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Effect of Physical Feed Restriction in Finisher Period on Carcass Traits and Broiler Chickens Performance

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Abstract: This experiment was conduced to determine the effects of different physical feed restriction levels on performance and carcass quality during finisher periods from 36 to 45 day old. Hence Completely Randomized Design (CRD) that included different levels of physical feed restriction (in levels 10,20,30 or 40% less than *adlibitum* feed intake in control birds) and one control group (*ad libitum* feed intake) were used in 5 treatments with four replicate each containing five male broiler chicken (total 100 birds) of Arian strain in cage system. The results showed that feed intake in different levels is less than control birds ($p<0.01$). Live weight (at 45 day old), body weight gain, crude fat, crude protein, ash and dry matter percentage of carcass at all levels except 10 % level were lower than control birds ($p<0.01$) and abdominal fat percentage at whole levels had significant difference with control birds ($p<0.01$). Also thigh percent in 40 % levels and carcass weight in 20,30 and 40% were lower than control birds ($p<0.01$). The results of this study suggest that using of feed restriction in 10 % less than *ad libitum* feed intake has any adverse effect on broiler chickens performance and carcass traits.

Key words: Feed Restriction · Finisher Period · Broiler

INTRODUCTION

About 60-70 percent of the expenditures involved in poultry production is feeding costs [1]. As such, the most reasonable phase in reducing the cost of broiler chicken production would be find possible methods, which are cheap, adequate and readily available for feeding livestock. One such method is restricting the amount of daily feed offer for sometime [2]. The main reason for controlling feed intake in broilers is to prevent wastage of feed. Furthermore, a competition between man and poultry for energy (cereal grains)has created a problem of shortage of these feed ingredients. The wastage of these feed sources through feeding the birds in *ad libitum*. Also constant improvement in nutrition and genetic selection, has led to a fast growth rate in modern broiler strains. Over the last 20 years the time required to grow a broiler chicken to 2 kg has decreased (from 63 days to 37 days) nearly by half [3]. Unfortunately this growth rate is accompanied with increased body fat deposition, high mortality and high incidence of metabolic diseases and skeletal disorders [1]. These situations most commonly occur with broilers that consume feed ad libitum [4, 5]. Thus feed restriction has been proposed to reduce these problems. Also feed restriction resulted in compensatory growth and in turn lead to improvement of farm economy [6]. Therefore upon this topic Leeson *et al*. [7] reported that broiler fed with finisher diet diluted with sand and oat hulls in levels of 10,20,30,40 and 50% and use of these diets from 35 to 49 days, affected the percentage of abdominal fat, breast and carcass weight. Also other experiment result show that energy restriction in late 10 days of finisher period has led to reduce abdominal fat percent [8]. Research showed that use of feed restriction in finisher period has led to reduce abdominal fat percent and improvement feed conversion ratio in broiler chicken [9]. Alternatively, feed restriction could be applied at the end of the growing period. It is claimed that feed restriction at the end of the growing period is a better means of checking broiler growth performance [10]. This experiment was designed to compare the effects of different physical feed restriction levels at late 10 days of finisher period on broiler chicken performance and carcass characteristics.

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MATERIALS AND METHODS

A total of 100 Arian male broiler chicks were used for this study from 36 to 45 day olds. The chicks were placed on cage system and fed with conventional corn soybean meal diet in starter and grower phase. On day 35, after over night fasting, all birds were weighted individually and average for each treatment (cage) computed. Bird numbers per cage were fixed at 20 and mean cage body weight equalized. Each group comprised of 20 checks with 4 replicated of five birds. Diet treatments were applied at this time. The five finisher diets had 18 % CP and 3120 Kcal ME/Kg diet [11] (Table 1). The five experimental diets consists of (Control, *adlibitum* feed intake) and four restricted levels: 10, 20, 30 or 40 % were less than *ad libitum* feed in take. During the experiment weight gain, feed intake and feed conversion ratio were measured. Mortality was measured throughout the experiment. At the end of the experiment (45day old) average live weight was measured in all treatment and 2 bird from each replicate (8 birds of each treatment) with body weight close to the replicate average selected for carcass analyses. After feed withheld for 9h, the selected birds were transported to the university pilot for processing. Also one bird whole carcass of each treatments was selected and grinding for chemical compositions analysis such as dry matter, crude protein, ether extract and ash contents [12].

