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The Effect of Probiotic containing *Lactobacillus fermentum*, *Lactobacillus plantenrun* and *Weissallaciberia*on carcass quality and proximate analysis of broiler chicken

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Abstract: *The research was aimed at studying the effect of Lactobacillus fermentum, Lactobacillus plantenrun and Weissallaciberia on carcass quality and proximate analysis of broiler chicken. This was positioned at finding a replacement to antibiotics in broiler production. The study was done at the Department of microbiology, faculty of sciences, Kaduna State University, Kaduna between January to April 2018. A total of twenty day-old broiler chicks were administered probiotics (Lactobacillus fermentum, Lactobacillus plantenrun and Weissallaciberia) in water at* 10^8 *cells/milliliters/isolates/birds/day for six weeks. Carcass quality and proximate analysis were evaluated from the meat of the broiler at42 days old. The results indicates that there was a significant difference between the mean of the treatment on weight at slaughter P=0.0002 and salable cuts: breast muscle P=0.0012, Drumstick P=0.0039 and wings P=0.0039 but no significant difference was observed between the mean of liver/gizzard/intestine P=0.7359. The proximate analysis shows that there was a significant difference between the mean of experimental treatment on percentage moisture content P=0.0001, percentage ash content P=0.0212, percentage protein content P=0.0004 but no significant difference was observed between the mean of the treatment on percentage fat content P=0.4583. It clearly shows that chicken fed with probiotics recorded the highest level of protein content.*

Keywords: *Carcass, Proximate, Broiler, Lactic Acid Bacteria, Probiotics*

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I. Introduction

Lactic acid bacteria are a group of Gram-positive bacteria, non-respiring non-spore-forming, cocci or rods, which produce lactic acid as the major end product of the fermentation of carbohydrates (Khalid, 2011). Lactic acid bacteria provide many benefits to mankind by producing metabolites that retard the growth of pathogenic and nonpathogenic microorganisms (Fernandez *et al.,* 2011). They produce metabolites by fermenting some food materials which serves food industry in providing better shelf life through antimicrobial activities (Coda *et al.,* 2011).

Antibiotic resistance has been the cause of concern for scientist and poultry farmers. The needs for supplement that can effectively take the place of antibiotics in broiler production have become very imperative. Long-term use of antibiotics and chemical growth promoters increases the occurrence of resistant pathogenic micro-organisms and reduces the efficacy of antibiotics and chemotherapeutics in the treatment of some diseases (Sabatkova*et al* ., 2008). Concerns about a further decrease in the efficacy of therapeutic antibiotics led to the ban on the use of antibiotics and chemical growth promoters in animal nutrition. However, besides strict adherence to hygiene requirements and proper nutrition, suitable biological products stabilizing the health of animals in agricultural farms which would have a beneficial effect not only on growth and nutrient conversion but also on the environment, are keenly sought for. One of the ways of achieving the above-mentioned effects is to use additives which support the practical applications and development of probiotics and which include organic acids, bioplexes, manno-oligosaccharides (kumprecht and Zobac 2000).

A variety of different supplements, as the alternatives to antimicrobial growth promoters, have been explored to maintain growth performance of broilers (Ghadban, 2002; Biggs and Parsons, 2008; Chowdhury*et al* ., 2009). The most prominent among such is probiotics. Probiotics is a Specific live or inactivated microbial culture that has documented targets in reducing the risk of human disease or in their nutritional management (Isolauri*et al.,* 2002). The consumption of oral probiotics acts to modify the intestinal microflora balance in a beneficial “rebalancing” manner, and thus helps the digestive health of the consumer. Traditional probiotics include the products containing live stabilized cultures of exactly defined microorganisms as active components (Sabatkova*et al*., 2008).

Thus, this research was aimed at studying the effect of *Lactobacillus fermentum*, *Lactobacillus plantenrun* and *Weissallaciberia*on carcass quality and proximate analysis of broiler chicken.

