2.5	70	14.0	0.65	38.1	13.0
3.0	75	15.3	0.75	43.8	13.0

*Estimated dietary requirements for Brangus type steer under typical production conditions (Beef Cattle NRC, 1996). These requirements will vary depending on numerous factors including body condition, health, breed, environmental factors, use of growth promotants, and others.

Nutrient Requirements

800 lb yearling steer

ADG	% TDN	% CP	% Ca	Ca, gm	DMI, lb
1.0	53	7.8	0.25	22.0	20.0
1.5	57	8.6	0.30	26.9	20.5
2.0	61	9.5	0.34	31.4	20.6
2.5	65	10.3	0.39	35.6	20.6
3.0	70	11.1	0.44	40.6	20.6

*Estimated dietary requirements for Brangus type steer under typical production conditions (Beef Cattle NRC, 1996). These requirements will vary depending on numerous factors including body condition, health, breed, environmental factors, use of growth promotants, and others.

UNIVERSITY OF FLORIDA
IFAS Extension

Mineral Concentrations in Grazed Cool-Season Annual Grass Pastures in North Florida¹

Don Myer, G. Onellah, Lee McCrawell, Nancy Wilkinson, Ann Tibbitts, and Cheryl Mackintosh²

Minerals make up a small portion of an animal's diet, however, they play an important role in health, growth and reproduction.

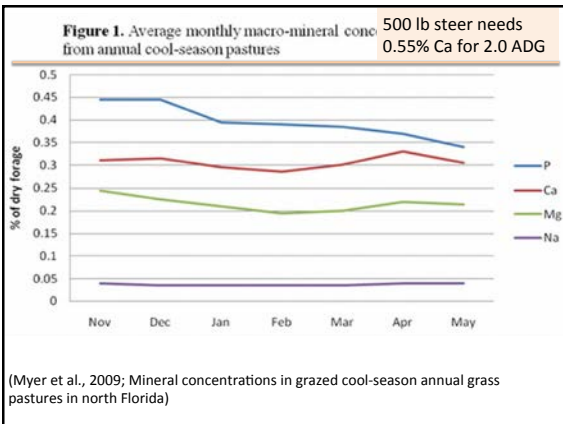
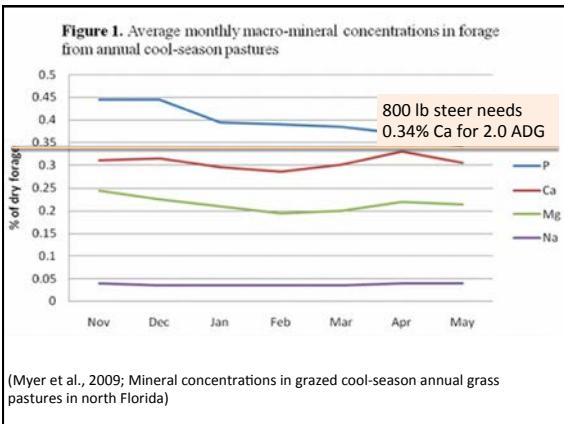
While low-chloride mineral supplementation is common for beef cattle on pasture, pasture forage is still the main source of many nutritionally essential minerals. In the southeastern USA, where permanent warm-season pastures are dominant, cool-season annual grasses, such as tall, ryegrass and timothy, are occasionally planted to provide forage for grazing by beef cattle during the late fall to spring period. These forages are highly digestible and are high in energy and protein, however, there is limited information about concentrations of various nutritionally important minerals.

North Florida Grazing Study

A four-year grazing study was conducted at the North Florida Research and Education Center (NFRREC) Beef Cows which is located near Marianna in northwestern Florida. The study evaluated two cool-season pasture establishment methods (seed-sowing and pasture warm-season pasture or planting into a clean tilled prepared seed-bed) and two forage treatments (zero-top to a maximum of forage species) for grazing by growing beef cattle. A mineral study was a component of this grazing study. The purpose of the mineral study was to measure monthly concentrations of selected minerals in forage from the various pastures used in the grazing study during the late fall to spring grazing season in north Florida. The minerals measured were the macro minerals calcium (Ca), phosphorus (P), sodium (Na), potassium (K) and magnesium (Mg), and the trace minerals copper (Cu), iron (Fe), zinc (Zn), manganese (Mn), cobalt (Co) and selenium (Se).

The pastures were well-drained, sandy soils (fine sandy, kaolinitic, hetero-cambial) typical of the Sandhills Coastal Plain. Prior to planting each year, pastures were fertilized and, if needed, additional lime applied based on soil analysis by a commercial laboratory. All pastures over the 4 to 24 period were grown under dry land conditions. The pastures were grazed by mixed breed, 15 to 18-month-old yearlings.

¹ This document is ANR-25, one of a series of the Animal Science Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date August 2009. Visit the IFAS Web site for a complete list of titles.
² Don Myer, professor, Department of Animal Science, Utah State University and Educator-Team FORREC, Marianna, FL; G. Onellah, former pasture health technician, Department of Animal Science, Utah State University; Nancy Wilkinson, associate professor, Department of Animal Science, Utah State University; Lee McCrawell, associate professor, Department of Agronomy, IFREC, Marianna, FL; Cheryl Mackintosh, associate professor, Department of Food and Food Systems, IFREC, Marianna, FL; Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Marianna, FL 32441.



