

EFFECT OF ORGANIC ACIDS-ESSENTIAL OILS BLEND AND OAT FIBER COMBINATION ON BROILER CHICKEN GROWTH PERFORMANCE, BLOOD PARAMETERS AND INTESTINAL HEALTH

Introduction

The investigation into potential alternatives continues as the poultry industry moves away from the use of preventative antibiotics. Organic acids are used as food preservatives because they inhibit the growth of fungi and bacteria. When added to the poultry diet they have been found to reduce bacteria production in the gut and change the structure of the intestinal wall (Langhout 2000). Plant derived essential oils have been reported to improve the production performance and health of chickens. Dr. Adewole's research detailed in APRI's Factsheet 43 evaluated bacitracin methylene disalicylate (BMD), an anti-bacterial used for the prevention and control of enteritis, and oat hulls (OH) to improve gut health. Limited success has been achieved in the single use of feed additives, but it is anticipated that a combinational approach could provide new insight into the application of non-antibiotic compounds to enhance production performance and bird health.



Photo Credit: Dalhousie University

Photo 1: Dr. Adewole and Jamie Fraser
Preparing Feed Mixtures

Objective

To determine the effect of BMD and an encapsulated organic acids and essential oils blend with and without OH on growth performance, organ weights, blood parameters and ceca short chain fatty acid (SCFA) and microbiota in broiler chickens.

Industry Impact

The use of an organic acid/essential oil blend alone or in combination with oat hulls demonstrated conclusively that they have the potential to improve gut health in chickens and achieve a reduction in the use of antibiotics for broiler production.

Trial

Day old broiler chickens (Ross 308) were randomly assigned to one of four dietary treatments. There were 26 birds per pen and there were 8 replicate pens per treatment. The dietary treatments were as follows:

Treatment 1 (BAS) – corn-soybean meal-wheat formulated to meet or exceed the NRC (1994) nutrient requirement for broilers.

Treatment 2 (BMD) – BAS diet plus 0.05% BMD.

Treatment 3 (OE) – BAS diet plus a protected organic acid/essential oil blend at 300g/1,000 kg of feed.

Treatment 4 (OEOH) – BAS diet plus the organic acid/essential oil blend plus 3 % oat hull (OH).

Every week, starting at Day 8, mortality, body weight and feed intake were measured. On Day 36, one chicken was randomly selected from each pen and euthanized. Blood samples were collected, weights of the empty gizzard and ceca taken, and gut morphology was examined. The following parameters were determined: feed intake, body weight, body weight gain, feed conversion ratio, organ weights, concentration of SCFAs, blood chemistry and identification of gut microbiota.

Results

- Dietary treatment had no effect on feed intake.
- There was a reduction in body weight gain in the OH treatment (#4) which was not surprising as OH has a low metabolizable energy value. However, when oat hulls were combined with the organic acid/essential oil blend, there was no negative impact on the feed conversion ratio.
- As well, birds in Treatment 3 recorded the highest gizzard weight. This is significant as an enlarged gizzard positively influences the bird's ability to digest nutrients and increases feed retention time. However, the potential increased ability to digest nutrients did not translate into an increase in body weight gain probably because of the reduction in the metabolizable energy of the diet due to OH addition.
- Birds fed the organic acid/essential oil treatment alone or in combination with OH had improved digestive tract structure, which would translate into improved feed conversion efficiency.

- As well, both afore mentioned treatments increased the relative abundance of potentially beneficial gut bacteria whilst also inhibiting the proliferation of pathogenic bacteria.

References

Adewole D. 2020. Effect of Dietary Supplementation with Coarse or Extruded Oat Hulls on Growth Performance, Blood Biochemical Parameters, Ceca Microbiota and Short Chain Fatty Acids in Broiler Chickens. *Animals*. 10:1429.

Langhout P. 2000. New additives for broiler chickens. *World poultry*; 16:22-27.

Researcher and Cooperators

Dr. Deborah Adewole, Samson Oladokun, and Elizabeth Santin

Funding

Canadian Agricultural Partnership – Advancing Agricultural Research and Innovation Initiative, Dalhousie University, and Chicken Farmers of Nova Scotia