II. Materials And Method

2.1 Standardization of Pure Isolates of LAB

The Pure isolate of *Lactobacillus fermentum*, *Lactobacillus plantenrun* and *Weissallaciberia*was obtained from microbial bank of the department of Microbiology, Kaduna State University with accession numbers: NC010610.1, MF428738.1 and N2CP012873.1 respectively. The standardization was done using 0.5 McFarland turbidity standards adopted by Ebu*et al*. (2018). One milliliters (ml) of concentrated H_2SO_4 was added to 99 ml of distilled water in a conical flask and mix well. A 1 % v/v solution of $H_2SO_4$was prepared. Then 0.5 grams (g) of dihydrate barium Chloride salt ($BaCl_2$. $2H_2O$) was dissolved in 50 ml of distilled water. In this way, a 1 % w/v of $BaCl_2$ was prepared. This is followed by adding 0.6 ml of $BaCl_2$ solution to 99.4 ml of H_2SO_4 solution to make up to 100 ml. The solution was then mixed well. This was the stock solution of the 0.5 McFarland turbidity standards. Exactly 2ml of the solution was transferred into capped tubes and store at room temperature until ready for use.

2.2 Experimental Design

A total of 60, one-day old broiler chicks were used in this research work. Out of which 20 were fed with probiotic LAB, 20 were administered with antibiotics and 20 were used as control without antibiotic or probiotic. The standardized lactic acid bacteria (10^8cells/milliliters/isolates/birds/day) was administered in 200ml of drinking water at day 6, 7, 8, 21, 22, and 23 (Brzoska, *et al* 2012). The birds were administered vaccine against Gumboro virus at week 1 and 3, Lasota vaccine (newscastle disease) at week 2 and 4. Hybrid feed (Nigeria) was used to feed the birds which were provided in marsh form in two phases (starter phase 0 to 3 weeks and finisher phase 4 to 6 weeks). Ethical approval was obtained from Kaduna State Ministry of Agriculture, Kaduna.

2.3 Evaluation of carcass and proximate analysis

At the end of the sixth week, two birds per treatment were randomly selected and slaughtered; the carcasses were mechanically de-feathered and eviscerated. Carcasses, Weight at slaughter, breast muscle, drumstick, wings and liver/Gizard/Intestine was determined. Breast muscles (100 g) were taken from the right carcass side for proximate analysis. The samples were analyzed for percentage moisture content, percentage ash content, percentage protein content and percentage fat content using the method of AOAC. (2006).

2.4 Data Analysis

The data were analyzed using one way analysis of variance with the aid of graph pad prism (USA) version 6. Statistically significant effects were further analyzed and means were compared using Duncan's multiple range test. Statistical significance was determined at $P \leq 0.05$.

III. Results And Discussion

The effects of experimental treatment on weight of carcasses are shown in Table 1 and Figure I. The results indicates that there was a significant difference between the mean of the treatment on weight at slaughter P=0.0002, breast muscle P=0.0012, Drumstick P=0.0039 and wings P=0.0039 but there was no significant difference between the mean of liver/gizzard/intestine P=0.7359 which is in partial agreement with the work of Brzóska*et a*l. (2012) in which a significant difference was observed in broiler fed with *Lactococcuslactis* 847 and *Lactobacillus plantarum* 837 bacteria by increasing dressing percentage in chickens in relation to the control group of birds. They further observed that group receiving *Lactobacillus delbruecki* 838 had no effect on dressing percentage in chickens.

Feeding lactic acid bacteria to the chickens resulted in no significant differences in slaughter weight, the weight of individual saleable cuts and their proportion in carcass weight which is in disagreement with the present research that uses a combination of *Lactobacillus fermentum, Lactobacillus plantenrun* and *Weissellaciberia*. This research is also not consistent with those of earlier studies which used mixtures of Lactobacillusparacasei KKP 824, Lactobacillus rhamnosus KKP 825 and KKP 826 bacteria, and agree with the findings of other authors (Brzóska and Stecka, 2007).

