

Feed Performance and Carcass Characteristics of Rock Partridges (*A. graeca*) in Intensive Conditions

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Abstract: This study was made in order to determine the feed performance, slaughtering and carcass characteristics of rock partridges (*A. graeca*) in intensive breeding conditions. In the study, 317 partridges were used to determine the feed performance and 50 partridges were used to determine the slaughtering and carcass properties. 182 chicks were placed in the ground system (1098 cm²/partridge) while 135 chicks were placed in the cage system (1060 cm²/partridge) in order to determine the effects of intensive breeding methods on feed performance, slaughtering and carcass characteristics. Chick growing feed was used until 16th week to feed the partridges and then egg-laying chicken feed was used in order to feed the female partridges. Feeding was made ad libitum during the study. Average animal weight increase between week 4 and week 16 in ground and cage groups were found as 332.96 and 342.48 g and between week 16 and week 32 as 54.64 and 34.44 g, respectively. Feed consumption of ground and cage groups between week 4 and 16 were found as 1706.78 and 1698.19 g; benefiting from feed ratios were found as 5.12 and 4.95; feed consumption of ground and cage groups between week 16 and week 32 were found as 352.75 and 334.34 g; benefiting from feed ratios were found as 6.45 and 9.70. Carcass efficiencies were found, respectively in ground and cage groups as 71.88 and 72.85%; leg ratios as 40.37% and 41.66 (p<0.05); wing ratios 10.30 and 9.38% (p<0.01); gizzard ratios as 4.19 and 3.48% (p<0.01).

Key words: Rock partridge, intensive, feed performance, carcass

INTRODUCTION

It was proved that, domesticated wild animals that live under human control are more effective than their wild ancestors, regarding their products and services. Among wild animals, humans try to breed animals that are hunted in controlled conditions because their meats are delicious and they are more effective. Various winged animal breeding methods including pheasant breeding were developed for this purpose^[1-3].

Partridge breeding is generally made for supplying material to hunting tourism and as contribution to preservation of nature. Meat production in intensive conditions is another purpose, as their weight is more than quails^[4-5].

Feed performance: The feed requirement of an animal depends on factors such as age, sex, efficiency level, weight, temperature of the environment, energy level of the feed and physical properties of the feed^[6-8]. Benefiting from feed is the talent to convert the feed to efficiency. Benefiting from feed depends on factors such as genotype, age, composition of the feed, environmental factors and sex. Many studies have been made to determine the feed consumption and benefiting from the feed properties of winged species^[9-13].

Woodard and colleagues^[14], found the cumulative feed consumption of male partridges that were 9 weeks of

age as 1702.5 g and feed consumption of female partridges that were 12 weeks of age, as 2043 g.

Coskun and colleagues^[15], found the cumulative feed consumption of partridges as 1200 g until the age of 8 weeks and as 3500 g until the age of 18 weeks although these amounts may vary according to feeding type and the ration type. Arslan^[11], found the benefiting from feed ratios of control and pro-biotic groups until the end of the week 12 as 7.78 and 7.36, respectively.

Cetin^[16], carried out a study to determine the carcass properties of partridges in different slaughtering ages and found the benefiting from feed ratio as 2.64, 2.53, 3.16 and 3.84 and cumulative feed consumption as 314.83, 531.50, 1249.45 and 1582.27 g in week 4, 8, 10 and 12, respectively. Cetin and colleagues^[17], determined the feed consumption of rock partridges at 12 weeks of age as 2067.51 g and benefiting from feed ratio as 5.20. Slaughtering and Carcass Properties: Meat efficiency economically means the eatable meat amount of the carcass obtained from the animals. Individual carcass composition in winged animals depends on factors such as age, sex, feeding, illumination, stocking density, feeding period, feeding methods and applications during and after slaughtering^[6,18-20].

Cetin^[16], found the carcass weights of male, female and general partridges at 10 weeks of age as 295.96, 251.54

and 280.41 g, respectively; at 12 weeks of age as 347.92, 291.23 and 305.78 g; he also found the carcass efficiency at 10 weeks of age as 69.16, 67.75 and 68.67%; at 12 weeks of age as 73.39, 71.25 and 71.79%. The ratio of wings, legs and chest (important parts of carcass) to the carcass for female partridges slaughtered at 10 weeks of age were found as 36.39, 25.74 and 12.08%, respectively; while the same ratio for male partridges slaughtered at 10 weeks of age were found as 33.87, 27.51 and 11.96%, respectively.

