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## Egg Production and Some Hatchability Characteristics of Rock Partridges (*Alectoris graeca*) Mated at Different Rates

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**Abstract:** This study was carried out to determine the hatchability characteristics of rock partridges mated at the ratio of one male to three females, one male to four females and one male to five females. Egg production/hen (%), fertile eggs/hen, fertility, hatchability and hatchability of fertile eggs of one male to three females, one male to four females and one male to five females groups were determined to be 40.53, 48.79 and 44.85%; 38.94, 42.16 and 38.30%; 88.37, 81.73 and 81.95%; 69.70, 65.47 and 66.50% and 78.97, 79.78 and 81.16%, respectively. There were significant differences between total egg production/hen and the fertility values of the groups ( $P < 0.05$ ), but there were no significant effects for the other hatchability traits. It was determined that the number of females (from three to five) mated to a male had no effect on the hatchability characteristics of the rock partridge except for fertility; thus, this finding indicates that it is not necessary to keep extra breeding males.

**Key Words:** Partridge, male : female ratio, egg production, hatchability.

### Farklı Oranlarda Çiftleştirilen Kaya Kekliklerinde (*Alectoris graeca*) Yumurta Verimi ve Bazı Kuluçka Özellikleri

**Özet:** Bu araştırmada erkek:dişi oranı 1:3, 1:4 ve 1:5 olarak belirlenmiş Kaya kekliklerinin yumurta verimleri ve bazı kuluçka özellikleri incelenmiştir. Erkek:dişi oranı 1:3, 1:4 ve 1:5 olan gruplarda yumurta verimi (%), fertil yumurta/keklik oranı, fertilitite, kuluçka randımanı ve çıkım oranı değerleri sırasıyla; % 40.53, 48.79 ve 44.85, % 38.94, 42.16 ve 38.30; % 88.37, 81.73 ve 81.95; % 69.70, 65.47 ve 66.50 ile % 78.97, 79.78 ve 81.16 olarak tespit edilmiştir. Grupların yumurta verimleri ve fertilitite oranları arasındaki farklılık önemli ( $P < 0.05$ ) bulunurken; diğer özellikler arasında istatistiki bir farklılık bulunamamıştır. Araştırmanın sonucunda Kaya kekliklerinde bir erkekle çiftleştirilen dişi sayısının artışı fertilitite değerini olumsuz yönde etkilemesine rağmen, kuluçka verimlerini etkilemediği, dolayısıyla fazla sayıda erkek kekliğin damızlığa ayrılmasına gerek olmadığı sonucuna varılmıştır.

**Anahtar Sözcükler:** Keklik, erkek:dişi oranı, yumurta verimi, kuluçka özellikleri.

### Introduction

Partridge breeding is mostly done to provide birds for hunting. However, breeding partridges for meat has become widespread in recent years. Knowing the ideal type of housing and the optimum ratio of males to females is very important for achieving greater profitability in a partridge breeding project. While housing is an important factor in the breeding of partridges, another critical factor in achieving greater profitability is the optimum ratio of males to females that allows for a reduction in feed costs and still maintains an acceptable level of fertility and hatchability.

Rock partridges (*Alectoris graeca*) are a preferred breed for intensive breeding programs because they are polygamous. For this reason, the breed is superior to

chukar partridges (*Alectoris chukar*), which has a wider natural distribution in Turkey (1).

Chukar partridges' first laying age was determined to be around 34 weeks of age (2). Egg yields of chukar partridges exposed to selection for increasing egg production and its control were found to be 65 and 49.96 (3). However, egg production was 11.20 and 38.40 respectively for chukar partridges reared in cages and in a room (2). In addition, this value was 50.36 in rock partridges under daylight conditions (4). Egg production was 21.7-67.1 for rock partridges in different age groups (5).

Reported fertility values for the rock partridge vary between 14.4 and 93.48% (1,4-7). However, the values for chukar partridges mated in cages one by one and in

free range (room) breeding systems were found to be between 57.14 and 89.06% (2).

