

# OSU Extension

## Beef Industry Tour 2013: Trace Minerals in the Cattle Diet

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This entire presentation can be viewed on the OSU Beef Cattle Sciences website at: <http://beefcattle.ans.oregonstate.edu/BeefTour2013.htm>

Session Three: Trace Mineral Supplementation of Grazing Beef Cattle

Dr. John Arthington, Professor and Center Director, University of Florida, Range Cattle Research and Education Center

Dr. Arthington was one of the guest speakers at the Beef Industry Tour in December. He started out by saying he would focus on three trace minerals: selenium, copper, and zinc. Trace minerals are also called micro-minerals, and generally speaking are required in beef cattle diets at amounts less than 1 gram per day. (Macro-minerals, on the other hand, are generally required at amounts of greater than 1 gram per day). Dr. Arthington gave a local background of mineral research which was conducted out at Burns, Oregon. Based on data collected from grass samples, copper, zinc, and sodium (selenium was not tested) were shown to be deficient all year long (Ganskopp and Bohnert, 2003). As far as the macro-minerals, calcium and manganese were deficient early in the year, and became more adequate as the year progressed. Phosphorus and potassium, also macro minerals, were the

opposite as they were sufficient early on, and then dropped in concentration. This information tells us that mineral concentrations in grasses change with grass growth and maturity. If cattle do not receive required minerals, initially they can have a sub-clinical disorder which can show itself in immune, growth, or reproductive function. However, over time, they can mineral specific clinical disorders that can be severe. Dr. Arthington proceeded to discuss the following micro or trace minerals:

**Selenium:** selenium deficiency is common in grazing cattle worldwide. The problem with administering selenium in the diet is that it can also be toxic. It has a narrow margin of safety. However, it is essential as it works together with Vitamin E to prevent such classic problems as white muscle disease which can kill calves, retained placentas and lowered fertility and immunity in cows.

**Zinc:** is a cofactor in the proper functioning of certain enzymes, and is commonly supplemented as zinc sulfate. It is important in proper testicular development and sperm function in bulls. In addition, it has found to be important in maintaining hoof integrity.

**Copper:** is also important in enzyme function, and is commonly supplemented as copper sulfate. It also plays an important part in cattle immunity, growth, and reproduction. Dr. Arthington warned against

supplementing with copper oxide as it has shown to have potential negative effects on forage consumption and weight gain. Copper addition in the diet should be balanced at a 1 (Cu):3 (Zn) ratio with zinc. Many times, but not always, copper deficiency can be noticed as a loss of hair coat pigmentation.

**Stress and the Increased Need for Trace Minerals:** Cattle during stressful periods have a heightened requirement for trace minerals. A study by Arthington (1996) showed that urinary zinc concentration shot up in response to a viral exposure in stressed calves, but then dropped dramatically after the second day of exposure, demonstrating that zinc is used during times of infection and stress.

**Forms of minerals and supplementation:** Minerals are sold as organically or inorganically based. Research has not supported one over the other, but antagonists, age, and stress are all factors that can demonstrate a difference. In one study (Arthington and Swensen, 2004), inorganic mineral supplement was shown to increase pregnancy rates in young cows by 21% over organic minerals. However, in another study (Arthington and Swensen, 2004), organic mineral supplement was shown to decrease calving interval in young cows by 16 days. In both studies, older cows were unaffected by mineral source.

Minerals can be supplemented to cattle in the following forms: Free-choice, loose mineral supplement, trace mineral fortified protein/energy supplements (cubes, cakes, tubs/blocks, loose feed mixes), trace mineral fortified salt blocks, and drenches, injections, and slow-release boluses. While free choice salt based mineral is the most common form of supplementation, consistency with intake is a problem, and not all cattle in the herd will get the same amount. Controlled supplement feeding with cattle can potential insure better intake of supplement and less problem with mineral deficient issues. This can be accomplished through addition in alfalfa cubes, soybean meals, or other types of added feeds. Another form of supplementation for selenium mineral can be fertilization. An Oregon State University study (Filley et al. 2007) showed forage selenium values increased in the first year with the use of a fertilizer with selenium addition.

Another newer form of mineral for zinc, copper, and manganese are hydroxy minerals. These concentrated minerals have been shown through research to be preferred by cattle over other forms. Yet another form that is currently popular is an injectable mineral mix formula such as Multi-Min. This product results in a rapid increase in blood concentrations of manganese, zinc, copper, and selenium, but it is also excreted rap-

idly. However, injectable minerals have been shown to be effective in increasing immune response.