Gertanson and colleagues^[21], found the carcass efficiencies in week 14, 16 and 20 as 72.06, 75.08 and 69.33% for female partridges; as 72.92, 72.90 and 74.38% for male partridges.

Tepeli and colleagues, found the carcass efficiencies of pheasants slaughtered in week 14, 16 and 18 as 74.75, 77.15 and 74.54%; they also found the ratio of chest and legs to the carcass as 34.18 and 27.66%, respectively in week 14 and as 28.34 and 34.23% in week 16.

This study was made to determine the feed performance, slaughtering and carcass properties of the rock partridges that were bred in ground and cages environments in intensive conditions.

MATERIALS AND METHODS

Animal material: The study was made in University of Fýrat, Veterinary Faculty, Education-Research and Application Farm. Totally 317 rock partridge chicks were used from 2 groups in order to observe the feed performance. 50 male animals (25 from each group) were slaughtered in order to determine the slaughtering and carcass properties. The feed performances of 80 female rock partridges from ground group and 79 female rock partridges from cage group were observed after week 16.

Feed Material: Chick growing feed was used until week 16, to feed the partridges and then egg-laying chicken feed was used in order to feed the female partridges. The nutrition values of the feeds are mentioned in Table 1. The Animal Feeding and Disease Department in University of Fırat Veterinary Faculty made the feed analysis.

Method: Totally 317 rock partridges were separated into ground and cage groups in order to initiate the research.

In the ground system, partridges were placed in a room with sawdust on the base. Necessary natural environment was provided for them. The stocking density was 9.1 partridges/m². In the cage system, partridges were placed into 14 cages with 3 flats. The cage dimensions were 100×100×50 cm. Feeding was made ad libitum and feed consumptions were determined on group basis. Necessary precautions were taken against

coccidiosis which is a prevalent disease among winged animals. In order to determine the slaughtering and carcass properties, animal weights were measured at 16 weeks of age before slaughtering and the male partridges that were selected according to their weights were slaughtered. The bloods of the slaughtered animals were spilt, their feathers were plucked, their head and feet were cut and their inner organs were taken out in order to measure the hot carcass weight. Weights of carcass pieces that were separated according to Turkish Standards Institution (TSE) were determined together with skins on them. Weights of the eatable inner organs were also measured^[23].

Data collection and assessment: A 1 g sensitive electronic scale was used in order to measure the feed weights during the feeding of animals. Evaluation of feed consumption values was made in means of whole group. In cage groups, feeding, cleaning of the base platform and recording of the data were made regularly every morning. In ground system; feeding of the animals, cleaning of the base platform and weighing and recording of the remaining feed in the manger, were made 3 times a week. A 0.1 g sensitive electronic scale was used in order to determine the slaughtering and carcass properties and determining the weight of carcass pieces. SPSS 11.0 package program was used for evaluating the collected data. Significance control of the difference between the groups regarding slaughtering and carcass properties was calculated by Independent Samples t-test^[24,25].

RESULTS

Feed performance: In the research, the feed consumption of the partridges was calculated in group basis. The cumulative feed consumption of groups and benefiting from feed ratios of groups are given in Table 2. When the Table is examined, it can be seen that, feed consumption increases in time in cage and ground systems. When male and female partridges were kept together, it was observed that, the feed consumption until week 16 in ground group was more than feed consumption in cage group. The cumulative feed consumption of ground and cage groups at the end of week 4 were calculated as 276.28 and 278.24 g, respectively; and until week 16, as 1706.78 and 1698.19 g, respectively. At the end of female partridge feeding period (week 16-32) the feed consumption of ground and cage groups were determined as 352.75 and 334.34 g, respectively.

When we look at the benefiting from feed ratios between week 4 and week 16, in ground and cage groups where males and females were kept together, the values in week 4 were 3.10 and 3.11, respectively; the values in week 16

Table1: Nutrition values of Concentrated feed given to the Rock Partidges during feding period

*	DM	RP	RC	RA	RF	OM	NFE	ME
Chick Growing Feed	92.60	20.21	4	7	4	85.60	57.39	3000
Egg-Laying Chicken Feed	91.80	16.61	6	14.42	4.30	77.38	50.47	2780

DM: Dry Materil (%), RP: Raw Protein (%), RC: Raw Cellulose (%), RA: Raw Ash (%), RF: Raw Fat (%), ME: Metabolic Energy (kcal/kg), OM: Organic Material (%), NFE: Nitrogen Free Extract (%), * These values were calculated based on DM

