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Research Article

Effect of Feed Fermentation on the Performance of Broiler Chicken in Starter Phase

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Abstract

Prebiotics and probiotics the farmers new found love and hope of combatting bacterial infections and surmounting the dangers of superbug (bacterial resistance) are known to be products of fermentation. Trials report from fermenting feeds of chicks for two days before feeding indicates that growth and health performance of the birds on fermented feeds show significant better performance than those placed on same commercial feeds as commercially presented. Improvement in both health, growth and feed conversion rate performance of chicks by fermenting the feed are of interest and important to farmers not only in cost saving but also in control of drug resistance in commercial flocks.

Keywords: Fermentation; Prebiotic and Probiotic; Superbug; Broiler Performance; Cost Saving

Description of problem

When Sir Alexander Fleming who discovered penicillin, was being interview by The New York Times in 1945, after he won the Nobel Prize for his discovery, he warned "that misuse of the drug could result in selection of resistant bacteria" [1]. The world did not take him serious enough and over time there was serious abuse of antibiotics including the prophylactic use antibiotic to prevent infection. And antibiotic use as feed additives' to achieve better feed conversion and improve growth in animals. Today the world has found itself in a situation where we have many bacteria resistant to most of the antibiotics that they are usually used to treat, referred to as superbugs.

The problem of Antibiotic resistance has led to so many exploration of ways of avoiding antibiotic growth promoter (WHO 2017), leading to search for non-antibiotic feed additives that could help promote better performance in life stock. All with the aimed of maximal production efficiency and cost saving. These had led to the development of probiotics and prebiotics [2] all product of fermentation by microorganisms. Many dried fermentation products are available commercially as additives that has been proven scientifically to improve broiler gut health and performance. So fermentation product has been in use in poultry diets [3,4]. However, documented reports on the direct feeding of the birds with fermented feed which contain a good number of these fermentation products is lacking.

These fermentation products are grouped into two under probiotics and prebiotics and they have profound effect on the health and performance of the birds [5].

Probiotics

Arise from studies that has exposed the fact that in the gastrointestinal tract (GIT) of animals and men are two sets of microorganisms. The beneficial and the harmful ones which are in constant competition.

The beneficial microorganisms are known to be products of fermentation since they are mostly anaerobes. It's known that the probiotics bacteria attach to the intestinal mucosa, thus blocking the attachment of pathogenic ones, like salmonella SPP, S. Coli and clostridia SPP [5]. The antibacterial compounds and enzymes produced by probiotics also stimulate the immune system [6].

The prebiotics

These include the lactic acids, acetic acids and formic acids produced during fermentation which act by inhibiting E. Coli, Coccidia and other intestinal pathogens. They also lower intestinal PH, which suppresses the pathogens. The lowering of oxidation reduction potential by these acids means that organism like salmonella that requires oxygen to grow will be inhibited. In addition, these bacteria's produce large quantity of digestive enzymes that aid digestion of both starch and protein. We reason that combine effect of the action of the prebiotic and probiotic will help the birds to increase resistance to pathogens as well as establishing and maintain a beneficial gut microflora through its synergistic action. This obviously will lead to improved growth parameter and increased profits. Also expected is a reduction in feed consumption due to better digestion and improved conversion rate.

Materials and Methods

One hundred and twenty-day old broiler chickens were randomly allocated to each of 2 treatments groups, with each of the two groups placed on a particular commercial feed A and B. At day 7 of life, each of the two groups A and B were further divided into two randomly making four treatment groups, with each commercial feed A or B having two treatment groups. The fermented feed groups A2 and B2 and unfermented feed groups A1 and B1. The experiment ran from day 7 to day 28 of age.

Feedings (or feed treatments)

The treatments groups, A_2, B_2, birds were placed on the commercial feeds A and B which has earlier been fermented for 48 hours. While the treatment groups A_1 and B_1 birds were placed on commercial feed A and B as commercially presented.

Parameters	A_1	A_2	B_1	B_2
Day 14	274.46 ± 1.00^b	311.02 ± 0.069^a	274.46 ± 1.00^c	310.37 ± 0.06^a
Day 21	640.65 ± 1.00^d	684.17 ± 1.00^a	656.45 ± 1.00^c	678.02 ± 1.00^b
Day 28	1295.33 ± 0.74^b	1512.67 ± 0.39^a	1312.67 ± 0.74^b	1466.00 ± 0.39^a

Table 1: Mean Body weight of 14, 21 and 28 day old chicks of the 4 different treatment groups.

$^{a-d}$ Means with different superscript differ statistically ($P < 0.05$).

