

Effect Of Dried Neem Leaves (*Azadirachta indica*) On Broiler Performance, Carcass Traits And Economic Efficiency

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ABSTRACT

The present work was carried out to study the effect of dried neem leaves (*Azadirachta indica*) on broiler performance, carcass traits and economic efficiency. A total of 72 one day old chicks of a commercial meat type (Hubbard) with an average body weight of 45 g were used. The birds were randomly allocated to equal 4 triplicate groups (each replicate contained six chicks). A basal control diet was formulated to fulfil the nutrients requirement of broilers. The first group of chicks were fed on basal diet and considered as control group while the other groups were fed on the basal diet supplemented by 2, 5 and 8g of dried neem leaves /kg diet. Results revealed that the use of dried neem leaves (2g /kg diet) had no effects on broiler chicken performance while dried neem leaves (5g, 8g /kg diet) had adverse effects on broiler chicken performance. All the treatment groups showed non significant ($P>0.05$) effect on internal organ weights, and carcass traits. Use of dried neem leaves (2g /kg diet) show better economic efficiency, net profit and performance index and lower feed cost/kg gain than other two levels of neem.

INTRODUCTION

The medicinal plants and herbs have been used for many years in the treatment of various diseases in animals and human beings. Recently, utilization of these medicinal plants is increasing, these are used in animal feed as growth promoters. Due to prohibition of most of the antimicrobial growth promoters in animal feed by their residual effects, plant extracts are becoming more popular (1). Neem tree is the most researched tree in the world and is said to be the most promising tree of 21st century. It possesses maximum useful non-wood products (leaves, bark, flowers, fruits, seed, gum, oil and neem cake) than any other tree species. These non-wood products are known to have antiallergenic, antidermatic, antifungal, anti-inflammatory, antiscabic, cardiac, diuretic, insecticidal, larvicidal, nematicidal and other biological activities (2). The present study aimed to evaluate the effect of dried neem leaves (*Azadirachta indica*) on broiler performance, carcass traits and economic efficiency.

MATERIAL AND METHODS

The present study was carried out in December 2011 at Animal Research Unit of Nutrition and Clinical Nutrition Department, Faculty of Veterinary Medicine, Zagazig University.

Preparation of neem leaves: neem leaves collected from special trees from Ten's of Ramadan city, then the leaves were sent to Faculty of Agriculture –Benha University at Musthuhr to be examined. After confirmation by the specialists the leaves were air dried then grounded and added to the diet

Experimental birds and management: A total of 72 one day old chicks of a commercial meat type (Hubbard) obtained from a local hatchery were used in this study. On arrival they were weighed and randomly allocated to equal four treatment groups. Each containing three replicates and each replicate contain six chicks. Birds were reared in a naturally ventilated open house with saw dust as litter and at a density 10 birds/m². Continuous

lighting was provided throughout the experiment. The starting temperature was 33° C then decreased gradually 2° C each week until reach 21° C at the 6th week.

Experimental design

Seventy two one day old chicks were equally allotted into four groups each group was divided into three replicates. The first group of chicks were fed on basal diet and considered as control group while the other groups were fed on the basal diet supplemented by 2, 5 and 8g of dried neem leaves /kg diet.

Chemical composition of the diet is shown in Table 1.

The experimental diets

The diets are isoenergetic isonitrogenous and offered in mash form, the feed and water are provided *ad libitum* along the duration of the trial. The experimental diet was formulated to meet the nutrient requirements (3). The experiment extended for 6 weeks, and the feeding period divided into 3 stages as shown in Table 2.

Table 1. Chemical composition (%) of feedstuffs used in formulation of the experimental diets (air dry basis)

Ingredient	Nutrient (%)								
	Moisture	CP	EE	*CF	*Ca	*AP ¹	*Lysine	*Methionine	*ME ²
Yellow corn	11.5	8.7	3.5	2.2	0.02	0.28	0.26	0.18	3350
Soybean meal, 44%	11.3	42.1	2.5	7	0.29	0.65	2.69	0.62	2230
Corn gluten, 60%	7	59.7	3.5	1.3	-	0.5	1.03	1.49	3720
Soybean oil	-	-	98	-	-	-	-	-	8800
Calcium carbonate	-	-	-	-	38	-	-	-	-
Calcium dibasic phosphate	-	-	-	-	26	18	-	-	-
premix	-	-	-	-	26	-	-	-	-
Lysine, Hcl, 78%	-	118*	-	-	-	-	78	-	4600*
DL-Methionine, 98%	-	58*	-	-	-	-	-	98	3600*

¹ Available phosphorus

² Metabolizable energy Kcal/kg

Moisture, CP, EE were chemically analysed (6).

