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SOME EGG PRODUCTION CHARACTERISTICS and PHENOTYPIC CORRELATIONS in JAPANESE QUAILS (*Coturnix coturnix japonica*)

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Japon bıldırcınlarında (*Coturnix coturnix japonica*) yumurta verimine ilişkin özellikler ve aralarındaki ilişkiler

ÖZET

Bu araştırma Japon bıldırcınlarında (*Coturnix coturnix japonica*) cinsel olgunluk yaşı ve ağırlığı, 210 günlük yaşa kadar gerçekleşen yumurta verimi ve klaç düzeni bakımından tanımlayıcı değerlerin elde edilmesi ve incelenen özellikler arasındaki ilişkilerin belirlenmesi amacıyla gerçekleştirilmiştir. Beş haftalık toplam 150 dişi bıldırcın, hayvan başına 300 cm^2 yerleşim alanı olacak şekilde bireysel kafeslere yerleştirilmişler ve cinsel olgunluk ağırlığı (COA), cinsel olgunluk yaşı (COY), ilk on yumurta ağırlığı (İOYA), dişi-gün yumurta verimi (YV), ortalama klaç uzunluğu (OKU) ve ortalama klaç aralığı (OKA) belirlenmiştir. Sonuç olarak, denemede kullanılan hayvanların cinsel olgunluğa ortalama olarak 47,67 günde ve 255,35 g canlı ağırlıkta ulaştıkları, İOYA'nın 11,28 g, 210 günlük yaşa kadar YV'nin ise hayvan başına 136,86 adet olduğu belirlenmiştir. OKU ve OKA değerleri ise sırasıyla 7,61 ve 1,42 gün olarak belirlenmiştir. COA ile COY, COA ile İOYA, COY ile İOYA, COY ile YV, İOYA ile YV, YV ile OKU ve YV ile OKA arasında sırasıyla +0,487 (p<0,001), +0,451 (p<0,001), +0,359 (p<0,001), -0,243 (p<0,01), -0,193 (p<0,05), +0,617 (p<0,001) ve -0,675 (p<0,001) düzeylerinde korelasyon bulunduğu gözlenmiştir. Sürüde gerçekleşen % 5, % 50 ve pik verim yaşı, günlük en yüksek pik verim randımanı ile 210. gün itibarıyla yumurta verim randımanı sırasıyla 41 gün, 47 gün, 65 gün, % 96,95 ve % 65,65 olarak belirlenmiştir. Artan OKU ve kısalan OAU doğal olarak YV'nin artmasına neden olmuştur. OKU ile YV ve OKA ile YV arasında sırasıyla +0,617 ve -0,675 düzeylerinde ve istatistiki olarak önemli (p<0,001) korelasyon olduğu belirlenmiştir.

ANAHTAR KELİMELER: Bıldırcın, cinsel olgunluk yaşı, cinsel olgunluk ağırlığı, klaç, yumurta verimi

SUMMARY

This research was conducted to determine descriptive figures and relations among the age and weight at sexual maturity, clutch pattern and egg production until 210 d of age in Japanese quails (*Coturnix coturnix japonica*). A total of 150 Japanese quail females were placed in individual cages (with a 300 cm^2/bird stocking density) at five wk of age for determining relations between weight at sexual maturity (WSM), age at sexual maturity (ASM), first ten egg weight (FTEW), quail-hen day egg production (HDEP), average clutch length (ACL) and average pause length (APL). It was revealed that experimental female quails had reached sexual maturity at 47.67 d and 255.35 g body weight. FTEW was determined as 11.28 g and HDEP at 210 d of age was determined 136.86 eggs per bird. ACL and APL were determined as 7.61 and 1.42 d, respectively. Statistically significant correlation coefficients between WSM and ASM, WSM and FTEW, ASM and FTEW, ASM and HDEP, FTEW and HDEP, HDEP and ACL, HDEP and APL were found as +0.487 (p<0.001), +0.451 (p<0.001), +0.359 (p<0.001), -0.243 (p<0.01), -0.193 (p<0.05), +0.617 (p<0.001) and -0.675 (p<0.001), respectively. It was determined age at 5 %, 50 % and peak egg production, egg production at peak (daily basis) and 210th das 41 d, 47 d, 65 d, 96.95% and 65.65%, respectively. As a normal result of increased ACL and decreased APL caused increasing HDEP. It was determined that ACL and APL were highly and significantly (p<0.001) correlated with HDEP (+0.617 and -0.675, respectively).

