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Effect of Different Protein Levels on Arabi Chicken Performance

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Abstract: It is important to note that feeding cost can reach up to 60-75% of the total farm production cost. This study investigated some feeding management practices needed by the Arabi chickens during the brooding phase. Three different feed rations were fed to Arabi chickens and the effect of these feed rations on the performance was evaluated. These feed rations contained three different levels of dietary protein: 18, 21 and 22%. Variables measured included body weight feed consumption and feed efficiency. Results showed that there was no significantly different protein levels indicating that using a diet with 18% protein level is as satisfactory as those with 21 and 22%. Therefore, a lower protein level can be possibly fed reducing the cost of feed. In conclusion, feeding a diet treatment with 18% protein is recommended for the Arabi chickens.

Key words: Arabi chickens, feed efficiency, brooding

INTRODUCTION

Rural small scale or family poultry production has been traditionally practiced in many developing countries for many generations as an important source of income and nutrition (Alders and Pym, 2009; FAO, 2003; Alemu, 1995; Anderson, 2011). Long ago, poultry fanciers in Kuwait started selection and breeding of several local chicken strains to obtain the Arabi chickens. That breed has been an important source for food protein and used as a show bird by local people. Productive performance of these birds was considered to be secondary as far as commercial purposes are concerned. It was concluded by Al-Nasser *et al.* (1998a) that there is no pure Kuwaiti chicken breed but a mixture of backyard chicken breeds were introduced to the country since more than 30 years ago. These non-commercial chicken breeds proved to be highly resistant to local adverse environmental conditions (Al-Haddad *et al.*, 2005). They are characterized by their small to medium size, various plumage color and different comb shapes (Al-Haddad *et al.*, 2005; Al-Khalaifa and Al-Nasser, 2006; Al-Nasser *et al.*, 1998a). The Arabi chickens are considered to be dual-purpose birds that can be used for both meat and egg production. They produce high quality eggs with different eggshell milky colors. However, their average egg production is only 150 eggs /hen/year (Al-Haddad *et al.*, 2005) As compared to commercial chicken production of 325 eggs /hen/year (Bell and Weaver, 2001; Al-Yousef, 2007; Baset *et al.*, 2000; Eriksson *et al.*, 2008).

Little is known about the performance of the local Arabi chickens and their management in the state of Kuwait considerably among local farmers who usually feed their birds commercial rations. In a study conducted at Kuwait Institute for Scientific Research (KISR), production

performance of Arabi chicken groups in Kuwait was evaluated. Production performance of the different groups of chickens was studied. The results indicated that the Arabi chickens have different feather colors with the yellow chicken having the highest egg production and most adapted strain of Arabi chickens to local environment (Al-Haddad *et al.*, 2005).

Formulating feed rations for the local breeds is a debating issue as these chickens are usually capable of grazing pasture to obtain their need. The nature of the vegetation in a pasture would considerably affect the quality of the land and consequently the performance of chickens (Gordon *et al.*, 2003). It is reported that chickens feed on a wide range of small invertebrates living in the upper layer of soil such as beetles, spiders and earthworms. As a result, the protein content of that animal source will add to the protein of formulated feed rations (Clark and Gage, 1996). Bassler *et al.* (1999) reported that the earthworm contain per kg 610 g protein and 42 g lysine that can be utilized by pasture chickens. However, it is recommended that supplementary feed complement the feed scavenged by the birds. Addition of vitamins and minerals is essential to optimize the performance of the range chickens (Dessie and Ogle, 1996). It was reported by Rashid *et al.* (2004) that during the brooding period, 22% crude protein feed supplementation would improve growth rate and feed conversion much more than supplementation of 18% and 20% protein diet. In the same study, authors showed that feed supplementation with 19% crude protein during the growing period improved feed conversion of the bird compared to supplementation with 15% protein. Also, Schmidt (2000) showed that the domestic chicken in rural Bangladesh under uncomplimentary traditional management might have

survival rate four to six times more than that of birds under traditional management. The objective of the current study is to investigate the effect of three different feed rations on the performance of starter Arabi chickens raised in Kuwait.

MATERIALS AND METHODS

The effect of different protein levels on bird performance was studied. A total of 171 one-day old Arabi chicks, vaccinated against Infectious Bronchitis (IB) were randomly housed in 9 brooding pens containing 19 chicks per pen (120x60 cm) with 0.04 m² for each bird until they are 3 weeks of age. One feeder and one waterer were used in each brooding pen. There was a continuous supply of drinking water and feed. Step-down lighting and temperature programs were applied and the relative humidity was kept in the range of 60-70 % throughout the experiment period. Three dietary protein treatments 21 (control), 18 and 22% were used with 3

replicates per treatment. The rations were formulated using Least Cost Formulation Program. Diet composition of the different feed rations is shown in Table 1. Body weight gain and feed efficiency were calculated on weekly basis. Temperature, relative humidity and mortality were monitored and recorded on a daily basis. Data collected was analyzed using one-way analysis of variance (ANOVA) where protein level was the main factor and means were separated using Duncan's multiple range test (SAS Institute, 1996). The level of energy was identical among the different dietary treatments.

