ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 4, Issue, 12, pp. 268-271, December, 2012

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

EFFECTS OF NEEM (*Azadirachta Indica*) AND PAWPAW (*Carica papaya*) LEAVES SUPPLEMENTATION ON PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILERS

Adeyemo, G. O. and Akanmu, A. M.

Department of Animal Science, Faculty of Agriculture, University of Ibadan, Nigeria

ARTICLE INFO

Article History:
Received 15th September, 2012
Received in revised form
20th October, 2012
Accepted 14th November, 2012
Published online 18th December, 2012

Key words:
Broilers,
Neem leaf meal,
Pawpaw leaf meal,
Performance
and Carcass characteristics.

ABSTRACT

A study was designed to investigate the combined effects of neem and pawpaw leaves supplementation on performance and carcass characteristics of broiler chickens from 14–56 days of age. 360 one day-old unsexed Arbor acre broiler chickens were randomly allotted to the following diets T_1 (0% leaf meal), T_2 (0.5% NLM), T_3 (2% PLM), T_4 (0.5% NLM+PLM), T_5 (1% NLM+PLM) and T_6 (2% NLM+PLM). Results obtained from the study indicated that supplementation of NLM and PLM improved the dressing percentages, the highest values of 89.29% and 87.55% were obtained for birds on T_5 and T_6 respectively which were significantly different ($p<0.05$) when compared with the value obtained from which was 76.83%. The eviscerated weight differs significantly across the treatments, birds on T_5 and T_6 had significantly better ($p<0.05$) results of 76.93% and 75.85% respectively compared to treatments 4 and 5 which had 69.33% and 73.13% respectively. Body weight gain, feed consumed and feed conversion ratio of the broiler chickens improved in the treatments fed diets supplemented with leaf meal although and there were no significant ($P>0.05$) differences.

INTRODUCTION

Broilers are chickens produced specifically for meat production, these includes small fryers to large roaster type chicken. Broiler production has grown dramatically in the past two decades; these improvements are largely due to numerous researches and breeding programs which further enhanced feed utilization, growth rate and low levels of activity. Current commercial hybrids with high performance require high energy diets which would enable the maximum expression of their genetic potential (Sadeghi, 2005), in order to achieve this poultry farmers make use of synthetic growth promoters to enhance feed utilization and growth performance of broilers.

The term "antibiotic growth promoter" is used to describe any medicine that destroys or inhibits bacteria and is administered at a low, sub-therapeutic dose. The use of antibiotics for growth promotion has arisen with the intensification of livestock farming. Infectious agents reduce the yield of farmed food animals and, to control these, the administration of sub-therapeutic antibiotics and antimicrobial agents has been shown to be effective. The use of growth-promoters is largely a problem of intensive farming methods. Many of these synthetic drugs and growth promoters are supplemented to broiler diets to effect rapid growth, but their use have shown many disadvantages like high cost, adverse side effect on health of birds and long residual properties and carcinogenic effect in humans (Butaye *et al.*, 2003). So, researchers are now concentrating efforts on the use of our ancient medicinal system to find beneficial herbs and plants, which can be safely used to increase production. Medicinal plants are cheap and renewable sources of pharmacologically-active substances and are known to produce certain chemicals that are naturally toxic to bacteria (Basile *et al*., 1999). Neem tree as one of the most researched tree in the world has attracted world-wide prominence due to its vast range of medicinal properties like antibacterial, antiviral, antifungal, antiprotozoal, hepatoprotective and various other properties without showing any adverse effects (Kale *et al*., 2003) while pawpaw leaves are rich source of the proteolytic enzymes papain and chymopapain (Poulter *et al*., 1985) which have protein digesting properties and are useful in controlling digestive problems and intestinal worms (Burkhill, 1985). Due to adverse side effects arising from the use of synthetic forms of growth promoters, consideration should be given to alternative natural supplements. Neem and pawpaw leaves (*Azadirachta indica*, and *Carica papaya*) have been found to be rich source of active ingredients essential to the growth of farm animals. Also, they are relatively abundant. This study hereby investigates the combined effect of neem and pawpaw leaves supplementation on the performance and carcass characteristics of broilers.

Corresponding author: gbemiadeyemo@yahoo.com

MATERIALS AND METHODS

Processing of Neem and Pawpaw leaves

Young, fresh and blooming neem and pawpaw leaves were harvested green from the University of Ibadan Teaching and Research Farm, the leaves were washed, chopped and air dried separately in a well ventilated room for 10 days. The dried leaves were ground separately using the attrition mill to produce Pawpaw Leaf Meal (PLM) and Neem Leaf Meal (NLM) and stored in air-tight bags.

