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Effect of different breeding systems on the growth performance of pheasants *(Phasianus colchicus)* under intensive conditions

Sülünlerin *(Phasianuscolchicus)* entansif şartlarda büyüme performansına farklı yetiştirme sistemlerinin etkisi

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ABSTRACT

This study was conducted for the purpose of determining the effects of free range and cage systems on the growth performance of pheasants under intensive conditions. At the end of the 16th week, for mixed gender pheasants bred with free range and cage systems 964.87 g and 998.57 g mean live weights were determined respectively. In terms of mean live weight values, it was determined that cage system had a significant advantage over free range system from week 7 to 16 (P<0.05).The mean live weight values determined for 16 weeks old male and female pheasants were 1043.74 and 886.39 g in free range system and 1078.36 and 917.83 g in cage system. From the 5th week to the 16th in both of the systems, male pheasants exhibited advantages of varying significance levels over the female pheasants (P<0.05, P<0.01). Cumulative feed consumptions in the 16th week were found out to be 4465.59 g per pheasant in free range system and 4575.77 g per pheasant in cage system. Feed conversion rates for pheasants bred with free range and cage systems at 16 weeks of age were determined to be respectively 6.38 and 6.53. No significant difference could be found between the two groups in terms of cumulative feed consumption and feed conversion rates.

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***Anahtar Kelimeler*:**

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ÖZ

Bu çalışma sülünlerin entansif şartlarda büyüme performansına serbest ve kafes sisteminin etkisini belirlemek amacıyla yapılmıştır. Sülünlerin erkek ve dişileri karışık olarak 16. hafta sonunda serbest sistemde 964.87 g, kafes sisteminde ise 998.57 g ortalama canlı ağırlık değeri tespit edilmiştir. Ortalama canlı ağırlık değerleri bakımından serbest sistem ile kafes sistemi grupları arasında 7. haftadan 16. haftaya kadar kafes sistemi serbest sistemine önemli (P<0.05) düzeyde üstünlük sağlamıştır. Erkek ve dişiler sırasıyla 16. hafta sonunda; serbest sistemde 1043.74 ve 886.39 g, kafes sisteminde ise 1078.36 ve 917.83g ortalama canlı ağırlık değeri tespit edilmiştir. Her iki sistemin 5. haftadan 16. haftaya kadar değişik derecelerde erkekler dişilere göre önemli (P<0.05, P<0.01) düzeyde üstünlükler sağlamıştır. Sülünlerin 16 haftalık tükettikleri eklemeli yem miktarları serbest sistemde sülün başına ortalama olarak 4465.59 g, kafes sisteminde ise ortalama olarak 4575.77 g olarak belirlenmiştir. Serbest ve kafes sistemlerinin 16 haftalık yaşta yemden yararlanma oranı sırasıyla; 6.38 ve 6.53 olarak tespit edilmiştir. Her iki grubun eklemeli yem tüketimi ve yemden yararlanma değerleri arasında önemli bir fark görülmemiştir.

1. Introduction

Housing conditions in intensive pheasant breeding are similar to those required for breeding other fowls. However, it is well known that pheasants can be bred in both free range outdoor and closed cages (Sarıca et al. 1995; Çetin and Kırıkçı 2000).

While in some studies (Çetin et al. 1997; Kırıkçı et al. 2003) individual breeding cages and coops were used to breed pheasants, some researchers (Mashaly et al. 1983) bred pheasants in flocks with varying male - female ratios and in outdoor coops with natural lighting. Kırıkçı et al. (2003), on the other hand bred pheasants as a free flock in closed coops. Nowland (2007) reported that keeping records in breeding flocks bred in breeding cages easier and more reliable than breeding in flocks, yet on the other hand flock management is easier and less labor is needed in breeding in flocks. It is also reported that with the use of mating cages, male pheasants do

not fight each other for expanding their harems and therefore a higher rate of fertilization is obtained with less egg losses (Çetin and Kırıkçı 2000).