RESULTS AND DISCUSSION

The current study was conducted to improve the performance efficiency of the Arabi chickens in Kuwait by investigating the effect of three different levels of crude protein on performance of that bird during the growth. The rations contained different levels of dietary protein: 18, 21 and 22%. No mortality among the birds was recorded and no signs of diseases were observed during the experimental period. The effect of feeding Arabi chickens 18, 21 and 22% dietary protein on body weight, feed consumption and feed efficiency is shown in Tables 2, 3 and 4, respectively. The results showed that there was no significant difference in the effect of protein level on performance. In other words, using a diet containing 18% protein did not adversely affect the performance of the Arabi chickens during the brooding period.

For many years, the trend of raising poultry in the world has been using an intensive management system, using commercial chicken which has been also the

Table 1: Diet composition of the different feed rations during the brooding period

Ingredients (%)	Protein %		
	21	18	22
Corn	58.36	65.460	55.860
Soybean	31.700	25.000	34.200
Salt	0.380	0.380	0.380
Limestone	1.900	1.900	1.900
Di Cal	1.500	1.500	1.500
DL Methionine	0.060	0.060	0.060
layer premix	0.500	0.500	0.500
Wheat Bran	5.000	5.000	5.000
Soybean Oil	0.600	0.200	0.600
Total	100.00	100.00	100.00

Table 2: Effect of Dietary Treatments on the Body Weight (g/b) at Different Ages of Arabi Chickens

Age	Dietary Treatment		
	18%	21%	22%
At Hatch	30.9 ^a ±0.346	30.9 ^a ±0.346	30.733 ^a ±0.635
1 st week	61.23 ^a ±3.0836	60.7 ^a ±2.233	61.933 ^a ±0.5773
2 nd week	107.533 ^b ±6.211	110.8 ^b ± 4.979	105.66 ^b ±16.810
3 rd Week	151.227 ^b ±12.469	163.33 ^b ±4.47	158.77 ^b ±0.804
Overall Mean	87.72 ^a ±48.125	91.43 ^a ±52.708	89.276 ^a ±50.800

Values are means±Standard Deviation (SD)

Means with the same letter superscript are not significantly different (p = 0.05)

Table 3: Effect of Dietary Treatments on Feed Consumption (g/bird/period) of Arabian Chickens

Age	Dietary treatment		
	18%	21%	22%
At Hatch	-----	-----	-----
1 st week	119.00 ^a ±1.000	116.0 ^a ±1.00	118.00 ^a ± 2.000
2 nd week	344.033 ^b ± 5.272	339.33 ^b ± 5.507	340.00 ^b ±10.00
3 rd Week	436.633 ^b ±18.359	419.67 ^b ±23.352	422.33 ^b ±17.04
Overall Mean	299.89 ^a ±141.790	291.67 ^a ±136.792	293.44 ^a ±136.68

Values are means±Standard Deviation (SD)

Means with the same letter superscript are not significantly different (p = 0.05)

Table 4. Effect of Dietary Treatments on Feed Efficiency of Arabi Chickens

Age	Dietary treatment		
	18%	21%	22%
At Hatch	-----	-----	-----
1 st week	2.433 ^a ±0.0577	2.433 ^a ±0.0115	0.230 ^a ±0.0577
2 nd week	2.767 ^a ±0.0577	2.733 ^a ±0.1965	0.343 ^a ±0.0577
3 rd Week	2.333 ^a ±0.0577	0.2316 ^a ±0.1246	2.567 ^a ±0.1145
Overall Mean	2.511 ^a ±0.203	2.577 ^a ±0.148	2.377 ^a ±0.243

Values are means±Standard Deviation (SD)

Means with the same letter superscript are not significantly different (p = 0.05)

case in Kuwait. This is true for both poultry meat and table egg production (Al-Nasser *et al.*, 1998b,c). production of poultry meat and eggs is considered as critical need because these products are major food items all over the world, including Kuwait. Per capita consumption of broiler poultry meat in Kuwait reached 75 Kg per person in 2010 (USDA, 2010); due to increase the consumer's health awareness and the shift from red meat consumption to poultry meat consumption. The poultry industry in Kuwait succeeded in covering only 35-38% of poultry meat consumption and 55% of table eggs (Ministry of Planning, 2004). Therefore, improving the performance of the Arabi chicken in Kuwait would fulfill the need of supporting food security by providing the people with good sources of high quality meat and eggs. Also, it provides scientists with valuable information that will help in further research in this valuable field. Also, there is a recent shift in the trend of raising poultry towards using more natural conditions such as the open door environment. The local chickens are the more suitable than the commercial ones because they are tolerant to the harsh environmental condition and resistant to diseases (Fayeye *et al.*, 2006; Abdelqader *et al.*, 2008a; Mungube *et al.*, 2008).

In addition to food security, improving performance of Arabi chickens in Kuwait would help in conserving and enhancing biological diversity of poultry species in the country on the genetics and species level. Genetic diversity in local chickens will be preserved, this will add to the genetics pool of poultry species worldwide (Abdelqader *et al.*, 2008b; Wimmers *et al.*, 2000; Soller *et al.*, 2006; Kaya and Yildiz, 2008). Accordingly, more focus should be given to the Arabi chickens in respect to their conservation and improvement.

Conclusion: Since feeding cost reaches 70% of the total farm operation expenses and in order to reduce cost of raising Arabi chickens, a protein level of 18% is recommended.

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