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Research article

MALE AND FEMALE BROILER GROWTH PERFORMANCE, CARCASS TRAITS AND ECONOMIC INDICATORS AS INFLUENCED BY FEEDING PROGRAMS (REGIMES) OF DIETS

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ABSTRACT: The current study was to determine the effect of the Feeding programs (regimes) upon the growth performance and carcass traits of the males and females of broiler. Efficiency conversion of feed, protein, energy, lysine and methionine to live body weight (LBW) and to a hot carcass weight (HCW) for males and females of the broilers were recorded. LBWwere also recorded at 21, 28, 35 and 42 days of age according to the type of feeding Program. The performance efficiency factor (PEF), feed cost per one kg of body weight production (FC/BWP) and feed cost per one kg of carcasses eight production (FC/CWP) were calculated at 42 days age. Formulations of the diet were based on NRC standards. Experimental diets were formulated to have three levels of crude protein (23, 20 and 18%) for starter, grower and finisher diets respectively with one metabolizable energy (3200kcal/kg diet) in each starter, grower and finisher diets. The broiler chicks were fed with starter diet from one-day old to 28 days of age and with the finisher diet from 29 days of age to 42 days of age (First treatment: First program), while the second treatment (second feeding program) included receiving the broiler chicks starter diet from one-day of age to 21 days of age, the grower diet fed to broilers from 22 days of age to 35 days of age and the broilers were fed with the finisher diet from 36 days of age to 42 days of age (Market age).One day old (Ross-308) broiler chicks were randomly assigned to 14 experimental pens, 25 chicks in each pen and each feeding program (regimen) was included seven pens (replicates) randomly. The experimental broilers access ad libitum to feed and water. The birds maintained in environmentally controlled broiler house under litter floor. At 42 days of age, each pen birds were evaluated for growth performance data, which were included LBW, efficiency conversion ratio of feed, protein, energy, lysine and methionine to LBW and to hot carcass weight (HCW). Then ten broilers (5 males and 5 females) were randomly selected from each treatment for processing trait which ware included HCW. The results at 42 days of age showed that values of growth performance,carcass traits,PEF, FC/BWP and FC/CWP date for male and female broilers in the second treatment (Second program) were better than the first feeding Program (first treatment).

Key words: Feeding Regimen, Broiler, Diet, Growth performance, Carcass Traits

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INTRODUCTION

Feed is the major Component of input cost, accounting for up to 70% of the total production cost for Poultry production (Agah and Norollahi, 2008). It is therefore, imported to use high quality diet that will increase or improve the growth performance of the bird aimed to optimizing feed efficiency. Therefore, the starter Period no represents a much higher proportion of the growing cycle, emphasizing the importance of a good starter diet. It has a significant impact on the overall farm and processing performance (Epol Broiler Feeding Brochure, 2009 and Gajana et al, 2011).

Previous research has shown that the time of providing diets has a significant effect on the economics, growth and uniformity of broilers (Gehle et al, 1974, Brown and McCartney, 1982; Skinner et al, 1992; Saleh et al, 1996, 1997a, b; warren and Emmert, 2000; pope and Emmert, 2001; Vandegrift, 2002; Vandegrift et al, 2003). Broilers are commonly fed starter, grower and finisher diets formulated to meet relatively Stable nutrient requirement level for specific feeding programe (Skinner et al, 1992). It therefore implies that birds of a Particulare age are fed various nutrient levels with only a minimum consideration of economics, The NRC (1994) provides A single set of recommendations that includes males and females, with dietary amino acid requirements segregated into three fixed periods: starter (0 to 3 weeks of age), grower (3 to 5 weeks of age) and finisher (6-8 weeks of age or market age). However, the starter diet is most expensive diet in the broiler feeding program, hence, the focus of this study was on reducing starter feeding time at the same time increasing farm efficiency (Gaiana et al, 2011). The cost of feed generally declines as the protein content is reduced, therefore, the optimum time at which diets are changed is of economics importance (Saleh et al, 1996). The selection of the best feeding program is a good way to improvement the feed efficiency and to reduce the feed cost for optimal economic returns (Moosavi et al, 2011). The objective of this experiment was to determine the optimal feeding program for broiler chicks, which included two feed program. In the first program (First treatment) the broiler chicks were fed three percentages of crude protein (23,20 and 18%) with one level of metabolizeable energy (3200 kcal/kg feed)during three feeding periods (Starter: 0-28 days of age and finisher: 29-42 days of age) respectively, while in the second program (second treatment) the broiler chicks were fed with two percentage of crude protein (23 and 18%) with one level of metabolizable energy (3200 kcal/kg feed) during three feeding period (Starter: 0-21 days of age and Finisher: 29-42 days of age and Grower: 22-35days of age) respectively.

