Pork Prose

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THE SELENIUM ISSUE

The Problem

Eight years ago, a report described high mortality rates in ducks near the Kesterson Reservoir in the San Joaquin Valley of California.

Excess selenium was apparently responsible for the deaths and poor reproductive rates among these water fowl. Where did the selenium come from?

It occurred naturally in the area, and was probably magnified from the runoff of irrigation water.

The Blame

Not long after the problem was discovered, environmental groups began pointing fingers at the livestock industry. And so the Food and Drug Administration (FDA) looked into the issue, asking questions, such as: In what form does selenium come out of the animal? How does it move in the soil and effluent? Where does it go in water sheds?

Hearing unsatisfactory answers, the FDA decided that the livestock industry was feeding too much selenium. Most sensible individuals would struggle to make the connection between the dead ducks in an area of high selenium concentration and the minuscule amounts (.3 ppm supplemental) we feed to livestock. Yet the FDA announced September 13, 1993 that maximum supplemental selenium in the livestock feeds would have to be reduced from .3 ppm to .1 ppm (diets for weanling pigs would remain at .3 ppm, and .2 ppm for turkeys). The new regulation went into effect immediately but will not be enforced for one year (September 13, 1994) to allow existing stocks of mineral mixes to be depleted.

The Defense

In the 10 months following the announcement of reduced selenium, there has been a lot of ruckus. Two highly respected organizations, the American Feed Industry Association (AFIA) and the Council for Agricultural Science and Technology (CAST), have criticized the decision. Neither have a economic interest in whether we feed any selenium at all, but both organizations have rightfully pointed out that just as ducks die from too much selenium, so do livestock from not enough.

In a recent CAST report, it was stated, "No scientific evidence or logic suggests that reducing supplementary selenium from .3 ppm to .1 ppm in livestock diets will reduce selenium in regions of the U.S. in which an excess is present." The report also pointed out that of the total amount of selenium released in the U.S. annually from natural and commercial sources, the livestock industry contributes less than .3 percent.

The Nature Of Selenium

Selenium occurs just about everywhere, but concentrations are low in the Northeast, the Pacific Northwest, and Southeast.

It's absolutely vital to pigs so they can make a selenium-containing enzyme called glutathione peroxidase. This enzyme prevents the oxidation and destruction of cell membranes. In addition, selenium is important in antibody production and cell-mediated immune function.

Selenium more or less works in concert with vitamin E. Vitamin E prevents the formation of dangerous oxidizing agents in the body. Selenium plays a role in destroying the oxidizing agents if they do form.

Like any essential element, selenium is important. But unlike other elements, there isn't much room for error. A dietary level of only 5 ppm is toxic to the pig. Concentrations of 5-10 ppm can lead to anorexia, hair loss, fatty infiltration of the liver, degenerative changes in the liver, edema, and, under chronic conditions, spinal poliomalacia. A high level, even for a short time, may cause irreversible damage.

In 1974, the livestock industry was permitted to add .1 ppm of selenium. In 1982, the FDA increased the maximum supplemental level to .3 ppm for pigs up to 44 pounds. In 1987, the FDA increased the level to .3 ppm for all pigs.

The important question debated now is how much is enough? The National Research Council (1988 swine edition) lists the followng requirements:

Selenium Requirements for Swine (NRC 1988)

Weight Class, lb	Requirement, ppm
2-11	.30
11-22	.30
22-44	.25
44-110	.15
110-242	.10
gestation	.15
lactation	.15

Two things to keep in mind with this table. First, the amounts of selenium listed are *total* amounts — that is, what occurs naturally in the corn, soybean meal, etc. plus what is supplemented from the premix. Corn and soybean meal will add another .10 ppm (for grower pigs and larger), bringing the total to roughly .20 ppm.

So have we got a problem with the new rule? Certainly not with the starter pigs — supplemental selenium levels for that phase of production remains at .3 ppm. But for older pigs we might, because of the second important issue in the table.

There is no margin of safety. Fast growing pigs and heavy-milking sows, many researchers argue, may be cut a little short. But even at the new levels, finding reports of any obvious deficiency problems in the literature is difficult.

The Worst Case

If supplemental selenium levels are to be .3 ppm for starter pigs, and .1 ppm for older pigs, what will happen?

In most operations, nothing. A few producers with high performing herds may see some deficiency signs — unthriftiness and pale skeletal and heart muscle upon post-mortem exam. If producers suspect problems are due to low dietary selenium, injectable selenium/vitamin E can be prescribed by a veterinarian. Or ingredients with naturally high selenium (alfalfa meal, fish meal, meat and bone meal, corn distiller's) could be included in the diet.

The Best Case

For the FDA to suggest that we need to reduce the selenium in swine diets from a tiny amount to an even tinier amount because ducks can't live in a seleniferous area is, in my opinion, almost silly. The list of items that are vital to life, but cause problems when consumed in excess, would fill this publication. Oxygen and water are just two examples.

Let's hope that logic and common sense will prevail and that the FDA will soon reverse their decision to lower selenium levels.

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