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EFFECT OF DIETARY NIACIN AND CHOLINE LEVELS ON THE PERFORMANCE OF MUSCOVY DUCKLINGS.

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ABSTRACT: A total number of 180 Muscovy ducklings 7-days old were assigned equally into 6 dietary treatments in a factorial design (3 x 2) where three levels of Niacin 35, 70, 105 mg/Kg diet and two levels of Choline (1300 and 2000 mg/Kg diet) were used. Ducklings were fed starting diet (22.08% CP and 2865 K cal ME/Kg diet) during the starting period (7 – 35 days) and growing diet (19.96% C.P and 2930 kcal ME/kg diet) during the growing period (36 – 80 days of age).

The results showed that the effects of Niacin or choline levels on live body weight and body weight gain were insignificant. The body weight average was significantly decreased (P<0.01) by the duckling fed on 35 mg Niacin with 1300 or 2000 mg Choline / Kg diet as compared with those of the other dietary groups. Feed intake and feed conversion were improved for ducklings fed on diets contained 105 mg Niacin with 1300 or 2000 mg Choline /Kg diet as compared with the other groups. No significant effect was observed on carcass traits.

INTRODUCTION

The National Research Council (NRC 1984) reported that Niacin requirement for Pekin ducks were 55 and 40 mg / Kg diet during the period from day-old to 7 weeks of age and breeding period, respectively.

Wu-Ls *et al.*,(1984). Showed that the least level of Niacin requirement for Straight-run mule ducklings was 45 mg/Kg diet.

Harms *et al.*, (1988) found that body weight of Nicholas large white turkey hens 32

weeks old significantly($p< 0.05$) incre-ased with Niacin supplem-entation at 8.4, 16.7, 33.4, or 66.9 mg/kg diet. However, Shih-Borling *et al.*, (1995) found that Niacin requirement was between 68 and 98 mg/Kg diet for Chinese goslings fed on maize – soybean meal diet from 0 to 4 weeks of age.

Ghazalah and Soliman (1988) reported that the total dietary Choline 1800 and 1250 mg/Kg diet were necessary for optimal growth during starting period (0-14 days) and growing period (14–56days), respectively for white Pekin ducklings fed on a maiz-soya basal diet. Sonbol and Habeeb (1989) showed that increasing dietary Choline level up to 2350 mg/Kg diet for white Pekin duckling significantly ($p<0.05$) improved the average of body weight.

The present study was aimed to study the effect of different levels of Niacin and Choline on the growth performance of Muscovy ducklings.

MATERIALS AND METHODS

The experimental work of the present study was carried out at El-Serw Animal production Research Station. Agriculture Research Center, Ministry of Agriculture, Dokki, Egypt.

A total number of 180 unsexed Muscovy ducklings, 7-days old were randomly divided into six experimental groups of 30 ducklings each. They were allocated in experimental pens. A 2 x 3 factorial design was used, including three levels of niacin (35, 70 and 105 mg/Kg diet) and two levels of Choline (1300 and 2000 mg/Kg diet) and in the starter and grower diets used (Table 1). The ducklings were fed on starter diets (22.08% CP and 2862 Kcal ME/ Kg) from 7 to 35 days of age and grower diet (19.96% CP and 2930 kcal ME / Kg diet) from 36-80 days of age, respectively. Feed and water were offered *ad libitum* all time during the experimental periods Ducklings were weighed individual record basis and feed consumption group-wise were recorded along with 7-35 and 36-80 days of age while feed conversion (g. feed /g. gain) was calculated.

At the end of the exper-imental period, 4 ducks from each group were randomly

taken, fasten for 12 hours, then slaughtered to estimate dressing weight percentage as well as other carcass traits relatively to the live weight. Statistical analysis was carried out according to Sendecor and Cochran (1982), while Duncans new multiple range test (Duncan, 1955), was used for comparisons among significant means.

