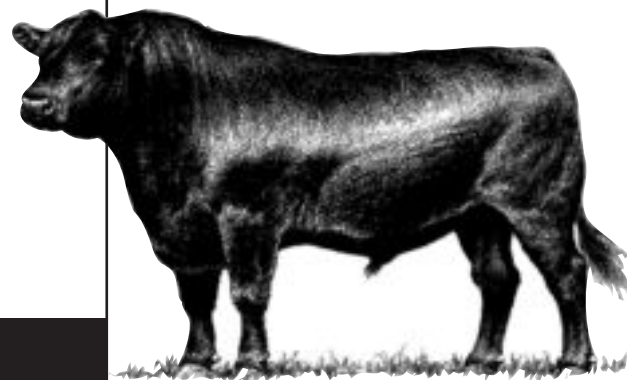


ANGUS

BEEF BULLETIN

"The Commercial Cattleman's Angus Connection"

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An aggressive trace-mineral supplementation program helped Bobby Wall's herd reach its potential.

Minerals Solve the Mystery

A copper deficiency prevented cattle from reaching their potential.



When Wall's heifers showed signs of copper deficiency, Montgomery county agent John Bartee brought Wall a bag of high-quality minerals.

Story & photos by
BECKY MILLS

For years, Bobby Wall looked forward to retiring from his job as an insurance claims adjuster and becoming a full-time cattleman. He didn't know he had a production mystery waiting for him.

In 2002, when he could turn his full attention to his 70 Angus and Angus-cross cows, Wall noticed his black cows were more of a rusty brown color. More obvious, at least to his bottom line, were the open cows.

"Our conception rates weren't there," says the Palmyra, Tenn., producer. "Some years it was down to 75% to 80%. Cattle that should have calved didn't."

At first, he suspected the problems might be from endophyte-infected fescue. But fescue has been on the farm

since 1981, and Wall keeps a bumper crop of clover in the pastures to dilute the endophyte's effects.

Fortunately for Wall, veterinarian Bill Pollard, Montgomery County Extension agent John Bartee and University of Tennessee (UT) Extension animal scientist Warren Gill all suspected a trace-mineral deficiency and suggested Wall try a high-quality mineral with a mix of both organic and inorganic sources of copper (Cu).

Actually, Bartee did more than suggest. He uses artificial insemination (AI) to breed Wall's heifers. When their reproductive tracts didn't have the tone they should, he brought Wall a bag of minerals.

Wall started using the minerals in 2003 and reports, "Our conception rates have certainly improved since we switched to a better mineral. They are

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Both are searchable by breeder, location and date.

Mystery (from page 1)

about 90% for the whole herd." That's in spite of the fact Wall has shortened his breeding season from 90 to 60 days.

Bartee adds, "There has been a noticeable difference in the heifers' reproductive tracts, too."

Wall also says, "My cows shed off their reddish winter coats by May. Before, they would go well into the summer before they'd shed."

More than a guess

The mineral cure was more than a lucky guess on the part of Wall's advisors. Similar symptoms had

shown up in other parts of the county and state. In response, Gill and co-workers Clyde Lane, Aaron Fisher and Debbie Jones waged a full-scale assault with a three-year forage and cattle mineral survey. Beginning in 2001 county agents across the state collected 834 forage

(Continued on page 6)

The where, how and how much of copper

Copper (Cu) deficiencies aren't just a Tennessee problem. At least marginal deficiencies have been reported out to the western mountain states and stretching to Florida. So how can you tell if your herd is affected?

First, take an honest look at your cows, especially their body condition scores (BCSs). The problem could be as simple as a lack of protein and energy. "Copper gets blamed on more problems than it causes," says John Arthington, University of Florida (UF) animal scientist. "Producers want to think of it as a magic bullet, but there are only a few incidences where copper deficiencies cause production problems."

If you are convinced it is a trace-mineral problem and copper is the prime suspect, the easiest way to determine if a deficiency exists is to start with hair coat. Black cows that don't have slick, black hair coats, that are rather slow to shed and have a reddish tinge to their coat are symptomatic of copper problems. "In Tennessee, I think we lost sight of the fact that black cattle are supposed to be black," comments Warren Gill, University of Tennessee (UT) Extension animal scientist.

Gill uses a hair coat scoring system (see Fig. 1) to gauge the problem.

However, Arthington says, "In experimental conditions we have not been able to affect coat color."

Also, look for reproduction rates that aren't up to par. If your cattle aren't settling or are aborting early, it could be a problem with low copper levels or with disease brought on by lowered immunity, another indicator. If there is an immunity problem, also look at selenium (Se) levels — sulfur antagonizes that mineral, too.