Table 1: Effect of Lactic Acid Bacteria on Weight of Carcasses

ITEMS	Experimental Treatment A	B	C	P VALUE
Carcasses				
Weight at Slaughter	1823	1516	1642	0.0002
Breast Muscle	453	354	357	0.0012
Drumstick	214	152	204	0.0039
Wings	153	150	107	0.0039
Liver/Gizard/Intestine	257	251	209	0.7357

KEY: A= Probiotics Group
B= Antibiotics group
C= Control group
a, b & c are mean of the treatment
*Significant value, * P < 0.05*

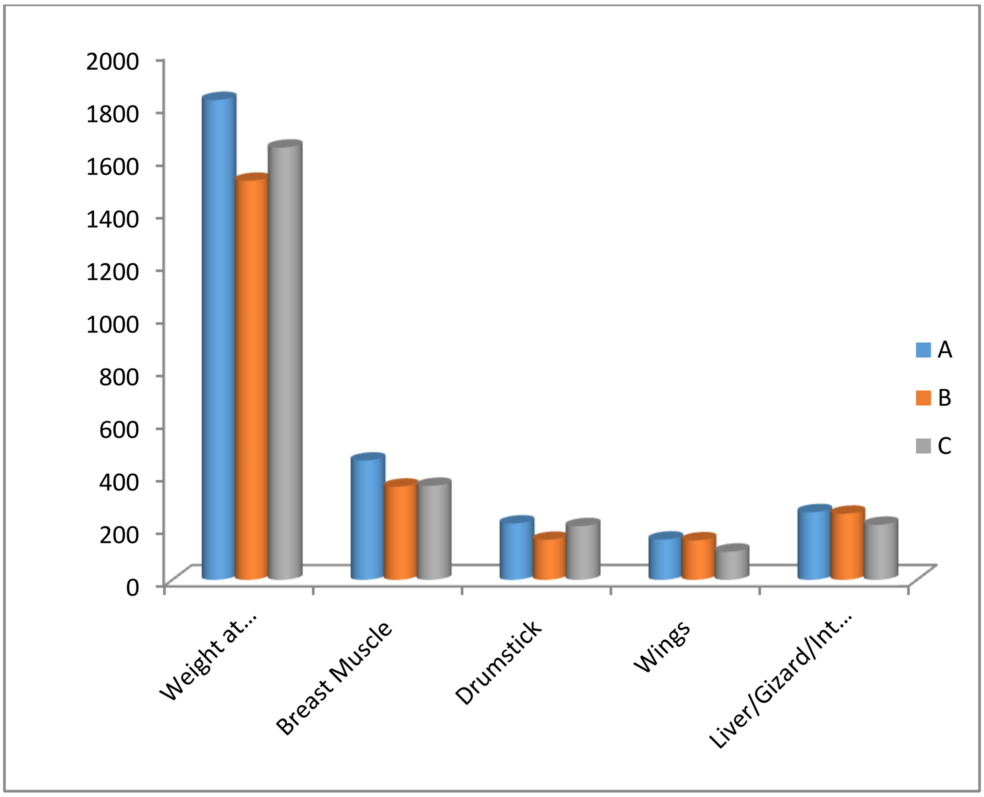

Figure I: Effects of lactic Acid Bacteria on weight of Carcasses
KEY: A= Probiotics Group
B= Antibiotics group
C= Control group

Table 2: Effect of Lactic Acid Bacteria on Proximate Analysis of Breast Muscle

	Experimental Treatment			
ITEMS	**A**	**B**	**C**	**P VALUE**
Proximate Analysis				
%Moisture Content	72.08	72.32	74.46	< 0.0001
%Ash Content	1.26	1.39	1.42	0.0212
%Protein Content	21.78	21.58	18.96	0.0004
%Fat Content	4.88	4.71	5.16	0.4583

KEY: A= Probiotics Group
B= Antibiotics group
C= Control group
a, b & c are mean of the treatment
*Significant value, * P < 0.05*