RESULTS AND DISCUSSION

1. Effect of dietary Niacin on:

1.1. Growth performance:

Ducklings fed diet supplemented with 105 mg Niacin/Kg tended to increase live body weight and body weight gain during the experimental periods as compared with the other groups (Table 3).

1.2. Feed intake and feed conversion:

Average feed intake of Muscovy ducklings was increased with 105 mg Niacin/kg diet during the experimental periods as compared with the other groups.

Feed conversion was improved with 70 and 105 mg Niacin/Kg diet during the starter, grower and the whole experimental periods as compared with ducklings fed diets supplemented with 35 mg Niacin / Kg diet (Table 3). These results may be due to Muscovy ducklings are rapidly growing so that require higher levels of Niacin to support optimum gains than previously believed.

1.3. Carcass traits:

Carcass, giblets and abdominal fat percentage were insignificantly affected by dietary of Niacin levels at 80 days of age.

These results are partially agree with those obtained by Wu-Ls *et al.*, (1984) who showed that the least Niacin requirement for straight-run mule ducklings was 45 mg/Kg diet.

2. Effect of dietary Choline on:

2.1. Growth performance:

Live body weight of ducklings fed diets contained 1300 mg Choline / Kg diet at 35 and 80 days of age was slightly increased as compared with the other groups. However, ducklings fed diets contain 1300

mg Choline / Kg diet tend to increase body weight gain during the starting (7-35 days), growing (36-80 days) and the whole experimental (7-80 days) periods (Table 4).

These results may be due to addition of choline stimulated growth only on the lower levels of total sulfur amino acid (TSAA). These results are partially agree with those reported by Ghazalah and Soliman (1988) who reported that total dietary Choline 1800 and 1250 mg/Kg were necessary for optimal growth during starting period (0-14 days) and growing period (14-56 days) for white Pekin ducklings fed on a maiz – soya basal diet.

2.2. Feed intake and feed conversion:

Average feed intake were improved of ducklings fed diet contain 1300 mg/Kg diet during the experimental periods. However, the values of feed conversion were similar with 1300 and 2000 mg Choline during the experimental periods. These results may be due to Choline (Vit. B_4) played an important role in improved metabolic process.

2.3. Carcass traits:

Carcass, giblets and abdominal fat percentages were insignificantly affected by dietary of Choline levels at 80 days of age.

3. Effect of dietary Niacin and Choline levels on.

3.1. Growth performance:

It is evident from (Table 5) that the live body weight average at 35 days of age was significantly increased ($P<0.01$) with 105 mg Niacin plus 1300 or 2000 mg Choline / Kg diet and with 70 mg Niacin plus 2000 mg Choline / Kg diet as compared with ducklings fed diet contained 35 mg Niacin plus 1300 or 2000 mg Choline / Kg diet.

3.2. Feed intake and feed conversion:

Results in (Table 5) indicated that feed intake was increased with 105 mg Niacin plus 1300 or 2000 mg Choline during the starter and whole experimental periods. However, feed intake was increased with ducklings fed diets supplemented with 70 mg Niacin plus 2000 mg Choline and increased with duckling fed diets with 105

mg Niacin plus 1300 mg Choline during the grower period (36-80 days) as compared with the other groups. Feed conversion was improved with ducklings fed diets supplemented with 70 mg Niacin plus 2000 mg Choline during the starter period. However, feed conversion improved with ducklings fed on diets supplemented with 105 mg Niacin plus 1300 or 2000 mg Choline in comparison with the other groups during the grower and the whole experimental periods (Table 5). These results may be due to Niacin and Choline as vitamins of B complex group play an important role of energy and protein metabolism. These results are in agreement with those obtained by Ruiz *et al.*, (1990) who indicated that increasing Niacin levels resulted improved feed intake and feed conversion of broiler chicks.

