IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 8, Issue 11 Ver. II (Nov. 2015), PP 33-36
www.iosrjournals.org

Effects of Probiotics Feeding Technology on Weight Gain of Indigenous Chicken in Kenya

Atela J. A. [a] ,Tuitoek J. [a] and Onjoro P. A. [a] Kibitok N.K[a]
[a]*Animal nutrition Group, Department of Animal Sciences, Egerton University, P.O Box 536, Egerton-20115, Kenya.*

Abstract: *This experiment was conducted and designed to evaluate the effects of feeding value of the feedstuffs utilized by Indigenous Chicken in farms. The suitability and choice by chicken in a cafeteria feeding system and the possibility of improvement using a selected commercial Molaplus poultry microbes was done. Fifteen chicken were allocated in 5 cages (3 birds each) and allowed a free choice diet of various feedstuffs like maize, millet, sorghum, ''omena'', rice germ, sunflower meal and soya bean meal and water provided adlibitum. The results indicated that maize grains was the most preferred feed by the growing indigenous chicken (72%) compared to sorghum (1%) intake. The effect of graded levels of multi-strain Molaplus poultry microbes on performance of indigenous chicken fed the local feedstuffs was then done. One hundred and fifty (150) indigenous Chicken between 12-16 weeks of age were randomly allocated in cages, into 6 groups, each group with 5 replicates (n = 25). The control group received the basal diet formulated. The treatment groups received the same basal diets supplemented with 5ml of molaplus poultry microbes solution in 250ml, 500ml, 1000ml, 1500ml, and 2000ml drinking water adlibitum for a 7 week trial. The results showed that dietary supplementation with molaplus poultry microbes significantly increased weight gain. Cummulative body weights were higher for the treatment level with 5ml molaplus poultry probiotics in1000ml of drinking water at the 7th week of treatment than for the other weeks and levels of treatment and control. In conclusion, Supplementing Indigenous Chicken with probiotics in drinking water can significantly improve the weight gains.*
Key words: *Molaplus poultry microbes; probiotics; indigenous chicken feeding; chicken feed technology; cumulative weight gain.*

I. Introduction

Free-range indigenous chicken in rural areas serve as a major source of protein and income to rural farmers in Kenya, but their upkeep is often associated with nutritional limitations; as a result egg and meat outputs for indigenous chickens are generally low compared to those for exotic birds (Gakige et. al., 2015). Probiotics are “any feed supplement with live microbials which affect the host animal beneficially by improving the intestinal microbial balance and the use can promote growth in poultry by ensuring a more effective utilization of nutrient intake.” (Zhang et. al., 2013). The species currently being used in probiotic preparations are varied and many they include, Lactobacillus acidophilus, Lactobacillus lactis, Lactobacillus casei, Lactobacillus helveticus, Lactobacillus bulgaricus, Lactobacillus salivarius, Lactobacillus plantarum, Streptococcus thermophilus, Enterococcus faecium, Enterococcus faecalis, Bifidobacterium spp. and Escherichia coli (Khobondo et. al., 2015). In particular, Lactobacillus, Bacillus and Clostridium-based probiotics have been shown to increase the digestibility of nutrients in chicken ((Timmerman et. al., 2009). Taking the beneficial effects of probiotics into account, the study aimed at testing the effects of multistrain poultry probiotics and local feed resources available to Indigenous Chicken and their effects on cumulative weight gains in the chicken. Supplementation of 5 ml of molaplus poultry microbes in 1000 ml of water is recommended in order to maximise beneficial effects in chicken (Molaplus.Com); higher concentrations do not always result in better performance (Khobondo et. al., 2015). This study investigated whether feeding graded levels of multi-strain probiotics delivered beneficial effects to indigenous chicken. The hypothesis that supplementing probiotics in drinking water increases weight gain was tested. The product used in the present study was supplied by Molaplus Ltd. Kenya. When used in poultry production, they avail, chelated minerals, ant-oxidant, enzymes, vitamins, organic acids, lactic bacteria, yeast and phototropic bacteria (Molaplus.com).