KEY WORDS: Quail, age at sexual maturity, weight at sexual maturity, clutch, egg production

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INTRODUCTION

As well known, in poultry species consecutively ovipositions were called as clutch. In wild life and/or non-domesticated poultry species, adult females inherently oviposit a few eggs and then brood them. Broodiness is an unwilling case in modern poultry production, cause of broody females discontinue to oviposition. Despite of the culling broody female breeders for many generations in poultry species, broodiness was not completely eliminated from modern poultry flocks.

Theoretically, one egg per day is supposed to be the biological limit of egg production for some poultry species with one developed ovary and one oviduct. This assumption is due to the fact that it takes about 24 h for a yolk to pass through the oviduct for albumin and shell formation before being laid as a complete egg. Furthermore, a new ovulation will not occur before ovipositions of the former egg (Herstad et al.1997). These facts reveal that in commercial egg production, clutch size and ovipositional pauses are vital to determine cumulative egg production of an avian female within her lifespan.

Sachdev and Ahuja (1986) reported that egg type Japanese quails reached sexual maturity at 65.56 d and 181-200 g body weight, and produced 205.7 eggs at 50 wk of age. Also Sreenivasaiah and Joshi (1988) reported that Japanese quails reached sexual maturity at 122.9-128.2 g body weight, and they found first ten egg weights mean as 8.99-9.72 g.

Prabakaran et al. (1992) reported that egg production in 24 wk of age Japanese quails varied between 49.15-79.29 %.

Koçak et al. (1995) reported that Japanese quails reached sexual maturity at 58.01 d and 202.23 g body weight. Same researchers also reported first ten egg weight and hen day egg production at 25 wk of age 10.44 g and 83.97 eggs, respectively. They determined correlation coefficients between age at sexual maturity (ASM) and weight at sexual maturity (WSM), ASM and hen day egg production (HDEP), ASM and fist ten egg weight (FTEW), WSM and HDEP, WSM and FTEW, HDEP and FTEW as +0.29, -0.461, -0.187, -0.073, +0.049 and +0.041, respectively.

It was reported there is a wide range individual variation for clutch size and aging that depending on egg production cycle resulted increased clutch size in quails (Sonoda et al. 1985). Wilson et al. (1983) reported average clutch size in Bobwhite quails as 4.6 eggs. Agreey et al. (1993) reported no evident correlation between clutch length and ovipositional pauses.

This research was conducted to determine descriptive figures and relations between age and weight at sexual maturity, clutch pattern and egg production until 210 d of age in Japanese quails (*Coturnix coturnix japonica*).

MATERIALS and METHODS

In this research totally 150 Japanese quail hens were placed in individual cages (with a 300 cm^2/bird stocking density) at five wk of age for determining relations between weight at sexual maturity (WSM), age at sexual maturity (ASM), first ten egg weight (FTEW), quail-hen day egg production (HDEP), average clutch length (ACL) and average pause length (APL) in Süleyman Demirel University, Faculty of Agriculture quail production house. No data were recorded until quails placed to individual cages. All the birds were fed ad-libitum with a cage layer diet (calculated values are 17.5 % CP and 2700 Kcal/kg ME).

At the age of the first eggs were oviposited, birds were weighed to determine WSM. It was also determined; first ten egg weight and quail-hen day egg production until 210 d of age. Clutch and pause (intervals between ovipositions) patterns during egg production cycle were determined by recording daily oviposition pattern. It was used an electronic scale (0.1 g sensitivity) to determine birds' weights at sexual maturity and egg weights. Collected data from 128 quail hens (22 females were excepted from analysis due to early death, erratic ovipositions and culling) were analyzed by Minitab for Windows release 13 statistical software (Anonymous 2000). Correlation coefficients between examined traits and detailed descriptive statistics were calculated (Düzgüneş et al. 1987).

RESULTS and DISCUSSION

Calculated descriptive statistics for examined traits and phenotypic correlation coefficients between the traits were given in Table 1 and Table 2, respectively.