Table 2: Additional Feed Consumption (AFC) Live Weight Gain (LWG) Feed Benefit Rate (FBR) between in rock partidges

Weeks	Ground system				Cage system			
	n	AFC (g)	LWG (g)	FBR	n	AFC (g)	LWG (g)	FBR
0-4th weeks	182	276.28	88.97	3.10	135	278.24	89.30	3.11
4-16th weeks	116	1706.78	332.96	5.12	125	1698.19	342.48	4.95
16-32th weeks*75	352.75	54.64	6.45	76	334.34	34.44	9.70	

*:Female partidge

Table 3: Values (g) associated with slaughter carcass characteristics of rock partidges

Characteristics	Ground system				Cage system				
	n	\bar{x}	S \bar{x}	V (%)	n	\bar{x}	S \bar{x}	V (%)	P
Live weight prior to slughter	25	462.81	6.90	7.45	25	482.77	5.15	5.33	*
Warm carcass weight	25	332.14	4.45	6.69	25	352.12	3.90	5.54	**
Rump weight	25	133.58	1.88	7.05	25	147.08	2.01	6.84	**
Chest weight	25	119.04	2.21	9.29	25	121.76	2.29	9.40	-
Back-neck weight	25	43.87	0.98	11.21	25	50.16	1.09	10.92	**
Wing weight	25	34.32	0.58	8.53	25	32.52	0.50	7.68	*
Head weight	25	23.40	0.28	5.98	25	24.88	0.31	6.35	**
Feet weight	25	10.98	0.12	5.82	25	11.41	0.14	6.39	*
Heart weight	25	2.31	0.06	13.41	25	2.68	0.12	22.76	**
Liver weight	25	8.61	0.14	8.13	25	8.66	0.23	13.39	-
Gizzard weight	25	13.75	0.33	12.21	25	12.44	0.28	11.57	*

- : p>0.05, *: p<0.05, **: p<0.01

Table 4: Rational valves (%) associated with slaughter and carcass characteristics of rock partidges

Characteristics	Ground system				Cage system				
	n	\bar{x}	S \bar{x}	V (%)	n	\bar{x}	S \bar{x}	V (%)	P
Carcass output	25	71.88	0.65	4.57	25	72.85	0.34	2.36	-
Rumps ratio	25	40.37	0.34	4.28	25	41.66	0.50	6.00	*
Chest ratio	25	35.44	0.49	7.02	25	34.96	0.51	7.32	-
Back-neck ratio	25	13.59	0.29	10.74	25	13.76	0.34	12.64	-
Wings ratio	25	10.30	0.15	7.47	25	9.28	0.15	8.29	**
Feet ratio	25	2.37	0.04	8.86	25	2.36	0.02	4.66	-
Head ratio	25	5.07	0.06	5.91	25	5.13	0.05	5.65	-
Heart ratio	25	0.68	0.01	13.23	25	0.76	0.12	18.42	*
Liver ratio	25	2.54	0.05	10.23	25	2.51	0.06	13.54	-
Gizzard ratio	25	4.19	0.08	9.78	25	3.48	0.08	12.35	**

-: p>0.05, *: p<0.05, **: p<0.01

are 5.12 and 4.95, respectively; the values in week 32 were 6.45 and 9.70, respectively. In periods when males and females were kept together, no significant difference between groups could be observed regarding feed performance.

Slaughter and carcass characteristics: The values regarding slaughtering and carcass properties of slaughtered partridges are presented in Table 3 and the proportional expressions of these values with statistical evaluations are given in Table carcass 4. Slaughtering and property differences between groups except chest and liver weights, were found to be statistically important (p<0.05, p<0.01). The male partridge weights in ground

and cage groups before slaughtering were found as 462.81 and 482.77 g, respectively; hot carcass weights were found as 332.14 and 352.12 g, respectively; leg weights were found to be 133.58 and 147.08 g, respectively; and wing weights were found as 34.32 and 32.52 g, respectively. Significant statistical differences between groups were also observed regarding leg and heart ratios at a level of p<0.05 and regarding back-neck and gizzard ratios at a level of p<0.01. Leg ratio was found as 40.37% in ground system, 41.66% in cage system; wing ratio was found as 10.30% in ground system, 9.28% in cage system. Gizzard ratio was found as 4.19% in ground system, 3.48% in cage system.