* According to previous study (3).

Performance and economic efficiency

Feed intake and live weight measurement were taken weekly to determine weight gain ratio while current market price was used for the economic analysis (4, 5) as shown:

1. Total return (LE)/bird = Price of kg X live body weight/ bird.
2. Total costs (LE) = Fixed costs + Variable costs.
3. Variable costs (LE) (Feed cost).

$$4. \text{ Net profit (LE)} = \text{Total returns} - \text{Total costs.}$$

$$5. \text{ Economic efficiency (E.EF)} = \frac{\text{Net profit (L.E)}}{\text{total feed cost (L.E).}}$$

$$6. \text{ Feed cost/kg gain} = \frac{\text{total feed cost} \times 1000}{\text{Total weight gain}}$$

$$7. \text{ Performance index \% (PI)} = \frac{\text{final live body weight (Kg)} \times 100}{\text{Feed conversion}}$$

Table 2. Physical and chemical composition (%) of the experimental diets used in experimental stages

Ingredient	Experimental diets		
	Starter	grower	Finisher
Yellow corn	54.8	60	65.25
Soybean meal, 44%	26.8	23.75	21
Corn gluten, 60%	12.6	8.6	6.6
Soybean oil	4.1	3.8	3.3
Calcium carbonate	1.1	1.12	1.12
Calcium dibasic phosphate	1.75	1.8	1.8
Common salt	0.3	0.3	0.3
Premix ¹	0.25	0.25	0.25
DL- Methionine, 98%	0.1	0.14	0.14
Lysine, Hcl, 78%	0.1	0.14	0.14
Toxenil	0.1	0.1	0.1
Calculated composition			
ME, Kcal/Kg	3204	3205	3201
CP, %	23	20	18.0
EE, %	6.98	6.72	6.27
CF, %	3.2	3.1	2.99
Ca, %	1.03	1.04	1.03
total phosphorus, %	0.7	0.68	0.67
Lysine, %	1.06	0.99	0.91
Methionine, %	0.55	0.52	0.48

¹Muvco premix: Each 2.5kg contain vit. A (10, 000000 IU), vit. D3 (2, 000000 IU), vit. E (10 g), vit. k3 (1000 mg), vit. B1 (1000 mg), vit. B2 (5 g), vit. B6 (1.5 g), pantothenic acid (10 g), vit. B12 (10 mg), niacin (30 g), folic acid (1000 mg), biotin (50 g), Fe (30 g), Mn (60 g), Cu (4 g), I (300 mg), Co (100 mg), Se (100 mg) and Zn (50 g)

Carcass analysis: Four birds were randomly selected per treatment (i.e., 2/replicate) for carcass cuts and organ examination at the expiration of the experiment having withdrawn feed for 12 hr. Weight of organs and various parts were taken and expressed as percentage of the final live weight of the birds

Chemical and statistical analysis: Proximate composition of the diets and test ingredients were determined by standard method (6).

All data were analyzed using the general linear model (7). Data were subjected to one way analysis of variance (8), while significant

mean differences were by Duncan's multiple range tests (9). All statements of significance were based on the 0.05 level of probability.

RESULTS AND DISCUSSION

Effect of dried neem leaves on overall performance is shown in Table 3.

Statistical analysis of the effect of neem leaves supplement on total body weight revealed that broiler chickens fed diet supplemented with dried neem leaves (5g/kg diet) showed significant ($P < 0.05$) lower final

body weight and total average body weight gain than those of control and those which fed diet supplemented with dried neem leaves (2g and 8g/kg diet), while broiler chickens fed diet supplemented with dried neem leaves (2g and 8g /kg diet) showed no significant ($P>0.05$) difference as compared to control group.

