COMPARATIVE EFFECTS OF DIFFERENT NATURAL AND SYNTHETIC FEED ADDITIVES ON CHANGES IN DIGESTIVE ORGAN WEIGHTS AND PH PROFILE OF BROILER CHICKENS

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ABSTRACT
Gut intestinal regulation and stability is directly correspondent to the p^H of the internal organ of chicken, likewise the health status of the chicken can be measured based on the various metabolic and physiological function of different organs. Therefore, *this study was carried out to determine the effect of different (biotic additive) fermented Brassica oleracea, antibiotic and synthetic probiotic on gastrointestinal pH of broiler chickens. A total of (150) day old Broiler chickens were used. Experimental treatment consisted of five treatments (T1, T2, T3, T4 and T5) which composed ordinary water, antibiotics, 200 mL Brassica oleracea, 400 mL Brassica oleracea per 1 liter of water and synthetic probiotic respectively) in a completely randomized design. Thirty birds were assigned to each treatment made of three replicates of ten birds. The birds were maintained on ad-libitum commercial feed (starter and finisher) diet for a period of six week. Samples were taken at week six by selecting two birds per replicate for pH determination of different organs. Data on the weight and different pH of the internal organs (crop, proventiculum, Gizzards, liver, Duodenum, jejunum, ileum, and caecum) were obtained after slaughtering at week 6 and subjected to one way analysis of variance. Result showed that broilers treated with 200 mL and 400mLs/liter of water were able to maintain the right pH for all the normal digestive processes at different digestive organs taken into consideration. Hence, this study concluded that the application of Brassica oleracea at 200ml and 400 ml of inclusion levels improves the pH of the gastrointestinal tract of broilers chicken and the synthetic probiotic lower the acidity of the proventriculus*
Keywords: Probiotic, Brassica oleracea, antibiotics, pH, proventiculum

INTRODUCTION

Over the years, there have been increase in demand for broiler chicken and this has compelled farmers for the use of growth promoters Vipin *et al*., 2022 notably antibiotic growth promoters (AGPS) to improve feed efficiency, livability, growth rate, and low mortality in other to ensure that broiler chicken reach table size earlier (Miles *et al.,* 2006). However, consumer preference for wholesome and antibiotic free animal products were not taken into consideration Adam *et al*., 2023 instead the ever rising request for broiler chickens have made it necessary that the production be subjected to improvement and the use of different biotic additives to enhance their health.

Meanwhile, the gut health of chicken's digestive system is responsible for feed break down and utilization. The development of broiler gastro intestinal is faster when compared with others breed of chicken and pH has been discovered as one of the factors responsible for gut intestinal regulation. Consequently, the health and the nutrient consumed has direct effect on the chicken's gastro intestinal tract. The growth of microbes in a particular organ is the function of the pH of the organ, moreover digestibility and absorption on different part of the gastro intestinal tract depends on pH level of the particular organ Rahmani *et al.,* 2005. Limited information is available on the use of different biotic additives (phytobiotics, probiotics and antibiotics) on gastro intestinal pH of Broiler chickens.

MATERIALS AND METHODS

Experimental site: The research was carried out at the Directorate of University Farm, Federal University of Agriculture, Abeokuta (FUNAAB), Alabata Road, Abeokuta, Ogun State, Nigeria. The location lies within the rainforest vegetation zone of South-West Nigeria. It lies in the region of latitude 7.013030N and longitude 3.025280E.

Sourcing of experimental materials:
Fresh cabbage *(Brassica oleracea)*, was bought in an open market in Abeokuta, rinsed, cut and soaked in water for a period of seven days with a measure of 1 kilogram into 10 liters of water, with addition of 50 grams of salt in an airtight bucket. The resulting solution was sieved and kept in a room temperature for further usage.

Animal management and experimental diet
Cleaning and fumigation were done prior to the experiment, one hundred and fifty (150) day old broiler chicks were used and the treatments were as followed: the experiment commenced on arrival after balancing for weight and redistributed into five treatments and three replicate with ten birds per replicate. The following are the treatments: one contained ordinary water, two contained antibiotic (Floxinor® Enrofloxacin), while three was *Brassica oleracea* at 200mL/L of water and treatment 4 contained 400mL of *Brassica oleracea* / liter of water while treatment 5 contained synthetic probiotic, the experiment lasted for 42 days. Commercial starter diet that contained isonitrogenous 20.50, isocaloric 2700Kcal/kg and finisher diet of 16.50, 2900Kcal/kg were used respectively.

