Evaluation of the dietary protein to energy ratio on meat production performance and carcass characteristics of Iranian Indigenous Chickens

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Abstract:

Today's demand for native hen rearing and their products is growing. So a trial was conducted to determine the effect of different dietary protein to energy ratio on growth performance and carcass characteristics of Iranian native chickens from 1 to 63 d of age. Five experimental diets were formulated to have 5 ratio of ME to CP, respectively in each phase. A total of 500 one-day-old native chickens in a completely randomized design were randomly divided into 25 experimental pens, at random. The results showed that average daily gain and body weight (BW) have affected by ME/CP ratio during starter, grower, finisher, and overall experimental periods (P < 0.05). Feed intake (FI) was affected just in starter period and feed conversion ratio (FCR) was affected in starter and grower periods, whereas both of them (FI & FCR) were not affected by the treatments in overall experimental periods. Protein conversion ratio increased significantly (P < 0.001) with high-CP diet (0.53 for diet E vs. 0.43 for diet A), whereas energy conversion ratio (ECR) was not affected by treatments in overall experimental periods. However, carcass traits were not affected by the treatments. In conclusion, dietary ME/CP ratio of 119, 170 and 177 are recommended for starter, grower and finisher periods, respectively for Iranian native chickens.

Keywords: Indigenous Chicken, energy: protein ratio, growth performance, nutrient utilization,

Introduction:

The population of native hens in Iran has increased over the past decade. According to different reports (Makarechian *et al*., 1983), indigenous chicken populations are able to take valuable position in the future animal breeding programs in the world. Local chickens are an important source of high quality protein (meat and eggs) and they also provide small cash income (Tadelle *et al*., 2000), hence they provide food security and alleviate poverty. In addition indigenous chickens always play an important role in supplying fresh animal protein sources of food in developing countries and especially in rural areas. Most of the time, indigenous chickens are used as dual purpose chickens. In terms of adult body weight indigenous chickens divided into three weight groups such as: light (dwarf), medium (normal), heavy in which full-grown weight mean in this group has been reported 800, 1400 and 2000 g, respectively (Tadelle *et al*., 1999; Ansari *et al*., 1997). Makarechian *et al*. (1983) evaluated productive characteristics and genetic potential of indigenous chickens of Fars in Iran for meat production. Reported that location had significant effect on the average body weight at 25 days of age (P <0.01). Sex did not have a significant effect on the average weight of chicks at 25 days of age. Location and sex had significant effect on the average weight of the chicken at 105 days of age and their gain from 25 to 105 days of age (P <0.01), but their interaction was not significant. Since little research has been done on characterization of indigenous chickens under improved management conditions therefore, this study was undertaken to compare growth, feed utilization, carcass and meat quality traits in Iranian native chickens in order to meat production .

Materials & Methods:

Five experimental diets were formulated to have 5 ratio of ME to CP, respectively in each phase: 159(diet A), 149 (diet B), 139(diet C, as a control diet agree with NRC), 129(diet D), and 119(diet E) in starter phase (1 to 21 d); 180,170,160,150, and 140 in grower phase (22 to 42 d) and 197,187,177,167, and 157 in the finisher phase (43 to 63 d). A total of 500 one-day-old native chickens in a completely randomized design were randomly divided into 25 experimental pens, 20 chickens in each pen, and each diet was offered to 5 replicates at random**.** Feed and water were provided *ad libitum*. Data were collected from day one by weighing each group (pen) and body weights, feed intake and feed efficiency determined weekly until 9 weeks of age. At the end of experiment one male and one female from each replicate were randomly selected and sacrificed. The carcasses were eviscerated, dissected and the carcass parts weighed the same day of slaughter. Weights for carcass (dressed weight), intestines, breast, drumsticks, wings, thighs, back, liver, gizzard, heart, neck and were recorded. Statistical analyses of the influence of different diets were performed using the proc General Linear Model Procedure of SAS 9.1 (SAS, 2003

Results & Discussion:

The average daily gain and body weight (BW) have affected by ME/CP ratio during starter, grower, finisher, and overall experimental periods (P < 0.05).The highest (1026 g) and the less (943 g) BW at 63 d age was belonged to diet E with the lowest ME/CP ratio and diet B with 10 unit ME/CP ratio more than control diet, respectively. The results on growth traits are consistent with Nguyen and Banchasak (2005), who found that the live weight of Betong chicken increased with high protein diet.