These results are in agreement with the findings previously recorded (10). The authors showed that all the treatment supplemented with neem leaf powder (1g, 2g and 3g/kg of broiler ration) had recorded non significant increase in weekly gain in weight and disagree with our result on live body weight as all the treatment groups showed significant ($P<0.01$) higher means for live body weight than that of control group. The present results clearly reinforced by those previously obtained (11), which mentioned that feeding of neem (*Azadirachta indica*) as an antibiotic growth promoter substitute at a level of 7 g neem/kg in the diet not influence final body weight and total average body weight gain and the results of the present study disagreed with those (12) which mentioned that using of 4% concentrated neem leaves' (*Azadirachta indica*) infusion of 50ml L-1 of fresh drinking water exhibited better ($P<0.05$) mean body weight gain. In the same line, scientists (13) evaluated the comparative efficacy of six medicinal plants including *Nigella sativa*, *Boerhavia diffusa*, *Withania somnifera*, *Ipomea digitata*, *Azadirachta indica* and *Corylus avellana* (4 g/kg of feed) as growth promoter and their subsequent influence on the performance of broilers. The Maximum gain in weight was observed with *Withania somnifera* followed by *Nigella sativa* and *Azadirachta indica*.

Concerning the Effect of dietary supplementation of dried neem leaves (2g,5g and 8g/kg diet) on feed intake of broiler chickens, the results of this study revealed that broiler chickens of all experimental groups recorded no significant ($P>0.05$) difference in total feed intake.

These results are in agreement with the findings which showed that all the treatment supplemented with neem leaf powder (1g, 2g and 3g/kg of broiler ration) had recorded non-

significant increase in mean feed consumption in all the treatment groups, as compared to control group (10). The present results were reinforced by those previously obtained (11), which showed that feeding of neem (*Azadirachta indica*) as an antibiotic growth promoter substitute at a level of 7 g neem/kg in the diet don't influence the daily feed intake. But these results disagreed with those which mentioned that using of 4% concentrated neem leaves' (*Azadirachta indica*) infusion of 30,40,50ml L-1 of fresh drinking water exhibited significantly ($P<0.05$) lower feed intake than that of the control group (12).

Regarding the effect of dietary supplementation of dried neem leaves (2g,5g and 8g/kg diet) on feed conversion ratio of broiler chickens, the analysis of data on mean cumulative FCR which revealed that broiler chickens fed diet supplemented with dried neem leaves (5,8g/kg diet) had significant ($P<0.05$) higher FCR than those of control group and those which fed diet supplemented with dried neem leaves (2g/kg diet). Also no significant ($P>0.05$) difference was recorded in broiler chickens fed diet supplemented with dried neem leaves (2g/kg diet) as compared to control group.

The obtained results are in agreement with those previously obtained (10), which showed that all the treatments supplemented with neem leaf powder (1g, 2g and 3g/kg of broiler ration) had recorded non-significant increase in feed efficiency in all the treatment groups, as compared to control group. In the same line, it has been investigated the response of cockerel chickens fed graded levels of untreated and treated neem seed cake as partial replacement of Soya Bean Meal (SBM) (14). The results showed that feed gain ratio did not show any difference among treatment means.

The present results are reinforced by those previously obtained (11), which mentioned that feeding of neem (*Azadirachta indica*) as an antibiotic growth promoter substitute at a level of 7 g neem/kg in the diet had the highest feed conversion ratio at 42 day.

Results of the present study disagreed with those reported before (12), which mentioned that using of 4% concentrated neem leaves' (*Azadirachta indica*) infusion of 50ml L-1 of fresh drinking water exhibited significantly ($P < 0.05$) lower feed conversion ratio as compared to the control. Moreover, results of the present study disagree with those which investigated the performance of broilers fed varying dietary levels of sun dried Neem Leaf Meal (NLM) (0, 0.5, 1.0, 1.5 and 2%) (15). The results showed that treatment effect on Conversion Ratio (FCR) was significant ($P < 0.05$). Birds on the 0.5% NLM had significantly ($P < 0.05$) superior FCR than control and other groups.