Oklahoma Winter Wheat

Treatment	2004 to 2005 ADG, lbs	2005 to 2006 ADG, lbs
pasture only	1.08 ^a	1.92 ^a
+ mineral	1.21 ^a	2.40 ^b

November 2005: 0.55% Ca
March 2006: 0.38% Ca


4 year average:
no mineral: 1.57 lb/d with mineral 1.81 lb/d
0.24 lb/d increase due to mineral

(Fieser et al., 2007; Effects of energy, mineral supplementation, or both, in combination with monensin on performance of steers grazing winter wheat pasture)

Additional Resources

E-861

Vitamin and Mineral Nutrition of Grazing Cattle



• Department of Animal Science •
 • Oklahoma Cooperative Extension Service •
 • Division of Agricultural Sciences and Natural Resources •
 • Oklahoma State University •

AgriLIFE EXTENSION

Mineral Supplementation of Beef Cows in Texas

David R. Hunt*

The proper balance of protein, energy, vitamins and all essential mineral elements in a ration is a prerequisite for maximum production. However, because of the wide variation in mineral content of forages and supplements, it is difficult to provide a ration that is balanced in these elements. This is especially true when the mineral content of the forage is low. This is where the mineral supplement can be of great value. The mineral supplement should be formulated to provide the essential mineral elements in a ration that is balanced in these elements. This is especially true when the mineral content of the forage is low. This is where the mineral supplement can be of great value.

Recent Field Experiences

Since 1976, mineral field experiments have been conducted with more than 200 cow-calf pairs. The results have shown that mineral supplementation of beef cows is profitable. The mineral supplement should be formulated to provide the essential mineral elements in a ration that is balanced in these elements. This is especially true when the mineral content of the forage is low. This is where the mineral supplement can be of great value.

Phosphorus Research

The importance of phosphorus in the nutrition of beef cows has been demonstrated in a number of studies. The mineral supplement should be formulated to provide the essential mineral elements in a ration that is balanced in these elements. This is especially true when the mineral content of the forage is low. This is where the mineral supplement can be of great value.

UA DIVISION OF AGRICULTURE, FORESTRY & EXTENSION

Agriculture and Natural Resources

Mineral and Vitamin Supplementation of Beef Cows in Arkansas

Shane Gossard, Associate Professor, Animal Science

Introduction

Cattle require the proper balance of energy, protein, vitamins and all essential mineral elements in a ration to maximize production. However, because of the wide variation in mineral content of forages and supplements, it is difficult to provide a ration that is balanced in these elements. This is especially true when the mineral content of the forage is low. This is where the mineral supplement can be of great value.

Production Losses Due to Mineral and Vitamin Deficiencies

Production losses associated with mineral and vitamin deficiencies in beef cows are substantial. These losses can be reduced by providing a ration that is balanced in these elements. This is especially true when the mineral content of the forage is low. This is where the mineral supplement can be of great value.

Evaluating a Mineral Deficiency


The sign of mineral deficiency in a ration is a decrease in production. This is especially true when the mineral content of the forage is low. This is where the mineral supplement can be of great value.

Vitamins for the Cow Herd

Vitamins are essential to the health and productivity of beef cows. The mineral supplement should be formulated to provide the essential mineral elements in a ration that is balanced in these elements. This is especially true when the mineral content of the forage is low. This is where the mineral supplement can be of great value.

UF Extension


MINERAL NUTRITION OF BEEF CATTLE



UNIVERSITY OF TENNESSEE

THE UNIVERSITY OF ARIZONA COOPERATIVE EXTENSION

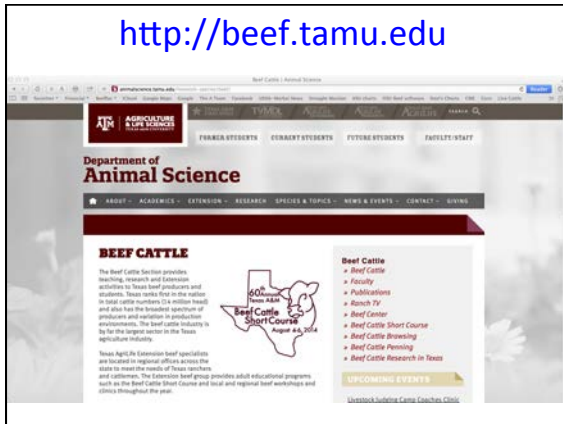
Mineral Supplements for Beef Cattle



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http://beef.tamu.edu



The screenshot shows the TAMU Beef Cattle website. At the top, there is a navigation bar with links for 'HOME', 'TIMES', 'ABOUT', 'CONTACT', and 'SEARCH'. Below this is a header for the 'Department of Animal Science' with a sub-header 'BEEF CATTLE'. The main content area is divided into three columns. The left column contains a paragraph about the Beef Cattle Section's mission and a map of Texas highlighting the 'Beef Cattle Short Course' held in August 2014. The middle column lists various resources such as 'Beef Cattle Faculty', 'Publications', 'Beef Center', and 'Beef Cattle Research in Texas'. The right column features a section for 'UPCOMING EVENTS' with a link to 'Livestock Judging Camp Coaches Clinic'.

Department of Animal Science

BEEF CATTLE

The Beef Cattle Section provides teaching, research and Extension activities to Texas beef producers and students. Texas ranks first in the nation in total cattle numbers (2.6 million head) and also has the greatest percentage of producers and operations in production environments. The beef cattle industry is by far the largest sector in the Texas agriculture industry.

Texas April 16 Extension beef specialists are located in regional offices across the state to meet the needs of Texas ranchers and cattlemen. The Extension beef group provides adult educational programs, such as the Beef Cattle Short Course and local and regional beef workshops and clinics throughout the year.

Beef Cattle

- Beef Cattle
- Faculty
- Publications
- Ranch TV
- Beef Center
- Beef Cattle Short Course
- Beef Cattle Breeding
- Beef Cattle Penning
- Beef Cattle Research in Texas

UPCOMING EVENTS

[Livestock Judging Camp Coaches Clinic](#)