In Tennessee, blood samples showed copper deficiencies statewide. But, Arthington notes, "It has to be an extreme case to detect a copper deficiency in the blood. Liver biopsies are the only reliable way. Fortu-

Fig. 1: Hair coat scoring system used to gauge presence of copper deficiency

Score	Condition
1	No detectable problem, healthy coat, appearance appropriate to season
2	Slight indications of off-color in limited amount, possibly over shoulders or around flank
3	Definite off-color, dull hair covering less than one-third of body, slightly slow to shed
4	Enough dead hair to cover significant percentage (more than 50%), slow to shed
5	Hair clearly dead in appearance, brittle, cattle not slicking off normally

nately, there are skilled people who can do that."

If the blood tests do indicate a lack of copper [a deficiency is usually considered under 0.55 parts per million (ppm)] then take a look at your minerals. Check the level of copper and also the form it is in. Gill says copper oxide usually isn't considered a very available source, while copper sulfate and copper carbonate are more effective.

As for rates, Gill uses the guide presented in Fig. 2. "Monitor consumption and keep records," Gill emphasizes. "The best minerals in the world won't work if the cows don't eat them." He says consumption varies through the year, but producers should generally expect them to eat 2-6 ounces (oz.) per head per day.

"The levels of copper we are recommending for beef cattle are toxic for sheep and Jersey cattle," he warns.

If your cattle are eating too much mineral, Arthington suggests mixing stock salt with the mineral to limit consumption. But, he warns, "Do not offer the salt and minerals separately. They'll eat the salt and not the minerals."

Fig. 2: Suggested copper levels in mineral supplements based on various conditions, assuming consumption of 3 to 4 ounces of mineral supplement per cow per day

Scenario	Forage copper, ppm	Forage sulfur, %	Suggested level of copper in mineral, ppm
No known problems	10	0.2	700-1,000
Some rough hair coat	8	0.25	1,000-1,200
Rough hair, slow breeders and some open cows	6	0.3	1,500-2,000
Rough hair coat and more difficult and significant breeding problems*	<6	>0.31	2,000-3,000

*This scenario is included to emphasize extreme situations in some areas, which may require higher than usual levels of copper supplementation. Work with Extension agents and mineral suppliers to develop solutions to difficult problems. This may include developing a custom mineral mixture, typically available but requires ordering in bulk quantities. Monitor consumption carefully if higher copper levels are chosen. If copper levels exceed label recommendations, there could be a risk of toxicity.

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3201 Frederick Ave. • Saint Joseph, MO 64506-2997
phone: (816) 383-5200 • fax: (816) 233-6575
office hours: (M-F) 8 a.m.-4:30 p.m. (Central time)
Web site: www.angusbeefbulletin.com

Staff are listed by name, phone extension and e-mail prefix. All direct phone numbers are "(816) 383-5..."; all e-mail addresses are "...@angusjournal.com"

General manager – Terry Cotton, 214, tcotton

Editorial Department

Editor – Shauna Rose Hermel, 270, shermel;
Associate editor – Corinne Patterson, 277, cpatterson; **Assistant editor** – Crystal Albers, 215, calbers; **Artists** – Christy Benigno & Mary Black;
Intern – Alaina Burt, 209

Field editors

Kindra Gordon, PO Box 645, Spearfish, SD 57783, (605) 722-7699, kindras@gordonresources.com;
Janet Mayer, 259 Mile Hill Rd., Johnstown, PA 15909, (814) 322-4687, jmayer5013@aol.com;
Becky Mills, Rt.1, Box 414, Cuthbert, GA 31740, (229) 732-6748, lovettmills@alltel.net; &
Troy Smith, HC 72, Box 18A, Sargent, NE 68874, (308) 527-3483; wordsmith@nctc.net

Contributing writers

Barb Baylor Anderson & Brent Eichar

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Mystery (from page 4)



Wall follows the recommendations of Warren Gill, UT Extension animal scientist.

samples in the spring and fall.

In addition, with help from UT veterinarian Fred Hopkins, blood samples were taken from 20 herds. David Kirkpatrick, manager of the UT Central Bull Test Station, also helped get blood samples from a portion of the young bulls consigned to the bull test.

Copper was at least marginally deficient, or less than 10 parts per million (ppm), in more than 92% of the forage samples. The

blood work also showed at least marginal deficiencies across the state.

The next question was, why? As it turns out, the fescue endophyte probably is guilty for part of the problem. Copper levels in the forages were lowest in late summer. "This goes along with work from Virginia Tech," Gill says. "The endophyte fungus found in fescue depresses copper availability."