Carcass quality traits

Concerning the effect of dietary supplementation of dried neem leaves (2g, 5g and 8g/kg diet) on carcass quality traits of broiler chickens is shown in Table 4. The present results revealed that all experimental diets had no significant ($P > 0.05$) effect on dressing percent, also no significant ($P > 0.05$) difference was recorded in spleen, gizzard, heart, liver and intestinal percent as compared to control group or when compared with each other.

Results of the present study fit with those (12), which showed that studied the effects of neem leaves' infusion on broilers. The authors concluded that using of 4% concentrated neem leaves' (*Azadirachta indica*) infusion of 50ml L-1 in fresh drinking water exhibited no significant ($P > 0.05$) difference in weight of giblet (gizzard, liver, heart and intestine) but exhibited better ($P < 0.05$) dressing percentage and significantly ($P < 0.05$) higher mean breast weight. Furthermore it has been also reported that the dietary treatment of alkali-treated neem did not cause any significant change in liver, heart, gizzard, intestine and abdominal fat (16).

In the same line the effect of neem (*Azadirachta indica*) as an antibiotic growth

promoter substitute on growth carcass traits in broiler chickens (11). The authors found that internal organ weights and carcass traits were not influenced by the dietary treatments.

Effect of dried neem leaves on economic efficiency is shown in Table 5.

Concerning the effect of dietary supplementation of dried neem leaves (2g, 5g and 8g/kg diet) on economic efficiency of broiler chickens, the present results revealed that all experimental groups recorded significant ($P < 0.05$) difference in economic efficiency as compared to control group. Broiler chickens of groups fed diet supplemented with dried neem leaves (5,8g/kg diet) showed significant ($P < 0.05$) lower economic efficiency, net profit and performance index and significant ($P < 0.05$) higher feed cost/kg gain as compared to control group and group supplemented with dried neem leaves (2g/kg diet). However no significant ($P > 0.05$) difference was recorded between them. Also non-significant ($P > 0.05$) difference was recorded between group supplemented with dried neem leaves (2g/kg diet) as compared to control group. No significant ($P > 0.05$) difference was recorded between all experimental groups in feed cost. The results of this study agreed with those which investigated the response of cockerel chickens fed graded levels of untreated and treated neem seed cake. The authors showed that Feed Cost per kilogram Weight Gain (FCWG) were significantly different ($p < 0.05$) across the treatments while feed cost did not show any difference among treatment means and disagreed with those of investigation which revealed that the economic indices of broilers fed varying dietary levels of sun dried Neem Leaf Meal (NLM) (15). And the results showed that Gross margin analysis revealed a profit of N707.30 is made per bird on the 0.5% NLM as against N630.97, N620.73, N621.81 and N507.06 for birds on the control, 1.0, 1.5 and 2.0% NLM respectively.

Table 3. Effect of the dietary supplementation with dried neem leaves on overall performance of broiler chicks (means \pm SE)

Parameter	Control	Neem leaves (2g/kg diet)	Neem leaves (5g/kg diet)	Neem leaves (8g/kg diet)
Initial body weight, g	44.5	44.5	44.5	44.5
Final body weight, g	1921.11 \pm 28.56 ^a	1925.56 \pm 64.58 ^a	1681 \pm 27.3 ^b	1788 \pm 42.57 ^{ab}
Absolute BWT gain, g	1876.61 \pm 28.56 ^a	1881.06 \pm 64.58 ^a	1636.6 \pm 9.63 ^b	1744.38 \pm 42.57 ^{ab}
Total feed consumption	3304.5 \pm 195.1 ^{ab}	3232.7 \pm 61.5 ^{ab}	3393.4 \pm 116.5 ^{ab}	3598.1 \pm 45.4 ^a
Feed conversion ratio	1.76 \pm 0.11 ^b	1.72 \pm 0.06 ^b	2.07 \pm 0.04 ^a	2.06 \pm 0.07 ^a

Means within the same row carrying different superscripts are significantly different at ($P \leq 0.05$).

