

# Enzymatically hydrolyzed yeast carbohydrates improve broiler chicken growth performance within a commercial organic production system

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## Introduction

- In organic production systems, broiler chickens are exposed to multiple stressors such as initial transportation, feedborne contaminants, stocking density and immune challenges and these stressors can only be alleviated through advanced management and nutrition programs.
- Dietary supplementation of yeast cell wall carbohydrate products (YCW) are generally considered as viable methods to improve animal growth performance, intestinal development and immune function (Shurson, 2018). Therefore, YCW may assist broiler chickens to overcome those aforementioned stressors within organic production systems.
- However, the beneficial effects of YCW supplementation were not consistently observed and these inconsistencies may be caused by diverse chemical structures and inconsistent water solubilities of different YCW preparations (Shurson 2018; Heike et al., 2014).
- Our preliminary studies indicate that enzymatic hydrolyzation treatment improves yeast cell wall carbohydrates solubility, and thus improved the effectiveness of YCW (unpublished data).

## Objective

- Evaluate the effects of dietary supplementation with a commercially-available enzymatically-hydrolyzed YCW product, Maxi-Nutrio<sup>®</sup>, on performance and health of broiler chickens raised under a commercial organic production system.

## Materials and Methods

### Animals:

- A total of 16,320 newly hatched Ross 708 broiler chicks were placed at a certified organic commercial farm (Ontario, Canada).
- A subsample of 360 birds were randomly selected and placed in 18 identical floor pens with 20 birds/pen for a 28 d feeding study. The experimental pens, which provided 966 cm<sup>2</sup>/bird floor space, were located within the barn and were fitted with individual feeders and waterers.



### Treatments:

- Birds were randomly assigned to one of three dietary treatments with or without Maxi-Nutrio<sup>®</sup> supplementation (Table 1).
- Birds had *ad lib* access to feed and water for the entire study period.

**Table 1:** Maxi-Nutrio<sup>®</sup> supplementation within the experimental diets.

| Item      | Control | Maxi-Nutrio <sup>®</sup> |                |
|-----------|---------|--------------------------|----------------|
|           |         | Step-down (SD)           | Full-dose (FD) |
| 1 - 14 d  | 0%      | 0.1%                     | 0.1%           |
| 15 - 24 d | 0%      | 0.075%                   | 0.1%           |
| 25 - 28 d | 0%      | 0.050%                   | 0.1%           |

### Measurements:

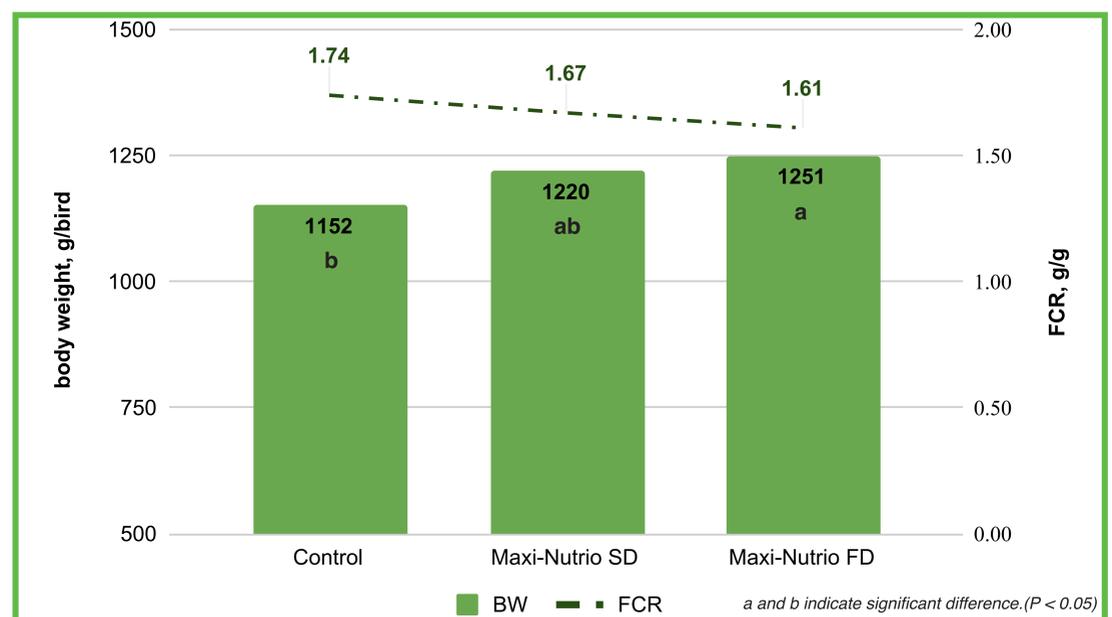
- Body weight (g), average daily gain (ADG, g/d), average daily feed intake (ADFI, g/d) and feed conversion ratio (FCR) were measured at 7, 14, 21 and 28 d. The effects were analyzed as a completely randomized design with six replications.
- At the end of experiment, 3 birds/treatment were randomly selected and subjected to veterinary histopathology examination.

