



Nutritional mitigation strategies for antibiotic free broiler production

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Background

The poultry industry is intensively looking for new ways to mitigate the substantial loss due to the potential ban of prophylactic antibiotics in poultry diets. Dietary components not only provide nutrients for growth, but also nurture the immune cells. Research has shown that high nutrient density diets could support the proliferation of immune cells and muscle development. 25-OH-vitamin D₃ (Hy•D®) stimulates crosstalk among the immune cells by increasing chemicals known as cytokines (IL-1β, LITAF, iNOS) that are regulators of hosts responses to infection. The supplementation of the high nutrient density and Hy•D® could be able to support rapid growth in broilers.

Our approach

We tested the effect of starter nutrient density, Hy•D® and antibiotic on broiler performance and changes in the amount of messenger RNA produced from associated inflammation genes (IL-1β, LITAF, and iNOS genes). This would tell us if production of proteins related to these specific immune functions were likely to increase as a result of the dietary treatments. Inflammation has adverse impact on broiler performance; however, an effective immune response would be essential for host body to clear up the germs during invasion periods. An increase in pro-inflammatory genes may support broiler antimicrobial defenses.

► Body weight and feed conversion ratio were evaluated every week.

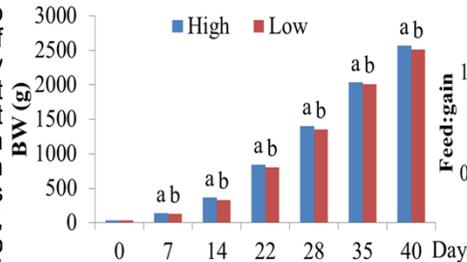
► To stimulate an immune response, some of the chickens were injected with a toxic component of *Salmonella typhimurium* (LPS) to induce an inflammatory response, others served as non-injected controls.

► The expression of mRNA pro-inflammatory cytokines was measured from spleen tissues on d 14 of age.

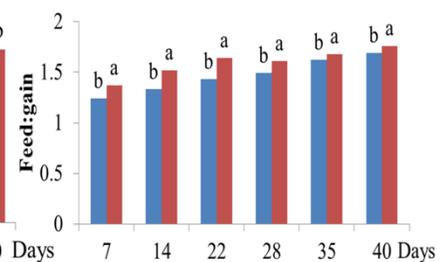
Nutrient Density ¹	Hy•D ^{®2}	BMD ³
High	-	-
High	-	+
High	+	-
High	+	+
Low	-	-
Low	-	+
Low	+	-
Low	+	+

¹ High: 3,025 kcal/kg; 23.9% CP, or Low: 2,858 kcal/kg; 22.3% CP, fed from d 0 to d 14 of age.
² 0 or 69 µg/kg of 25-OH-D₃ (2,760 IU of vitamin D₃/kg)
³ Bacitracin Methylene Disalicylate (BMD[®] 110): 0 or 0.5 g/kg.
 - Treatment was not applied
 + Treatment was applied

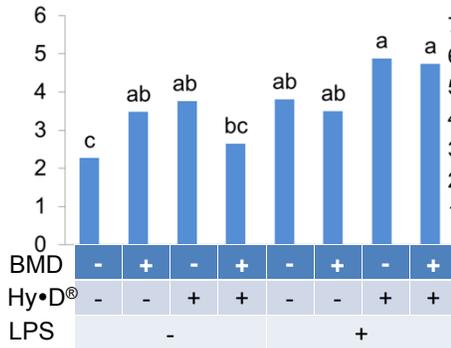
Body weight



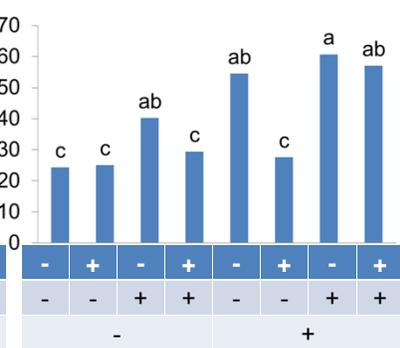
Feed conversion ratio



mRNA LITAF expression



mRNA iNOS expression



What Does this mean?

- Early high nutrient density increased feed conversion efficiency of broilers, which could increase profits at market age.
- This study also found that feeding BMD reduced mortality (12.6 % vs. 5.4 %, SEM=1.76 %) caused by a necrotic enteritis outbreak. We observed a \$0.10/kg increased in poultry meat produced in broilers fed prophylactic BMD, compared to non-antibiotic supplemented group.
- The stress caused by mounting an inflammatory response may be mitigated when the baseline of the pro-inflammatory genes increased by including Hy•D®.

Acknowledgements



Our Observations

- Early high nutrient density
- Increased body weight
- Decreased feed conversion ratio of broiler chickens.
- In the non-injected LPS group, broilers fed Hy•D® without BMD had elevated LITAF and iNOS expression.

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