MATERIAL AND METHODS

The objective of this experiment was to determine the optimal proportions of time broilers should be fed starter (S), grower (G) and finisher (F) diets to optimize live hidey weight (LBW), efficiency conversion of feed (ECF), protein (ECP), energy (ECE), lysine (ECL), Methionine (ECM) to (LBW) and to hot carcass weight (HCW) and carcass traits. Performance efficiency factor (PEF),feed cost/one kg of body weight production (FC/BWP)and feed cost/one kg of carcasses weight production (FC/CWP) were calculated as follow:

$$\text{PEF}=\frac{\text{livability (\%)}\times\text{live weight in kg}}{\text{feed conversion ratio}\times\text{age in days}}\times 100$$

FC/BWP (%) = Feed conversion ratio (feed/body weight)× Price/kg of feed ($)

FC/CWP (%) = Feed conversion ratio (feed/body weight)× Price/kg of feed ($)

Composition of S, G and F diets formulated according to NRC (1994) standards are shown in Table 1. The LBW's were recorded weekly. . Feed intake (FI) was taken at the end of each week for each treatment by subtracting the amount of feed left from the known amount of feed supplied and dividing with the number of birds in each replicate (Pen) to obtain the average feed intake per bird. Efficiency conversion of the feed and nutrients to BWG or to HCW by dividing feed or nutrients by LBW or HCW respectively. The experiment was conducted with 1-d-old broiler chicks (Ross-308). The chicks were weighted and placed 25 chicks per pen in each of 14 floor pens (7 replicates per treatment) with new pine sharings a bedding material. Initial temperature was set at 35°C and was reduced by 2.8°C per week until 21.1°C was reached. The s, G and F diets were fed as mash diets according to proportions of time in Table 2. Feed and water were provided ad libitum. Light Was provided on a continues basis. Carcass processing data were determined from random Samples of 10 birds (5 males and 5 females) from each treatment. The sampled birds were tagged, individually weighed, slaughtered and processed. measurements were made for HCW, dressing percentage (DP) and fat pad percentage (FPP), percentage of liver, gizzard and heart (PL, PG and PH) respectively. The experiment was a completely randomized design.

STATISTICAL ANALYSIS

Statistical analysis Data of this experiment were analyzed using general linear procedures of SAS (2010). Significant differences between the means of groups were separated by Duncan Multiple Range test (1955).

Table-1: Feed ingredients and Chemical Composition of Starter, Grower andFinisherbroiler diets.

Feed Ingredients %	Diets		
	Starter	Grower	Finisher
Wheat ground	37.49	68.44	70.96
Yellow Corn	21.90	——	——
Soybean meal (44% protein)	25.00	19.00	18.96
Animal protein concentration (50% protein)	10.00	5.00	——
Vegetable oil	5.00	5.00	5.00
Salt	0.20	0.20	0.20
Limestone	——	1.11	1.94
Dicalcium phosphate	——	0.70	1.94
DL-Methionine	0.20	0.15	0.10
L-Lysine	0.01	0.20	0.10
Mineral and Vitamin premix	0.10	0.10	0.10
Enzymes premix	0.10	0.10	0.10
Total	100	100	100
Chemical Composition			
Crude protein %	23	20	18
M.E (Kcal/Kg diet)	3200	3200	3200
Lysine %	1.10	1.00	0.85
Methionine %	0.50	0.38	0.32
Calcium %	1.00	0.90	0.80
Available Phosphorus %	0.45	0.35	0.30
C.P Ratio	139.0	160.0	177.7

Table-2: The effect of feeding programs and sex upon the growth rate and growth improvement percentage.

Growth Rate	Treatments			
	First		Second	
	♂	♀	♂	♀
L.B.W (gms/bird) at 42 d age	b 2487.5±36.60	c 2264.6±26.18	a 2741.4±57.29	b 2477.5±43.59
B.W.G (gms/bird) 0-42d age	b 2447.07±36.63	c 2225.07±26.63	a 2700.28±57.17	b 2436.35±43.42
Growth Improvement Percentage %	**Males**		**Females**	
L.B.W T2 vs T1	10.20		9.40	
B.W.G T2 vs T1	10.35		9.50	

Means in a column with different superscripts are significantly different (p≤0.05).

RESULTS AND DISCUSSION

The results of present study (Table-3) showed significant (P≤0.05) higher in LBW and BWG for the birds in three phase feeding Program (Second treatment) than the birds in two phase feeding (first treatment). The percentage of the improved in LBW and BWG for males were (10.21% and 10.35%) and for the females were (9.40% and 9.50%) respectively. Overall means (Table-3) referred to significant (p≤0.05) difference in efficiency conversion ratio of feed, protein, energy, lysine and methionine to BWG (FCR, PCR, ECR, LCR and MCR) between phase feeding regimens (Programs), where better FCR, PCR, ECR, LCR and MCR were attained by males and females broilers in three-phase feeding regimen (Second treatment).