While the first eggs of pheasants are obtained approximately while they are 40 weeks old (Çetin et al. 1997; Özbey et al. 2011), studies where pheasants are fattened for 14 weeks (Slaugh et al. 1987; Moore and Krueger 1989; Sarıca and Karaçay 1994), 16 weeks (Nowland 2007), 18 weeks (Cain et al. 1984; NCR 1984; Marsico and Vonghia, 1992; Çetin et al. 1997) and 20 weeks (Woodard et al. 1977) following their hatching for meat production, are available.

In a study conducted on pheasants bred in order to be released to the natural environment in Turkey, Sarıca and Karaçay (1994) reported male, female and general live weight as 1148.57, 842.00 and 1020.83 g respectively after a fattening period of 14 weeks. Çetin et al. (1997) on the other hand, determined the general live weight and the live weights of male and female pheasants at the end of a fattening period of 18 weeks as 955.17 g, 1074.92 g and 790.18 g. In the study conducted with the purpose of examining the effects of different lighting methods implemented during the fattening period on the performance, Slaught et al. (1987) reported 1138.2 g live weight for males and 1045.3 g for females in the 14th week. Woodard et al. (1979) reported that the 14th week live weights of male and female pheasants they fed with rations containing varying levels of protein, Ca and P, varied between the values of 854 - 1073 and 754 - 795, and suggested that during their growing period, pheasants should be fed with rations that contain at least 24% HP. Nowland (2007) on the other hand, reported live weights varying between 1150 - 2000 g for male, 810 - 1380 g for female and 936 - 1297 g in general pheasants at the end of a fattening period of 16 weeks.

For pheasants slaughtered at varying ages, Tepeli et al. (1999) reported the mean live weights at the 4th, 8th and 12th weeks as 20.78, 175.36 and 738.06 g respectively, determined pheasants' feed consumptions in the 14th, 16th and 18th weeks as 3434.70, 4126.86 and 4964.31 g, feed conversion values as 3.98, 4.33 and 4.68 and mean live weights as 877.00, 918.00 and 1058.00 g ($P<0.05$). Çetin et al. (1997) determined the 4th, 8th, 14th and 18th week live weights of pheasants as 153.73, 462.87, 835.61 and 955.17 respectively. While the mean live weights of female pheasants were determined to be 133.40, 420.16, 701.67 and 790.18 in the same weeks, the same were determined to be 163.33, 495.56, 909.67 and 1074.92 g for male pheasants. At the end of their growing period, feed consumption amount and feed conversion rates were calculated as 5141.80 g/pheasant and 5.51 kg.

The present study was conducted with the purpose of determining the effects of different breeding systems on the intensive growth performance of pheasants.

2. Material and Methods

The materials of the study were constituted by the chicks obtained from Ring-Necked Pheasants (*P. colchicus*) bred in the Livestock Research and Implementation Unit of Firat University Faculty of Veterinary Science. In consequence of the 2 weeks chicks are kept in the breeder, the chicks were separated into two groups in order to be bred either in a free range system or in cages.

In free range system 30 male and 60 females were put as a flock to a 60 m² area with wood dust ground, while in cage system the chicks were bred in three cages of 5 x 4 x 1.5 m dimensions and with a male-female ratio of 10:20.

After separating the chicks into groups, the necessary arrangements for having 16 hours of light and 8 hours of dark throughout the period of the study was carried out. In the first 4 weeks the chicks were fed with turkey starter feed (28 Crude Protein and 3100 ME kcal/kg), while after the first 4 weeks until the time of slaughter they were fed with turkey grower feed (23 Crude Protein and 3000 ME kcal/kg) on ad libitum basis.

At 2 weeks of age, numbering labels were attached to the feet of the pheasants and two debeaking processes were carried out at the end of 5 and 10 weeks of ages. Pheasants were weighed on weekly basis and every week on the day they hatched. While the live weights of pheasants were determined on individual basis, feed consumptions were determined on group level. The tasks of feeding, cleaning of the base mat and recoding data were carried out regularly every morning. As for the free range system, feeding the fowls, cleaning the base and recoding data by weighing the remaining feed were carried out three times a week. The following formula was used in order to calculate feed conversion rate (Erensayın 2000).