II. Materials And Methods

A feeding trial was conducted using one hundred and fifty (150) indigenous chicken sourced at two months old from free range small scale farmers from Kisumu and Baringo counties, Kenya. The trial was done in a randomized complete block design. The birds were randomly allocated the 5 test diets, into 6 groups and each group with 5 replicates (n = 25) per treatment. The dietary treatments and water were offered ad libitum. The molaplus poultry microbes solution was added into drinking water by giving a specific concentration of 5ml of Molaplus microbes solution in different volumes (250, 500, 1000, 1500, 2000 ml) of the respective water once a day at 0900 hours. The Molaplus poultry microbes is a complex solution of various beneficial Micro-organisms which are found naturally and are used in food manufacturing. When used in poultry production, they avail, chelated minerals, anti-oxidant, enzymes, vitamins, organic acids, lactic bacteria, yeast and phototropic bacteria (Molaplus.com). The experimental was done for a period of 60 days. Weight gains of the chicken were monitored by weighing them weekly at 0900 hours before morning feeding. Final weight gain was calculated for seven weeks experimental period to get the best level of concentration of molaplus poultry microbes solution that achieved the best weight gain.

Data analysis and Statistical models

Data from the experiment was subjected to Analysis of Variance (ANOVA) using the general linear model (GLM) of SAS software (Statistical Analysis Systems 2002) with the model containing treatment effects on the parameters measured. Differences between treatment means were separated using LSD.

III. Results And Discussion

Table 1: Nutrient Composition of feed ingredients used in making basal feed for indigenous chicken

		OMENA	MAIZE	RICE	GROWERS	MILET	SORGHUM
CF%		2.2	3.0	8.9	7.3	3.8	3.5
CP%		49.8	10.6	13.7	16.6	11.1	10.7
DM%		92.4	89.8	90.1	90.8	86.3	87.8
EE%		2705	2814	2987	3161	2693	3147
AAµg/ml		74.5	27.3	1.0	1.3	3.6	6.1
AFLATOXINSppb		4.8	11.1	6.2	15.8	3.1	15.2
Intakeg/d		5.2	32.7	1.0	1.0	4.3	0.3
%Intake		11	74	2	2	9	1

