APRW -26

Growth Performance and Hematology of Cockerel Starters Fed Diets Containing Neem Leaf Meal

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Abstract
A 7-week feeding trial was conducted to evaluate the effects of neem leaf meal (NLM) on growth performance and hematological variables of cockerels. Sun–dried neem leaves were milled, used to formulate seven diets which contained NLM at 0% (control), 2.5%, 5.0%, 7.5%, 10.0%, 12.5% and 15.0%, and used to feed 336 Isa white day-old cockerels. There were 48 birds and 4 replicates per treatment in a completely randomized design. Water and feed were given *ad-libitum*, and other necessary management practices were observed. Data on feed intake and weight gain were taken during the experiment. At the end of the experiment, blood was collected from 2 cockerels/ replicate and analyzed. Results showed that final weight, weight gain and feed intake were significantly ($p<0.05$) influenced by NLM treatments, values reduced with higher levels of NLM in the cockerels' diets. There was no significant difference ($p>0.05$) in hematological variables; erythrocyte sedimentation rate, packed cell volume, red blood cell count, hemoglobin concentration, Mean cell hemoglobin concentration, mean cell hemoglobin, mean cell volume, Lymphocyte, neutrophil and basophil values recorded. In conclusion, the use of neem leaf meal in cockerel production is not encouraged at high levels.

Keywords: Chicks, alternative feed ingredients, animal protein, blood parameters, cockerel production

Introduction

The animal protein needs of humans can easily be met through poultry production (Rehman *et al.,* 2011). Poultry constitutes the largest livestock species consumed worldwide accounting for more than 30% of the animal protein utilized by man. The challenges of high feed cost have led to the researches on alternative feed ingredients that would be suitable in poultry production. Leaf meal could thus be incorporated in poultry diets as a means of reducing high cost of feed ingredients (Nworgu *et al.,* 2003). Neem known as Indian neem (margosa) or Dogoyaro is a tropical tree plant which is widely distributed in Africa and is available all year round. It is well adapted to the climatic and soil conditions in the tropical rainforest regions, all the way to the Sahel savannah part of Nigeria.

The effects of neem leaf meal have been studied on broilers and layers (Esonu *et al.,* 2005; Onyimonyi*et al.,* 2009; Obikaonu, 2012) and it was recommended for use in their diets at various levels. Cockerels are birds known to be hardy, energetic in behavior and also very cheap. Since cockerels too are meat producing chickens (poultry) and can be effectively raised together with broilers.

This study was carried out to evaluate the effect of neem leaf meal on growth performance and hematology of cockerel starters.

Materials and methods

The study was conducted at the Poultry unit, Teaching and Research Farm of the Federal University of Technology, Akure, Ondo state. The neem leaves used were harvested fresh, sundried till crispy while still retaining the green colour and pulverized for experimental diets formulation.

A total of 350 day-old Isa white cockerels were sourced from a reputable hatchery in Ibadan, Oyo state, out of which 336 (three hundred and thirty six) were randomly allocated to the 7 dietary treatments. There were 48 birds and 4 replicates per treatment in a completely randomized design. The experimental diets were designated as control (0% neem leaf meal), 2.5% neem leaf meal (NLM), 5.0%NLM, 7.5%NLM, 10.0%NLM, 12.5%NLM and 15.0%NLM as shown in Table 1. The feeding trial lasted for 7 weeks during which data on initial live weight, final live weight and feed intake were taken. At the end of the experiment, blood was collected from 2 cockerels per replicate into labeled Bijour bottles with anticoagulant for hematological studies. The cockerels were reared intensively. Feed and water were provided *ad-libitum.*

All data collected were subjected to one-way ANOVA using SPSS statistical package and significant means were separated using same package.

Table 1: Gross composition of experimental diets

Ingredients	Treatments						
	Control	2.5%	5.0%	7.5%	10.0%	12.5%	15.0%
Maize	55.00	54.00	52.00	50.00	48.00	46.00	44.00
Neem leaf meal	0.00	2.50	5.00	7.50	10.00	12.50	15.00
Wheat offal	15.00	14.00	14.00	14.00	14.00	14.00	14.00
Fish meal	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Soybean meal	12.50	12.00	11.50	11.00	11.00	11.00	11.00
Groundnut cake	11.00	11.00	11.00	11.00	10.50	10.00	9.50
Bone meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Limestone	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Lysine	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100	100	100
Proximate composition							
Moisture (%)	8.30	8.65	7.76	7.10	7.10	7.06	6.55
Crude protein (%)	19.27	20.19	20.53	20.13	20.68	20.62	21.06
Crude fibre (%)	4.43	5.76	5.27	6.62	5.10	6.16	6.83
Ash (%)	4.53	4.16	6.52	5.35	5.35	5.84	6.65

Results and discussion

As presented in Table 2, final weight, total weight gain and average weight gain were significantly ($p<0.05$) influenced by inclusion of NLM in cockerel starters' diets. These weights followed same trend across the treatments. Cockerels fed 2.5% NLM had the highest weight gain and the value did not differ significantly from those of control and 5.0% NLM diet. Total weight gain (g/bird) reduced significantly with addition of NLM from 7.5%. As reported by Onyimonyi *et al.* (2009) and Obikaonu (2012), there were also reductions in weight gained by broilers fed higher levels of NLM. Cockerels on the control diet had the highest feed intake. It appeared that values of total feed intake reduced with increasing addition of NLM to the diets. This is in contrast to Obikaonu (2012) who reported a significant ($p<0.05$) increase in total feed intake with increasing level of NLM in finisher broilers' diets. The decrease observed in this study might be related to reduced palatability of NLM diets. Feed conversion ratio although not significant ($p>0.05$), was highest for cockerels on 2.5%NLM diet (3.22±0.26) followed by 5.0% NLM (3.67±0.13) and control (3.72±0.16). This suggests that cockerel starters might not be able to tolerate NLM above 5.0%.

