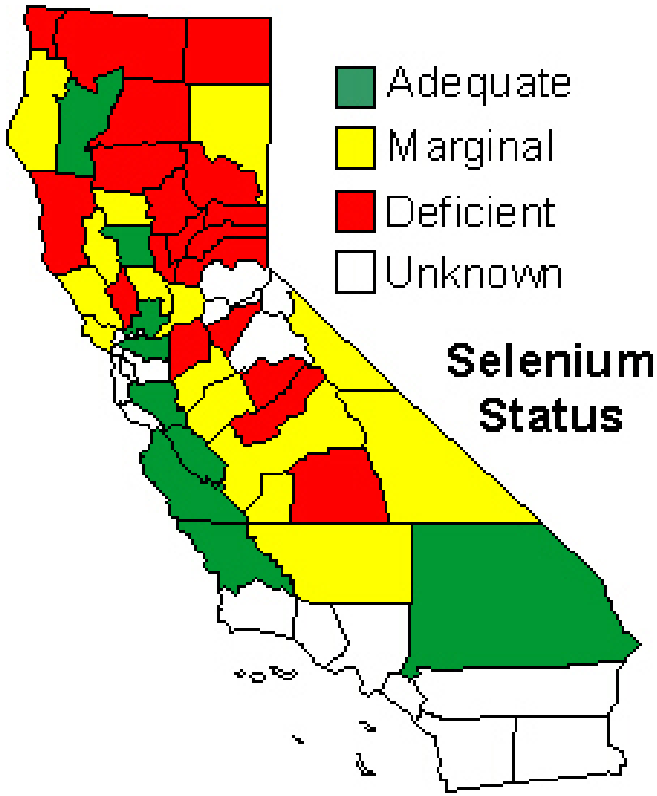
# Supplementing Se

Funded by the Rustici Cattle Research Endowment

Josh Davy – Farm Advisor
Larry Forero – Farm Advisor
Jim Oltjen – UC Specialist
Dan Drake – Farm Advisor
John Maas – UCCE Veterinarian
Rick Tucker – UC Vet Med
Christie Mayo – UC Vet Med

# Reported problems from Se deficiency

- Reduced weight gain???
- Reduced feed efficiency
- Lower immune response
- More cases of scours
- Retained placentas
- White muscle



# Where are you currently?
# $15 a sample

- Whole blood for Se
- Serum…liver biopsy for trace element screen

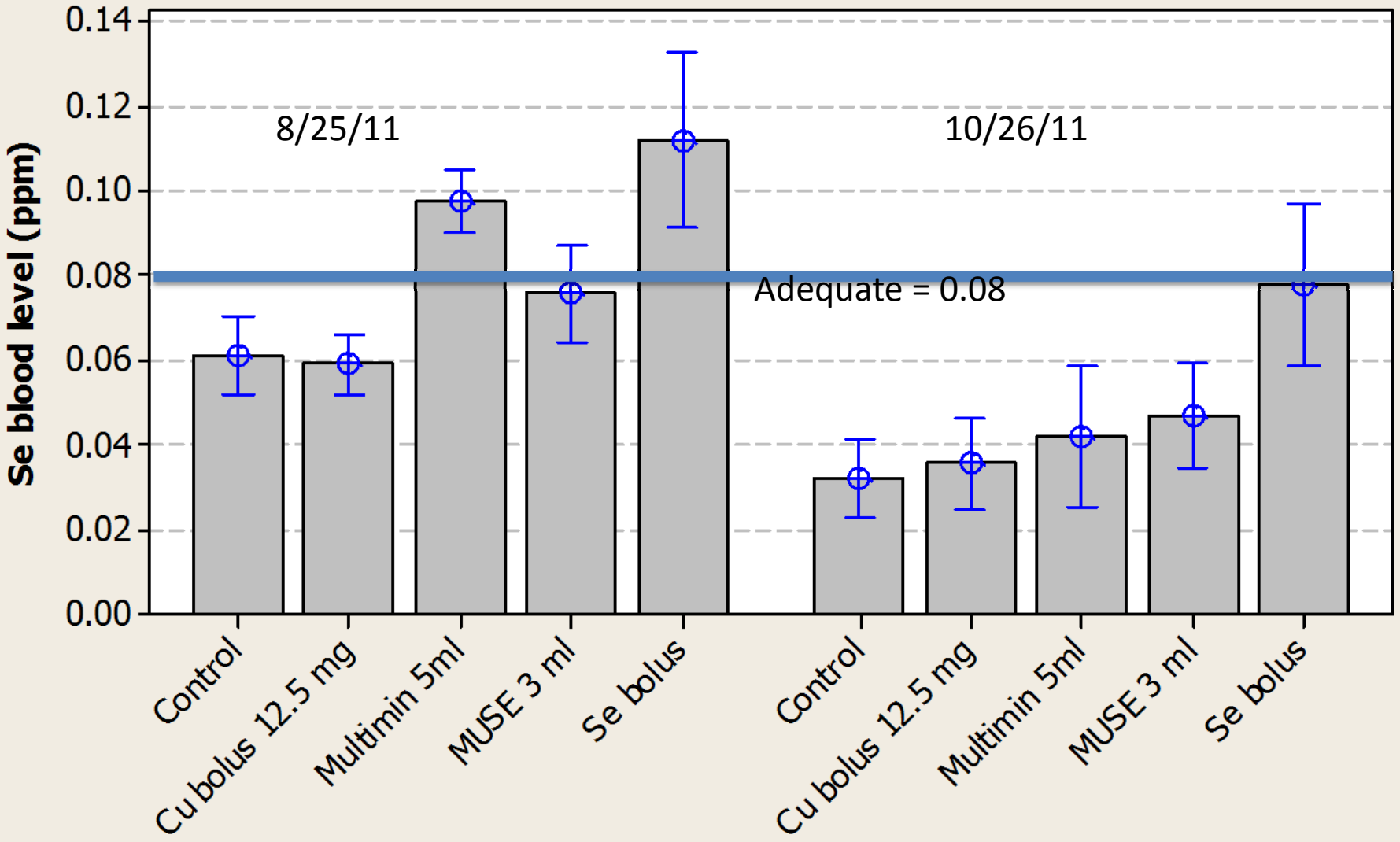
# Proper tubes – do you want zinc?