DISCUSSION

Feed Performance: Feed consumption is the feed amount eaten by animals in 24 hours period, in order to fulfill their nutrition requirement. Benefiting from feed is the talent to convert the feed to efficiency. Regarding this property, there can be significant differences between genotypes and also benefiting from feed ratios can be different in the same breeding group. When the feed consumptions of ground and cage groups in intensive conditions are considered, at the end of 16 weeks in which males and females were kept together, it was observed that ground group consumed 1706.78 g feed while cage group consumed 1698.19 g feed. These values were 352.75 and 334.34 g, respectively at the end of 32 weeks for only females. Although there were no significant differences between groups regarding these values, generally animals in ground group consumed more feed. The reason of this difference may be feeding operation being done more systematically and more hygienic. These values are in accordance with the general data of some researchers^[14,16,27].

Benefiting from feed values in ground and cage groups in week 4 were 3.10 and 3.11, respectively; these values in week 16 were 5.12 and 4.95; and these values in week 32 were 6.45 and 6.70, respectively. These values are in accordance with the general data obtained in various researches^[11,12,16,22].

Slaughter and carcass characteristics: Considering hot carcass, leg, wings, back and waist ratios in ground and cage groups, it was observed that wing ratios were higher in ground group due to more movement opportunity while leg ratios were higher in cage group where less movement space is available.

Carcass efficiencies in ground and cage groups (71.88-72.85%, respectively) are in accordance with the values of some researchers^[16,17,21,22]. While leg ratios (40.37 and 41.66%, respectively) were found higher than the values mentioned in some studies,^[16,17,21] wing ratio (10.30 and 9.28%, respectively) values are in accordance with some researches^[16,17]. As a result, in the research, the effects of feed performance, slaughtering and carcass properties on breeding system were determined and it was understood that it is possible to breed rock partridges comfortably in both systems intensively. In intensive conditions, during the period that males and females were kept together, no significant difference could be observed regarding benefiting from feed ratios (which is important for feed performance) between two different breeding systems such as ground and cage. Regarding carcass efficiency (which is important for carcass properties) it was observed that cage system is better regarding leg

ratios, while ground system is better regarding wing ratios. It can be said that the reason of these differences is related to breeding systems.

REFERENCES

1. Anonymous, 2001. Av Kuslari. Hayvancılık Özel İhtisas Komisyonu Raporu. 8. Bes Yıllık Kalkınma Planı. Yayın No: DPT: 2574- ÖİK: 587. Ankara.
2. Gunlu, A., K. Kirikci and O.Cetin, 2001. Orman İci ve Kenari Koylerin Ekonomik Refahinin Artirilmasında Alternatif Kanatli Yetistiriciligi. I. Dogu Anadolu Kanatli Yetistiriciligi Sempozyumu. 45-51. 21-24 Mayıs. Yuzuncu Yil Uni. VAN.
3. Inal, S., M.A. Tekes, F. Inal and S. Dere, 1996. Japon Bildircinlarında (Coturnix Coturnix Japonica) Canlı Agirlığa Gore Yapılan Seleksiyonun Canlı Agirlik, Canlı Agirlik Artisi, Yem Tuketimi ve Yemden Yararlanma Uzerine Etkileri. *Vet Bil Derg* 12; 1: 5-14.
4. Anonymous, 1980. Keklik. Gelisim Alfabetik Genclik Ans. Gelisim Basimevi ve Yayim A.S. Istanbul, 6: 1540.
5. Cetin, O. and K. Kirikci 2000. Keklik Yetistiriciligi. Alternatif Kanatli Yetistiriciligi. Selcuk Uni Vakif Yayinlari. Konya, pp: 93-107.
6. Akbay, R., 1985. Tavuk Eti ve Tavukculukta Tutulan Kayitlar. Bilimsel Tavukculuk. Guven Matbaa. Ankara.
7. Aksoy, T.F., 1991. Yemler ve Yemleme. Tavuk Yetistiriciligi. Sahin Matbaa. 229 Ankara.
8. Turker, H., 1998. Yemden Yararlanma. Bilimsel Yonleriyle Tavuk Besleme. I.U. Vet. Fak. Istanbul.
9. Cerit, H. and A. Altinel, 1998. Japon Bildircinlarının (Coturnix Coturnix Japonica) Cesitli Verim Ozelliklerine Ait Genetik ve Fenotipik Parametreler. *Istanbul Uni Vet Fak Derg* 24, 1: 111-136.
10. Kurter, T., 1981. Gelisme ve Yem Tuketimi. Tavukculuk ve On Bilgiler. Erol Matbaa. Istanbul. 282-287.
11. Arslan, C., 2004. Effect of Dietary Probiotic Supplement on Growth Performance in The Rock Partridge (Alectoris Graeca). *Turk J. Vet. Anim. Sci.*, 28: 887-891.
12. Kucukyilmaz, K., E Baser, C. Erensayin, H. Orhan, E. Arat 2001. Japon Bildircinlarında Damizlik Yumurta agirliğinin Kulucka Sonuclari, Besi Performansi ve Yumurta Verim Ozellikleri Uzerine Etkisi. *Hayvancılık Aras Derg.*, 11, 1: 6-12.
13. National Research Council (NRC). 1994. Nutrient Requirements of Ring-Necked Pheasants, Japanese Quail and Bobwhite Quail. 9th Revised Edition., National Academy Press, Washington, D.C. USA., Erisim: <http://www.nap.edu/openbook /0309048923/44.html>, Erisim Tarihi: 10.2005, pp: 44-45.