Table 4. Effect of the dietary supplementation with dried neem leaves on carcass traits of broiler chicks (means \pm SE)

Parameters	Control	Neem Leaves (2g/kg diet)	Neem Leaves (5g/kg diet)	Neem Leaves (8g/kg diet)
Dressing %	74.19 \pm 0.75 ^a	73.72 \pm 0.53 ^a	73.01 \pm 0.95 ^a	73.25 \pm 0.35 ^a
Gizzard %	2.05 \pm 0.22 ^a	2.12 \pm 0.08 ^a	1.89 \pm 0.06 ^a	2.07 \pm 0.07 ^a
Liver %	2.41 \pm 0.24 ^a	2.04 \pm 0.05 ^a	2.41 \pm 0.07 ^a	2.15 \pm 0.16 ^a
Intestinal %*	9.63 \pm 0.05 ^a	9.05 \pm 0.05 ^a	9.19 \pm 1.01 ^a	10.21 \pm 0.43 ^a
Spleen %	0.14 \pm 0.02 ^a	0.11 \pm 0.03 ^a	0.12 \pm 0.01 ^a	0.11 \pm 0.03 ^a
Heart %	0.58 \pm 0.06 ^a	0.69 \pm 0.06 ^a	0.57 \pm 0.03 ^a	0.62 \pm 0.05 ^a

Intestinal%*: intestinal weight from beginning of duodenum till end of rectum relative to life body weight

Table 5. Economic importance of inclusion of dried neem leaves supplementation on broiler ration (means \pm SE)

Parameter	Control	Neem leaves (2g/kg diet)	Neem leaves (5g/kg diet)	Neem leaves (8g/kg diet)
Total return (LE)/bird	25.93 \pm 0.38 ^a	25.99 \pm 0.87 ^a	22.69 \pm 0.36 ^b	24.15 \pm 0.57 ^{ab}
Net profit	7.52 \pm 0.68 ^a	7.79 \pm 0.85 ^a	4.01 \pm 0.22 ^b	4.85 \pm 0.71 ^b
Total costs	18.41 \pm 0.58 ^a	18.19 \pm 0.18 ^a	18.68 \pm 0.34 ^a	19.29 \pm 0.13 ^a
Feed costs	9.91 \pm 0.58 ^a	9.69 \pm 0.18 ^a	10.18 \pm 0.34 ^a	10.79 \pm 0.13 ^a
Economic efficiency	0.77 \pm 0.11 ^a	0.8 \pm 0.09 ^a	0.39 \pm 0.02 ^b	0.45 \pm 0.07 ^b
Feed cost/ kg gain	5.28 \pm 0.31 ^b	5.16 \pm 0.18 ^b	6.12 \pm 0.22 ^a	6.19 \pm 0.22 ^a
Performance index%	112.64 \pm 7.11 ^a	116.41 \pm 7.21 ^a	83.91 \pm 1.36 ^b	90.07 \pm 5.27 ^b

Means within the same row carrying different superscripts are significantly different at ($P \leq 0.05$)

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الملخص العربي

"تأثير أوراق نبات الازدرخت الهندي المجففه على الاداء في بداري التسمين"

سهام محمد محمد ابراهيم، ومجدي السعيد الخولي ، وفاء عبد الحميد العراقي ،
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نظرا لزيادة استخدام المضادات الحيوية كإضافات للأعلاف في انتاج الدواجن وما إلي ذلك من تأثير بالغ الخطورة علي صحة المستهلك , فإنه يجب علينا الاتجاه الي استخدام البدائل الطبيعية لهذه المضادات الحيوية التي ليس لها تأثير ضار علي صحة المستهلك. تم اجراء هذه التجربة لدراسة أثر إضافة مستويات مختلفه من نبات الازدرخت الهندي (النيم) كاضافه طبيعيه علي علائق الدواجن .

استخدم في هذه الدراسة عدد ٧٢ كتكوت تسمين قسمت إلي ٤ مجاميع (١٨ طائر/ مجموعة) وكل مجموعة قسمت الي ٣ تكرارات كل تكرار يحتوي علي ٦ طيور حيث تم تغذيتهم علي ٤ علائق متساوية في الطاقة والبروتين لكل مرحلة عمرية:

المرحلة الاولى: عليقة الباديء (١ - ١٤ يوم) تحتوى علي ٢٣,٦٥ % بروتين خام و ٣١٩٥ كيلو كالوري طاقة ممثلة /كجم عليقة.

المرحلة الثانية: عليقة النامي (١٥- ٢٨ يوم) تحتوى علي ٢١,٨٣ % بروتين خام و ٣١٩٧ كيلو كالوري طاقة ممثلة /كجم عليقة.