## Results

**Table 2:** The effects of dietary supplementation of Maxi-Nutrio<sup>®</sup> on broiler chicken average daily gain and average daily feed intake during 0 - 28 d.

| Item      | Control           | Maxi-Nutrio <sup>®</sup> |                   |
|-----------|-------------------|--------------------------|-------------------|
|           |                   | Step-down (SD)           | Full-dose (FD)    |
| ADG, g/d  | 38.2 <sup>b</sup> | 41.1 <sup>ab</sup>       | 41.9 <sup>a</sup> |
| ADFI, g/d | 66.3              | 67.1                     | 67.7              |

*a and b indicate significant difference. (P < 0.05)*



**Figure 1:** Effects of Maxi-Nutrio<sup>®</sup> supplementation on 28 day broiler chicken body weight (g) and feed conversion ratio (FCR, g/g).

**Table 3:** The effects of dietary supplementation of Maxi-Nutrio<sup>®</sup> on broiler chicken health status.

| Item           | Control  | Maxi-Nutrio <sup>®</sup>                       |   |
|----------------|--|--|---|
|                |  | Step-down (SD)                                 | Full-dose (FD)  |
| Necropsy       | 2 birds with mild coccidiosis                  | 2 birds with mild coccidiosis                  | 1 bird with mild coccidiosis  |
| Histopathology | Some GIT lesions                               | Minimal GIT lesions                            | Some GIT lesions  |
| Bacteriology   | <i>E. coli</i> are resistant to antimicrobials | <i>E. coli</i> are resistant to antimicrobials | Least number of <i>E. coli</i> strains with the greatest susceptibility to antimicrobials   |
| Overall        | Healthy birds under the organic condition      | Healthy birds with least severe GIT lesions    | Healthy birds with least number of <i>E. coli</i> types and least resistance to antibiotics |

## Discussion & Conclusion

- Broiler chicken body weight was affected by dietary treatment ( $P = 0.04$ ). Over the entire study, the FCR for control, SD and FD were 1.74, 1.67 and 1.61 respectively and did not differ between dietary treatments ( $P = 0.26$ ).
- Dietary supplementation of enzymatically hydrolyzed yeast carbohydrates, Maxi-Nutrio<sup>®</sup> is beneficial within an organic broiler chicken production system.
- The growth enhancement observed in the Maxi-Nutrio<sup>®</sup> fed birds could be because YCW improved broiler chicken GIT health and limited the growth of pathogenic bacteria.
- In conclusion, the most pronounced beneficial effects were observed in the birds fed the full-dose Maxi-Nutrio<sup>®</sup> (1 kg/tonne) throughout the experimental period.

### Reference(s):

- Shurson, G.C. 2018. Anim. Feed Sci. Tech. 235: 60 - 76.
- Heike et al., 2014. Nutr. J. 12: 38.