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Protein and Energy Supplements on Broiler Chicken Growth With or Without Feed Additives

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ABSTRACT

Poultry development has a significant function in improving egg and chicken meat output. Poultry rearing provides income and employment to large number of people. The objective of this investigation is to determine the performance of broiler chicken when fed with diets containing different combinations of energy and protein. Total of 200 (day-old chicken) broiler chickens of a commercial strain randomly chosen for three distinct studies and fed with experimental meals. The birds rearing period was 6 weeks, the live body weight performance and health condition were measured by weekly. For each experiment Eighty (80) 1-day-old male broiler chickens of a commercial strain were selected in four groups with control including supplements diet treatments. Each treatment group of 20 birds was allocated. In the first and second weeks of feeding the body weight of broiler chicken was significantly increased by corn (starch rich supplements), however the body weight in week 4 and 5 was significantly increased by protein supplements particularly alfalfa. Also feed additives had significantly effect on growth performance where mortality rate was zero.

Keywords- Broiler, protein, energy, growth.

I. INTRODUCTION

Poultry development has a significant function in improving egg and chicken meat output. Poultry rearing provides income and employment to large number of people. The broiler farms can currently raise day-old chicks on their farms in the Khost province. According to agriculture directorate survey there are 120 total registered broiler farms in Khost province and their annually production is 1,673,640 chickens. This study carried out to determine the effect of feeding with various protein and energy supplement on the performance and carcass values of broiler chicken. The relationship between protein and energy requirements has been discussed by many researchers around the world. It is clear that protein requirements have little meaning unless energy requirements have been considered [11]. Many workers have decided to represent these dietary needs in terms of protein and energy ratios. The physiological and practical implications of the interaction between energy intake and protein metabolism and between protein intake and energy metabolism must then be considered when the dietary requirements for either nutrient are assessed [3, 8]. The effects of varying dietary energy and protein levels on broiler chicken in Afghanistan, however, are not well understood. This investigation's goal is to find out how broiler chickens react to diets that contain various ratios of protein, energy, and feed additives. Broilers need less nutrients as they get older owing to changes in growth and maintenance requirements [14]. In addition, poultry consume more feed as they grow heavier. Thus to balance and meet their nutrient requirements, the composition of diet has to change

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accordingly [2]. As a result, as broilers age, it is standard practice in the poultry industry to decrease dietary protein (amino acid) content and increase energy while maintaining the same levels of other nutrients throughout the feeding program [1]. The feeding of industrial broiler chickens is often criticized because of the extensive use of feed sources which are neither socially nor ecologically sustainable [1–4]. The diet of intensively-raised broilers consists mainly of maize, soy and wheat [5–7], ingredients that could also be used directly in the human diet [8,9,10]. Proposed alternative ingredients, less sought after in the human diet that could be used in the chickens' diet. Solving the problems for both the industrial and the rural chickens is especially interesting since chickens are a widespread food source around the globe. The United Nation's Food and Agriculture Organization (FAO) estimated that there were nearly 22 billion living chickens in 2012 [15]. This is the equivalent of more than three chickens each person. Moreover, in developing countries, chickens are often the main source of animal protein through their meat and eggs and most of these chickens stem from indigenous, slow growing, breeds [16,17]. According to current thought, birds eat to maintain a consistent energy intake, hence fixing energy levels in feed composition is not essential [5]. Several pieces of evidence point to the fact that birds fed high energy diets grow better while eating less than those fed low energy diets. The changes in reaction from various energy or protein levels are not taken into account by current linear programming methods [4]. Iterative linear programming techniques can be used to choose among alternative diets with various protein and energy levels. A quadratic programming model can choose the levels of protein and energy that maximize profits [13]. Diets for chickens normally consist of a cereal grain (most often maize, but also wheat, barley, sorghum, and others) and a protein source (most commonly soybean meal, although there are other various animal and plant protein sources) [15]. Animals that get just these simple elements will not survive. Feeds contain trace vitamin and mineral additives and, occasionally, macro minerals, like as calcium, that boost their nutritionsness [16]. A number of additional factors, such as feed presentation, microbial contamination, and the presence of nutritional additives, as well as factors like digestibility, palatability, and intestinal healthfulness, also affect a feed's nutritional quality [12]. A variety of feed additives are available to deal with these issues [6]. Due to their many benefits, including the encouragement of growth, the prevention of infectious illnesses, and the improvement of feed digestibility in poultry, feed additives are becoming more and more important [8]. In our experiments the mixture of additive (Antibiotics, Vitamins, Antioxidants, feed enzymes, probiotics and Acidifiers) were used respectively. The goal of this study is to identify the ideal protein and energy levels for broiler chickens' growth performance in the province of Khost as well as to enhance the quality and balance of imported broiler feed by supplementing locally produced feed on the market.