Mineral supplementation in cattle is complex as antagonistic effects can also occur between minerals. For example, a high sulfur diet can bring on copper deficiency when molybdenum, another trace mineral, is also absent. For example, pasture fertilization using a sulfate base should be considered as a potential high sulfur input for cattle forage, and has been shown to decrease copper levels in cattle in one study (Arthington et al. 2002).

Arthington concluded with the fact that cattle will only consume salt rapidly based on their physical need, and will not consume necessary minerals without the use of salt if they are deficient in those minerals. Therefore, attention has to be paid to supplementing required minerals for cattle performance. Minerals are a necessary and important part of the cattle diet and can influence production. A better understanding of local cattle needs and supplementing according to those needs can prevent deficiency disorders in your cattle management system.

For additional information, please contact your local Extension office or visit our Beef Cattle website: <http://beefcattle.ans.oregonstate.edu/BeefTour2013.htm>

### Extension Garden Coordinator

Meet Yvonne Babb, our new OSU Extension Garden Coordinator who will be teaching gardening classes in Warm Springs and Sinnasho this season. Born in Illinois and raised on a farm, she learned to work hard, raise animals and bake a mean apple pie.

Her excitement and love of gardening took root after she started learning about nature and wondering how it worked, eventually becoming a science teacher and naturalist in the southwest and Florida.

Recently Yvonne completed her Masters in Teaching and her Master Gardener training from OSU in Central Oregon. She currently teaches in the classroom during the winter months and runs a gardening education service, called Your Garden Companion, LLC during the growing season. She will be a contract gardener for our program.

Her goal is to help you enjoy



both the work and wonder of gardening.

Her motto is:

"Nature is my model for living and my avenue for learning."

## Small Food, Big Success

Oregon State University's Recipe to Market Online provides an entrepreneurial foundation for developing and launching successful food business ventures. Through lessons in start-up knowledge, food regulations, marketing and commercialization, these courses will teach students essential skills for navigating today's small food landscape. Gain behind the scenes access to successful food start-ups through real world case studies and interviews with professional entrepreneurs. Save \$100 by completing all three courses in the certificate.

✓ **Brand and Market Planning** - Explore successful methodologies used by food entrepreneurs to promote, package and develop a food brand that meets a consumer need.

✓ **Development and Production** - Learn the practical aspects of food safety and the importance of FDA guidelines and regulations, as well as food processing requirements.

✓ **Business Planning, Legality and Financing** - Understand how to develop an effective food business plan that considers available financing channels and negotiating legal requirements.

For questions about the Recipe to Market Online Certificate or to enroll, visit [pace.oregonstate.edu/recipe2market](http://pace.oregonstate.edu/recipe2market), call 1541-737-4197, or email [learn@oregonstate.edu](mailto:learn@oregonstate.edu).



**Oregon State UNIVERSITY**  
Extension Service

## OSU Extension Garden Workshops

### Warm Springs – Garden Workshops

Incredible Soils, Thursday, March 20, 12:00 – 1:00pm  
Soil Recipe for Gardening Success - Wednesday, April 2, 5:30 pm – 7:30 pm  
Planning your Garden - Wednesday, April 30, 5:30 pm – 7:30 pm

### Sinnasho – Garden Workshop

Planning your Garden, Wednesday, April 23, 6:00 – 8:00 pm

Light Meals Provided!

Bring leftover seeds, packets, colored pencils and a ruler if you have them

Register: 541-553-3238



### Cooking with Chicken




Try these quick and easy ways to add chicken to your meals!



- Cut raw chicken into bite-sized pieces, cook and use as toppers for salad and pasta. Or use a fork to shred cooked chicken to use in recipes like FoodHero.org's **Chicken Enchilada Soup**.
- Try a new seasoning! Rosemary, thyme, basil, tarragon or garlic powder tastes great on chicken.
- Serve homemade **Crunchy Chicken Nuggets** (recipe on back) with veggie sticks and low-fat dip!

### Vegetarian Recipe Substitution

- Substitute 1 cup of tofu, cooked beans or lentils for every 1 cup of cooked meat in a recipe.
- If a recipe calls for meat in pounds, use 2-2 1/2 cups of tofu, cooked beans or lentils per pound of raw meat in the recipe.

Stay Connected   

### Kids Can...

- choose a vegetable to serve with chicken.
- top their salad with shredded or bite-size chicken pieces.
- set a timer for cooking chicken.



### Safety First with Chicken

- Sanitize knives, cutting boards and countertops after preparing chicken.
- Wash hands before and after handling raw meat.
- Cook chicken to 165° F.
- Refrigerate leftovers within 2 hours.



### Monthly Food Hero Checklist

- Try a new seasoning on chicken.
- Have kids top salads with chicken.
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