



Dairy Briefs

The Latest Information on Dairy Cattle Nutrition



Vitamin E and Selenium Make a Great Defensive Team Laura Martin, M.Sc

Performance expectations in dairy cows can put a lot of stress on an animal. Dairy cows are expected to produce large quantities of milk that drain their body's resources, while getting bred or maintaining a pregnancy and staying healthy all at the same time. This can put a strain on different systems in the animal and can cause a chain reaction of consequences. Vitamin E and selenium supplementation is often recommended by veterinarians and nutritionists to give cows a boost when performance isn't 100%.

Vitamin E is found naturally in plants and cows on fresh pasture typically get enough from the plants they consume to support production, reproduction and health. As plants age, or spend time in storage the levels of Vitamin E decrease. Typical dairy cows with access to fermented feeds and dry hay may not be receiving enough Vitamin E without additional supplementation. NRC (2001) recommendations for Vitamin E for lactating holstein cows are 545 IU/day and just over 1000 IU/day for dry cows.

Selenium can also be taken up from soil and stored in plants; however Ontario soil is selenium-deficient and produces selenium-deficient plants. NRC (2001) recommends 0.3 ppm supplemental selenium for both dry and lactating animals. This level is also the legal limit for supplemental selenium according to the CFIA.



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Inside this Issue...

*Vitamin E & Selenium Make a Great
Defensive Team*

By: Laura Martin, M. Sc, Nutritionist



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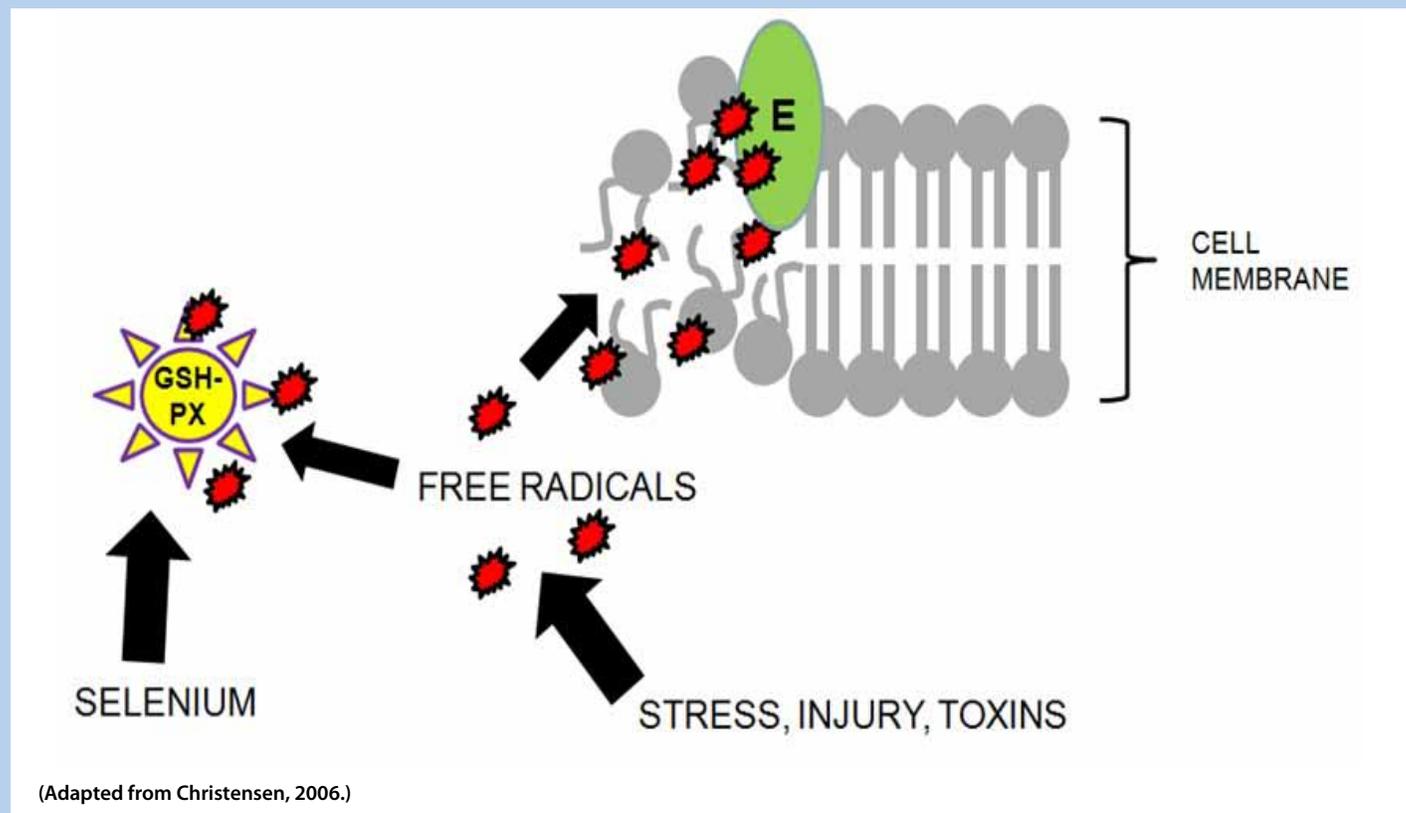
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Dairy cows deficient in Vitamin E and selenium may show a variety of symptoms, ranging from hair loss, reproductive failure, and increased incidence of retained placenta, embryonic death and uterine infections. Calves born to mothers that are deficient in selenium and Vitamin E are at risk for white muscle disease which is usually fatal to calves.