II. MATERIALS & METHODS

2.1 Animal Husbandry and experimental design

A total of 200 (n=200) commercial strain day-old male broiler chickens were chosen at random for three experiments and fed experimental diets. The chicks were offered the deep litter housing system, which gave each one square feet of space. The poultry house was entirely cleaned, washed with fresh water and disinfectant. Before housing the chick's, entire shed was coated with limestone and left to dry over 24 hours. The recommended temperature and humidity were maintained throughout the experimental period and recorded. The chicks were weighed on receipt, and then equally assigned to four dietary treatments, each diet replicated 6 times with 20 birds per replication in a completely randomized block design (CRD) (CRD). To prevent infection and disease, vaccinations were given to birds. After the first week, the brooding temperature was gradually lowered by 2°C each week, staying between 33 and 35°C. Throughout the duration of the experiment, electric tube lights in the rearing house provided 24-hour illumination. Each pen was equipped with three separate feeders and drinkers. The broiler was fed ad libitum, twice daily, and any feed that was refused was collected from feeders in each group, weighed, and the amount of feed that was eventually consumed was recorded each day. The live body weight performance and overall health of the birds were assessed weekly during their 6-week rearing period.

2.2 Protein, energy and feed additives supplements

In this experiment, three different protein supplements-alfalfa, soybean meal, and oil cake-were used as the control group (T1) and their effects on each individual participant were examined (table 1). Eighty (80) of day-old male broiler chickens of a commercial strain were selected in four groups. Experiment 2: this experiment was undertaken to assess the impact of three different energy supplements separately; control (T1) comprising three different protein supplements alfalfa, soybean meal, oil cake (T3) (Table 1). (Table 1). Eighty (80) of day-old male broiler chickens of a commercial strain were selected in four groups. In the third experiment was assess the influence of feed additives on broiler chicken development; control (T1) incorporating feed additives (T4) (table 1). A commercial strain of forty (40) male day-old broiler chickens was divided into two groups.

III. STATISTICAL ANALYSES

All collected data were statistically analyzed using JMP software (ver.5.1.2 SAS institute, Tokyo, Japan). One-way ANOVA was used to analyze the data

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with diet as a factor. Student t-test with a significant difference of.05. was used to assess the significance of differences between means.

Table1: Ingredients composition of experimental diets

Ingredient composition %	Treatments			
	T1	T2	T3	T4
Alfalfa	0.0	30.0	0.0	0.0
Soya Bean Meal	0.0	30.0	0.0	0.0
Oil cake	0.0	30.0	0.0	0.0
Corn	0.0	0.0	30.0	0.0
Barley	0.0	0.0	30.0	0.0
Wheat	0.0	0.0	30.0	0.0
Feed Additives	0.0	0.0	0.0	5.0
Corn	55.0	45.0	45.0	50.0
Soya Bean Meal	15.0	5.0	5.0	15.0
Canola Meal	10.0	5.0	5.0	10.0
Rice Polish	10.0	5.0	5.0	10.0
Corn Gluten Meal	3.0	3.0	3.0	3.0
Vegetable Oil	1.0	1.0	1.0	1.0
Lime Stone	1.0	1.0	1.0	1.0
Di calcium Phosphate	0.6	0.6	0.6	0.6
Salt	0.2	0.2	0.2	0.2
Sodium Bicarbonate	0.2	0.2	0.2	0.2
Premixes	4.0	4.0	4.0	4.0

T1; diet refer to control or basal diet, T2; three kind of protein supplements each of them used one time 30 % treatment, T3; three kind of energy supplements each of them used one time 30 %, T4; feed additives

Table 2: Composition of Mixed Feed Additive

Items	Action	Quantity %
Oxy tetracycline & penicillin	Antimicrobials	10
Vitamins	Co enzymes	10
Electrolytes	Growth promoter	25
Trace elements	Growth promoter	25
Organic acids	Acidifiers	25
Feed enzymes	Biological catalysts	5

Table 3: Time table of Vaccination

No	Vaccine	Age	Doss
1	IB+ND	6	
2	IBD-A	12	
3	IBD-B	18	
4	ND+IB	26	
5	ND Lasota	30-32	According to label

IV. RESULTS AND DISCUSSION

Experiment 1: In the protein-supplemented group, broiler feed consumption increased quickly as they aged, and there were significant differences in feed consumption between the weeks (table 4). In the first two weeks intake of control feed was greater than the protein supplement, yet in weeks 4 an5 alfalfa groups improved

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their feed consumption dramatically. Soybean and oil cake supplemented feed consumption were lower in the all periods of feeding (table 4). (table 4). Following the measurement of live body weight, there was no discernible difference between the control and protein treatments in the first week. However, in the following week, protein supplements had a negative impact on the live body weight of broiler chickens, whereas the control was noticeably higher. While alfalfa and control greatly raised the body weight in week four, alfalfa alone significantly enhanced the live body weight of broiler chicks in week five (figure 1). The body weight steadily decreased from week one to week five as a result of the negative effects of soybean meal and oil cake.