# What can we use?

•100 steers weaned off the truck at pasture delivery in Cottonwood

•Five  treatments
  - •Muse – label rate
  - •Multimin – label rate
  - •Se bolus
  - •Cu bolus
  - •Control – all had 3 ppm liquid supplement (¾ lbs/day)

•Monthly weights plus blood work at 30 and 90 days


Se blood status 8/25/11 and then 10/26/11
Se blood level (ppm)
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
8/25/11
10/26/11
Adequate = 0.08
Control
Cu bolus 12.5 mg
Multimin 5ml
MUSE 3 ml
Se bolus
Control
Cu bolus 12.5 mg
Multimin 5ml
MUSE 3 ml
Se bolus

# What about salt?

60 steers total

- 6 positive control
  - Bolus
- 6 negative control
  - No supplement
- 48 treatment group
  - Loose salt at 120 ppm

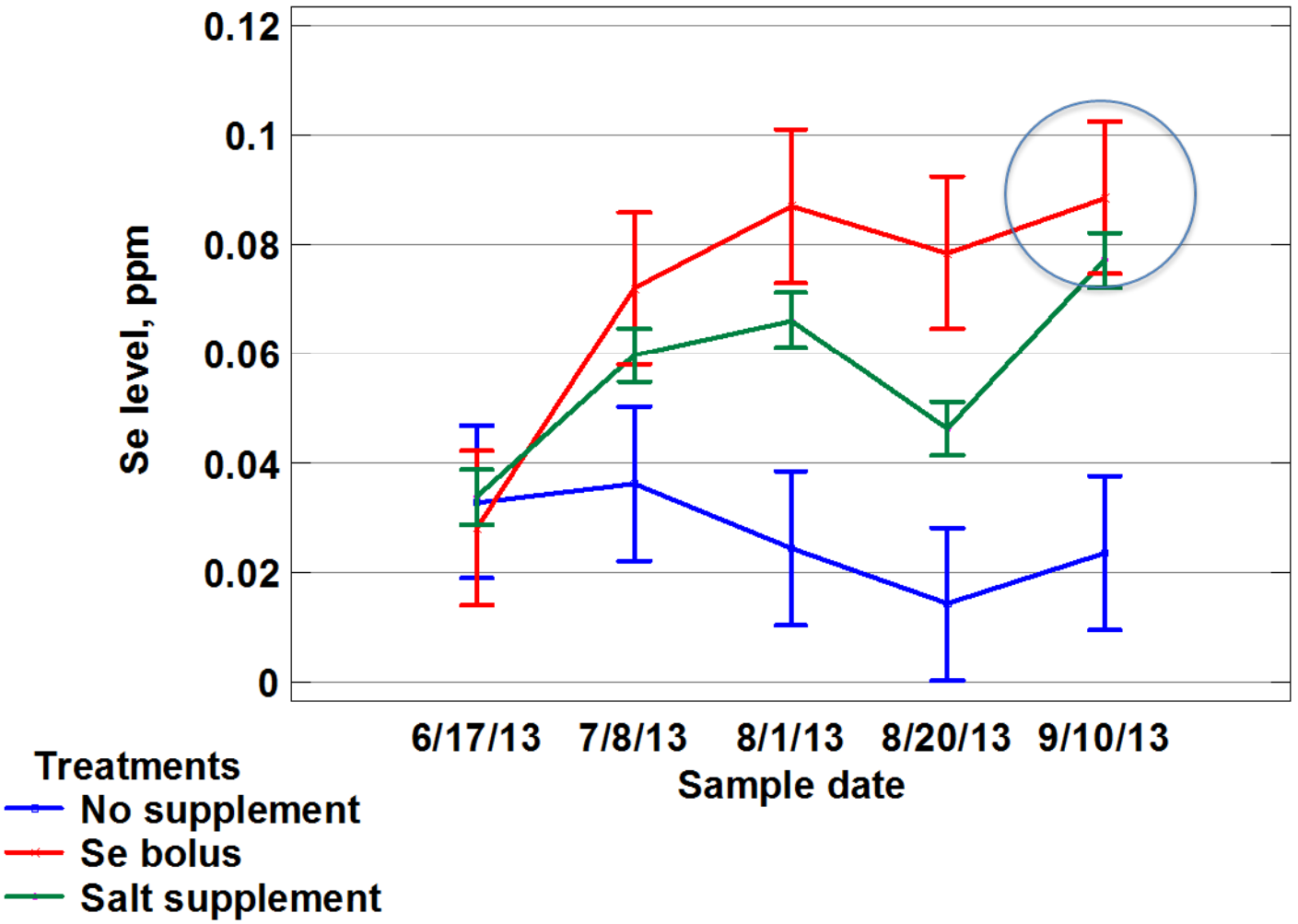
# Salt evaluation

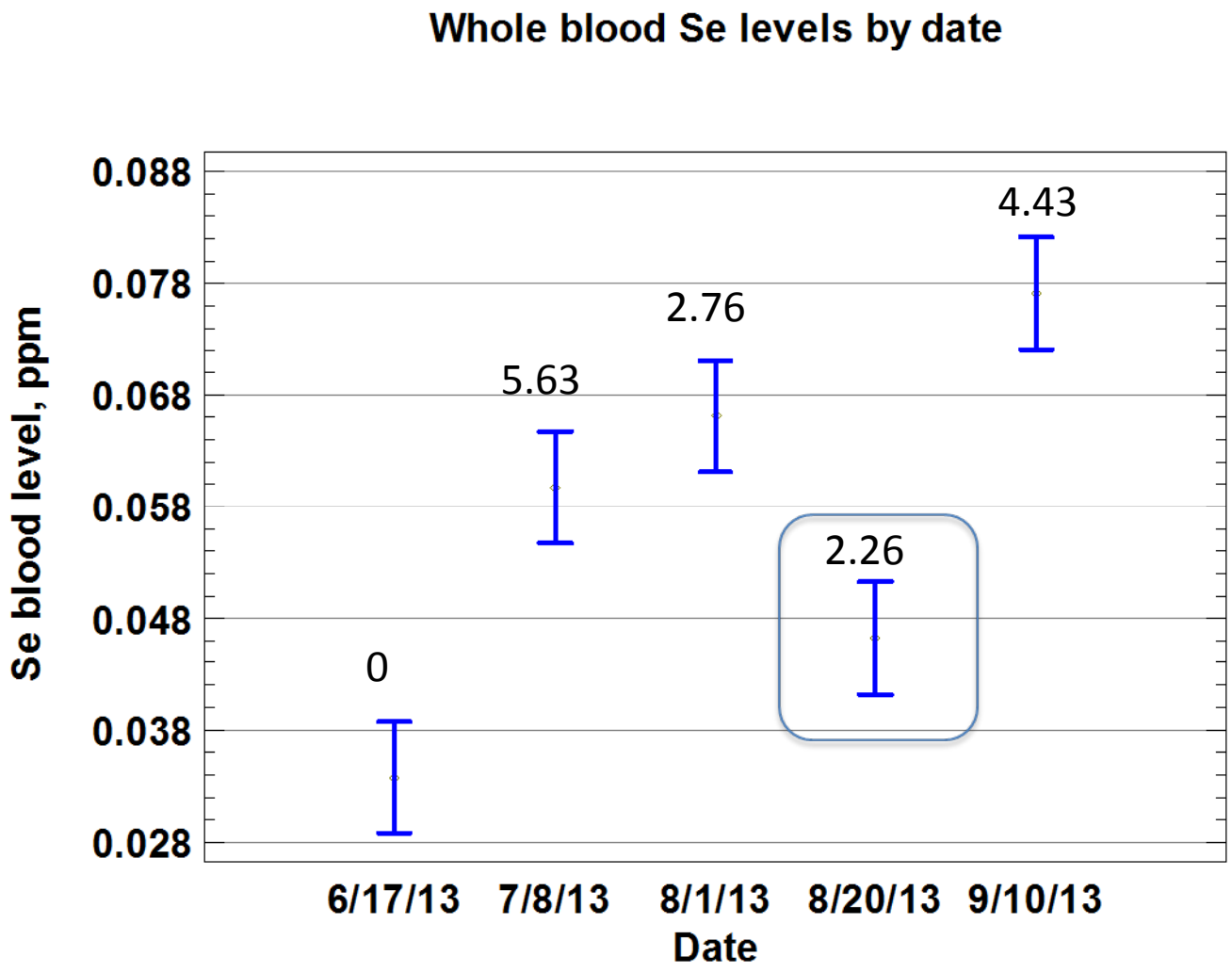
- Day -21, sample all cattle for background mineral levels
  - 5/28/13
- Day 0, begin supplementation, sample all cattle for mineral levels, collect individual weight
  - 6/17/13
- Day 21, mineral sample all cattle, collect individual weight
  - 7/8/13
- Continue every 21 days until day 90