Feed Conversion Rate: Feed Consumption (g) / Live Weight Increase (g)

In the statistical evaluation of the obtained data SPSS 11.5 program was used and for analyzing the obtained values and controlling the significance of the differences between the groups were made through t test (Özdamar 1999; SPSS 2002).

3. Results

Weekly mean live weights, increases in live weights, feed conversion rates and cumulative feed consumption of pheasants are presented in Table 1, while Table 2 shows the mean live weights and live weight increases of male and female pheasants. In the 2nd week, mean live weights of pheasant chicks were determined as 57.21 g for free range system and 63.55 g for cage system. At the end of the 16th week, the mean live weights of pheasants in free range system and cage system were determined to be 964.87 g and 998.57 g respectively. Although no significant difference could be found until the 6th week between the different systems in terms of mean live weights, from week 7 to 16 significant differences between the groups were determined ($P<0.05$). According to the determined differences, cage system exhibited significant advantage over free range system ($P<0.05$).

In terms of weekly mean live weight increase, increases between 36.97 and 93.52 g were determined in pheasants bred in free range system while the increases determined for pheasants in cage system varied between 42.83 and 101.41 g. The differences in the mean live weight values obtained in weeks 9, 10, 11 and 16 between the two groups were determined to be statistically significant ($P<0.05$).

The mean live weight values determined for 16 weeks old male and female pheasants were 1043.74 and 886.39 g in free range system and 1078.36 and 917.83 g in cage system. While no significant difference could be found between the male and female pheasants of both free range and cage system until the 4th week, it was determined that the differences that occur from the 5th week to the 16th week were statistically significant at different levels of significance ($P<0.05$, $P<0.01$). According to the determined differences, in both groups male pheasants had exhibited significant advantages over female pheasants ($P<0.05$, $P<0.01$).

Table 1. Mean live weight (MLW), weekly live weight ıncrease (LWI), feed conversion rates (FCR), cumulative feed consumption (CFC) (g). of pheasants.

Çizelge 1. Sülünlerin ortalama canlı ağırlıkları, haftalık canlı ağırlık artışları, yemden yararlanma oranları, eklemeli yem tüketimleri (g).

	Breeding system					Breeding system			Breeding system					
	Free range system		Cage system			Free range system	Cage system		Free range system		Cage system			
	LW		LW			LWI	LWI		FCR	CFC	FCR	CFC		
Week	n	$\bar{x} \pm S\bar{x}$	n	$\bar{x} \pm S\bar{x}$	P	$\bar{X}$	$\bar{X}$	P	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	P	P
2	90	57±0.9	90	64±1.4	-	-	-	-	-	-	-	-	-	-
3	87	94± 1.7	89	106±2.8	-	37	42.8	-	6.7	366	6.8	373	-	-
4	87	156±3.1	88	173±3.7	-	61	66.3	-	4.6	576	4.2	578	-	-
5	86	229±4.3	88	239±4.5	-	73	67.1	-	4.9	736	5.7	777	-	-
6	85	322±5.3	87	331±6.2	-	94	93.0	-	4.2	954	4.9	984	-	-
7	85	379±7.7	87	394±7.3	*	67	62.6	-	4.6	1246	5.0	1349	-	-
8	84	457±8.3	86	474±8.5	*	70	79.2	-	4.7	1576	5.3	1636	-	-
9	83	536±9.1	86	575±9.8	*	78	101.4	*	4.9	1886	5.1	1942	-	-
10	83	613±10.1	86	631±10.4	*	78	56.4	*	5.0	2254	5.5	2313	-	-
11	82	683±11.6	86	721±12.6	*	71	89.6	*	5.4	2677	5.7	2742	-	-
12	82	736±12.4	85	766±14.3	*	53	44.3	-	5.7	3026	5.7	3146	-	-
13	81	795±13.5	85	836±15.4	*	61	69.8	-	6.0	3415	5.8	3525	-	-
14	81	847±14.6	84	895±17.3	*	52	58.7	-	6.0	3743	6.0	3855	-	-
15	81	891±16.4	84	939±20.6	*	46	44.6	-	6.1	4097	6.2	4141	-	-
16	81	965±19.8	84	999±24.7	*	74	59.5	*	6.3	4466	6.5	4576	-	-

*: P<0.05

Table 2. Weekly live weight (LW) and live weight increase (LWI) (g) of female and male pheasants.