Experimental Procedure and Management of the birds

Three hundred and sixty (360) one day old Arbor acre broilers sourced from Ajanla Farms in Ibadan, Nigeria were brooded on a commercial broiler starter marsh for 14 days and were randomly allotted to 6 treatment groups, each treatment had 60 birds which were further replicated 5 times (12 birds each). Treatment diets fed were prepared as follows:

1. Basal diet (control) 0% leaf meal
2. Basal diet + neem leaf (0.5kg per 100kg diet) as recommended by Onyimonyi *et al*. (2009)
3. Basal diet + pawpaw leaf (2kg per 100kg diet) as recommended by Onyimonyi *et al*. (2009)
4. Basal diet + mixture of neem and pawpaw leaf meal (0.5kg per 100kg diet)
5. Basal diet + mixture of neem and pawpaw leaf meal (1.0kg per 100kg diet)
6. Basal diet + mixture of neem and pawpaw leaf meal (2.0kg per 100kg diet)

All managerial practices were applied as at when due and vaccinations were carried out as recommended by the hatchery. Feed and water were provided *ad libitum.*

The initial body weights of the birds were recorded after 12 days, while data on feed intake and individual body weights were recorded for 5 weeks. At the end of the seventh week, 4 birds per replicate were randomly selected, fasted overnight, weighted, slaughtered and de-feathered. The carcass weight, dressed weight, organs and cut parts of the birds were recorded. Data collected were subjected to one way analysis of variance (ANOVA) (Steel and Torrie, 1980). Significant differences between the treatment means were determined using the Duncan Multiple Range Test (Duncan, 1955)

DISCUSSION

Results for the performance characteristics followed no particular trend and the differences were not significant. The average total feed consumed in all treatments during the 5 weeks feeding trial were lower than the recommended level of 4.46kg/bird for 2 – 7 weeks by Arbor acre (2009) which resulted into lower finisher weights and high feed conversion ratio. The lower feed intake could be due to the diet formulation which was high in energy, and from the proximate analysis of the feed composition, some feed ingredients had higher actual nutrients value than the values used in the formulation of the diet, thereby the high energy in the feed generally depressed feed intake.

Table 1: Gross Composition of Broiler Basal Diet fed to Experimental Birds

Ingredient	StarterDiet	Finisher Diet
Maize	53	65
Full fat Soya	15	28
Groundnut Cake	23	1
Wheat Offal	3	0
Fishmeal (72%)	2	2
Bonemeal	2.3	2.3
Oyster Shell	1	1
Methionine	0.1	0.1
Lysine	0.1	0.1
Premix	0.25	0.25
Salt	0.25	0.25
Total	100	100
Calculated Values		
Metabolisable Energy (Kcal/kg)	3001	3200
Crude Protein (%)	22.99	20.25
Calcium	1.3	1.2
Phosphorous	0.82	0.38
Methionine	0.52	0.51
Lysine	1.18	1.01
Crude Fibre	3.99	2.99

Table 2: Proximate Composition of Experimental Starter Diet

	T1	T2	T3	T4	T5	T6
Parameters (%)	0% Control	0.50% (NLM)	2% (PLM)	0.50% (NLM+PLM)	1% (NLM+PLM)	2% (NLM+PLM)
Dry Matter	89.5	90.4	91.39	90.35	90.5	90.1
Crude Protein	23.94	24.5	26.5	24	24.1	26.3
Crude Fibre	3.68	4.11	5.5	6.6	6.1	5.5
Ether Extract	2.54	2.55	3.5	4	4	3.5
Ash	5.2	7.4	9.3	7.6	8	8.5

Table 3: Proximate Composition of Experimental Finisher Diet

	T1	T2	T3	T4	T5	T6
Parameters (%)	0% Control	0.50% (NLM)	2% (PLM)	0.50% (NLM+PLM)	1% (NLM+PLM)	2% (NLM+PLM)
Dry Matter	89.75	90.4	88.49	91.22	90.22	89.55
Crude Protein	21.22	20.94	21.32	22	22.1	22.5
Crude Fibre	6.7	6.8	7.9	6.3	6.5	7.3
Ether Extract	1.51	1.43	3.5	3.2	4.5	3.4
Ash	5	6.42	7.6	4.5	5	7.5