CF=crude fibre, CP=Crude protein, DM=Dry Matter, EE=Ether Extract, AA=Amino Acid

Table 1 describes the nutrient composition of major feed substances utilized by farmers in the two counties. The crude protein and energy (Dry Matter) content of the feedstuffs are similar to the conventional ranges of feed ingredient composition. The aflatoxins levels in the feeds were significantly higher than the 10ppb that is recommended conventionally in humans and poultry. Maize was the most preferred feed (72%) while the intake of sorghum was higher in the beginning but reduced later drastically probably because of the tannin content in sorghum; an anti nutritive factor limiting digestion in feeds. The cafeteria intake formular that the chicken gave us in this trial was 72% maize, 12% omena, 11% millet, 2% rice germ and 1% sorghum which was then used to formulate for them a ration for the next experiment. Given that these are free ranging chicken that are not usually supplemented, it is difficult to know exactly what is the daily nutrient intake per day in free ranging environment, but because the chicken has compensatory feed characteristics, the cafeteria gave us their intake per day.Chicken usually consume just enough food to meet their energy requirements since the control of feed intake is believed to be based primarily on the amount of energy in the diet (Badubi et. al.,2006). Increasing the dietary energy concentration leads to a decrease in feed intake thus affecting growth. Energy requirements in chicken are expressed in terms of metabolizable energy (ME) per day and the dietary requirements for protein are actually requirements for the amino acids contained in the protein. Amino acids obtained from dietary protein are used by the chicken to fulfil a diversity of functions such as growth, meat or egg production. Protein is a key nutrient and its deficiency in a feed reduces growth (Kingori et. al.,2010). Khobondo (2015) reported that protein deficiency in a feed reduced growth rates in broilers as a consequence of depressed appetite and intake of nutrients. Age is an important factor that contributes to a bird's response to nutrient composition of a diet. In fact, muscular protein deposition decreases as the bird advances to maturity but indigenous chicken are known to be slow growing with a low carcass weight (Okeno et. al., 2012). Protein efficiency is better at the lower level of dietary protein on indigenous Chicken. If dietary protein is inadequate, there is a reduction or cessation of growth or productivity and a withdrawal of protein from less vital body tissues to maintain the functions of more vital tissues. As such, protein requirements considerably vary according to the physiological status of the indigenous chicken, such as the rate of growth or egg production. Other factors contributing to variations in protein requirements of the chickens include sex, age, breed and body size. Matching the feed protein levels with animal protein requirements is crucial for maximizing animal performance (Gakige et. al., 2015). For optimum production, protein and energy supplementation has to be provided since they are limiting under the free range system. Olwande et. al. (2010) reported that a dietary protein level of 13 % was adequate for indigenous chicken aged between 14 and 21 weeks while King'ori et al. (2010) observed that indigenous chicken require a protein level of 16 % to optimize feed intake and growth between 14 and 21 weeks of age. Furthermore, Islam et. al. (2014) reported that indigenous chicken supplemented and fed diets containing 17 to 23 % CP had similar feed intakes and growth rates, suggesting that a 17 % CP diet was sufficient for chicken. The increase in protein requirement could be due to difference in production system practiced and technological improvements with time in rearing.

Table 2: Cumulative weight gain means for indigenous chicken fed on *molaplus* poultry microbes for a period of 7 weeks

Molaplus probiotics (ml)	0	250	500	1000	1500	2000
Weight gain (g)						
Week1	40±0.02[a]	100±0.02[b]	120±0.02[b]	50±0.02[a]	40±0.02[a]	30±0.02[a]
Week2	90±0.02[a]	280±0.02[b]	240±0.02[b]	230±0.03[b]	180±0.02[b]	120±0.02[a]
Week3	190±0.03[a]	320±0.03[b]	260±0.02[a]	270±0.03[a]	210±0.03[a]	150±0.03[a]
Week4	200±0.03[a]	420±0.03[b]	360±0.03[b]	290±0.03[a]	300±0.03[b]	200±0.03[a]
Week5	210±0.03[a]	450±0.03[b]	370±0.03[b]	300±0.04[a]	330±0.03[b]	220±0.03[a]
Week6	220±0.04[a]	540±0.04[b]	440±0.04[b]	380±0.05[a]	460±0.04[b]	250±0.04[a]
Week7	230±0.04[a]	460±0.04[bc]	360±0.03[b]	580±0.04[c]	440±0.04[c]	260±0.04[ab]

Means with different superscripts within rows are significantly different (p<0.05); Mean±SE

