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The Effect of Dried Rumen Content on Growth Performance and Carcass Traits of Japanese Quails

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Abstract: In this study because feed costs make up a significant portion among the whole cost of animal production, availability of the dried rumen contents which is not used in animal fed, so far was investigated to reduce feed cost of quail for fattening. The aim of this study is to figure out utility of dried rumen content found easily and/or free of charge in quail diet. A total of 250 days old Japanese quail was used. Quails were divided into 5 groups and the rumen contents were added to the ration in 2nd week. The dried rumen contents were supplemented with 0, 5, 10 and 20% for 1st (control) 2nd-4th groups, respectively. The rumen contents were added gradually from weeks 3 to diet of 5th group as 5% in 3 week, 10% in 4 weeks, 20% in 5 and 6 weeks. At the end of the 6th week feeding period, live weights of group 1 (control) 2-5 were 167.4, 174.3, 170.5, 148.3 and 153.4 g; feed consumption 978.4, 901.6, 902.7, 948.9 ve 975.4 g; feed conversion ratio 5.8, 5.1, 5.1, 6.3 and 6.4, respectively. The addition of dried rumen contents to ration live weight, feed intake, feed converse ratio and carcass traits significantly affected ($p<0.01$, 0.05). It is observed that supplementing with 5 and 10% dried rumen contents had a positive impact on growth performance of quails.

Key words: Quail, rumen contents, growth performance, carcass traits, feed cost

INTRODUCTION

As in other animal species, feed costs make up a significant part of the costs. So it is necessary to know how much and how to feed birds in terms of balanced nutrition. The ratio of imported raw material is around 85% in poultry feds in Turkey. The transfer of modern nutrition techniques is made in the same speed as in the poultry production in which there is a rapid change and development of modern raising techniques (Abudabos, 2012). The application of these techniques changes depending on the structure of countries or region's climate and soil. For this reason the farmers of different countries or regions use appropriate feed and feed additives what they have (Konca *et al*., 2009). Recently, due to the high level of foreign exchange, like other countries, Turkey has paid to much money via importing, the studies on discovering feed sources cheaper and not used in the nutrition of human being have gradually increased.

Recently, the additives described as probiotic have gained importance in animal nutrition. One of these additives is stabilized rumen content (Adeniji, 2008). Stable rumen content described as probiotic is a natural production that does not contain a synthetic material both as antibiotic and as growth factor. As the rumen content found easily and/or free of cost, it should be utilized. Rumen content could be harvested from slaughtered cattle or other ruminants. The material is degraded but undigested nutrients because the major digestions occurs inferior digestive organ. These degraded but undigested nutrients are thought to be a good feed source for poultry. But, it is difficult to transport and storage of rumen due to high level of water contents. Crude protein level of rumen content varies between 10-20% depending upon pasture and daily ration consumed by ruminant. There is not only ruminal protein but also there is dense vitamin, mineral and carbohydrate and small amounts of fat in rumen content. In an experiment, the nutrient composition of dried rumen content is determined, as such: 94.97% dry matter, 86.49% organic matter, 6.74% crude protein, 0.64% crude fiber and 1.88% crude oil. Kamphues and Ebers stated that there are 8-20% dry matter, 30-36% crude fiber, 14% crude protein and 2% crude fat in the fresh rumen content.

Stabilized rumen extract has recently drawn attention among alternative feed additives as an agent of development accelerator in the probiotic characteristic and the effects of fattening rations. Stabilized rumen extract has begun to be studied densely. Using the rate of 2 and 4% of rumen content of cattle and pigs did not affect growth rate adversely but decreased feed intake and improve FCR (Chrappa *et al*., 1988). Tuncer reported that adding about 0.2% stabilized rumen extract to chicken diet effects both live weight and FCR positively. Erener studied the effect of stabilized rumen extract that adding

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different doses of it on quail diet did not affect growth performance. The aim of this study is to figure out utility of dried rumen content found easily and/or free of charge in quail diet.