Table 1: Composition and calculated nutrients composition of finisher diets

Ingredient (%)	Finisher diet
Corn	50
Soybean meal	21
Fish meal	4
Soybean oil	3.50
Wheat	18
Oyster shell	1.30
MCP	1.20
Salt	0.25
Lys	0.075
Met	0.15
Vitamin-mineral mixture[1]	0.50
Nutrient composition	
Metabolizable energy	3120
Crude protein	18
Calcium (%)	0.92
Available phosphorus (%)	0.47
Methionine (%)	0.41
Lysine (%)	1.05

1Provided per kg of diet: vitamin A, 8,800 IU; vitamin D3, 3,300 IU; vitamin E, 40 IU; vitamin K3, 3.3 mg;thiamine, 4.0 mg; riboflavin, 8.0 mg; panthothenic acid, 15 mg; niacin, 50 mg; pyridoxine, 3.3 mg; choline, 600mg; folic acid, 1 mg; biotin, 220 µg; vitamin B12, 12 µg; ethoxyquin, 120 mg; manganese, 70 mg; zinc, 70 mg;iron, 60 mg; copper, 10 mg; iodine, 1.0 mg; and selenium, 0.3 mg

In this experiment was arranged as completely randomized designs with cage as the experimental unit. Data of this experiment were analysis of variance using General Linear Model (GLM) procedures SAS[13]. Difference among treatment were separated by Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

The effects of different feed restriction levels on the performance of broilers are given in Table (2).

Increasing of severity of feed restriction has led to reduce feed intake significantly ($p<0.01$). that the results agreements with others [7]. And conversely by Plavink and Hurwitz [14]. But feed conversion ratio had not influenced under different feed restriction levels ($p>0.05$). This agrees with the findings of Snetsinger [15] who reported that feed restrictions results in an improvement in feed conversion of broilers. Average weight gain in treatments of 20, 30 or 40 % less than control birds, was lower than control ($p<0.01$). but no observed significant difference between 30 and 40 % levels of physical feed restriction ($p>0.05$). using of 20, 30 and 40 % physical feed restriction has led to reduce final boy weight in 45 day old rather than control birds ($p<0.01$). The results is according with other [6], that reported Feed restriction can exert negative effects on the body weight at marketing age. The reason for this situations are increasing severity of feed restrictions and decreasing of nutrients for growth of chicks. That in agreements with finding of Leeson *et al*. [7], that suggested the old chicks con not be able compensatory growth. The effect of the experimental treatments on the carcass traits are shown in Table 3. Carcass weight in 20, 30 or 40 % of feed restrictions levels, thighs relative weight percentage just in 40 % of feed restrictions and abdominal fat pad percentage in all levels of feed restrictions had significant difference ($p<0.01$). The responses observed in present study partially agree with those reported by Benyi and Habi, [9]. But breast relative weight percentage had not under effect of different treatments ($p>0.05$).

The findings of current study is agree with Saleh *et al*. [16] that showed the percentage of breast yield was not affected by feed restriction. Also seem to when using of severity feed restrictions in 30 and 40 % levels in comparing with 10 and 20 % feed restrictions levels, tissues had high concentrations of proteins such as breast muscles in contrast with tissues by high levels of fat such as thighs was lower under effects of different feed restrictions [16]. In this experiments by increasing of

Table 2: Effects of different feed restriction levels on broiler chickens performance