The percentage of the improvement of FCR, PCR, ECR, LCR and MCR in the birds of the second treatment were (6.40% and 5.59), (7.60% and 6.58%), (6.52% and 5.69%), (3.14% and 2.74 %) and (16.66% and 1.45%) for the male and female respectively. On other hand the feed, protein, energy, lysine and methionine conversion ratio to hot carcass (Table-5) were better for the second treatment birds, chicks maintained on three-phases feeding regimen and the enhancement percentage of the FCRC, PCRC, ECRC, LCRC and MCRC were (9.91%, 9.92%, 8.89%, 7.92% and 12.82%) and (4.83%, 5.88%, 9.75%, 3.45% and 8.69%) for males and females respectively by comparing that with the birds in the two-phase feeding program (first treatment).The focus of the study is on reducing starter feeding time from 28 days to 21 days and reducing the finisher time from 28 days to 7 days and the cost of feed generally declines as the protein content is reduced, therefore, the optimum time at which diets are changed is of economic importance (Roush, 1988; Saleh et al, 1996 and Roush et al, 2004).

Table-3: The effect of feeding programs and sex upon the efficiency conversion ratio of nutrients to B.W.G.

Efficiency Conversion Ratio of Nutrients to B.W.G	Treatments			
	First		Second	
	♂	♀	♂	♀
Feed (gms)/ B.W.G (gm)	bc 1.72±0.04	a 1.89±0.05	c 1.61±0.02	ab 1.79±0.04
Protein (gms)/ B.W.G (gm)	b 0.354±0.00	a 0.389±0.00	c 0.329±0.00	b 0.365±0.00
Energy (gms)/ B.W.G (gm)	bc 5.50±0.12	a 6.05±0.17	c 5.16±0.06	ab 5.73±0.12
Lysine (gms)/ B.W.G (gm)	b 0.016±0.00	a 0.018±0.00	b 0.015±0.00	b 0.016±0.00
Methionine (gms)/ B.W.G (gm)	b 0.007±0.00	a 0.007±0.00	c 0.006±0.00	b 0.0069±0.00

Means in a column with different superscripts are significantly different ($p \leq 0.05$).

Table-4: The effect of feeding programs and sex upon the efficiency conversion ratio of nutrients to Hot Carcass.

Efficiency Conversion Ratio of Nutrients to Hot Carcass	Treatments			
	First		Second	
	♂	♀	♂	♀
Feed (gms)/ Hot Carcass (gm)	ab 2.26±0.268	a 2.52±0.213	b 2.077±0.099	ab 2.406±0.109
Protein (gms)/ Hot Carcass (gm)	ab 0.465±0.017	a 0.518±0.044	b 0.423±0.020	ab 0.490±0.022
Energy (kcals)/ Hot Carcass (gm)	ab 7.24±0.083	a 8.07±0.684	b 6.65±0.099	ab 7.70±0.350
Lysine (gms)/ Hot Carcass (gm)	a 0.0218±0.00	a 0.024±0.00	a 0.020±0.00	a 0.023±0.00
Methionine (gms)/ Hot Carcass(gm)	ab 0.008±0.00	a 0.010±0.00	b 0.007±0.00	ab 0.009±0.00

Means in a column with different superscripts are significantly different ($p \leq 0.05$).

The starter period now represents a much higher proportion of the growing cycle (Gajana et al, 2011 and Mehmood et al, 2014). It has a significant impact on the overall farm and processing performance (Epol Broiler Feeding Brochure, 2008). Phase feeding is a good means of reducing feed costs during the grower and finisher phases (pope and Emmert, 2001) with out influencing performance (Gutierrez et al, 2008) The finding of studies (Sahate et al, 2012 and Mahmood et al, 2012)indicated that phase-feeding is directly correlated with feed intake, body weight and feed conversion ratio. Feed conversion also improved significantly as the time of feeding the finisher diet was reduced (Gajana et al, 2011).

Table-5: The effect of feeding programs (feeding regimes) upon the PEF, FC/BWP and FC/CWP for the male and female of broilers.

Economic Inicators	Treatments			
	First		Second	
	♂	♀	♂	♀
PEF	244.96	223.11	270	243.98
FC/BWP ($)	1.015	1.115	0.949	1.056
FC/CWP ($)	1.333	1.486	1.225	1.419
Economic Indicators Improvement (%) T_2 vs. T_1	**Males**		**Females**	
PEF (Higher)	10.22		9.35	
FC/BWP (Lower)	6.50		5.29	
FC/CWP(Lower)	8.10		4.51	

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