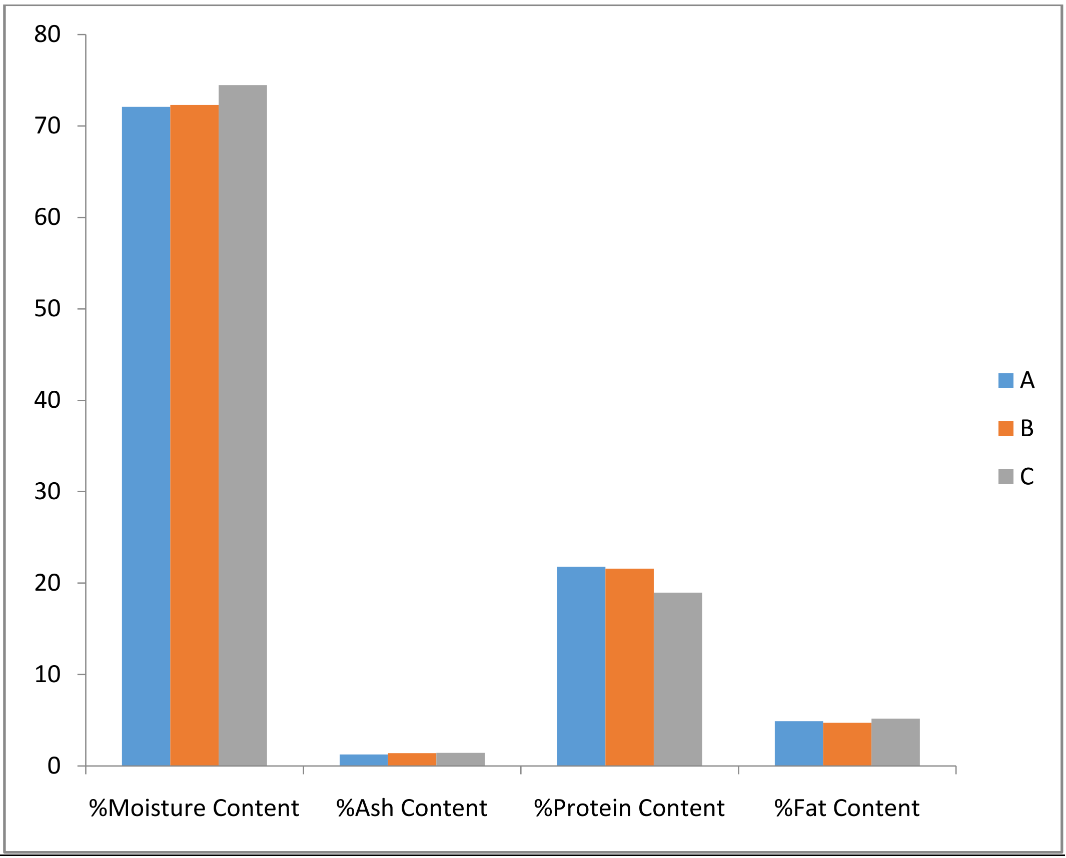

Figure II: Effects of lactic Acid Bacteria on Proximate Analysis of breast muscle
KEY: A= Probiotics Group
B= Antibiotics group
C= Control group

The effects of the experimental treatment on proximate analysis are shown in table 2 and figure II. The results indicates that there was a significant difference between the mean of experimental treatment on percentage moisture Content P=0.0001, percentage ash content P=0.0212, percentage protein content P=0.0004 but there was no significant difference between the mean of the treatment on percentage fat content P=0.4583. The results clearly showed that, the chickens of the lactic acid bacteria contain more proteins and have less fat content which is in contrast with other research which reported that feeding probiotic bacteria to the chickens did not create any differences in dry matter, protein and fat content of breast muscles, which is confirmed by many previous studies and suggests that probiotic bacteria do not interfere with the basal metabolism of protein and fat in avian bodies (Kalavathy*et al*., 2003). These traits are genetically determined, and feed additives and bacterial dietary supplements did not result in any significant differences in the components of chicken muscle tissue studied Brzóska*et al* (2012).

Conclusion

The use ofprobiotic containing*pLactobacillusfermentum, Lactobacillus plantenrun and Weissallaciberia*clearly indicates that there was a significant difference between the mean of the treatment on salable cuts and proximate analysis. It clearly shows that chicken fed with probiotics contain more protein and less fat.

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