Still, the fescue endophyte couldn't begin to take the full share of the blame. The major culprit was sulfur. Along with molybdenum (Mo) and iron (Fe), sulfur has a reputation for tying up copper and making it unavailable to plants and animals. The forages showed sulfur levels at least marginally antagonistic in almost 90% of the samples.

Wall's cattle were getting hit with two out of three of the antagonists.

"We have the largest fossil-fuel-burning plant in the world just across the line in Stewart County," Barte says. "Ten years ago the state of Kentucky told the Tennessee Valley Authority (TVA), owner of the plant, that if they'd burn Kentucky coal, which is high in sulfur, they would build new stacks and scrubbers to take the sulfur out. It doesn't take it all out."

The yellow haze produced by the plant is visible for miles, even well across state lines. But there's more. The area around Wall's operation is so rich in iron that foundries sprung up during the Civil War to turn the ore into cannons and cannon balls.

Wall had the water tested in his pond and springs. Both tested positive for antagonistic amounts of sulfur and iron.

Convinced, Wall turned to a mineral mix with both chelated and inorganic sources of copper.

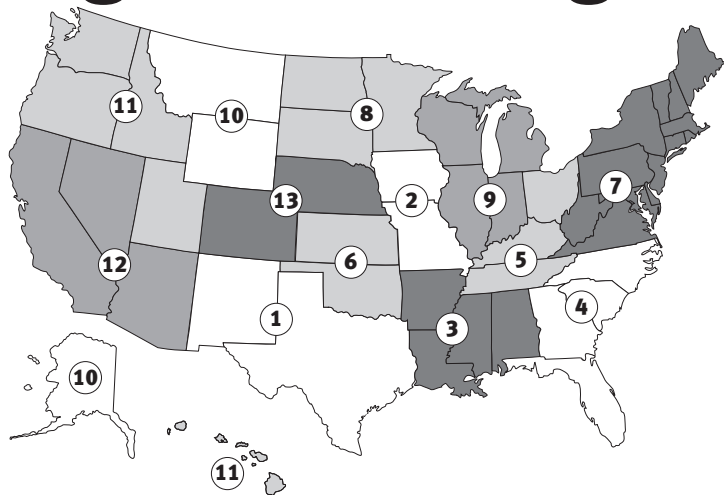
"Organic, or chelated, minerals have a higher availability to animals, but almost all the data suggests healthy, mature cows do as well on inorganic minerals," says University of Florida (UF) animal scientist John Arthington. "If antagonists are present, they (chelated minerals) can make a difference."

Wall is just grateful he found out about the deficiency so he could correct it. "We didn't know," he says. "Daddy always put out a white salt block until spring. Then he'd put out a red one. I had been feeding minerals all along but got them wherever because I thought all minerals were created equal. It has been a matter of education."



Wall's cattle look and perform better now that they are on a high-quality mineral.

American Angus Association Regional Managers



Region 1

CASEY WORRELL
PO Box 201296
Austin, TX 78720-1296
(512) 413-1610
cworrell@angus.org



Region 2

DON LAUGHLIN
36327 Monarch Trail
Guilford, MO 64457
(660) 652-3500
laughlin@angus.org



Region 3
RICHARD DYAR
1633 CR 104
Crossville, AL 35962
(256) 659-6305
rdyar@angus.org



Region 4
DAVID GAZDA
1985 Morton Rd.
Athens, GA 30605
(706) 227-9098
dgazda@angus.org



Region 5
CHUCK GROVE
1919 Goshen Rd.
Forest, VA 24551
(434) 525-4687
cgrove@angus.org



Region 6
MATT CALDWELL
14937 KS Hwy. 152
LaCygne, KS 66040
(913) 757-2600
mccaldwell@angus.org



Region 7
DAVID MULLINS
1579 Fairfax Pike
White Post, VA 22663
(540) 869-6220
dmullins@angus.org



Region 8
VERN FREY
1271 55th St. North
Granville, ND 58741
(701) 721-0344
vfrey@angus.org



Region 9
JERRY CASSADY
1408 E. Heather Dr.
Mahomet, IL 61853
(217) 586-2009
jcassady@angus.org



Region 10
ANDY REST
PO Box 50473
Billings, MT 59105
(406) 254-7576
arest@angus.org



Region 11
ROD WESSELMAN
PO Box 746
Moses Lake, WA 98837
(509) 765-9219
rwesselman@angus.org



Region 12
JOHN DICKINSON
Apt. 1099
1586 Response Rd.
Sacramento, CA 95815
(916) 924-1844
jdickinson@angus.org



Region 13
MATT PRINTZ
17787 WCR 25
Platteville, CO 80651
(970) 737-9045
mprintz@angus.org