Growth performance in broiler chickens has been considered as the key criteria for estimating the feed nutritional needs since the broiler chick is an appropriate study instrument with a limited nutrient store, high nutrient demand and quick development rate (Ammerman, 1995). (Ammerman, 1995). In this research, total growth responses of the broilers were altered negatively by feeding supplemented (T2, T3, T4) food. The poor feed intake of the birds as seen in our study may be the cause of the broilers' decreased performance on a supplemented diet. Poor weight increase of the birds and the resulting decreased nutritional demand might possibly be a contributing factor in the inadequate feed consumption of broilers on a diet supplemented with (soybean and oil cake). While palatability test of the food was not done, but it can be hypothesized that the low palatability and poor nutrient (AAs) digestibility of the diet might be causes which can impact the feed intake and growth performance of the birds (Jackson et al., 1982; Mahmoudnia et al., 2011). (Jackson et al., 1982; Mahmoudnia et al., 2011). It is reported that the AAs imbalances in diets decreased the biological value and feed intake of the diets (Jackson et al., 1982). (Jackson et al., 1982). Besides, other factors such as organoleptic traits (e.gcolour, smell, odour, flavor, taste and texture) of diet might also affect the feed ingestion and feed regulation ofbroiler chickens (Cruze et al., 2005). (Cruze et al., 2005). The intake of alfalfa grew during the last three weeks, and at the same time, broiler body weight increased. This suggests that although chickens initially have trouble digesting alfalfa feed, they get more adept at it as they get older. The current study makes it clear that broilers fed a diet with added protein (soybean and oil cake) underperformed in terms of growth, most likely as a result of less feed being consumed.

Table 4: Feed consumption (g/b) of broiler as influenced by various protein supplements

Weeks	Control	Alfalfa	Soybean	Oil Cake
1	160 ± 7 a	152 ± 5 b	151 ± 3 b	152 ± 8 b
2	305 ± 11 a	298 ± 9 ab	288 ± 7 b	280 ± 5 b
4	942 ± 11 ab	965 ± 9 a	886 ± 16 b	846 ± 12 b
5	1345 ± 27 b	1435 ± 23 a	1274 ± 34 c	1266 ± 22 c
Total	2752 b	2850 a	2599 c	2544 c

Table 5: Feed consumption (g/b) of broiler as influenced by various energy and feed additives supplements

Weeks	Control	Corn	Barley	Wheat	Feed additives
1	161 ± 6 b	182± 4 a	172 ± 3 ab	168 ± 5 b	162 ± 5 b
2	337 ± 11 b	352 ± 7 a	305 ± 5 bc	314 ± 11 bc	338 ± 7 b
4	957 ± 17 a	913 ± 13 b	948 ± 12 a	904 ± 23 b	949 ± 8 a
5	1337 ± 23 b	1245 ± 23 c	1435 ± 16 a	1236 ± 21 c	1355 ± 11 b
Total	2792 a	2692 ab	2860 a	2622 ab	2803 a

a,b,c: Showed that was significantly differ between diets

Experiment 2: In the energy supplemented group; the feed consumption of broiler rapidly increased with development of their age and different between weeks for feed consumption was significant (table 5). (table 5). In the first two weeks consumption of corn supplemented feed was higher than control and other supplements, however in weeks 4 and 5 barley supplementation increased their feed consumption significantly. Wheat supplemented feed intake were reduced in the all times of feeding (table 5). In first week of feeding the energy supplements (corn, barley and wheat) had effect on broilers growth, where the live body weight was increased significantly. In week 2 only maize had considerable influence on growth performance of broiler chicken, but barley and wheat had negative effect on growth. In week 4, the body weight was higher with the control, while the growth performance was unaffected by the energy supplements. However in week 5; barley had significant effect of broiler chicken growth performances (figure 2).