# Forage Sampling

- Collected botanical composition
- Sampled forage biomass
- Sampled forage quality
- Sampled forage mineral content
  - Salt screen:  Ca, P, Mg, K, Na
  - Heavy metal: Cu, Fe, Mn, Zn, et
  - Selenium: Se

## Whole blood Se level by treatment and date



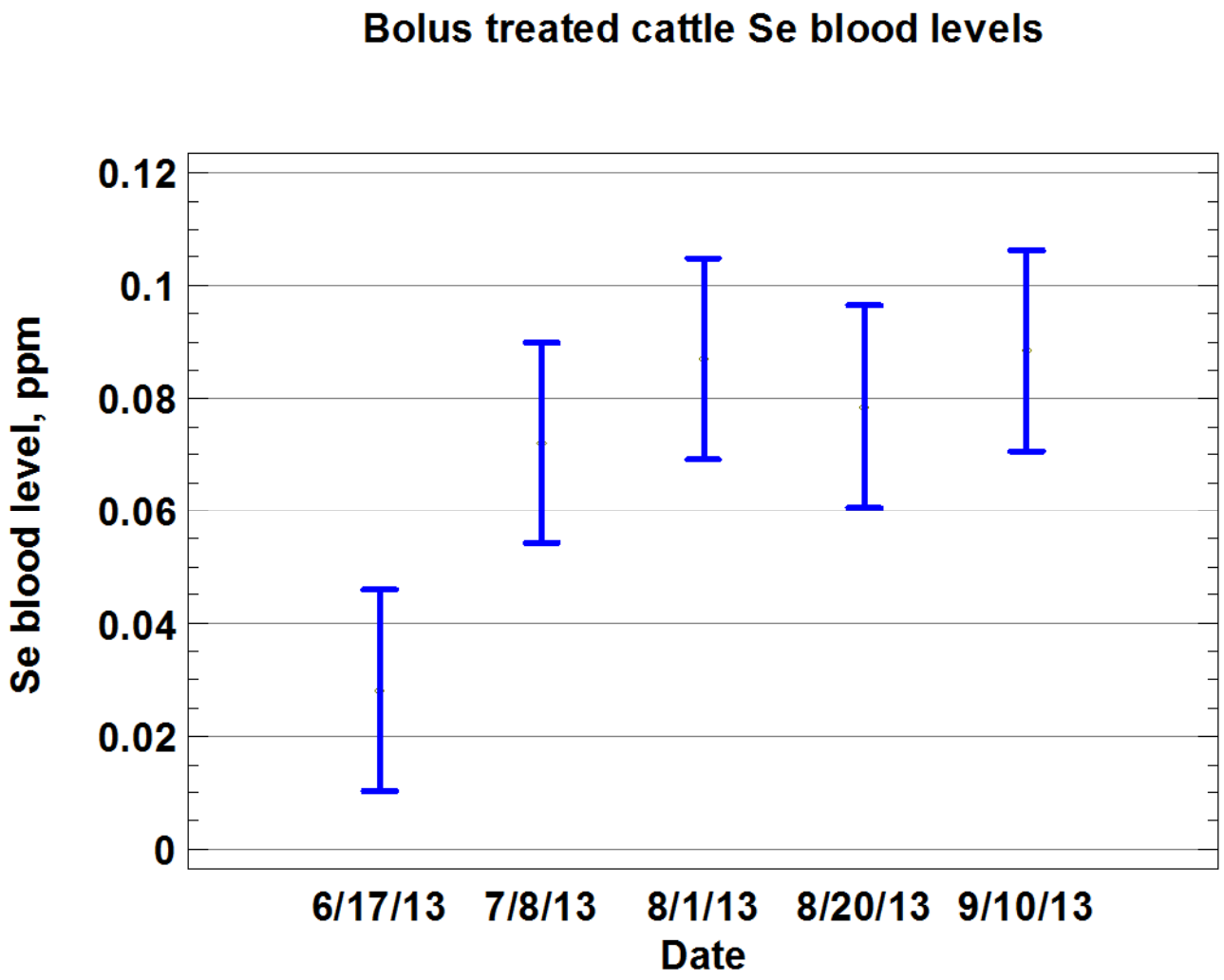



Labels = oz/hd/day consumed

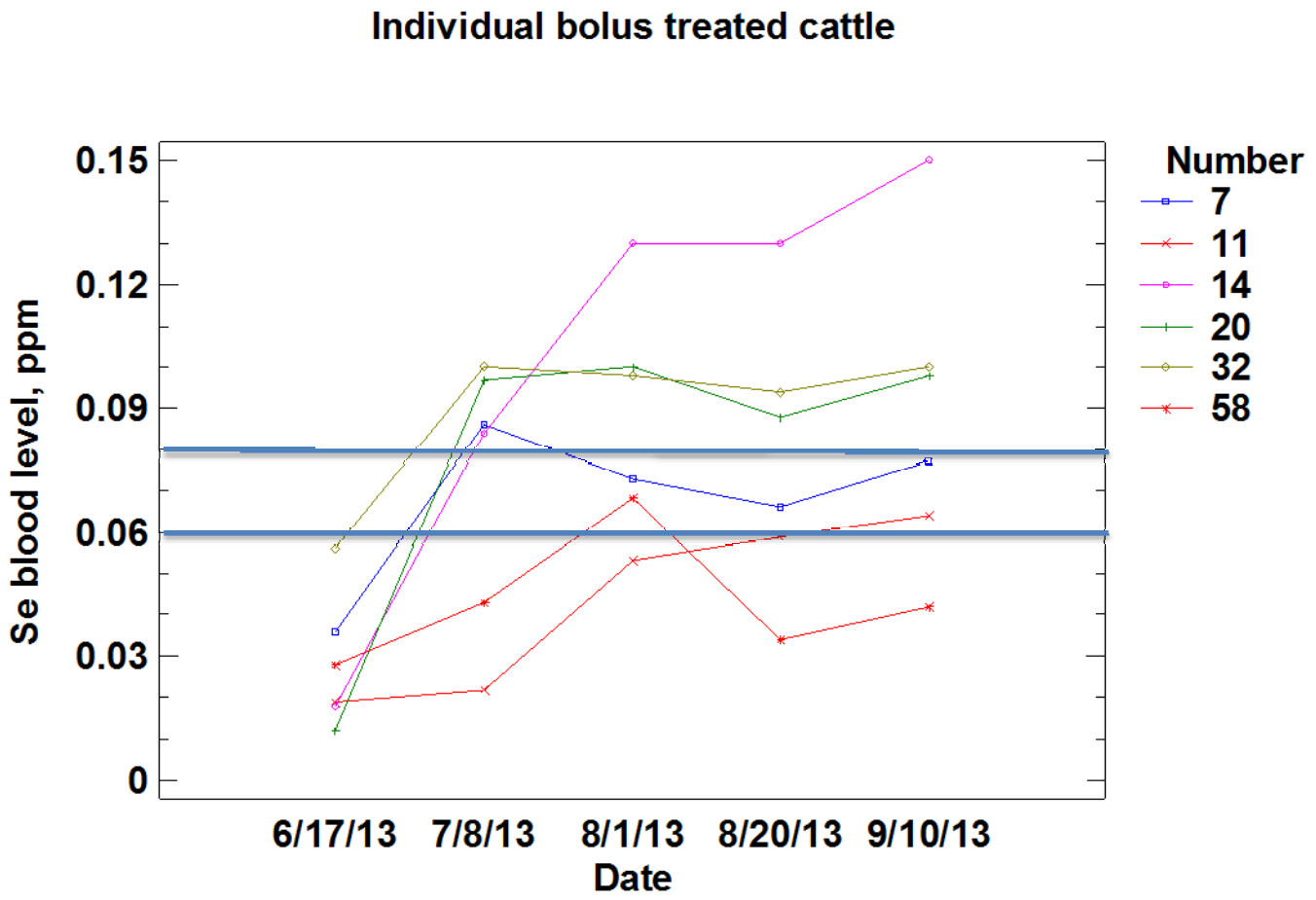
# Still very interesting

- (ii)*Beef cattle:* At a level not to exceed an intake of 3 milligrams per head per day.
  - Federal regulation
- 1 ppm Se salt provides .02835 mg Se/oz of salt
- 120 ppm salt provides 3.402 mg Se/oz of salt
  - Thanks to Dan Drake for acquiring information
- At max legal dose of Se we can still be deficient