Table 1. Descriptive Statistics of Examined Traits

	n	Mean	St. Er. of mean	Min.	Max.	CV, %
WSM, g	128	255.35	2.49	188.6	316.3	11.06
ASM, d	128	47.67	0.47	36	65	11.03
FTEW, g	128	11.28	0.09	8.69	14.93	9.39
HDEP, egg count	128	136.86	1.05	73	154	8.71
ACL, d	128	7.61	0.18	2.61	14	27.29
APL, d	128	1.42	0.04	1	3.46	34.20

Table 2. Correlation Coefficients Among The Examined Traits

	WSM	ASM	FTEW	HDEP	ACL
ASM	0.487***				
FTEW	0.451***	0.359***			
HDEP	-0.107	-0.243**	-0.193*		
ACL	0.009	0.015	-0.080	0.617***	
APL	-0.043	0.053	0.131	-0.675***	-0.120

*: p<0.05, **: p<0.01, ***: p<0.001

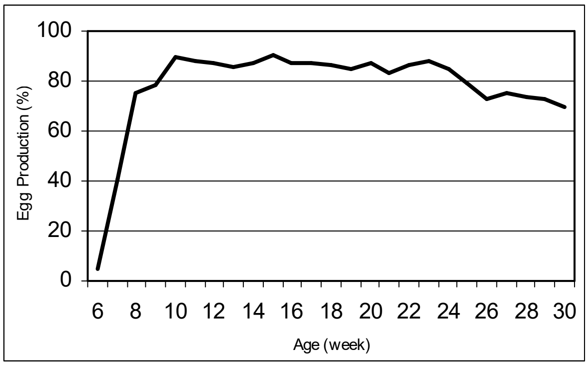

Figure 1. Weekly Basis Egg Production Curve

When the descriptive statistics were dissected, it was revealed that experimental female quails had reached sexual maturity at 47.67 d and 255.35 g body weight, averagely. FTEW was determined as 11.28 g and HDEP at 210 d of age was determined 136.86 eggs per bird. ACL and APL were determined as 7.61 and 1.42 d, respectively. Results reveal that the quail hens reached sexual maturity earlier and heavier, first ten egg weight and quail hen day egg production were higher than other researchers' reports (Sachdev and Ahuja 1986, Sreenivasaiah and Joshi 1988, Prabakaran et al. 1992, Koçak et al. 1995). This case may be presumably dependent to genotypic difference and/or year (generation) related genetic improvement.

The highest coefficients of variation were observed for APL and ACL, respectively. It means that there is a wide range individual variation and agreed with the report of Sonoda et al. (1985).

According to the correlation analysis results, some examined traits were highly correlated. Statistically significant correlation coefficients between WSM and ASM, WSM and FTEW, ASM and FTEW, ASM and HDEP, FTEW and HDEP, HDEP and ACL, HDEP and APL were found as +0.487 ($p<0.001$), +0.451 ($p<0.001$), +0.359 ($p<0.001$), -0.243 ($p<0.01$), -0.193 ($p<0.05$), +0.617 ($p<0.001$) and -0.675 ($p<0.001$), respectively. These results generally agreed with the report of Koçak et al. (1995). However, while they found phenotypic correlation coefficients between ASM and FTEW, FTEW and HDEP as -0.187 and +0.041, it was found in the opposite direction that phenotypic correlation coefficients for these traits in this research were +0.359 and -0.193, respectively. Nevertheless, it is reasonable that delayed sexual maturity caused heavier eggs laid, and birds laid lighter FTEW means they presumably reached sexual maturity earlier and they will expectably produce more eggs within a definite period. Despite phenotypic correlation coefficient between WSM and FTEW in the same direction, Koçak et al. (1995) reported a lower correlation between these traits than we calculated (+0.041 vs. +0.451). It is also reasonable that females reached the sexual maturity with a heavier body weight will cause heavier FTEW. In general, it was observed that ACL and APL were poorly and insignificantly correlated with other examined traits. However, ACL and APL were highly and significantly correlated with HDEP (+0.617 and -0.675, respectively). These results are also reasonable that increasing clutch size and decreasing laying pauses will expectably cause increased egg production.

According to the research results that not given above tables, it was determined age at 5 %, 50 % and peak egg production, egg production at peak (daily basis) and 210th d as 41 d, 47 d, 65 d, 96.95% and 65.65%, respectively. Weekly basis egg production curve was shown in Figure 1. It was observed that this curve resembled the commonly observed egg production curve in poultry flocks.

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