MATERIALS AND METHODS

In this study, 250 days old Japanese quail were used as animal material. The birds were randomly distributed to 5 groups (1 control and 4 treatments) with 3 replicates, 50 birds in each group. In the first 7 days, the quails were fed with standard commercial quail raising feed containing 23% crude protein and 3100 kcal kg^{-1} ME (Table 1). In the 2-6 week, the feeds given to the quails according to meet needs of protein, energy and other nutrients. Rumen content is added to the feed at the beginning of 2nd week of the trail and the quails were fed for 5 weeks. The nutrient composition of rumen contents used in this study is given in Table 2.

Rumen contents are mixed to the feed at the beginning of 2nd week of 2nd-4th groups in proportion of 5, 10 and 20%. In the 5th group, the rumen content added to diet as gradually; 2nd week commercial quail feed and 5, 10 and 20% for 3rd-5th week to slaughtering, respectively. The study lasted 42 days. Compositions of grower feeds are provided in Table 3.

Table 1: Composition of quail feeds used in experiments (%)

Ingredients	Starter feed	Grower feed
Corn	48.0	56.0
Wheat	6.0	6.0
Soybean meal	33.0	24.5
Vegetative oil	4.0	4.5
Fish meal	4.0	4.0
Meat-bone meal	2.5	2.5
DCP	0.5	0.5
Limestone	1.0	1.0
Methionine	0.2	0.2
Lysine	0.1	0.1
Salt	0.4	0.4
Vit+Min premix	0.3	0.3
Calculated values		
Crude protein %	23.0	20.0
Metabolic energy (kcal kg^{-1})	3100.0	3250.0

Table 2: Nutrient content of dried rumen content

Raw nutritious matters	Amount (%)
Dry matter	91.5
Organic matter	83.4
Crude ash	8.1
Crude protein	12.1
Crude oil	0.9
Crude fiber	23.3
Nitrogen free extract substances	48.4
ME (kcal kg^{-1})	1980.0

Table 3: The composition of rations used in the study

Groups	Feed formula	Crude protein (%)	ME (kcal kg^{-1})
Control	Quail grower feed	23.00	3100
5%	95% ration+5% RC	21.05	3000
10%	90% ration+10% RC	21.50	2986
20%	80% ration+20% RC	20.91	2992

RC = Rumen Content

The rumen content given to the birds is obtained from slaughtered cattle rumen. These contents are dried was dried on concrete floor by 5-10 cm thick in hygienic environments. The material is mixed from time to time in order to get full dryness. The dried content is given to the animals by mixing to the feed in certain amounts. The feeds and the animals are weighted individually every week by 1 g sensitive. Deaths are recorded daily.

Statistical analysis: The programme of SAS (1999) is used in the statistical analysis of the results obtained. Duncan method was used to compare and find out significance of the means.

RESULTS AND DISCUSSION

During the 6 weeks, the mean body weight of control and treatment groups and the standard errors are given in Table 4. When Table 4 is examined, the difference between the groups is observed insignificant at the first 2 weeks. In other words, the rumen contents added in the feeds at different levels has not an impact until the end of 2nd week. In the 3rd week, the impact of the treatment is begun to be seen and significant differences are observed among the groups considering live weight in the 4th week. In the 4th week, the value of live weight control is found for 1st-5th groups were: 114.52, 120.12, 121.22, 114.91 and 104.25 g (male+female), respectively and the differences were significant ($p<0.01$). In the 4th week, the highest live weight was observed in the 2nd and 3rd group.

The live weights of the control and treatment groups at 6 weeks of age were significantly different ($p<0.01$). The live body weight of the birds at the end of 6th week from highest to lowest were seen as 174.25, 170.46, 167.36, 153.39 and 148.32 g for 1st, 2nd, control, 5th, 4th and 3rd groups, respectively. The result of this study agrees to Erener.