Internal organ collection
At weeks 6, two (2) birds were selected per replicate. These was manually slaughtered and skinned, to evaluate the pH of the crop, proventriculus, liver, gizzard content, duodenum, ileum, Jejunum and caecum, using a pH meter.

Determination of the pH of different organ
Determination of the pH of different organ and gastro intestinal tract were determined through electrochemical measurement by an instrument known as pH meter (Protein sensitive electrode (glass) and a reference electrode that contained silver chloride and allowed the probe to be properly immersed into organ and the pH meter was read and recorded according to Young *et al.,* 2004.

Statistical analysis
Data collected was subjected to a one-way analysis of variance (ANOVA) in completely randomised design SAS(1999) and the means separated using Duncan multiple range test

Result and Discussion
The pH of the different organs in broiler chicken can vary, as each organ has its own metabolic activity and physiological functions. The results of this experiment significantly shows different variations for crop, gizzards, proventiculum, liver, duodenum, jejunum, ileum and caecum.
The measurement of pH is on a scale of 0-14, where less than 7 is acidic, 7 is neutral, and more than seven is alkaline. The variations of pH of an organs are due to differences in metabolic activity as well as the handling procedures during the processing.
There was no significance difference ($p>0.05$) on the pH of the crop but the value is in contrast with the report of Mabelebele *et al*., 2014, that reported 6.08 in Ross Broiler.
The significance ($p<0.05$) differences in pH of the proventriculus of broiler chickens across the treatment indicate (less acidic) in broiler chickens treated with probiotic (5.27±0.51) as compared with Treatment (1) 3.80±0.17, (2) 3.93±0.55, (3) 4.03±0.40 and (4) 3.57±0.85 obtained from broiler chicken treated with; ordinary water, antibiotics, *Brassica oleracea* at 200 ml and *Brassica oleracea* at 400ml respectively. There were no significant ($p>0.05$) differences in crop, gizzard content, liver, duodenum, jejunum across the treatment..

Table 1: Effect of locally produced probiotics *Brassica oleracea* on the gastrointestinal tract pH of broiler chickens at week 6

Parameters	T1	T 2	T 3	T 4	T 5
Crop	5.27±0.15	5.00±1.73	4.90±1.08	5.77±0.21	5.67±0.45
Proventriculus	3.80±0.17^{b}	3.93±0.55^{b}	4.03±0.40^{b}	3.57±0.85^{b}	5.27±0.51^{a}
Gizzard	3.17±0.23^{b}	3.43±1.35^{a}	2.77±0.29^{c}	3.50±0.76^{a}	3.60±1.05^{a}
Liver	6.10±0.17	6.20±0.26	5.97±0.21	6.00±0.44	6.17±0.21
Duodenum	6.43±1.29	5.60±0.26	5.83±0.06	6.00±0.00	5.83±0.21
Jejunum	6.47±1.19	6.27±0.81	5.63±0.12	6.20±0.56	5.83±0.45
Ileum	6.67±1.93	5.63±0.40	6.07±0.50	6.50±0.53	6.77±0.49
Caecum	6.67±0.74^{b}	6.33±0.70^{b}	6.63±0.31^{b}	7.27±0.70^{a}	6.57±0.32^{b}

[abc] means on the same row with different superscripts differ significant ($p<0.05$);Treatment 1, negative control (ordinary water), Treatment 2, positive control(contains antibiotics), Treatment 3 and 4, contains 200ml and 400ml of *Brassica oleracea* per liter of water respectively, and Treatment 5: Synthetic Pro-poultry probiotic

In this study the effects of *Brassica oleracea* on pH of the gastrointestinal tract was studied in comparison to other conventional treatments, with the treatments at different levels, 200mL and 400mlL *Brassica oleracea* (Miles 2011). Uni *et al*., 2015 reported a high pH value in jejunum after 6 weeks, potentially indicating changes in enzymatic activity (Uni *et al.,* 2015). The effectiveness of the test ingredients is in harmony with the changes impacting nutrient digestion, microbial activity, and the overall efficiency of the digestive system. The functionality of the caeca is affected largely by the fermentative activities going on in it (Svihus, 2014), which may explain the rise in pH towards alkalinity. Gastric acidity can be detrimental to some of the microflora that inhabit the hindgut.

CONCLUSION

The study showed that the administration of fermented cabbage syruped *Brassica oleracea* from 200mL and 400mL per liter respectively were able to maintain the required pH, thus, maintaining caeca pH for enhancement of gut health. Likewise, the pro poultry® synthetic probiotic too lower the acidity level of the proventiculus.

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