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PERFORMANCE AND SOME CARCASS TRAITS OF TURKEY FED DIETS CONTAINING DIFFERENT PROTEIN AND LYSINE LEVELS

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Abstract
The present study was designed to determine the effects of different dietary protein and lysine levels on the growth performance and some carcass traits of Bronze turkeys reared in intensive conditions. A total of 180 mixed sex one-day old Bronze turkeys were equally divided into four dietary treatments (three replications per treatment) from 0 to 16 week of age. The experimental diets were formulated to meet both crude protein and lysine levels of 100 (control), 110, 90 and 80 % of NRC (1994) recommendations. Diets were changed at 4-week intervals corresponding NRC (1994) nutrient recommendations and were fed from 0 to 4, 4 to 8, 8 to 12 and 12 to 16week of age. Other nutrients of experimental diets differing in both protein and lysine were some the levels in general. Although BW of male and mixed sex turkeys at the 16 week of age was not influenced by dietary treatments, turkey fed 80% NRC protein and lysine levels had BW significantly lower than that of turkeys receiving 100 and 110% of NRC recommended dietary treatments on cumulative feed consumption, feed conversion ratio, and dressing percentage of turkeys. Decreasing dietary crude protein and lysine levels to 80% of NRC recommendation resulted in percentage of edible internal organs lower (P<0,05) than that of turkeys fed diets containing 100 and 110% of NRC protein and lysine. This experiments demonstrates that dietary both protein and lysine can be decreased to approximately 90% of NRC recommendation in Bronze turkeys.
Key words: Bronze turkey, protein, lysine, performance, carcass.

Introduction

Primary objective of poultry nutrition programs centre around nutrient availability and to obtain highest level of performance. Use of dietary nutrients in excess of requirement result in loss capital due to the conversion of costlier product (feed ingredients) to a cheaper product (manure). Therefore, it is important to know the accurate nutrient requirement of commercial poultry and is also important to understand the effect of various levels of a nutrient in concern with other nutrients on bird's performance and profitability. The protein requirements of commercial turkey is relatively high is compared with some other poultry and protein and/or amino acids is one of the major cost components of the diet of turkeys. Also, dietary protein level and the balance of amino acid of dietary protein have major effects on performance as well as the cost of the finished product.

Turkeys of various strains grow at different rates, (Noble et al.1994; Lilburn and Emmerson, 1993; Barbour and Lilburn, 1996; Blair et al., 1989), and the growth rate and feed intake were determined by genetic and environmental factors. Strain of turkey has a large effect on the breast meat yield expressed as a percentage of carcass weight (Moran et al. 1984) and on the eviscerated carcass yield as percentage of live weight (Larsen et al., 1986). The deposition of fat in the turkey has also been reported to very with strain (Salmon et al., 1982).

Bronze turkey which is light strain and it's extensively reared in Turkey. Body weights of male and female Bronze turkeys at 16 wk of age were 5,0-5,5 and 4,0-4,5 kg, respectively, and feed consumption and feed conversion ratio for mixed sex turkeys were varied between 11,0 to 12,5 and 2,5 to 2,8 respectively (Konca et al., 1999; Sengül et al., 2000). Whereas, body weigh, feed consumption and feed conversion ratio of Large White strain at the same age were 12,6 and 8,99 kg; 30,81 and 23,06 kg; and 2,44 and 2,6 for male and female turkeys, respectively (NRC. 1994). Although these differences Bronze turkeys were fed contain as nutrients levels recommended by NRC (1994). However, these requirements may not be optimum for Bronze turkeys and also the response of various strains to nutrient restriction at the particular age may differ. Since protein is of the most costly ingredient in diets for turkey, savings can be made by using diets containing marginal levels of protein than has generally been recommended and such diets may support live performance equal to high protein diets depending on the extent to which protein is reduced. Just us Clarke et al.,(1993) reported that body weight at market age and carcass traits were not affected by feeding a diet with 90 % of the NRC (1984) recommended protein levels from 1 to 8. Diets with 80 % or less of NRC (1984) protein levels from 1 to 6 or 1 to 8 wk however, reduced leg abnormalities and reduced body weight of market age (Ferket and Sell, 1989; Clarke et al., 1993). Increasing the level of protein in diets of turkeys had no measurable effect in carcass yield and breast meat yield (Salmon et al., 1982; Summers et al., 1985; Sell et al., 1985). Commercial turkeys may or may not be able to exhibit complete compensatory growth, depending on the length and severity of the restriction protein

and amino acids levels (Ferket and Sell, 1989; Hesfer et al., 1990; Turner and Lilburn, 1992). There is insufficient information on the effect of dietary protein and amino acids restriction of different age on performance, carcass traits, and leg abnormalities of different strains of commercial turkeys. For this reason, an experiment was conducted to determine performance and some carcass trails of Bronze turkeys when dietary protein and lysine levels was altered at intervals of 4 wk until they were 16 wk of age.