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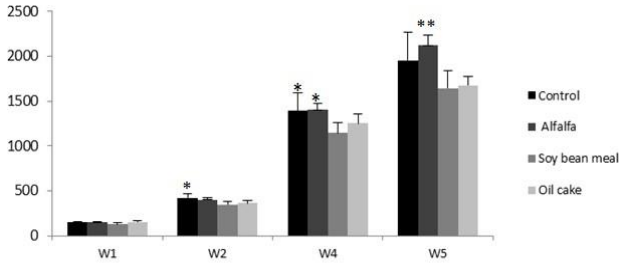
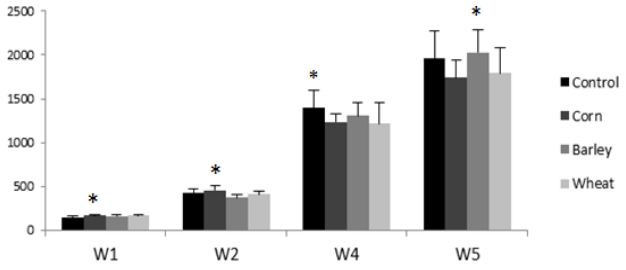


* P< 0.05, **P<001 subscribe different significantly between diets in each week (w).

Figure 1: Effects of protein supplements (live body weight-gr/week)

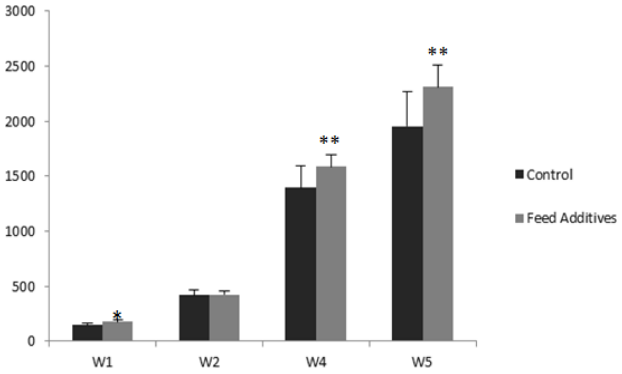
Supplementation of corn improved feed intake and body weight of broilers in the first two weeks. The response to the corn in starter is in agreement with the results of Cafe et al. (2002), who found a significant improvement in body weight of male broilers at different ages with a nutritionally adequate broiler diet based on maize, and Shakouri et al. (2008) reported a similar positive effect of supplemental corn on the performance of broiler chickens fed on a wheat-based diet. Also result shows that wheat and barley supplementation didn't effect positively on growth performance. Several studies have shown that wheat has NSP (non-starch polysaccharides) that are water soluble and viscous, which results in subpar performance when compared to non-viscous cereals like maize.



* P< 0.05, subscribe different significantly between diets in each week (w).

Figure 2: Effects of energy supplements (live body weight-gr/week)

Experiment 3: Feed supplementation consumption was comparable to control diet intake (table5). According to feed additives feeding, the live body weight of broiler chicken was significantly increased during weeks 1, 4 and 5. Only in week, 2 there was no significantly effect of feed additive supplementation (figure 3). The treatment of feed additives resulted in the greatest weight gain possible, as is obvious. Similar observations were made by Grafin (1982) who observed maximum weight gain in response to the addition of penicillin, Zinc Bacitracin, oxy tetracycline, vitamins and Electrolytes. In their study the body weight gain was more than the control when feed additives were used in the ration but the superiority of individual feed additive varied with feeding period. The mortality rate was increased with alfalfa feeding followed by soybean meal; the mortality rate was 15 % \swith control feed, barley and wheat, while the mortality rate was dropped with corn feeding and became nil with feed additives supplementation (figure 4). (Figure 4). The fatality rate was greater during the first two weeks of alfalfa consumption because the chickens had trouble swallowing the dried alfalfa particles, which were also likely contaminated with fungus.



* P< 0.05, **P<001 subscribe different significantly between diets in each week

Figure 3: Effects of Feed additives (live body weight-gr/week)

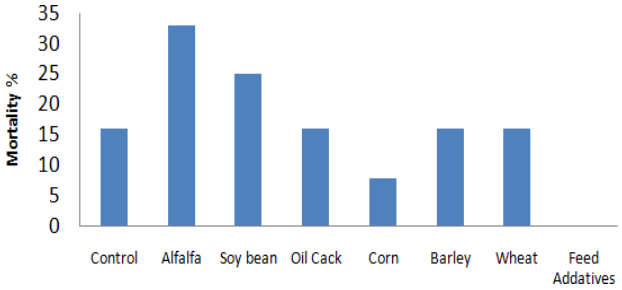


Figure 4: Mortality Rate (each flock)

V. CONCLUSION

Broiler chicken's body weight was significantly increased by starch-rich supplements like corn in the first and second weeks, but alfalfa, a protein supplement, significantly increased body weight in weeks four and five. Also feed additives had significantly effect on growth performance where mortality rate was zero. From this conclusion we suggest to the farm owners to use corn as a supplement in the first two weeks and alfalfa in the following weeks along with feed additives. By supplementing these materials we will improve live body weight and decrease the mortality rate of broiler chickens in Khost province.

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