



## Effect of Vitamin E, Carnitine and Canthaxanthin on **Early Innate Immune Function of Broilers**

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Why These Nutrients? In the first week of life the innate immune system is not fully functional therefore young chicks are more susceptible to disease. Also it is known that diet has an effect on immune function, but there is little data available for how specific nutrients affect immune function, especially in poultry.

Vitamin E: A fat soluble vitamin of plant origin known for its antioxidant, reproductive, muscular, circulatory, nervous and immune functions. Commercial vitamin E is an equal mixture of different alpha-tocopherol molecules, of those eight RRR-alpha-tocopherol is the strongest. We want to know if feeding only RRR-alpha-tocopherol has a different effect on immune function than feeding the commercial vitamin E does.

Carnitine: Synthesized in the liver and aids in energy metabolism. It also possesses anti-inflammatory properties

Canthaxanthin: A carotenoid pigment of plant origin commonly added to poultry and fish diets to improve the colour of tissues. May act as an antioxidant or modulate immune function. Although related to viamin A, it has no pro-vitamin A activity.



How Will We Investigate: Broiler breeder hens are fed one of five diets consisting of:

- A control containing natural vitamin E as per industry standards:
- A basal diet containing an equivalent amount of synthetic vitamin E but no natural vitamin E;
- A control supplemented with carnitine:
- · A control supplemented with a low level of a carotenoid pigment called canthaxanthan, and;
- · A control diet supplemented with a high level of canthaxanthan

The hens are individually housed and are artificially inseminated. Fertile eggs are collected from these hens in early, mid and late production stages for incubation and hatching. The resulting chicks will be assessed for innate immune function and innate maternal antibody traits; and levels of vitamin E, carnitine and canthaxanthan are being monitored throughout the trial

Our Expectations: We expect several outcomes:

- The first is that natural vitamin E has a more positive effect on the early innate immune function of chicks than synthetic sources of vitamin E do.
- Second that supplementing the diet with carnitine will improve the early innate immune function of chicks.
- Finally we expect that supplementing the diet with canthaxanthan will improve the early innate immune function of chicks and furthermore that that a higher level of supplementation of canthaxanthan will be more beneficial to chicks than a lower level will.



How Might This Work Benefit Industry? Conducting this research will contribute to the current understanding of the avian immune system, which is not as well understood as the mammalian immune system at this time. This research may also provide a sound basis for reducing the need to supplement broiler production with antibiotics to enhance growth by minimizing disease challenge, which will result in a healthier product. To that end consumers are becoming increasingly more concerned with the health risks associated with antibiotic residues in food, therefore they are likely to be more accepting of a product which was produced with minimal or no antibiotic supplementation.



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