Materials and methods

A total of mixed sex one day old Bronze turkeys poults were obtained from Keskin Agricultural Research Institute. Birds equally distributed to 12 floor pens (5,5 m^2) in a windowed conventional house. Each pen contained 15 poults and was equipped with one hanging tube feeder, an automatic water device and built up pine shavings. All poults were kept under the same environmental conditions. Incandescent lights for 24h/d was provided during for first week and then pullets were exposed to natural day light House temperature was maintained at 32° C for the first 7 d, 29° C for second week, 26 °C for third week and approximately 22°C thereafter. Experimental diets and top water were provided for ad-libitum consumption throughout the study. Prior to experimental diet formulation, all protein-containing feedstuffs batches were analysed in duplicate for their crude protein and dry matter according to AOAC (1984) and utilizing regression equations (Anonymous 1990), amino acids concentration was predicted. The experimental diets for the interval 4 wk of age were formulated to contain 100, 110, 90 and 80 % of NRC (1994) recommendation for both crude protein and lysine. Diets were fed form 0 to 4, 4 to 8, 8 to 12 and 12 to 16 wk of age. All the other nutrient contents of experimental diets same as NRC (1994) recommendations.

All poults were weighed individually and pen feed consumption was determined at 2 wk intervals to 16 wk of age, at which time the study terminated. Mortality was recorded daily and therefore used to correct feed consumption data. Feed conversion ratio (feed/gain) was calculated. At 16 weeks six pullets (3 male and 3 female) from each pen (18 pullets per treatment) nearest the mean pen weight were processed in the pilot plant using manual evisceration. Hot carcass weight including heart, liver, gizzard and lungs were recorded individually. Dressing percentage and edible internal organs percentage were calculated. Statistical analysis was carried out using the statistical software MINITAB. Data were subjected to ANOVA procedure appropriate for completely randomised designs. Duncan's Multiple Range Test was used to compare treatment means. For all measurements the statistical unit was the pen. All percentage data were transformed to arc sine prior to analysis. This procedure did not alter statistical interpretation; therefore, data are presented as natural numbers.

Results and discussion

The effect of dietary treatment on body weight (BW) of Bronze turkeys is presented Table 1. BW at 1 d of age was similar among all groups (between 50-52 g) prior to initiation of the experiment. The BW of Bronze turkeys were affected by dietary treatment at 4, 12 and 16 wk of age. BW of mixed sex and male turkeys fed the diet containing 80 % of NRC protein and lysine at 4 wk of age was significantly lower ($P< 0.01$) than that of turkeys fed the other three diets. Similarly, at 4 wk of age, BW of female turkeys receiving 80 % of NRC both protein and lysine was depressed and significantly lower in comparison to turkeys fed the diet containing 100 and 110 % of NRC protein and lysine. At 12 wk of age, all turkeys receiving 80 % both protein and lysine diets hot market BW lower than those fed the 110 % protein and lysine diet. Although, BW of mixed sex and male turkeys was not significantly influenced by dietary treatments at 16 wk of age, reduction in BW was still present in female turkeys receiving 80 and 90 % of protein and lysine diets at 16 wk and these groups had significantly reduced BW relative to those fed 110 % of protein and lysine diets, and BW of their were close to the control group. There were no significant differences in BW between turkeys fed diets with 100 and 110 % of recommended protein and lysine at any age.

Cumulative feed consumption (FC) and feed conversion ratio (FCR, feed/gain) at different age periods for mixed sex turkeys is shown in Table 2. Dietary protein and lysine levels did not affect FC at any age and FC of turkeys was close to each other. However, a significant improvement observed for 0 to 8 wk of age in regard to FCR and FCR of turkeys receiving 100 % of recommended levels of protein and lysine had significantly better ($P< 0.05$) FCR than did turkeys fed 80 % of NRC protein and lysine levels. The effects of dietary protein and lysine levels on carcass characteristics and percentage of edible internal organ are shown Figure 1 and 2, respectively. The dietary treatments did not affect the dressing percentage, however, turkeys fed 110 % of recommended levels of protein and lysine had the lowest dressing percentage. Decreasing the dietary protein and lysine levels resulted in improvement in percentage of edible internal organs and significantly greater with turkeys fed 80 % of recommended levels of protein and lysine than that of turkeys fed 100 and 110 % of NRC protein and lysine levels. In the experiment, the diets with 90 and 80% of NRC recommended protein and lysine levels were fed over the entire experiment (0-16 wk).

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Table 1. Effect of dietary crude protein and lysine on body weight of mixed sex, male and female of Bronze turkeys.