Table 2: Performance of cockerel chicks fed diet containing neem leaf meal

Treatments	Initial weight (g/bird)	Final weight (g/bird)	Total weight gain (g/bird)	Average weight gain (g/bird/day)	Total feed intake (g/bird)	Average feed intake (g/bird/day)	Feed conversion ratio
Control	35.42±1.21	362.29±21.92^{a}	326.88±21.81^{a}	6.67±0.45^{a}	1205.83±33.08^{a}	24.61±0.68^{a}	3.72±0.16
2.5%NLM	33.33±1.70	391.04±33.09^{a}	357.70±31.40^{a}	7.30±0.64^{a}	1126.21±20.46^{ab}	22.98±0.42^{ab}	3.22±0.26
5.0%NLM	32.29±1.04	337.18±10.83^{ab}	304.89±10.62^{ab}	6.22±0.22^{ab}	1116.88±32.02^{abc}	22.79±0.65^{abc}	3.67±0.13
7.5%NLM	35.42±1.24	300.47±9.46^{bc}	265.06±8.94^{bc}	5.41±0.18^{bc}	1066.11±26.88^{bcd}	21.76±0.55^{bcd}	4.04±0.17
10.0%NLM	35.42±1.21	262.08±5.29^{c}	226.67±5.98^{c}	4.63±0.12^{c}	1007.63±25.99^{d}	20.56±0.53^{d}	4.45±0.14
12.5%NLM	34.17±1.89	289.44±26.21^{bc}	255.28±25.75^{bc}	5.21±0.53^{bc}	1045.83±41.86^{bcd}	21.34±0.85^{bcd}	4.27±0.60
15.0%NLM	32.50±1.13	273.96±16.44^{c}	241.46±15.99^{c}	4.93±0.33^{c}	1026.88±17.06^{cd}	20.96±0.35^{cd}	4.32±0.36

Mean± standard deviation; Means with different superscripts along same column are significant ($P<0.05$)

Hematological variables of cockerels starters fed NLM are shown in Table 3. Erythrocyte sedimentation rate, packed cell volume, red blood cell count, hemoglobin concentration, mean cell hemoglobin concentration, mean cell hemoglobin, mean cell volume, lymphocyte, neutrophil and basophil values were not significantly ($p>0.05$) influenced by dietary NLM treatments. Packed cell volume (PCV) values were generally lower than those reported by Mitruka and Rawnsley (1977) and Ross *et al.* (1978) except that of 15.0% NLM which might be due to breed difference. However hemoglobin concentration (HB) which also indicates anemia fell within the normal range reported by these authors. The results obtained for HB is in consonance with Obiakonu *et al.*

(2011) whose values also fell within the normal range by Mitruka and Rawnsley (1977) and Ross *et al.* (1978) although the PCV values were in contrast. Mean cell hemoglobin concentration, which indicates the average amount of hemoglobin in the red blood cell, fell within the normal range suggesting that NLM is not deleterious to the hematology of cockerel starters.

Table 3: Hematological variables of cockerel chicks fed diet containing neem leaf meal

Treatments	ESR	PCV	RBC	HB	MCHC	MCH	MCV	LYM	NEU	BAS
Control	2.75±0.50	23.50±2.08	2.16±0.42	7.85±0.70	33.40±0.08	36.90±4.07	110.40±12.20	63.50±1.00	19.00±2.16	3.25±0.50
2.5%NLM	2.50±0.58	24.80±3.40	2.28±0.73	8.25±1.17	33.30±0.16	37.70±6.33	113.20±19.50	64.00±0.82	18.80±1.26	3.25±0.50
5.0%NLM	4.25±1.50	22.50±3.70	1.98±0.64	7.50±1.21	33.30±0.12	39.00±4.96	117.00±14.60	63.00±0.82	18.80±2.06	3.00±0.00
7.5%NLM	3.50±1.29	22.30±3.77	1.95±0.66	7.43±1.26	33.40±0.08	39.80±6.57	119.40±19.80	63.30±1.23	19.50±2.08	3.25±0.50
10.0%NLM	3.25±1.26	21.50±3.11	1.80±0.51	7.18±1.02	33.30±0.14	41.20±6.72	123.40±20.10	63.80±0.96	18.30±0.96	3.25±0.50
12.5%NLM	2.75±0.50	23.30±2.50	2.08±0.50	7.78±0.83	33.40±0.08	38.40±5.18	114.60±15.40	63.80±0.96	19.00±3.16	3.25±0.50
15.0%NLM	2.25±0.50	25.30±2.23	2.47±0.36	8.43±0.72	33.40±0.13	34.40±2.09	103.10±6.05	64.00±0.82	17.50±2.08	3.50±0.44

Mean± standard deviation; ESR- Erythrocyte sedimentation rate; PCV- Packed cell volume; RBC- Red blood cell; HB- Hemoglobin concentration; MCHC- Mean cell hemoglobin concentration; MCH- Mean cell hemoglobin; MCV- Mean cell volume; LYM- Lymphocyte; NEU- Neutrophil; BAS- Basophil

Conclusion

Although there were no depressions in the haematological variables studied, the growth performance shows the use of neem leaf meal in cockerel starters' diets should not exceed 5%.

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