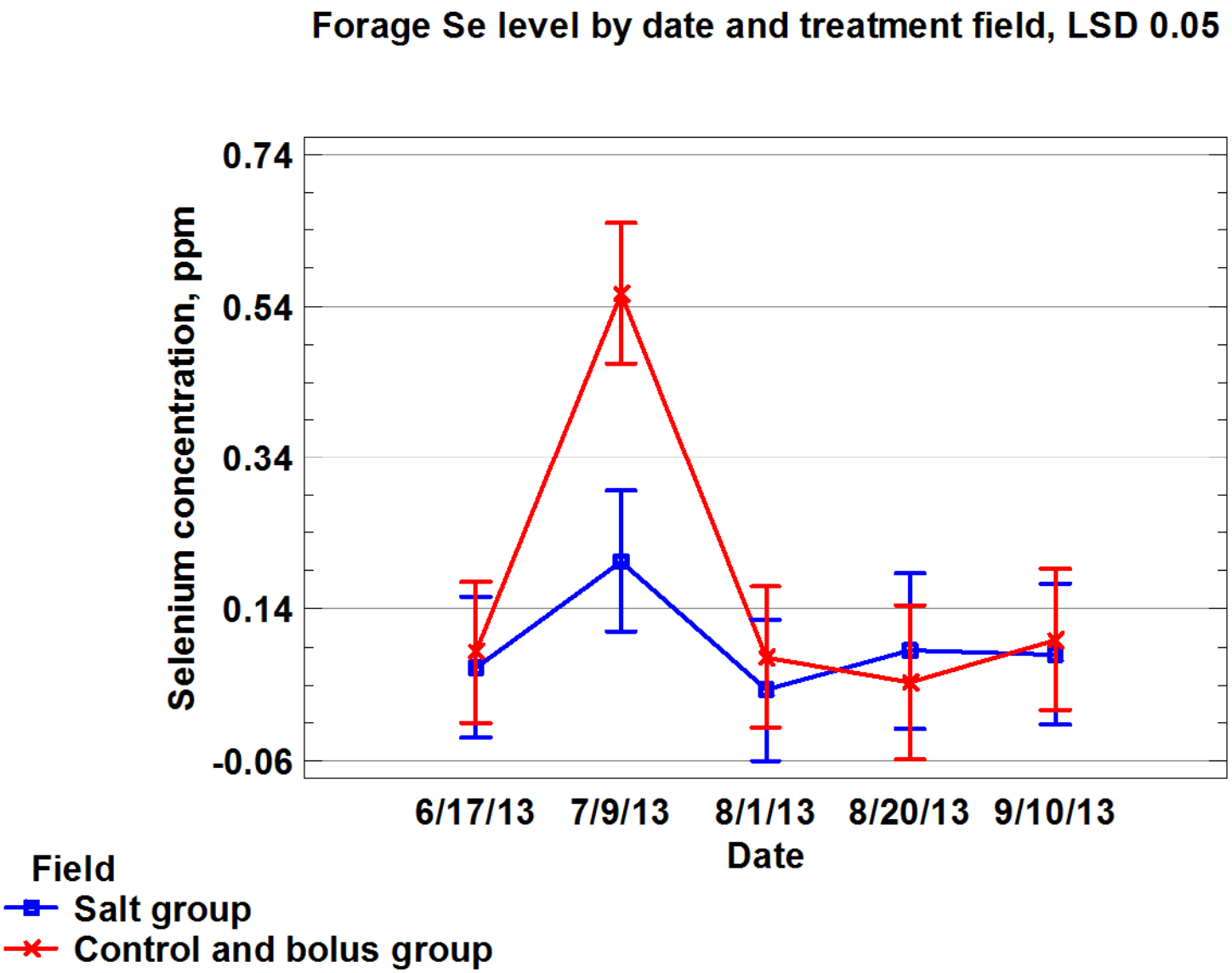
On the whole the bolus works well



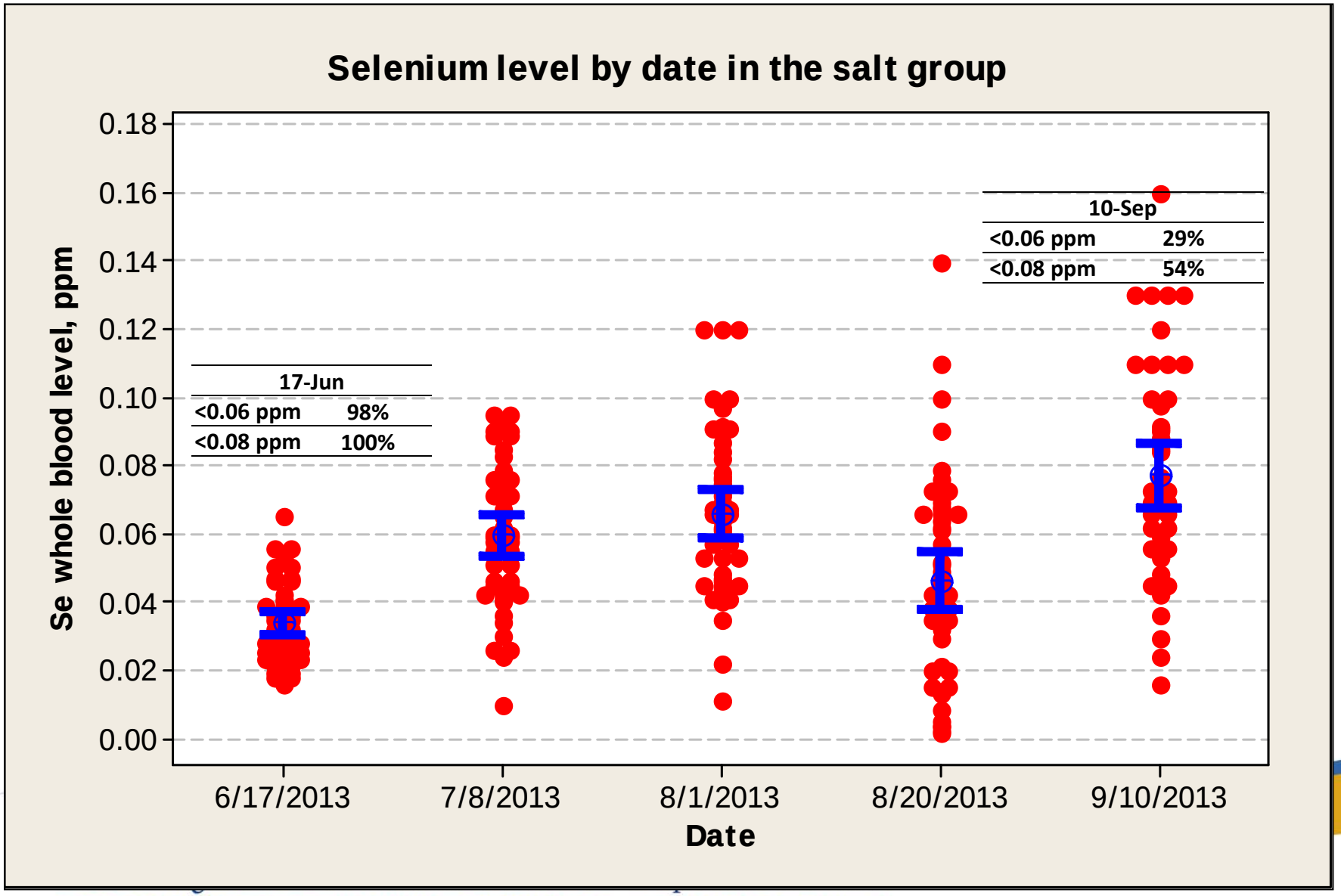
# Some still low - Diet? bolus = 3mg/d
# Assume all bolus are working the