Traits Treatments	Feed Intake (g)	Feed Conversion Ratio	Weight Gain (g)	Body Weight (45d) (g)
Control (*adlibtum*)	1350[a]	2.25	600[a]	2000[a]
10	1220[b]	2.21	551[a]	1950[ab]
20	1075[c]	2.08	515[b]	1920[b]
30	930[d]	2.02	460[c]	1860[c]
40	850[e]	2	428[c]	1820[c]
Treatments effect	**	ns	**	**
CV	1.46	6.22	3.86	1.96

CV: coefficient variation, Means within columns with no common superscripts differ significantly, **significant difference ($p<0.01$)

Table 3: The effect of the experimental treatments on the carcass traits

Traits Treatments	Carcass weight (g)[1]	Thighs (%)[2]	Breast Muscle (%)[2]	Abdominal fat pad (%)[2]
Control (*adlibtum*)	1480[a]	38.32[a]	30.25	2.86[a]
10	1400[ab]	31.36[ab]	29.80	2.11[bc]
20	1362[bc]	30.70[ab]	28.81	2.08[bc]
30	1314[cd]	30.92[ab]	28.28	1.49[cd]
40	1261[d]	29.96[b]	29.47	1.21[d]
Treatments effect	**	**	ns	**
CV	2.30	7.84	6.54	24.03

CV: coefficient variation, Means within columns with no common superscripts differ significantly, **significant difference ($p<0.01$)

1. Eviscerated carcass weight, 2. Relative to Carcass weight

Table 4: The effect of the experimental treatments on the carcass compositions(%)

Traits Treatments	Dry Matter	Ash	Ether Extract	Crude Protein
Control (*adlibtum*)	31.20[a]	9..63	44.16[a]	46.16[a]
10	30.33[ab]	8.53	42[ab]	49.43[ab]
20	29.53[bc]	8.33	39.83[ab]	51.83[b]
30	28.56[c]	8.40	39.33[bc]	52.20[b]
40	28.16[c]	8.36	38.83[c]	52.73[b]
treatments effect	**	ns	**	**
CV	2.55	9.80	4.01	3.8

CV: coefficient variation, Means within columns with no common superscripts differ significantly, **significant difference ($p<0.01$)

physical feed restrictions levels, the abdominal fat pad percent was significantly reduced, the probably reason for this, birds were not able to maintain constant intakes of energy for supply of energy requirement for maintenance and growth, therefore were forced to consume of carcass energy deposition such as abdominal fat. The results in according with other findings reported by Sahraei and Shariatmadari [6], Benyi and Habi [9] and Leeson *et al.* [7] that the feed restriction decrease the abdominal fat. But in disagreements with Saleh *et al*. [16]. The effects of different feed restriction levels on carcass compositions of broilers are shown in Table 4. With increasing of physical feed restrictions severity the carcass dry mater percent decrease in 20, 30 or 40 % levels of feed restrictions, carcass ether extract (fat percent) in 30 and 40 % levels of feed restrictions and increase of carcass crude protein percent increase in 20, 30 or 40 % levels of feed restrictions ($p<0.01$). but no significant difference observed in ash percent of carcass ($p>0.05$).

Increasing of carcass dry mater concentration has led to reduce moisture percent of carcass and because carcass fat percent had negative relationship with carcass moisture percent, therefore the reason of significant carcass fat percent reduction in 20, 30 or 40 % levels of feed restrictions is acceptable and logical for mind. The results of this study were against with findings of Scheileder and Baughman, [17]. But is agree with other investigators' results Leeson and Zubair, [18]. It seems that the reductions in carcass crude protein percentage in 20, 30 or 40 % levels of feed restrictions was due to of lipogenesis decreasing and increasing protein synthesis in treatments under feed restrictions [5].

CONCLUSION

The results obtained from current study showed that using of 10-20 % physical feed restriction less than ad libitum feed intake in finisher phase, did not any adverse

effects on performance and carcass traits, therefore has led to economical saving in cost of feeding in broiler chicken production, thus may be usefulness for commercial broiler chicks production farms.

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