Çizelge 2. Dişi ve erkek sülünlerin haftalık canlı ağırlıkları (LW) ve canlı ağırlık artışları (LWI) (g).

	Breeding system (LW)										Breeding system (LWI)					
	Free range system				Cage system				P		Free range system		Cage system		P	
	Female		Male		Female		Male		S		Female	Male	Female	Male	S	
Week	n	$\bar{x} \pm S\bar{x}$	n	$\bar{x} \pm S\bar{x}$	n	$\bar{x} \pm S\bar{x}$	n	$\bar{x} \pm S\bar{x}$	FRS	CS	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	FRS	CS
2	60	56 ±0.8	30	59±0.9	60	61 ±0.7	30	65±0.9	-	-	-	-	-	-	-	-
3	57	92.±1.5	30	97±1.7	59	101±1.6	30	110±1.7	-	-	36	37	39	45	-	-
4	57	148±3.2	30	164± 4.2	58	161±3.8	30	183± 3.9	-	-	55	67	61	72	-	-
5	56	208±4.9	30	249±5.2	58	214±5.1	30	262±4.5	*	*	60	84	52	78	*	*
6	56	293±5.8	29	350±6.3	57	297±6.2	30	366±5.4	*	*	84	101	83	104	*	*
7	56	344±7.0	29	433 ±7.4	57	345±7.9	30	445±6.2	**	**	50	82	49	78	**	**
8	56	416±7.7	28	500±8.2	57	424±8.1	29	524±7.4	**	**	73	66	78	80	-	-
9	55	488±9.1	28	585±9.6	57	522±9.3	29	628±8.5	**	**	71	84	98	104	-	-
10	55	568±11.0	28	658±10.2	57	579±9.9	29	684±10.0	**	**	79	70	57	57	-	-
11	54	637±11.9	28	730±11.5	57	644±12.5	29	763±10.2	**	**	69	70	67	79	-	-
12	54	687±12.7	28	791±12.8	57	707±13.0	28	823±11.5	**	**	50	62	64	61	-	-
13	53	736±13.7	28	855±13.2	57	775±14.5	28	895± 12.4	**	**	48	65	68	72	*	-
14	53	787±14.8	28	911±14.6	56	828±15.4	28	960±13.7	**	**	51	57	54	66	-	-
15	53	827±16.2	28	955±15.8	56	877±16.7	28	1003±14.5	**	**	41	44	49	44	-	-
16	53	886±17.6	28	1044±17.3	56	918±17.3	28	1078±16.2	**	**	59	88	41	76	**	**

*: P<0.05, **: P<0.01, FRS: Free range system CS: Cage system S: Sexuality.

While male and female pheasants bred with free range system exhibited live weight increases between 37.13 g - 100.97 g and 35.84 g - 83.78 g, live weights of male and female pheasants bred with cage system increased between 45.27 g - 103.69 g and 39.12 g - 97.86 g. The differences in mean live weight increases found between the males and females of the free range system in weeks 5, 6, 7, 13 and 16, and the males and females of the cage system in weeks 5, 6, 7 and 16 were found out to be statistically significant (P<0.05, P<0.01).

Within the scope of the study, the amount of consumed feed were calculated on cumulative basis, and while it was determined that the 16 weeks cumulative feed consumption per pheasant was 4465.59 g in free range system, it was 4575.77 g in cage system. Feed conversion rates for pheasants bred with free range and cage systems at 16 weeks of age were determined to be respectively 6.38 and 6.53. No significant difference could be found between the two groups in terms of cumulative feed consumption and feed conversion rates.