Vitamin E and selenium each work on different systems in the body but when it comes to cell protection they work together as a team. Free radicals form during normal metabolism in each cell, but periods of stress, disease, or injury create more free radicals than the body can handle. These free radicals can cause a lot of damage if left unchecked, resulting in poor performance. Selenium is a key component in glutathione peroxidase (GSH-PX), an antioxidant that protects cell membranes from these free radicals. Without selenium the body can't make this antioxidant. Vitamin E is embedded in the cell membrane and helps to protect the cell from any free radicals that escape the glutathione peroxidase (Figure 1).

Figure 1. Role of Vitamin E and Selenium in Cell Protection



Well that all sounds quite technical, so let me relate it to something most Canadians understand – hockey! The selenium rich enzymes (GSH-PX) are the defensemen. They try to catch the free radicals before they reach the goal (the cell membrane). Any free radicals that make it past these defensemen are up to the goalie (Vitamin E) to stop. If the goalie gets pulled (the diet is low in Vitamin E) the defensemen can still stop a lot of free radicals from getting through. If it's a shoot-out and there are no defensemen (low selenium diet) the goalie still has a chance to stop the free radicals. However, the game works much better if the defensemen and goalie can work together.

While that's on the level of each cell in the body research backs up the positive effects of Vitamin E and selenium working together. Trials done in dairy cows showed that cows supplemented with Vitamin E, selenium or a combination of both had less mastitis, retained placentas, metritis and cystic ovaries than cows not receiving any extra supplementation (Table 1). From the table it's easy to see in some cases that selenium works on its own, or Vitamin E works on its own, but together they have a much better effect on these reproductive issues.

Table 1: Research Summary of Vitamin E and Selenium on Cow Performance

Treatment	Mastitis Cases (%)	Mastitis Duration (Months)	Retained Placenta (%)	Metritis (%)	Cystic Ovaries (%)
Control	41	0.95	16	83	50
Selenium	36	0.51	17	65	19
Vitamin E	26	0.53	20	84	44
Se + Vitamin E	26	0.36	0	57	19

Adapted from Smith et al. (1984) and Harrison et al. (1984).

Preventing costly treatments for retained placentas or mastitis and keeping the milk in the tank rather than in the pail offset the cost of feeding the right levels of Vitamin E and selenium. Talk to your nutritionist to make sure that you are getting enough Vitamin E and selenium into your cows to keep them healthy and productive while under the stress of lactation and gestation.

References

Christensen, K. 2006. Selenium – The Essential Trace Mineral. The Goat Magazine.
 Harrison, J.H., D.D. Hancock, and H.R Conrad. 1984. Vitamin E and Selenium for Reproduction of the Dairy Cow. J. Dairy Sci. 67(1): 123-132.
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