Feed intake (FI) was affected just in starter period and feed conversion ratio (FCR) was affected in starter and grower periods, whereas both of them (FI & FCR) were not affected by the treatments in overall experimental periods. The present results for FCR were lower than Khosravinia, (1999) and higher than Ahmadian (2001) reports.

Protein conversion ratio increased significantly (P < 0.001) with high-CP diet (0.53 for diet E vs. 0.43 for diet A), whereas energy conversion ratio (ECR) was not affected by treatments in overall experimental periods, but for starter period ECR decreased by dietary CP increasing (5.99 vs. 5.50, P < 0.05).

The results on protein efficiency concur with Nguyen and Banchasak (2005), who reported that protein in diet with 17 percent protein is more efficient than 23 percent protein(0.48 vs. 0.58). However, carcass yield, breast meat yield, thigh yield, abdominal fat, and alimentary tract weights were not affected by the treatments

Table 1: The effects of experimental diets on body weight and weight gain

Diet	Body Weight (g)			Weight Gain(g/bird/day)			
	WK 3	WK6	WK9	0-21	22-42	43-63	0-63
A	216.01^{bc}	610.45	972.33^{bc}	8.48 ^{bc}	18.65^{ab}	17.97^{ab}	15.43^{ab}
B	205.44 ^{c}	612.41	943.65^{c}	7.97^{c}	19.38^{a}	17.97^{ab}	14.97^{b}
C(Control)	229.64^{ab}	606	997.97^{ab}	9.13^{ab}	17.92^{b}	22.08^{a}	15.84^{ab}
D	230.52^{ab}	609.2	977.42^{bc}	9.17^{ab}	18.03^{ab}	15.66^{b}	15.50^{ab}
E	245^{a}	637.06	1026.86^{a}	9.89^{a}	18.69^{ab}	16.98^{b}	16.29^{a}
Average	225.32	615.02	983.65	8.92	18.53	18.13	15.20
SEM	3.86	5.18	8.35	0.8	0.2	0.72	0.22
P <	0.004	0.33	0.01	0.004	0.148	0.049	0.044

Table 2:The effects of experimental diets on feed, protein and energy conversion ratio.

Diet	Feed Conversion Ratio				Protein Conversion Ratio	Energy Conversion Ratio
	0-21	22-42	43-63	0-63	0 -63	0-63
A	2.16^{ab}	2.49^{ab}	3.35	2.85	0.43^{b}	7.84
B	2.26^{a}	2.34^{b}	3.55	2.87	0.45^{b}	7.83
C(Control)	2.09^{ab}	2.54^{a}	3.16	2.78	0.47^{a}	7.75
D	2.01^{bc}	2.56^{a}	3.23	3.04	0.52^{a}	7.73
E	1.88^{c}	2.53^{ab}	3.08	2.74	0.53^{a}	7.60
Average	2.08	2.49	3.27	2.91	0.48	7.63
SEM	0.04	0.03	0.09	0.06	0.01	0.16
P <	0.003	0.119	0.493	0.603	0.0003	0.79

Table 3:The effect of experimental diets and sex on carcass traits at 63 days of age

Diet	Body Weight(g)	Carcass Weight (g)	Carcass Weight (%)	Thigh (%)	Breast (%)	Alimentary Tract (%)	Abdominal Fat (%)
A	1709	687	63.68	30.13	20.34	15.52	2.09
B	959	612	63.71	29.03	19.88	16.57	2.03
C (Control)	1025	661	64.49	29.42	20.02	14.86	1.58
D	992	637	64.09	29.18	19.74	14.75	1.12
E	1075	692	64.04	29.82	20.29	15.97	0.98
SEM	40.68	30.23	0.74	0.50	0.50	0.65	0.39
Male	1174^{a}	752^{a}	63.97	30.10	20.42	15.30	1.48
Female	878^{b}	563^{b}	64.03	28.93	19.69	15.79	1.64
Average	1026	658	64.00	29.51	20.05	15.28	1.56
Treatment	(P value)						
Sex	0.0001	0.0001	0.92	0.01	0.11	0.39	0.64
Diet	0.18	0.31	0.94	0.51	0.89	0.25	0.17
Sex * Diet	0.12	0.14	0.42	0.28	0.14	0.65	0.17

Conclusion:

Dietary ME/CP ratio of 139, 160 and 167 are recommended for starter, grower and finisher periods, respectively for Iranian indigenous chickens**.**