Table 2 presents the growth performance and feed efficiency of scavenging indigenous chicken given of chicken supplemented with varying levels of molaplus poultry microbes. Body weight gains were higher for chicken supplemented with molaplus probiotics compared to those on control. Weight gains were highest (580g) in chicken supplemented with 5ml of Molaplus poultry microbes solution in 1000ml drinking water at 7weeks compared to the rest of the treatment levels. The result shows that treatment of 5ml/1000ml molaplus poultry at week 7 had the best peak weights as compared to the control (0ml) at significant level of (p<0.05). There was a higher significant weight gains in week 1 between the treatment levels of 250ml and 500ml and the control, 1000ml,1500ml, 2000ml. It is clearly evident that the live weight gains were significantly higher in experimental birds as compared to control ones at all levels during the period of 8weeks of trial. Studies on the beneficial impact of probiotics on IC performance have indicated that probiotic supplementation had positive effects. According to Tatjana et. al (2005) the use of probiotics in farm animals results in faster weight gain for the same amount of food consumed. In this study the body weights os probiotics adminstered chicken were significantly increased (p<0.05) at treatment with 5ml in 1000ml drinking water in week 7 in comparison with those of chicken on control. The effect of probiotics started after two weeks of treatment. At 3rd week, the probiotics supplementation showed significant increase in the body weight compared with the control group, at the same age, there were significant differences among the five probiotics treatment groups, with group of level 5ml/1000ml having the significantly higher body weights than the other levels of treatment as well as control group. This positive effect of probiotics on body weight persisted until 7th weeks of trial. The differences in the body weight became greater towards the end of the trial period. On 6th week, the three levels (5ml/250ml,500ml and 1500ml) of probiotics groups showed significant increase in the body weight compared with the 5ml/1000ml and 2000ml group as well as the control group. The birds fed on probiotics level 5ml/1000ml exhibited higher body weights among groups at all times of this trial. In a similar study, Timmerman et. al. (2006) reported that the administration of probiotics via the drinking water had beneficial effects on broiler performance. Moreover, the birds fed on probiotic level of 5ml/1000ml water showed best cummulative weight gain than the other levels of probiotics as well as control group. This finding is in agreement with Alkhalf et. al. (2010) who demonstrated that probiotic supplemented to the chicken improve the body weight and daily weight gain. However, inconsistent effects of probiotics are also reported, which are likely influenced by administration dose, diet composition and the probiotic strains. Multi-strain probiotics when used may be more effective than single-strain probiotics (Zhang et. al.,2013). These results are also in agreement with Kabir (2009) who demonstrated increased live weight gain in probiotic fed chicken. Huang et. al. (2004) reported that higher inclusion levels did not always result in better performance in chicken.

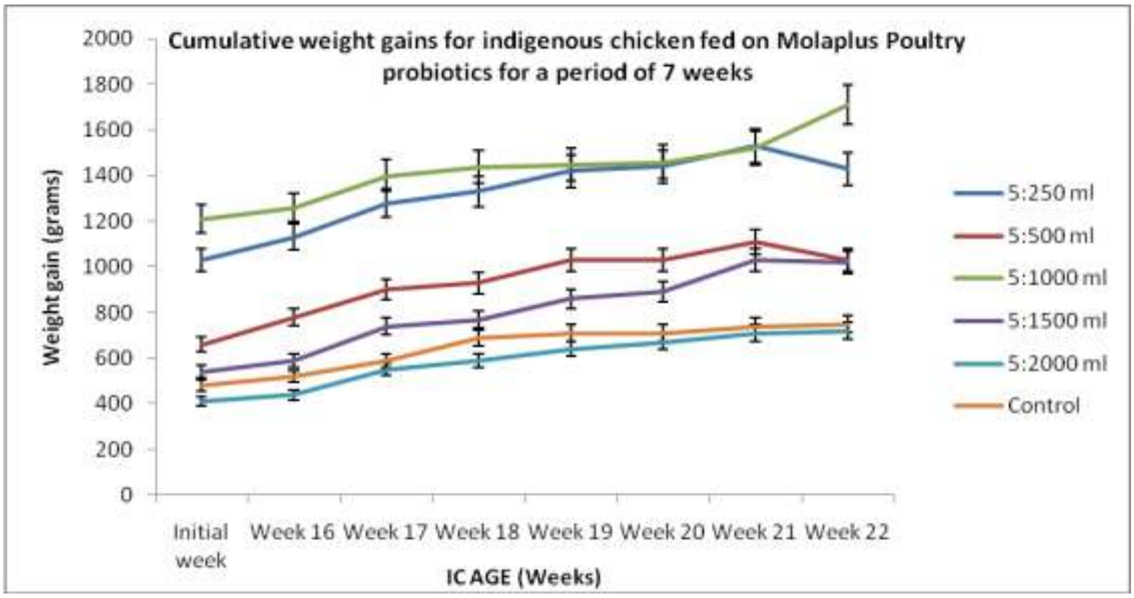

Figure 1: Cummulative weight gain of indigenous chicken fed on Molaplus Poultry Microbes

IV. Conclusion

Supplementing Indigenous Chicken with probiotics in drinking water can significantly improve the weight gains.