During 6 weeks, the mean body weight of control and treatment groups are given in Fig. 1. The lowest body weight at the end of the fattening period was obtained

Table 4: Weekly live weights of quails (F + M) of the control and treatment groups (g) and their standard errors (X±Sx)

	Rumen content supplementation rates to rations (%)					
Weeks	Control	5	10	20	Gradual	Sig. level
0	8.6±0.9	8.6±0.9	8.6±0.9	8.6±1.2	8.6±0.8	NS
2	53.2±1.3	57.1±0.9	54.6±0.10	51.2±0.96	54.0±1.1	NS
4	114.5±2.1^{a}	120.1±1.9^{b}	121.2±1.9^{b}	114.9±1.9^{a}	104.3±2.1^{ac}	**
6	167.4±2.8^{a}	174.3±2.5^{b}	170.5±2.6^{b}	148.3±2.6^{c}	153.4±2.8^{dc}	**

$^{a-d}$Differences between means of the same line with different letters are significant; M = Male; F = Female; *: $p<0.05$; **: $p<0.01$; NS = Non Significant

Table 5: Cumulative feed consumptions, feed conversion ratios and standard errors (X±Sx) of control and treatment groups

	Rumen content supplementation rates to rations (%)					
Weeks	Control	5	10	20	Gradual	Sig. level
Feed consumption (g)						
0-3	279.3±7.8^{b}	291.0±7.8^{c}	261.8±7.2^{a}	254.8±6.4^{a}	294.9±6.4^{c}	**
0-4	450.7±8.2^{c}	421.6±8.2^{ab}	421.9±9.2^{ab}	414.9±9.2^{a}	491.8±9.2^{d}	**
0-5	692.6±9.1^{c}	647.6±10.8^{a}	642.7±8.2^{a}	652.6±7.8^{ab}	710.6±8.4^{c}	**
0-6	978.4±6.2^{c}	901.6±7.1^{a}	902.7±8.2^{a}	948.9±8.2^{b}	975.4±9.0^{c}	**
Feed conversion ratio (g g^{-1})						
0-3	3.1±0.02^{a}	3.1±0.02^{a}	2.9±0.02^{a}	2.9±0.02^{a}	3.3±0.02^{ab}	*
0-4	3.9±0.07^{ab}	3.5±0.07^{a}	3.4±0.07^{a}	3.6±0.07^{a}	4.7±0.07^{c}	**
0-5	4.8±0.09^{b}	4.2±0.09^{a}	4.2±0.09^{a}	4.7±0.09^{b}	5.5±0.09^{c}	**
0-6	5.8±0.01^{b}	5.1±0.14^{a}	5.1±0.14^{a}	6.3±0.14^{bc}	6.4±0.14^{bc}	**

$^{a-d}$Differences between means of the same line with different letters; *p<0.05; **p<0.01; NS = Non Significant

Table 6: Average carcass weights, carcass yields and some carcass parts and their standard errors (X ±Sx)

	Rumen content supplementation rates to rations (%)					
Traits	Control	5	10	20	Gradual	Sig. level
Carcass weight (g)	112.0±6.8^{b}	121.7±6.8^{c}	120.6±6.8^{c}	102.4±6.8^{a}	109.7±6.8^{b}	**
Carcass percent (%)	67.0±0.1^{a}	70.9±0.1^{ab}	71.7±0.1^{ab}	69.0±0.1^{a}	71.0±0.1^{ab}	*
Breast weight (g)	36.1±1.4^{b}	37.1±1.4^{b}	35.8±1.4^{b}	31.3±1.4^{a}	34.2±1.4^{ab}	*
Breast ratio (%)	32.2±0.2	30.9±0.2	30.0±0.4	30.5±0.7	31.1±0.7	NS
Drumstick weight (g)	25.1±0.8^{ab}	25.3±0.8^{ab}	25.1±0.8^{ab}	22.6±0.8^{a}	23.3±0.8^{ab}	*
Drumstick ratio (%)	22.4±1.1^{ab}	21.1±1.1^{a}	21.0±1.1^{a}	23.0±1.1^{ab}	23.0±1.1^{ab}	*

$^{a-c}$Differences between means of the same line with different letters are significant; *p<0.05; **p<0.01; NS = Non Significant

from 20% of the group. This result is show the addition of the rumen contents of live weight ration of >10% have a negative impact. On the other hand, the highest 5% of body weight has been obtained from the rumen contents. This condition show that the addition of rumen contents of the appropriate level of 5%.