14. Woodard, A.E., 1982. Raising Chukar Partridges. Cooperative Extension Bulletin, Leaflet No: 21321. Univ. California.
15. Coskun, B., E. Seker and F. Inal, 1997. Kekliklerin Beslenmesi. Hayvan Besleme Ders Kitabı. Selcuk Uni Vet Fak Yayın Ünitesi, Konya, pp: 226-228.
16. Cetin, O., 2000. Kaya Kekliklerinin (A. Graeca) Farklı Kesim Yaşlarında Büyüme, Besi Performansı, Kesim ve Karkas Özellikleri. *Tavukçuluk Aras Derg.*, 2, 2: 41-44.
17. Cetin, O., K. Kirikci, A. Gunlu, C. Tepel and, A. Yilmaz, 2001. Kaya Kekliklerinde (A. Graeca) Zorlamalı Tuy Dokumunun Yumurta ve Kulucka Verim Özelliklerine Etkisi ve Elde Edilen Cıvıvlerin Büyüme, Besi Performansı ve Karkas Özellikleri. I. Dogu Anadolu Kanatlı Yetistiriciligi Sempozyumu. -Mayıs. Yuzuncu Yil Univ. Van., 53-160. 21-24.
18. Baéza, E., 2004. Measuring Quality Parameters. Woodhead Publishing Limited on CRC Pres LLC. INRA, France. Erisim :<http://www.crcnetbase.com/searchResult.asp/doc1591>, Erisim Tarihi : 10.2005.
19. Ozcelik, M., Z. Erisir and A. Esen 1999. Japon Bildircinlerinde Yerlesim Sikliginin Canlı Agirlik Artisi, Kesim ve Karkas Özelliklerine Etkileri. *Veteriner Hek. Dernegi Derg* 1-2: 46-54.
20. Ozen, N., 1989. Tavuk Etinin Kompozisyonu ve Besin Değeri. *Tavukçuluk Yetistirme, Islah, Besleme Hastaliklar, Et ve Yumurta Teknolojisi*. O MU Yayinlari. Yayin No: 48 SAMSUN.
21. Gertonson, E.H., L.E. Dawson and T.H. Caleman, 1974. Yield Composition and Acceptability of Meat from Chukar Partridge. *Poultry Sci.*, 53: 1819-1823.
22. Tepeli, C., K. Kirikci, O. Cetin, A. Gunlu and A. Yilmaz, 1999. Farklı Kesim Yaşlarında Sulunlerin (p. Colchicus) Büyüme, Besi Performansı, Kesim ve Karkas Özellikleri. *Vet Bil Derg*, 15,1: 29-34.
23. Anonymous, 1997. *Türk Standartları - Tavuk Govde Eti Parcalama Kurallari*. T.S.E. TS/Kasim. Ankara.
24. Anonymous, 2004. SSPS 11.0 SSPS for window release.
25. Ozdamar, K., 1999. SSPS ile Biyoistatistik. Kaan Kitabevi. 3. Baski. ESKISEHIR.
26. Kirikci, K., C. Tepeli, O. Cetin, A. Gunlu and A. Yilmaz, 1999. Farklı Barindirma ve Aydinlatma Sartlarında Kaya Kekliklerinin (A. Graeca) Bazı Verim Özellikleri. *Vet Bil Derg*, 15,1: 15-22.