same



Except for the one drastic difference the pastures were fairly even



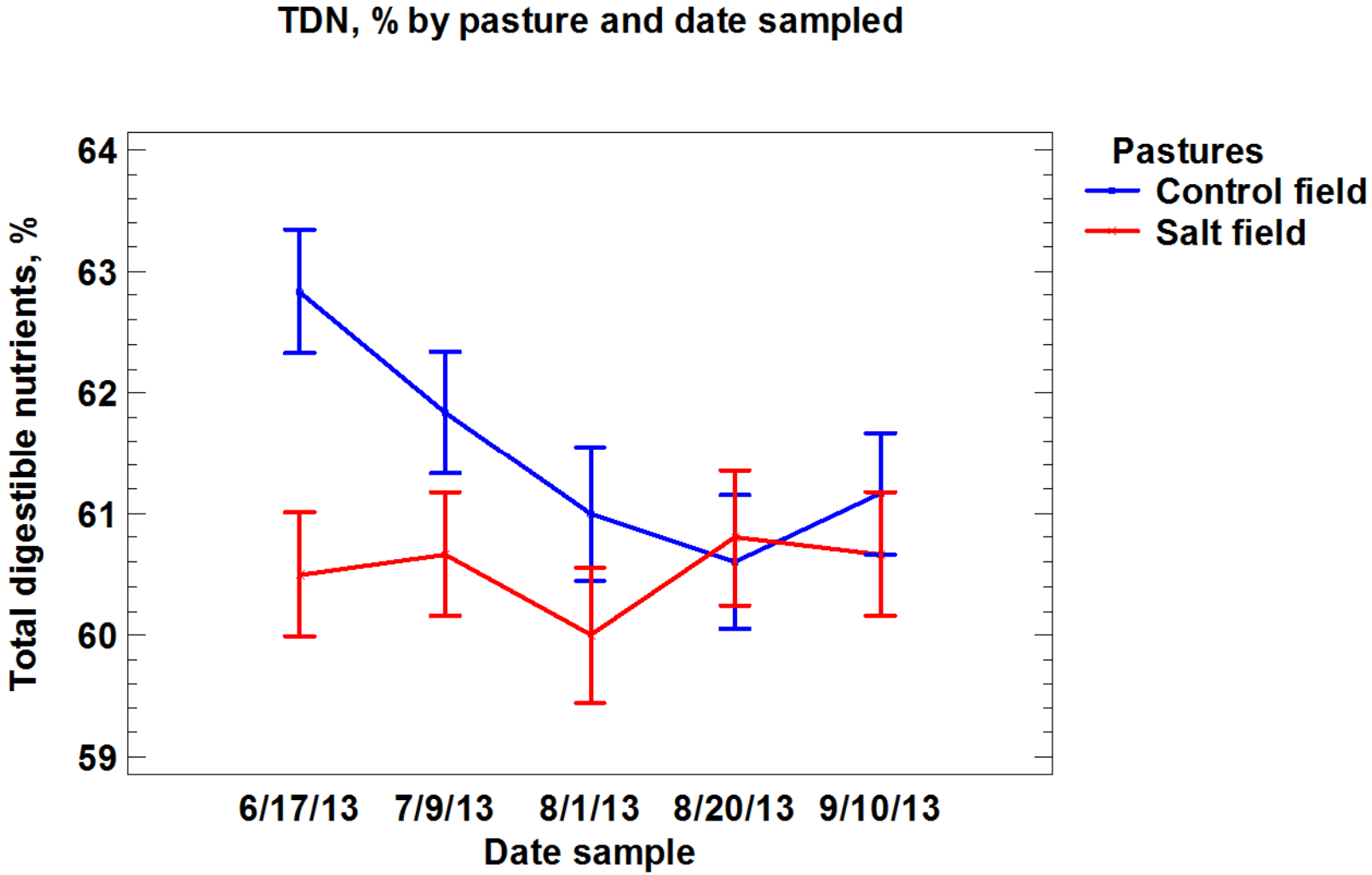
# How many were still deficient?
# So yes, the salt made a difference