Control is found for 1st-5th groups Feed Consumption (FC) and Feed Conversion Ratio (FCR) was observed in Table 5. Rumen content reduced feed consumption and had benefit from feed (Chrappa *et al*., 1988). The lowest feed consumption and feed conversion ratio was observed in 2nd and 3rd. Feed consumption of control group was more than 2nd-4th group but <5th group. The FCR of 2nd and 3rd groups were lower than control and the other treatment groups. The result of this study agrees to Erener, Tuncer and Chrappa *et al.* (1988). During 6 weeks, the mean carcass weights and yields of control and treatment groups and the standard errors are given in Table 6. Carcass weights and yields of the control and treatment groups (2nd-5th) of (male+ female) quails at the end of fattening period (6th week) were determined to be 112.0, 121.7, 120.6, 102.4 and 109.7 g, 67.0, 70.9, 71.7, 69.0 and 71.0%, respectively. Carcass weights and yields were significantly affected by Rumen content supplementation (p<0.01 and <0.05).

While the highest carcass weight was obtained from 5% and 10% group, the lowest value was obtained from the control group. With regard to breast weight and breast ratio, differences between the control and treatments groups (2nd-5th) of (male+female) quails at the end of fattening period (6th week) were determined to be

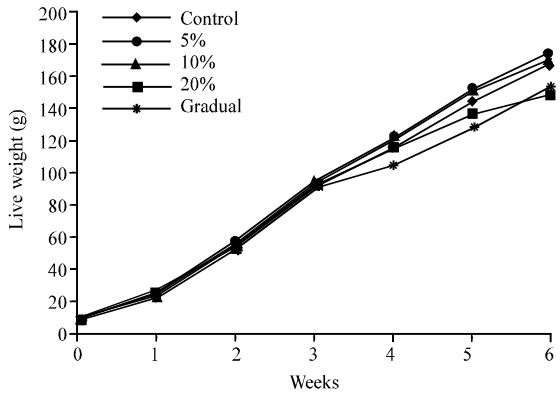

Fig . 1: Live weight changes at the 6 weeks period

36.1, 37.1, 35.8, 31.3, 34.2 g and 32.2, 30.9, 30.0, 30.5 and 31.1%, respectively. Breast weight and breast ratio, differences between the control and treatments groups were found to be significant (p<0.01 and 0.05). The highest breast weight was observed in 5% (2nd) group and the lowest in the control and 20% (5th) groups. With regard to drumstick weight and drumstick ratio, the differences between the control and treatment groups (2nd-5th) were found to be significant (p<0.01). While the highest drumstick weights were observed in 5% (2nd) group, the lowest values were seen in 20% (5th) group.

In this study, the effects of rumen content added to chick feed from 2nd to end of the trial on live body weight was significant. So, adding 5 and 10% rumen content had positive effect on body weight but 20% did not. It is remarkable that at the end of the fattening period the

lowest live weights were seen in 4th group received about 20% rumen content. This result shows that adding >10% rumen content to the ration has a negative impact on live weight. On the other hand, getting the highest live weight from 2nd group received 5% rumen content shows that this could be the most suitable rate adding rumen content to quail diet. But, it can be easily said that 10% can be added to the rations because it has not had a significant negative impact. According to results of this study, it can be said that adding 5 or 10% rumen content to the ration of quails influences the weight of breast and thigh in positive way.

CONCLUSION

As a result, adding the dried rumen content which is a waste material, to the quail ration has not had a negative influence on growth performance and carcass traits of the quail. According to the results of this study it can be said that the dried rumen content harvested from the ruminant animals can be added about 5-10% to the quail diets.

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