The A_2 and B_2 represent the fermented feed treatment group and each shows significant ($P < 0.05$) statistically difference from same commercial feed group feed as presented.

Day 28

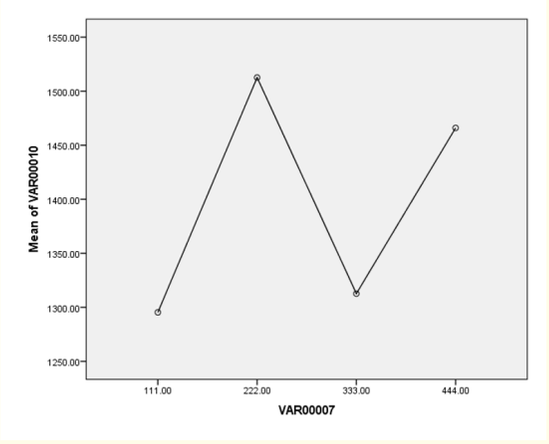

Figure 1

Day 21

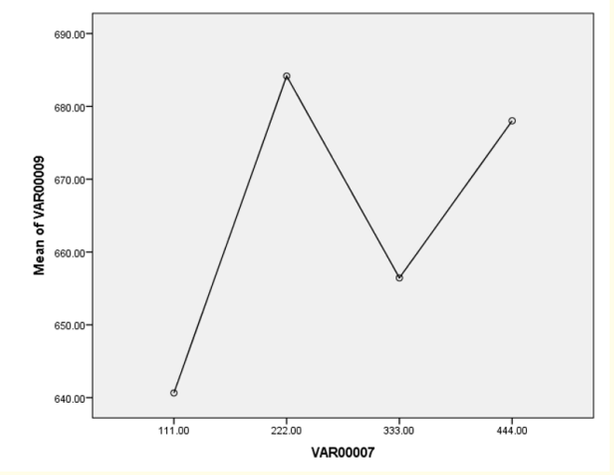

Figure 2

Day 14

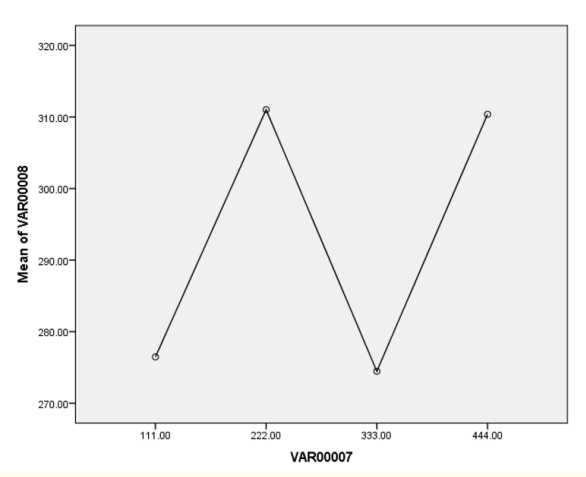

Figure 3

Traits and statistical analysis

Mortality was recorded daily. The body weight of the birds at 7day was calculated for each group by weighing group of 3chicks at the beginning of the experiment. Individual weight was recorded at the end of each 7days interval and analyzed through the GLM procedure of SAS. Statistical significance level was considered when $P < 0.05$.

Results and Discussion

Initial average body weight of whole birds at day 7 fell within 90gram range with no significant difference among the groups. The mortality was 2.5% across treatment in both commercial feed experimental groups. No statistical analysis was performed with these data.

Both commercial feeds fermented before feeding presented heavier ($P < 0.05$) body weight than the same commercial feed, fed as presented. The observed improved body weights of chicken fed fermented feed of both commercial diets can be attributed to the benefits derived from fermentation process. Also the two treatment groups placed on fermented feed (A_2 and B_2) consumed 23.1kg and 23.2kg of feed respectively. While the unfermented feed groups (A_1 and B_1) consumed 25.66kg and 25.67kg respectively. This can be explained as better feed conversion rate for fermented rubbing off on less feed consumption.

We also noted that the fermented feed lumps up together and are not dusty and thus wastage would have been minimized.

Conclusion and Applications

- Fermentation of feed 48 hours before feeding appears to benefit broilers improving the production performance and reducing consumption and cost.
- This application of fermentation, though cumbersome may be very beneficially in saving cost and having better performance when applied commercially.
- More research is needed in the area of the difference physiological processes playing out in the birds and possible draw backs.
- However, it's our observation that if the process of fermentation is not properly supervised, mold growth may occur in the feed with unpleasant consequences of toxicosis.

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