المرحلة الثالثة: عليقة الناهي (٢٩- ٤٢ يوم) تحتوى علي ١٩,٢٥ % بروتين خام و ٣٢٢٣ كيلو كالوري طاقة ممثلة /كجم عليقة.

وكانت المجموعات كآلاتي:-

المجموعة الاولى: غذيت علي عليقة ضابطة بدون اي إضافات.

المجموعة الثانية: غذيت علي عليقة ضابطة مع إضافة نبات الازدرخت الهندي (النيم) بمعدل ٢ جرام/ كجم عليقة.

المجموعة الثالثة: غذيت علي عليقة ضابطة مع إضافة نبات الازدرخت الهندي (النيم) بمعدل ٥ جرام/ كجم عليقة.

المجموعة الرابعة: غذيت علي عليقة ضابطة مع إضافة نبات الازدرخت الهندي (النيم) بمعدل ٨ جرام/ كجم عليقة.

ودرس تأثير تلك المعاملات علي:

اداء دواجن التسمين (وزن الطائر الحي , الوزن المكتسب أسبوعيا، معدل استهلاك العلف أسبوعيا، معدل التحويل الغذائي). تم تسجيل أوزان الطيور فرديا , وزن الجسم المكتسب, معدل الوزن الزائد , كمية العلف المستهلكة ومعامل التحويل الغذائي كل إسبوع و في نهاية التجربة تم أخذ عينات من الكبد والكلية والطحال والاجهزه الليمفاويه لاجراء الفحص النسيجي وأيضا تم تقييم مواصفات الذبيحة وكذلك تم تقييم الكفاءة الاقتصادية لاستخدام هذه الاضافات .

نتائج التجربة الاولى، أتضح من هذه التجربة ما يلي :

(١)- معدلات الأداء

وزن الجسم و وزن الجسم المكتسب: عدم وجود فروق معنوية في وزن الجسم و وزن الجسم المكتسب بين المجموعات المضاف اليها نبات الازدرخت الهندي (النيم) بمعدل ٥ جرام, ٨ جرام / كجم عليقة مقارنة بالمجموعة ذات العليقة الضابطة ولكن وجد نقص معنوي في وزن الجسم و وزن الجسم المكتسب للمجموعة المضاف اليها نبات الازدرخت الهندي (النيم) بمعدل ٥ جرام/ كجم عليقة مقارنة بباقي المجموعات.

معدل استهلاك العلف : عدم وجود فروق معنوية في معدل استهلاك العلف بين المجموعات المضاف اليها نبات الازدرخت الهندي (النيم) او المجموعة ذات العليقة الضابطة.

نسبة التحويل الغذائي : لوحظ زياده معنوية في نسبة التحويل الغذائي بين المجموعات المضاف اليها نبات الازدرخت الهندي (النيم) بمعدل ٥ جرام, ٨ جرام / كجم عليقة مقارنة بالمجموعة ذات العليقة الضابطة ولا يوجد فرق معنوي في نسبة التحويل الغذائي بين المضاف اليها نبات الازدرخت الهندي (النيم) بمعدل ٢ جرام / كجم عليقة مقارنة بالمجموعة ذات العليقة الضابطة.

(٢) صفات الذبيحة: لوحظ عدم وجود فروق معنوية في نسبة صافي الذبيحة في كل المجموعات المضاف اليها نبات الازدرخت الهندي (النيم) مقارنة بالمجموعة ذات العليقة الضابطة ولم يلاحظ اي تأثير معنوي في النسب المثوية للكبد والقلب بين كل المجموعات في التجربة الاولى .

(٣) الفائدة الاقتصادية: أدي استخدام نبات الازدرخت الهندي (النيم) بمعدل ٢ جرام / كجم عليقة الي حدوث زيادة معنوية في العائد الكلي، الربح وفي الكفاءة الاقتصادية و نقص معنوي في تكلفة العلف / كجم زيادة في وزن بداري التسمين مقارنة بالمجموعتين المضاف اليهما هذا النبات ولكن لم يلاحظ اي فرق معنوي بين هذه المجموعه مقارنة بالمجموعة الضابطة.