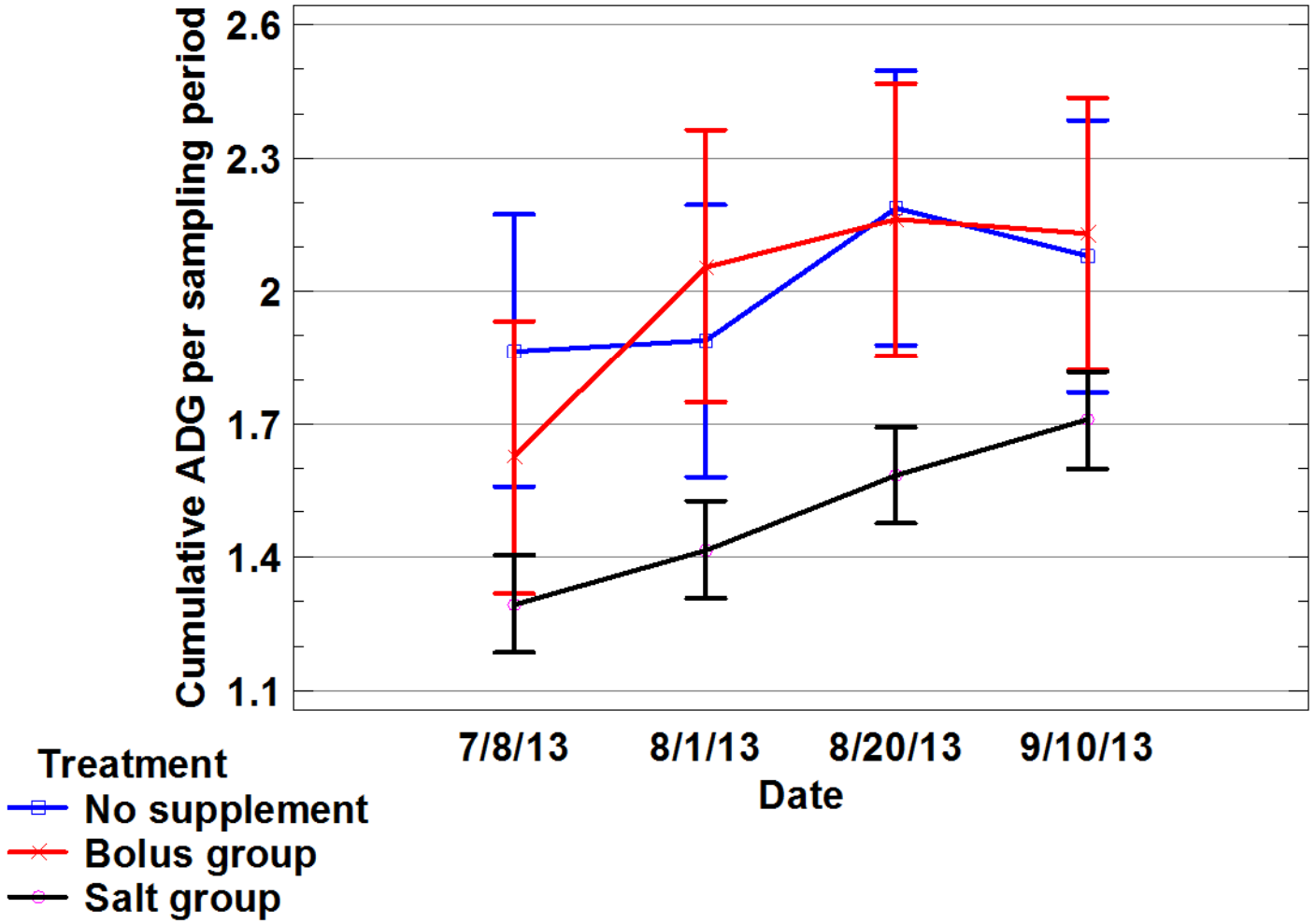
# Weight gain

- In these trials weight gain was <u>not</u> limited by Se levels and correlations did not exist
  - Remember there are other effects that can happen from low Se levels!!!!