V. Recommendation

Supplementation of local feeds with molaplus poultry microbes at the concentration of 5ml in 1000ml in the IC drinking water could improve body weight gains in indigenous chicken. Other studies should be done to ascertain other beneficial effects of molaplus poultry probiotics on chicken.

Acknowledgements

The authors are grateful to the National Commission for Science,Technology and Innovation (NACOSTI), Egerton University Research Section for the financial support and Molaplus LTD Kenya for the supply of the probiotics used in the feeding trials.

References

[1]. Alkhalf, A., Alhaj, M., & Al-homidan I. (2010). Influence of probiotic supplementation on blood parameters and growth performance in broiler chickens. Saudi Journal of Biological Sciences, 17(3), 219–225.

[2]. Alloui, M., Szczurek, W. & Świątkiewicz, S. (2013). The Usefulness of Prebiotics and Probiotics in Modern Poultry Nutrition: a Review / Przydatność prebiotyków i probiotyków w nowoczesnym żywieniu drobiu – przegląd. Annals of Animal Science, 13(1), pp. 17-32.

[3]. Badubi, S. S., Rakereng, M., &Marumo, M. (2006). Morphological characteristics and feed resources available for indigenous chickens in Botswana. Livest. Res. Rural Dev, 18(1).

[4]. Gakige J K, King'ori A M, Bebe B O and Kahi A K 2015**:** Effects of targeted phase supplementary feeding on gut morphology of scavenging ecotypes of indigenous chickens in Kenya. Livestock Research for Rural Development. Volume 27, Article #193.

[5]. Islam, R., Kalita, N., & Nath, P. (2014). Comparative performance of Vanaraja and Indigenous chicken under backyard system of rearing. Journal of Poultry Science and Technology, 2(1), 22-25.

[6]. J O Khobondo, T K Muasya, S Miyumo, T O Okeno2, C B Wasike, R Mwakubambanya, A M Kingori and A K Kahi (2015) Genetic and nutrition development of indigenous chicken in Africa. Livestock Research for Rural Development Volume 27 (7) 2015

[7]. Khobondo J O, Ogore P B, Atela J A, Onjoro P S, Ondiek J O and Kahi A K 2015**:** The effects of dietary probiotics on natural IgM antibody titres of Kenyan indigenous chicken. Livestock Research for Rural Development. Volume 27, Article #230.

[8]. Okeno, T. O., Kahi, A. K., & Peters, K. J. (2012). Characterization of indigenous chicken production systems in Kenya. Tropical animal health and production, 44(3), 601-608.

[9]. Olwande, P.O., Ogara, W.O., Okuthe, S.O., Muchemi, G., Okoth, E., Odindo, M.O. and Adhiambo, R.F. **(2010)** Assessing the productivity of indigenous chickens in an extensive management system in Southern Nyanza, Kenya. Tropical Animal Health and Production. 42, 283-288.

[10]. Timmerman, H. M., Veldman, A., Van den Elsen, E., Rombouts, F. M., & Beynen, A. C. (2006). Mortality and growth performance of broilers given drinking water supplemented with chicken-specific probiotics. Poultry Science, 85(8), 1383-1388.

[11]. Zhang, AW; Lee, BD; Lee, SK; Lee, KW; An, GH; Song, KB; Lee, CH.(**2005).** Effects of yeast (Saccharomyces cerevisiae) cell components on growth performance, meat quality, and ileal mucosa development of broiler chicks. Poult. Sci, 84, 1015–1021.

[12]. Kingori, A. M., Wachira, A. M., & Tuitoek, J. K. (2010). Indigenous chicken production in Kenya: a review. International Journal of Poultry Science.

[13]. **SAS,** SAS User's Guide Statistics. (**2002)** SAS Institute, Inc., Cary, NC., USA.