Weeks	Sex	100 % NRC	110 % NRC	90 % NRC	80 % NRC
4	Mixed sex	484.2±10.9^{A}	472.1±9.1^{A}	478.0±7.80^{A}	432.0±11.2^{B}
	Male	520.1±13.8^{A}	502.6±10.0^{A}	507.6±10.4^{A}	460.4±15.4^{B}
	Female	446.6±13.1^{a}	437.2±4.8^{a}	452.0±8.6^{ab}	402.2±14.0^{b}
8	Mixed sex	1518.9±35.5	1520.1±33.4	1450.6±36.5	1425.3±32.6
	Male	1694.1±34.1	1675.5±27.2	1640.9±39.0	1589.2±32.3
	Female	1335.7±31.8	1349.9±20.5	1284.1±32.3	1253.9±26.1
12	Mixed sex	3055.6±79.0^{ab}	3125.3±72.4^{a}	2917.7±82.8^{ab}	2836.7±74.3^{b}
	Male	3473.6±71.0^{a}	3516.5±52.8^{a}	3357.6±78.5^{ab}	3239.1±63.4^{b}
	Female	2618.6±58.7^{a}	2675.4±50.8^{a}	2516.0±71.9^{ab}	2416.0±52.7^{b}
16	Mixed sex	4584.2±131.0	4718.8±134.0	4353.7±134.0	4348.7±129.0
	Male	5324.6±115.0	5390.2±117.0	5118.2±113.0	5047.8±114.0
	Female	3810.2±61.7^{ab}	3906.1±57.7^{a}	3624.0±81.0^{b}	3617.8±86.4^{b}

$^{a, b}$: Values in rows with no common superscript differ significantly (P< 0.05).
$^{A, B}$: Values in rows with no common superscript differ significantly (P< 0.01).

Table 2. Effect of dietary crude protein and lysine on feed consumption and feed conversion ratio of mixed sex of Bronze turkeys.

Weeks	100 % NRC	110 % NRC	90 % NRC	80 % NRC
Feed Consumption				
0-4	856.2±2.5	894.8±4.2	888.1±10.6	854.9±23.0
0-8	3119.6±45.6	3162.2±49.2	3072.2±77.6	3058.8±124.0
0-12	6831.6±181	7044.9±55.2	6697.3±158	6636.7±192
0-16	12857±411	13175±122	12472±161	12452±401
Feed Conversion Ratio (Feed/BW gain)				
0-4	1.98±0.05	2.13±0.04	2.08±0.02	2.27±0.19
0-8	2.13±0.02^{b}	2.15±0.02^{ab}	2.19±0.01^{ab}	2.23±0.03^{a}
0-12	2.27±0.02	2.30±0.07	2.34±0.05	2.39±0.07
0-16	2.84±0.05	2.83±0.06	2.91±0.05	2.90±0.06

$^{A, B}$: Values in rows with no common superscript differ significantly (P< 0.05).

The results of the present experiment are in generally agreement with results of other researcher. Clark et al (1993) reported that BW at market age and carcass traits were not affected by feeding a diet with 90% of the NRC (1984) recommended protein levels from 1 to 8 wk. Diets with 80% or less of NRC (1984) recommended protein levels from 1 to 6 or 1 to 8 wk, however reduced BW at market age (Ferket and Sell, 1989, Clarke et al., 1993). In the experiment conducted by Noble et al (1996), two different turkey strains were fed diet containing 80, 100 or 120 of recommended level of protein from 1 to 8 wk of age. They reported that no difference in BW was evident at 17 wk in strain and dietary protein level generally did not influence overall fed to gain ratios, feed intake of male turkeys from these two strains. In the present experiment, the lack of differences in overall feed conversion ratio among dietary treatments is consistent with earlier studies utilizing Nicholas turkeys (Ferket and Sell. 1989; Hester et al., 1990; Clarke et al., 1993). Carcass characteristics are important factors to consider in the evaluation of alternative feeding programs. Ferket and Sell (1989) reported that early protein restriction may influence the proportionality of key tissues and organs depending on the severity of protein restriction. Hester et al. (1990) and Turner and Lilburn (1992) reported that commercial turkeys strains, which had different growth ability may or may not be able to exhibit complete compensatory growth, depending on the length and severity of protein and/or amino acids reduction. This experiment indicates that dietary both protein and lysine levels can be decreased to approximately 90% of NRC recommendations for male and mixed sex Bronze turkeys with no adverse effects on growth or feed conversion at market, which represents a potential savings depending on the price of protein sources.

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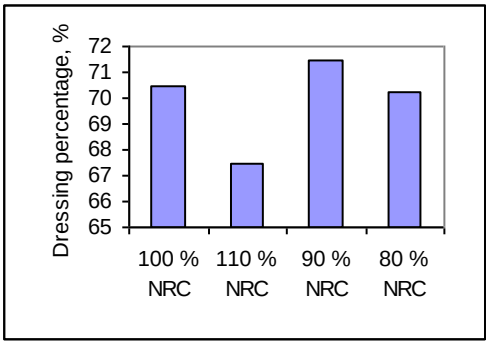


Figure 1: Effect of dietary treatments on dressing percentage

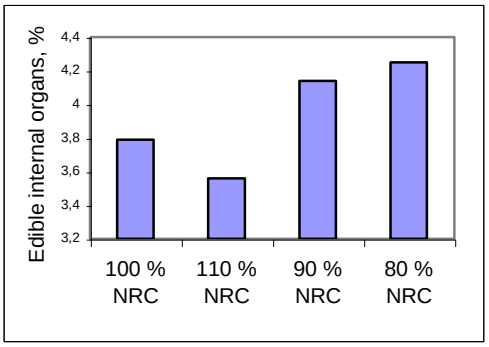


Figure 2: Effect of dietary treatments on edible internal organs.

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