3.3. Carcass traits:

The slaughter characteristics of Muscovy ducklings fed the experimental diets at 80 days of age are presented in (Table 6). Carcass, giblets and abdominal fat percentages were not affected by different dietary treatments. These results are in agreement with those reported by Waldroup *et al.* (1985) who reported that Niacin levels had no effect on carcass dressing percentages. Hence, these data indicated that Muscovy ducklings require to Niacin between 70 and 105 mg/Kg diet and does not require any supplemental Choline more than 1300 mg/Kg diet when diet contain sufficient quantity of (TSAA).

REFERENCES

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

Ghazalah, A. A. and Soliman, A. F. (1988). The interrelationship between methionine, Choline and inorganic sulfate in feeding white Pekin ducklings. Proceeding of the second conference of the Agricultural Development Research, Fac. of Agric., Ain Shams Univ., Cairo,17–19 Cairo, Egypt.

Harms, R.H.; Ruiz-N; Buresh, R. E. and Wilson, H. R. (1988). Research note: Effect of niacin supplementation of a corn-soybean meal diet on performance of turkey breeder hens. Poult. Sci.. 67 : 2 . 336 -338.

National Research Council (NRC 1984). Nutrient Requirements of Poultry. 8th ed. National Academy Press, Washington, DC.

Ruiz-N; Harms-RH and S.B.Li NDA (1990). Niacin requirement of Broiler chickens fed acorn-soybean meal diet from 1 to 21 days of age Poult. Sci. 69: 433-439.

Shih-Borling, HSU-Ali; Shin-Bl and HSU-A (1995). Niacin and tryptophan requirement of Chinese goslings from 0 to 4 weeks of age. J. of Taiwan -Livestock-Research, 28: 3, 215-223.

Snedecor, G.W. and Cochran W.G. (1982). Statistical Methods. 6th Edition, Iowa State University Press, Ames, U.S.A.

Sonbol, S.M. and A.A. Habeeb (1989). Effect of Choline levels on the performance and blood constituents of Pekin ducklings. Egypt. J. of Appl. Sci., 4 (4): 489-499.

Waldroup, P.W., H.M. Hellwig, G.K. Spencer, N.K. Smith, B.L. Fancher, M.E. Jackson, Z. B-Johnson, and T.L. Goodwin, (1985).The effects of increased levels of niacin supplementation on growth rate and carcass composition of broiler chickens. Poult. Sci.64:1777 -1784.

Wu-Ls;Wu-Cl and Shen-TF (1984). Niacin and tryptophan requirements of mule ducklings fed corn and soy-based diets. Poult. Sci. 1984, 63: 1, 153-158.

Table 1. Experimental design of Choline and Niacin (mg/Kg) supplementation

Treatment groups	Starter diets		Grower diets	
	Choline	Niacin	Choline	Niacin
1	1300	35	1300	35
2		70		70
3		105		105
4	2000	35	2000	35
5		70		70
6		105		105

Table 2. Composition and chemical analysis of the experimental basal diets

Ingredients	**Starter diet**	**Grower diet**
Corn yellow	60.82	72.9
Soybean meal 44%	32.00	20.24
Fish meal 70%	2.00	2.00
Meat meal 60%	2.00	-
Wheat bran	-	1.75
Dicalcium phosphate	1.20	1.20
Limeston	1.30	1.30
Primex*	0.30	0.30
Salt	0.30	0.30
Dl-Methiionine	0.08	0.01
Total	100.00	100.00
Calculated analysis**		
ME k cal/kg	2865.00	2930.00
Crude protein	22.08	19.96
Lysine	1.25	1.09
Total sulfur amino acids (TSAA)	0.72	0.60
Calcium	1.01	1.01
Total phosphorus	0.70	0.61

* Vitamin and mineral premix at 0.30% of the diet supplies the following per kg of the diet: Vit. A 12,000 IU, Vit D_3 2,000 IU, Vit. E, 10 IU, Vit. K_3 1.6 mg riboflavin 4 mg. B6, 1.5 mg. folic acid 2mg, Vit. B12 10 mg, Mn; 60 mg, Zn; 40 mg, Fe 50 mg. Cu 5mg.;Co 0.2 mg.