Table 4: Performance characteristics of broilers fed leaf meal supplements

Treatment/Parameters (kg)	1	2	3	4	5	6	SEM
Initial bodyweight	0.23	0.26	0.25	0.26	0.25	0.23	0.03
Final body weight	1.13	1.23	1.31	1.16	1.26	1.20	0.18
Total weight gained	0.9	0.97	1.06	0.89	1.01	0.97	0.17
Total feed consumed	2.99	2.70	2.05	2.65	2.74	2.61	0.34
Feed conversion ratio	3.39	3.00	3.22	3.52	3.07	3.09	0.51

Table 5: Carcass Analysis and Organ weights of broilers fed leaf meals

Treatment/Parameters	1	2	3	4	5	6	SEM
Live weight (g)	1500.00	1520.00	1720.00	1540.00	1740.00	1410.00	319.63
Dressed weight (%)	83.11^{ab}	83.43^{ab}	84.16^{ab}	76.83^{b}	89.29^{a}	87.55^{a}	6.41
Eviscerated weight (%)	72.50^{ab}	74.12^{ab}	73.13^{ab}	69.33^{b}	76.93^{a}	75.85^{a}	4.31
Thigh (%)	9.63^{ab}	10.51^{a}	10.02^{ab}	9.03^{b}	10.26^{a}	9.82^{ab}	0.81
Drumstick (%)	9.85^{a}	9.28^{ab}	9.68^{a}	8.43^{b}	10.03^{a}	9.57^{ab}	0.85
Breast (%)	13.41^{ab}	14.80^{ab}	12.31^{b}	13.44^{ab}	15.78^{a}	16.37^{a}	2.63
Back (%)	13.34	14.20	13.58	12.30	13.32	13.46	2.05
Wing (%)	7.84	7.93	7.92	7.39	8.53	8.51	0.89
Head (%)	2.66	3.00	2.56	2.52	2.49	2.96	0.42
Neck (%)	4.45^{ab}	4.69^{ab}	4.82^{ab}	3.87^{b}	4.34^{ab}	5.25^{a}	0.86
Heart (%)	0.45	0.42	0.49	0.46	0.40	0.46	0.08
Spleen (%)	0.14	0.12	0.12	0.14	0.16	0.16	0.05
Liver (%)	2.09	2.24	2.06	2.15	2.18	2.13	0.34
Gizzard (%)	2.41	2.41	2.24	2.44	2.23	2.49	0.57
Shank (%)	4.91	4.31	4.98	4.67	4.48	4.77	0.67
Lung (%)	0.53^{a}	0.46^{ab}	0.52^{a}	0.40^{b}	0.52^{a}	0.54^{a}	0.08

a,b: mean in the same row with different superscripts are significantly ($P<0.05$) different

The high feed intake witnessed in treatment 3 could be due to the digestive enzymes present in pawpaw leaf (papain and chymopapain), as stated by Anibijuwon (2009) that these are active ingredients having protein digesting properties. This aided the digestive processes of the birds and enhanced the degradation of the feed components, this was also observed in their final body weight which had the highest value across the treatments, and this is similar with the observation of Poulter and Caygil (1985). Pawpaw leaf inclusion at high level as recommended by Onyimonyi (2009) help the digestion of the feed by digesting protein in food at acid, alkaline or neutral medium (Krishna *et al*., 2008). The papaya leaves also contains alkaloids carpaine, pseudocarpain, vitamins C and E which further enhanced the digestion processes. The mixture of PLM and NLM at 0.5%, 1% and 2% supplementation as represented in treatments 4, 5 and 6 respectively, influenced the performance of the birds which increased as supplementation moved from 0.5% to 2%. While treatment 5 had the highest body weight value compared with others fed leaf meal mixture. All the treatments had better weight gained than those on the control diet except birds on treatment 4. Treatment 5 had the combination of NLM and PLM at 1% supplementation, the antibacterial, antiprotozoal, hepatoprotective and antifungal properties of neem leaf as stated by (Kale *et al*., 2003) coupled with the growth promotion properties and feed utilization efficiency ability of neem leaf as reported by (Padalwar, 1994), the birds on this treatment may have been able to suppress the growth of harmful organisms among other useful actions by the aid of the active ingredients in neem leaf, thereby creating a conducive environment for the active substances in the pawpaw leaf to aid digestion and give better feed conversion efficiency. The lowest mean live weights recorded in T1 and T4 may be due to poor utilization of diets, while the level of inclusion of leaf meal in T4 was low for optimum performance and feed conversion efficiency. Birds on treatment 5 had higher values in dressed weight, eviscerated weight, thigh, drumstick, and breast muscle compared to other treatments.