4. Discussion

Concerning the weekly live weight values in both systems under intensive conditions, cage system exhibited significant advantage over free range system from week 7 to week 16

(P<0.05). It was determined that the effects of breeding systems (free range and cage systems) on the weekly mean live weight values significantly increase with the increasing age (P<0.05).

In terms of mean live weight values, males exhibited significant advantages over females in both systems from week 5 to week 16 (P<0.05, P<0.01).

While being lower than the values obtained by Sarıca and Karaçay (1994) in consequence of 14 weeks of fattening, by Slaught et al. (1987) for 14 weeks old males and females, and by Nowland (2007) after a fattening period of 16 weeks, and higher than those reported by Woodard et al. (1979) for 14 weeks old males and females, by Tepeli et al. (1999) for weeks 14, 16 and 18; the weekly mean live weight values obtained in the present study for free range and cage systems, for mixed gender and separately for male and female pheasants were found out to be similar to the values Çetin et al. (1997) obtained at the end of 18 weeks of fattening. The differences in live weights can be associated with any variety in the factors of lighting schedules, genotype, age, care, and feeding (Woodard et al. 1979; Mashaly et al. 1983; Slaugh et al. 1987; Moore and Krueger 1989; Tepeli et al. 1999). Data gathered by working on hatchlings from eggs obtained from pheasant flocks subjected to selection for meat yield purposes are surely expected to be different than those collected by studying pheasant chicks that are not subjected to any selection process as it was the case in our study. On the other hand, another possible reason for the live weights obtained in our study to be different than those in the literature (Slaugh et al. 1987; Sarıca and Karaçay 1994; Nowland, 2007), is considered as the differences in breeding.

The differences in mean live weight increases between the pheasants bred in free range and cage systems in weeks 9, 10, 11 and 16 were determined to be statistically significant (P<0.05). The weekly mean live weight increases determined in both systems in the period of 16 weeks were found out to be similar to the mean live weight increases reported in some studies (Woodard et al. 1979; Sarıca and Karaçay 1994; Çetin et al. 1997; Tepeli et al. 1999).

Considering the feed consumptions of the free range and cage systems under intensive conditions, although being not statistically significant, it is observed that the pheasants in the cage group consumed more. This can be associated with the fact that the feeding process in cage system is performed on a more regular and healthy basis.

The highest feed conversion values for both systems were determined to be in 2 weeks of age. No significant difference was found between the feed conversion values of free range and cage systems in any week of age.

The cumulative feed consumption values determined for both systems in the study are lower than the values reported around 5 - 6 kg in several other studies (NCR 1984; Kalous and Stradal 1989; Sarıca and Karaçay 1994; Çetin et al. 1997; Nowland 2007). On the other hand, the feed conversion values determined for the two systems is higher than those reported in some studies (Slaugh et al. 1987; Sarıca and Karaçay 1994; Çetin et al. 1997) for pheasants between 14 and 18 weeks of age, and lower than the feed conversion values Kalous and Stradal (1989) reported for 18 weeks old male and female pheasants.

Being highly emphasized parameters in pheasant breeding as well as other areas of livestock breeding, due to their economic significance, feed consumption and feed conversion values are also affected by factors such as ambient temperature and the energy level of the feed, in addition to the age, gender, live weights and health status of the animals being bred (Woodard et al. 1979; Mashaly et al. 1983; Slaugh et al. 1987; Moore and Krueger 1989; Tepeli et al. 1999). These factors can be set forth as the reason for the values obtained in the present study to differ from those reported in the literature.

It was determined that breeding systems (free range and cage systems) are effective on the mean live weights, weekly live weight increases, feed consumption and feed conversion values of pheasants bred under intensive conditions, and that in terms of mean live weight and mean live weight increase cage systems are significantly more advantageous over free range systems (P<0.05), and males exhibit better values than females at varying levels of significance (P<0.05, P<0.01).

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