** Calculating according to NRC (1984).

Table (3): Performance of Muscovy ducklings (X + SE) fed different levels of Niacin during 7-80 days of age

Items	Niacin levels mg/kg diet (NS)		
	35	70	105
Initial body weight	130.11±1.89	130.11±2.20	127.93±2.49
Live body weight			
35 days of age	1623.05±31.27	1646.50±34.54	1703.79±35.37
80 days of age	3322.18±99.89	3509.99±109.93	3635.09±109.93
Body weight gain			
7-35 days	1492.71±30.01	1516.08±32.78	1575.36±33.28
36-80 days	1698.91±45.13	1863.50±58.72	1931.55±62.19
7- 80 day	3191.73±98.72	3379.57±108.05	3506.04±114.25
feed Intake			
7-35 days	2959.66	2928.75	3213.21
36-80 days	7484.09	7949.41	7955.52
7-80 days	10443.59	10877.66	11168.73
feed conversion			
7-35 days	1.98	2.92	2.04
36-80 days	4.41	4.26	4.12
7-80 days	3.27	3.22	3.19

NS : not significant

Table (4): Performance of Muscovy ducklings fed different levels of Choline during 7-80 days of age.

Items	Choline levels mg/kg diet (NS)	
	1300	2000
Initial body weights	129.52±1.79	129.25±1.81
Live body weight (g) at		
35 days of age	1659.66±27.13	1655.28±28.29
80 days of age	3513.73± 89.06	3464.70±90.57
Body weight gain from		
7-35 days	1529.77±25.81	1525.87±26.87
36-80 days	1854.71±36.42	1807.93±34.16
7-80 days	3383.33±87.68	3335.05±89.07
feed intake		
7-35 days	3043.65	3024.09
36-80 days	7872.02	7720.65
7- 80 days	10915.34	10744.65
feed conversion		
7-35 days	1.99	1.98
36-80 days	4.24	4.27
7- 80 days	3.23	3.22

NS : not significant

Table (5): Performance of Muscovy ducklings ($\overline{X} \pm SE$) fed different levels of Niacin and Choline, during 7-80 days of age.

Items	Niacin and Choline levels mg/kg diet					
	35 N+ 1300cho	70N+ 1300cho	105N+ 1300cho	35N+ 2000cho	70N+ 2000cho	105N+ 2000cho
Initial body weights	129.80 ± 2.78	131.60 ± 3.22	127.16 ± 3.34	130.96 ± 2.62	128.63 ± 3.04	128.70 ± 3.76
Live body weight						
35 days of age	1621.00 ± 42.33^{b}	1641.33 ± 45.92^{b}	1720.71 ± 52.53^{a}	1625.17 ± 46.92^{b}	1651.66 ±52.38^{ab}	1688.00 ± 48.36^{a}
80 days of age	3332.14 ± 151.99	3534.28 ± 132.65	3680.74 ± 175.14	3311.85 ± 131.66	3485.71 ± 177.74	3951.07 ± 157.23
Body weight gain						
7-35 days	1491.20 ± 40.44	1509.73 ± 43.61	1592.57 ± 49.58	1494.21 ± 45.19	1523.03 ± 49.68	1607.63 ± 60.29
36- 80 days	1711.14 ± 111.83	1892.95 ± 88.55	1960.03 ± 122.78	1686.68 ± 88.13	1834.05 ± 129.47	1903.07 ± 105.09
7-80 days	3201.68 ± 150.24	3401.71 ± 130.11	3552.63 ± 171.96	3181.41 ± 130.05	3357.14 ± 174.94	3536.03 ± 138.87
feed Intake						
7-35 days	2940	3009.17	3181.78	2979.31	2848.33	3244.64
36-80 days	7774.76	7860.10	7981.21	7193.42	8038.72	7929.82
7-80 days	10714.76	10868.27	11162.99	10172.43	10887.05	11174.47
feed conversion						
7-35 days	1.97	1.99	2.00	1.99	1.87	2.02
36-80	4.54	4.15	4.07	4.26	4.38	4.17
7-80	3.24	3.19	3.14	3.19	3.24	3.16

a and b.....Means bearing different letters within the same classification, differ significantly ($P<0.05$)

Table (6): Carcass traits of Muscovy ducks ($\overline{X} \pm SE$) fed the experimental used diets.