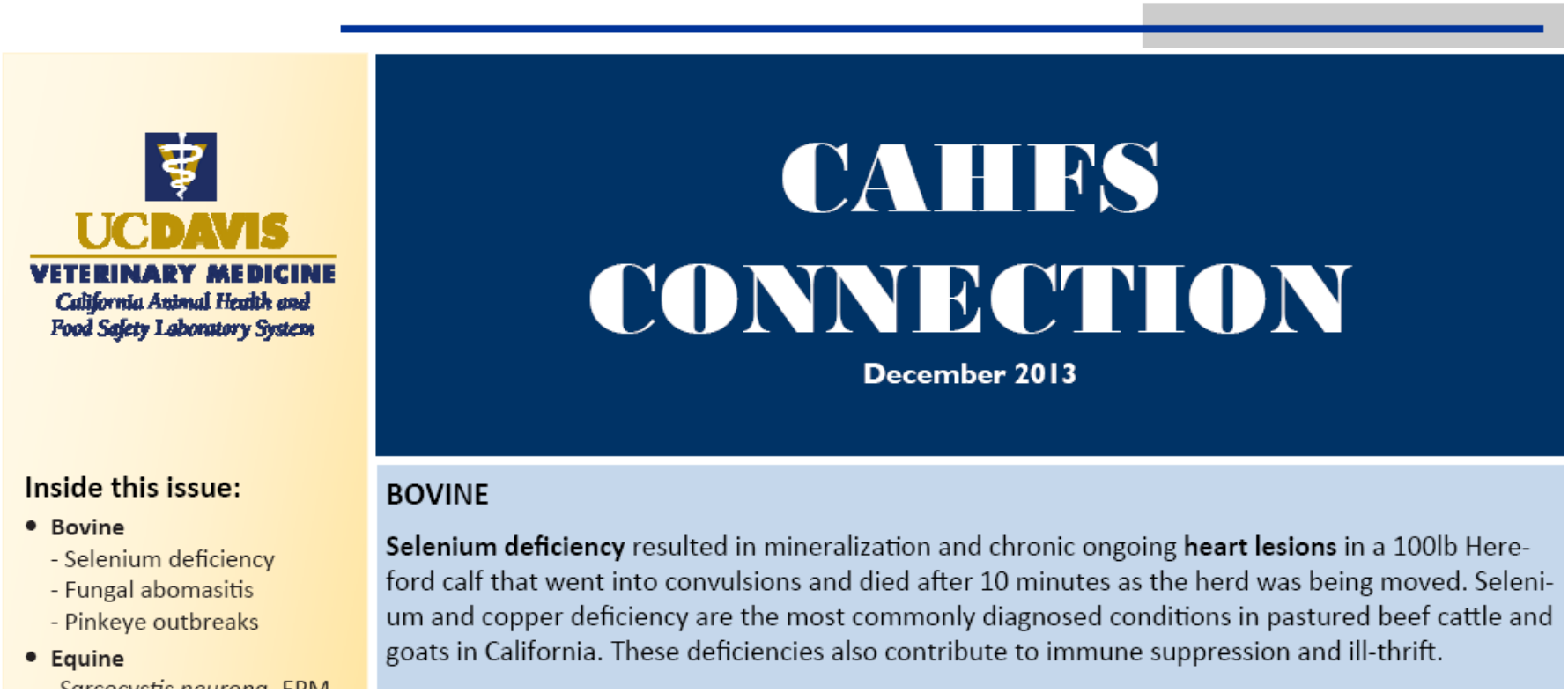
Think of supplementation as a vaccination that prevents secondary problems


TDN, % by pasture and date sampled
Total digestible nutrients, %
64
63
62
61
60
59
6/17/13
7/9/13
8/1/13
8/20/13
9/10/13
Date sample
Pastures
Control field
Salt field

## Cumulative Average Daily Gain by sampling date and treatment



# Examples of Se problems is real!
# UC Vet Med sample submission



UCDAVIS
VETERINARY MEDICINE
California Animal Health and Food Safety Laboratory System

CAHFS CONNECTION

December 2013

Inside this issue:

- Bovine
  - Selenium deficiency
  - Fungal abomasitis
  - Pinkeye outbreaks
- Equine
  - Sarcocystis neurona, EPM

BOVINE

**Selenium deficiency** resulted in mineralization and chronic ongoing **heart lesions** in a 100lb Hereford calf that went into convulsions and died after 10 minutes as the herd was being moved. Selenium and copper deficiency are the most commonly diagnosed conditions in pastured beef cattle and goats in California. These deficiencies also contribute to immune suppression and ill-thrift.

Selenium deficiency can lead to muscle damage (eg. white muscle disease), illthrift, poor production (including reproduction), and decreased resistance to other diseases.

# What is an Se supplement?

Low

ACTIVE DRUG INGREDIENT

Monensin (as Monensin Sodium) ... 800 g/ton

**Guaranteed Analysis**

| | | | |
|---|---|---|---|
| Crude Protein | (Min) | 2.8 | % |
| Crude Fat | (Min) | 3.7 | % |
| Crude Fiber | (Min) | 1.9 | % |
| Ash | (Max) | 74.9 | % |
| Calcium | (Min) | 6 | % |
| Calcium | (Max) | 10 | % |
| Phosphorus | (Min) | 0.3 | % |
| Sodium | (Min) | 14 | % |
| Sodium | (Max) | 25 | % |
| Magnesium | (Min) | 1 | % |
| Copper | (Min) | 2,083 | PPM |
| Manganese | (Min) | 70 | PPM |
| Zinc | (Min) | 4,053 | PPM |
| Iodine | (Min) | 330 | PPM |
| Selenium | (Min) | 42 | PPM |
| Selenium | (Max) | 57 | PPM |

**List of Ingredients**

Salt, Rice Bran, Calcium Carbonate, Magnesium Oxide, Zinc Sulfate, Copper sulfate, Sodium Selenate, Ethylenediamine Dihydriodide, Rumensin 90.

N1303 PPR5I

NOTICE: Expiration Date: 30 days after date of manufacture.

WARNING: A withdrawal time has not been established for pre-ruminating calves. Do not use in calves to be processed for veal.

CAUTION: Do not allow horses or other equines access to

Higher

**Guaranteed Analysis**

| | | | |
|---|---|---|---|
| Ash | (Max) | 94.6 | % |
| Sodium | (Min) | 26 | % |
| Sodium | (Max) | 49 | % |
| Copper | (Min) | 2,016 | PPM |
| Zinc | (Min) | 3,820 | PPM |
| Iodine | (Min) | 159 | PPM |
| Selenium | (Min) | 82 | PPM |
| Selenium | (Max) | 137 | PPM |

**List of Ingredients**

Salt, Zinc Sulfate, Sodium Selenate, Copper sulfate, Ethylenediamine Dihydriodide.

L1302 POWER

CAUTION:
THIS FEED CONTAINS MORE 110.1 PPM OF SELENIUM, FEED AT A RATE WHERE THE TOTAL SELENIUM DOES NOT EXCEED .3 PPM (PARTS PER MILLION) IN THE TOTAL DIET.

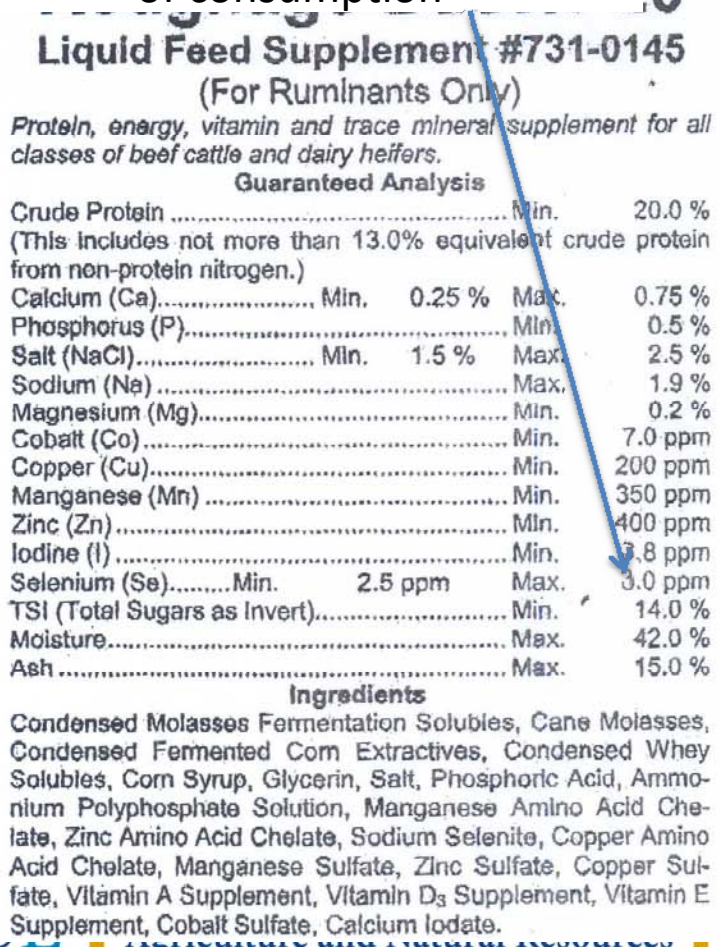
DO NOT FEED MORE THAN .27 PERCENT OF DIET AS THE ONLY SOURCE OF SELENIUM.

