

Selenium and Vitamin E Interactions and Diagnostics

Dairy Cattle Nutrition Workshop
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Table 1: Vitamin E and Se content of Selected Ingredients

Feedstuff	Avg Vit E, IU/lb	Range	Avg Se, ppm
Corn	6.2	4.5-10	0.07 (0.02-0.22)
Soybean meal	1.0	0.6-1.9	0.13 (0.1-0.8)
Alfalfa hay	35	--	0.2
Alfalfa haylage	--	--	0.18
Corn silage	--	--	.04
Wet Brewers grains	13	--	1.0
Whole cottonseed	--	--	0.14
Menhaden meal	6	--	2.36
Wheat midds	--	--	0.46
DDGS	19	--	0.39

Table 2: Vitamin E and Se Requirements of Dairy Classes

Class	Vitamin E, 2001 NRC	Vitamin E, Roche	Selenium
Calves	50 IU/kg diet	100-150	0.3 ppm of ration
Heifers	545-1200 IU/hd/day	200-300	“
Lactating cows	545 IU/hd/day	500-1000	“
Dry cow	1200 IU/hd/day	1000-3000	“

Selenium Sampling (<http://www.ahdl.msu.edu>)

- Obtain blood samples via venipuncture of the jugular vein or the coccygeal vein. Use royal blue or red-top tubes. For serum, spin down and separate serum before freezing. Send chilled or frozen in styro with ice packs.
- Send to the Michigan State University Diagnostic Lab for whole blood and serum Se analysis.
- Milk—collect 5 ml into plastic tubes, send chilled or frozen

Vitamin E Sampling

- Collect blood samples into royal blue or red-top tubes, protect from light. Send chilled or frozen. For serum, spin down and separate before freezing
- Liver—send frozen.
- Feed—100 gm, with sources and expected levels labeled.

Case 1: Injectable trace minerals

Pincushion Farm is a high-producing dairy in CA, with 900 cows, 23,000 lb RHA on 2X milking. The herd averages a heat detection rate of 57% and a pregnancy rate of 18%, or 2-5% higher than the CA averages. The feeding regime and vit/tm program have been described by the consulting veterinarian as “adequate.” The vet has recommended an injection program in which cows will be injected SQ with 5 ml of a trace mineral solution (contains 100 mg Zn, 100 mg Mn, 50 mg Cu, and 25 mg Se) when moved into the close-up group and again 6 weeks after freshening. You are being considered (vs. 3 other candidates) as a consulting nutritionist for Pincushion Farm, on the basis of how well you work with the veterinarian and whether you can evaluate this program. Expected responses may include: mastitis, SCC, and reproductive parameters as reported in Dairy Comp 305.

Questions:

1. What else do you need to know before the trial starts?
2. What clinical/feed samples (if any) should be taken?
3. Because you have the advantage of observing the future, you know that these results will occur: mastitis cases will decrease from 13.5% to 10.5% at 30 DIM (with a continued spread at 60 DIM), and pregnancy rates will increase 2% in cows 70-90 DIM. How will you explain this?
4. What future recommendations (routes of administration and levels) for vitamin E and trace minerals will you provide for Pincushion Dairy?

Case 2: Commodity Guys

You are the consulting nutritionist for Hopperbottom Dairy, run by 4 brothers, 1 of whom was a Dairy Fellow at C_____. They are “big-time” into commodities and want to purchase as little as possible from “feed companies”. Herd size is 1200; RHA is 24,000 (up from 21,500 when you started with them), and you really have things rolling. Hopperbottom harvests their own hay, haylage, corn, and corn silage, and they buy beet pulp, WCS, fat, VTM, and mineral. They also buy specialty ingredients (anions, bypass fats, etc) in bags, and in the remaining 3 empty commodity bays they store their bass boats and ATV’s.

You are in the middle of evaluating a move from WCS to a mixture of dry ethanol distillers and roasted beans, and brother 2 has contracted restaurant grease in an effort to control costs. You and Hopperbottom are committed to making these changes work (i.e. you want to keep your job).

Questions:

1. What is your hypothesis for what will happen and what clinical or feed samples will you use to prove it?
2. Will your vitamin E/Se recommendations change? Why or why not?

3. What are your expectations for metabolics, reproductive challenges, etc?
4. What are your butterfat expectations?
5. What would you recommend they “try” next?

Case 3: Let’s Run a Test!

You are a Dairy Specialist for Conglomerated Feed Company. You have been charged with the duty of evaluating an organic selenium product (2000 ppm Se) vs. sodium selenite for dairy. You have 6 months to complete your evaluation, and have access to 4 candidate herds for testing; one of which has tiestalls. You also have some “trouble” herds with high SCC, high RP’s and/or low pregnancy rates.

Questions:

1. What phase(s) of production will you most likely investigate?
2. What will be your supplemental vitamin E and Se recommendations?
3. What design(s) will you favor: (split herd, switchback, clinical observations, etc?)
4. What will you measure?
5. How will you analyze your results and make your conclusions?