The higher value of the dressing percentage indicates that total edible meat part from birds on this treatment is higher than the meat yield from other treatments. This view is similar to what Onyimonyi *et al* (2009) obtained when they fed similar substances to broilers although they observed a lower dressing percentage compared with what we obtained with birds on Treatments 3 and 5. One other striking observation is the distribution of meat on the carcass and the meat yield from the birds, although the birds on treatment 3 had the highest body weight, those on Treatment 5 had the best dressing percentage, and meat distribution which had significant localization on the breast, drumstick and thigh regions of the birds, these are also the parts that command greater consumer preference. Since carcass yield is an indication of the quality and utilization of the ration (Bamgbose and Niba, 1998), then birds on Treatment 5 utilized their diets better which was evidenced by their higher carcass values. The percentages of back, wing, head and shank did not differ significantly across the treatments more so, these parts carry less value in terms of meat yield and consumer preference. The values for liver, heart, gizzard and lungs did not differ significantly, this could be linked to the absence of anti-nutritional factors in the diets, because higher physiological activities by these organs is triggered by the presence of anti-nutritional factors and their concomitant effect. In conclusion, results of the present study showed that supplementation of diet with 1% (NLM+PLM) improve performance, feed utilization, dressing percentage and carcass yield therefore this combination of neem leaf meal and pawpaw leaf meal can serve as an effective replacement for chemical based growth promoters in broiler production.

REFERENCES

A.O.A.C, 1990. Association of Official Analytical Chemists. Official Method of Analysis, 15th Edn. Washington, D.C

Anibijuwon, I.I and A.O.Udeze 2009. Antimicrobial activity of *Carica papaya* (pawpaw leaf) on some pathogenic

organisms of clinical origin from south-western Nigeria. Ethnobotanicals leaflets 13: 850-864

Arbor Acres 2009. Broiler management guide. Aviagen Incorporated Cummings Research Park. Huntsville USABamgbose, A.M and Niba A.T 1998. Performance of broiler chickens fed cotton seed cake in starter and finisher rations. Proceedings of the 3rd annual conference of animal science association of Nigeria. ASAN. September 22-24

Basile, A., Giordano, S., Lopez-saez, J. A. and Cobianchi, R. C. 1999. Antibacterial activity of pure flavonoids isolated from mosses. *Phytochemistry*. 52:1479- 1482

Burkill, H. M. 1985. The useful plants of West Tropical Africa. Royal Botanical Garden Kew (7)1: 200- 219.

Butaye, P. Luc A. Devriese, F. Haesebrouck 2003. Antimicrobial Growth Promoters used in Animal feed: Effects of less well known antibiotics on Gram – positive bacteria. *Clin. Microbiol. Rev.* vol.16 (2):175 - 188

Duncan, D.B., 1955. Multiple range and multiple F tests. Biometrics, 11: 1-42.

Kale, B.P., Kothekar, M.A., Tayade, H.P., Jaju, J.B.and Mateeddin, M. 2003: *Indian J. Pharmacol* 35, 177.

Krishna, K.L, M. Paridhavi and J.A.Patel 2008. Review on nutritional, medicinal and pharmacological properties of papaya (*Carica papaya* Linn.) *Natural product radiance*. 7(4):364-373

NRC 1994. National Research Council: Nutrient Requirement for Poultry 1994. Ninth Revised edition. National Academy Press. Washington D.C.

Obikaonu, H.O, I.C. Okoli, M.N. Opara, V.M.O.Okoro, I.P.Ogbuewu, E.B.Etuk and A.B.I.Udedibie 2012. Haematological and serum biochemical indices of starter broilers fed leaf meal of neem (*Azadirachta indica*). *Journ. Agric. Tech*. 8(1):71-79

Onyimonyi, A.E and Onu Ernest 2009. An assessment of pawpaw leaf meal as protein ingredient for finishing broiler. *Int journ poult sci*. 8(10): 995-998

Onyimonyi, A.E., Adeyemi Olabode and G.C. Okeke, 2009. Performance and Economic characteristics of broilers fed varying dietary levels of Neem leaf meal (*Azadirachta indica*). Int. *J. Poult. Sci*., 8: 256-259 *Padalwar, R.V.(1994) M.V.Sc Thesis, Dr.P.D.K.V, Akola

Poulter, N.H. and J.C. Caygill, 1985. Production and utilization of papain-a proteolytic enzyme from *Carica papaya* L. *Trop. Sci.*, 25: 123-137.

Sadeghi, G.H and S.A Tabiedian 2005. Effect of different enery to protein ratio and tallow supplementation on broiler performance. *Int. journ poult. sci.* 4(12): 976-981

Steel, R.G. and Torrie, J.H. 1980. Principles and Procedures of Statistics. An Approach. 2nd ed. McGraw-Hill Book Co.Inc. New York.

****