(A) Carcass traits as affected by dietary Niacin levels

Items	Niacin levels (mg) NS		
	35	70	105
Live body weight	3528.14	3452.50	3563.75
Carcass %	67.68±1.62	68.67±0.75	69.72±1.45
Giblets %	5.13±0.27	5.40±0.16	5.16±0.33
Abdominal fat %	1.22±0.23	1.55±0.37	1.32±0.66

(B) Carcass traits as affected by dietary Choline levels

Items	Choline levels (mg) NS	
	1300	2000
Live body weight	3477.93	3551.66
Carcass %	69.51±0.97	67.87±1.57
Giblets %	5.11±0.24	5.35±0.27
Abdominal fat %	1.28±0.62	1.44±0.22

Table (C): Carcass traits as affected by the interactions between Choline and Niacin levels.

Items	Niacin and Cholin levels (mg) NS			Niacin and Cholin levels (mg) NS		
	35 N+ 1300cho	70 N+ 1300cho	105 N+ 1300cho	35N+ 2000cho	70N+ 2000cho	105N+ 2000cho
Live body weight	3378.78	3447.50	3607.50	3677.50	3457.50	3520.00
Carcass %	69.47 ± 1.31	69.05 ± 0.59	70.00 ± 1.02	65.89 ± 1.92	68.29 ± 0.90	69.43 ± 1.88
Giblets %	5.18 ± 0.20	5.17 ± 0.17	4.97 ± 0.34	5.08 ± 0.34	5.62 ± 0.15	5.35 ± 0.32
Abdominal fat %	1.08 ± 0.32	1.47 ± 0.36	1.29 ± 1.18	1.35 ± 0.14	1.63 ± 0.38	1.35 ± 0.15

NS: not significant

تأثير مستوى النياسين والكولين على أداء كتاكيت البط المسكوفى النامى

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أجريت هذه الدراسة على ١٨٠ كتكوت بط مسكوفى عمر أسبوع وقسمت إلى ٦ مجاميع تجريبية غذيت الثلاثة الأولى على علائق مضاف لها ٣٥ ، ٧٠ ، ١٠٥ملجم نياسين / كجم علف +١٣٠٠ ملجم كولين فى حين غذيت الثلاث الأخرى على علائق بها ٣٥ ، ٧٠ ، ١٠٥ ملجم نياسين /كجم علف +٢٠٠٠ ملجم كولين وذلك خلال فترة البادى (٧- ٣٥ يوم) و(النامى ٣٦-٨٠ يوم) وكانت هذه العلائق متشابهه فى محتواها من البروتين الخام(٢٢٫٠٨ % الطاقة ٢٨٦٥ كيلو كالورى /كجم عليقة خلال فترة البادى و ١٩٫٩٦% بروتين خام و ٢٩٣٠ك كالورى /كجم علف خلال فترة الناهى وتشير النتائج إلى أن النياسين أو الكولين ليس لهما تأثير معنوى على وزن الجسم الحى والزيادة الوزنية.

كما انخفض متوسط الوزن الحى معنويا للبط الذى تغذى على عليقة مضاف لها ٣٥ ملجم نياسين/ كجم علف مع ١٣٠٠ أو ٢٠٠٠ ملجم كولين/ كجم علف مقارنة مع باقى المجاميع. كما تحسن استهلاك الغذاء وكفاءة تحويل الغذاء للبط الذى تغذى على علائق مضاف لها ١٠٥ ملجم نياسين مع ١٣٠٠ أو ٢٠٠٠ ملجم كولين/كجم علف مقارنة مع المجاميع الأخرى. ولم تلاحظ أى تأثير معنوى على صفات الذبيحة.