WARNING: DO NOT FEED TO SHEEP. THIS FEED CONTAINS ADDED COPPER AT 2376.46 MG/KG. COPPER LEVELS IN THIS FEED ARE UNSAFE FOR SHEEP.

UC CE

# Liquid supplement

Yes, with a lot of consumption



145/91

**Liquid Feed Supplement #731-0145**

(For Ruminants Only)

*Protein, energy, vitamin and trace mineral supplement for all classes of beef cattle and dairy heifers.*

**Guaranteed Analysis**

| | | | | |
|---|---|---|---|---|
| Crude Protein | | | Min. | 20.0 % |
| (This includes not more than 13.0% equivalent crude protein from non-protein nitrogen.) | | | | |
| Calcium (Ca) | Min. | 0.25 % | Max. | 0.75 % |
| Phosphorus (P) | | | Min. | 0.5 % |
| Salt (NaCl) | Min. | 1.5 % | Max. | 2.5 % |
| Sodium (Na) | | | Max. | 1.9 % |
| Magnesium (Mg) | | | Min. | 0.2 % |
| Cobalt (Co) | | | Min. | 7.0 ppm |
| Copper (Cu) | | | Min. | 200 ppm |
| Manganese (Mn) | | | Min. | 350 ppm |
| Zinc (Zn) | | | Min. | 400 ppm |
| Iodine (I) | | | Min. | 3.8 ppm |
| Selenium (Se) | Min. | 2.5 ppm | Max. | 3.0 ppm |
| TSI (Total Sugars as Invert) | | | Min. | 14.0 % |
| Moisture | | | Max. | 42.0 % |
| Ash | | | Max. | 15.0 % |

**Ingredients**

Condensed Molasses Fermentation Solubles, Cane Molasses, Condensed Fermented Corn Extractives, Condensed Whey Solubles, Corn Syrup, Glycerin, Salt, Phosphoric Acid, Ammonium Polyphosphate Solution, Manganese Amino Acid Chelate, Zinc Amino Acid Chelate, Sodium Selenite, Copper Amino Acid Chelate, Manganese Sulfate, Zinc Sulfate, Copper Sulfate, Vitamin A Supplement, Vitamin $D_3$ Supplement, Vitamin E Supplement, Cobalt Sulfate, Calcium Iodate.

731-0145/91

**DIRECTIONS FOR USE**

1. THIS SUPPLEMENT IS FOR RUMINANT ANIMALS ONLY.
2. THIS SUPPLEMENT MAY BE FED FREE CHOICE IN A LICK WHEEL FEEDER, MIXED AS A PART OF A COMPLETE RATION, OR TOP DRESSED.
3. THIS PRODUCT IS A SUPPLEMENT! ADEQUATE ROUGHAGE AND OR GRAINS MUST BE AVAILABLE AT ALL TIMES. INTAKE OF THIS PRODUCT SHOULD NOT EXCEED 2.2 LBS. PER HEAD PER DAY BASED UPON A 1000 LB ANIMAL.
4. IF FED FREE CHOICE, FEEDERS DESIGNED FOR LIMITING THE INTAKE ARE RECOMMENDED. INTAKE CAN BE AFFECTED BY A NUMBER OF FACTORS SUCH AS FEEDER PLACEMENT RELATIVE TO WATER, SHADE OR LOAFING AREA AND NUMBER OF ANIMALS PER FEEDER OR LICK WHEEL. THESE FACTORS CAN BE USED TO MANAGE LEVEL OF CONSUMPTION.

**OBSERVE THE FOLLOWING PRECAUTIONS:**

- *PROVIDE UNLIMITED DRINKING WATER*
- *PROVIDE ADEQUATE ROUGHAGE IN TERMS OF BOTH QUANTITY AND QUALITY*
- *PROVIDE ADEQUATE MINERAL SUPPLEMENT FREE-CHOICE*
- *DO NOT EXCEED THE DAILY MAXIMUM INTAKE SPECIFIED ABOVE*
- *DO NOT OFFER FREE-CHOICE TO OVERLY HUNGRY OR DEPRIVED ANIMALS AS OVER CONSUMPTION MAY RESULT*

Mix this product with grain and roughage to provide 1.0 to 2.2 lbs. per head per day (Basis a 1000 pound animal) in the complete feed. This product can be fed up to a maximum inclusion of 10.0% in the complete feed on an air dry basis (90% dry matter). At this level it provides 0.3 ppm supplemental selenium on an air dry basis (90% dry matter) in the complete feed, the maximum permitted by Federal Regulation Title 21 CFR 573.920. Inclusion of this product in the complete feed should be reduced if other sources of supplemental selenium are utilized.

# Is consumption adequate?

## Compare apples to apples

## I prefer to bring them all to salt terms

- loose salt
  - 1 oz/hd/day = >100 ppm Se
- liquid supplement with 3 ppm Se
  - 0.75 lbs/hd/day
    - 3 ppm * 12 oz (0.75) = 36 ppm at 1 oz/hd/day….low
  - 2.2 lbs/hd/day
    - 3 ppm * 35 oz (2.2 lbs) = 105 ppm at 1 oz/hd/day …acceptable

# Follow up thoughts

- Why even use a salt mix
  - Other minerals in the mix
- Shots work quickly, but how long do they last
- There will be variance even with a bolus
  - In general the bolus is pretty reliable
- The salt can work, but will vary in consumption, and possibly Se levels

# Follow up thoughts

- Calculate your consumption
  - 1 50lb bag = 800 ounces
  - How many days and how many head
  - Follow up with blood monitoring
    - Its cheap compared to problems and can help figure out if what your doing works
  - The diet looks to play a difference, but quantify?
  - Manganese