While the hatchability values of rock partridges were reported to be 62.5%, 63.5 to 79.0%, 61.5 to 77.8%, 85.31%, 87.96 to 75.92% and 77.11% in various studies (1,4-8), the hatchability values of chukar partridges were determined to be 53.57 to 81.25% (2). When the eggs were stored for 1 to 7, 8 to 14, 15 to 21 and 22 to 28 days the hatchability of rock partridges was found to be 60.2, 62.8, 62.1 and 56.3%, respectively (8). In the same study, when turning was applied to stored eggs, the values were determined to be 57.1, 74.4, 62.1 and 56.3%, respectively. Partridge eggs should be stored for a 15-day period (9).

The hatchability of fertile rock partridge eggs was reported to be 88.04, 92.79 to 97.05 and 80.97 to 82.49% (1,7,8). However, the values for chukar partridges were reported to be 91.11 and 93.75% (2).

Egg production and some hatchability characteristics of rock partridges mated at different rates were investigated in this study.

**Materials and Methods**

This research was carried out at the Veterinary Faculty Farm of Selçuk University in Turkey. Rock partridges (*Alectoris graeca*) reared at this farm were used as subjects in the study.

Partridges were mated in three-floor cages, each having four units. Breeder pen dimensions were 30 cm x 60 cm x 40 cm. On the first floor, 16 partridges were placed with one male to three females in each of the four units. In the second floor cages, 20 partridges were put in the ratio of one male to four females. A total of 24 partridges were placed in the ratio of one male to five

females in the units of third floor. All partridges were put into their cages randomly.

Initially, the partridges were exposed to a 12-hour light period. The light period was increased one hour every week until it was fixed at 16 hours per day. The partridges received a 24% crude protein ration during the mating period.

The eggs obtained from the partridges over the 16 weeks were put into an incubator every 15 days. After the incubation period, which is 24 days for partridges, the number of chicks and the number of eggs not hatched were recorded. These unhatched eggs were then checked for fertility.

The differences among the three group means were analysed by one-way analysis of variance for egg production and hatchability characteristics. Significant differences among means were tested by Duncan's multiple range test (10).

**Results**

Total eggs/hen (%), fertile eggs/hen, fertility, hatchability, and hatchability of the fertile eggs are shown in the Table.

There were significant differences in eggs/hen means between the 1:3 and 1:4 groups ( $P < 0.05$ ). The fertility rate of the 1:3 group was statistically significant ( $P < 0.05$ ) compared with the others, but there were no significant differences among the group means in terms of fertile eggs/hen, hatchability, and hatchability of the fertile eggs.

**Discussion**

The laying period of all groups lasted 16 weeks. There were significant differences in average eggs/hen between

Table. Egg Production and Hatchability Characteristics of Rock Partridges Mated at Different Rates.

Groups	Eggs/hen (%) $\bar{X} \pm S\bar{X}$	Fertile eggs /hen $\bar{X}$	Fertility (%) $\bar{X} \pm S\bar{X}$	Hatchability (%) $\bar{X} \pm S\bar{X}$	Hatchability of the fertile eggs (%) $\bar{X} \pm S\bar{X}$
1:3	40.53 ± 1.83 b	38.94	88.37 ± 2.05 a	69.70 ± 3.59	78.97 ± 3.94
1:4	48.79 ± 2.00 a	42.16	81.73 ± 1.55 b	65.47 ± 3.70	79.78 ± 3.70
1:5	44.85 ± 1.85 ab	38.30	81.95 ± 1.10 b	66.50 ± 3.70	81.16 ± 2.83

a, b: Means in same column having different letters are significant ( $P < 0.05$ ).

the 1:3 and 1:4 groups ( $P < 0.05$ ). The difference may be attributed to uncontrolled environmental conditions. Average egg production obtained from the groups was similar to that in previous studies (1,3-7).

The fertility rate of the 1:3 group was 88.54% and was statistically significant ( $P < 0.05$ ) compared with the others. But average fertile eggs/hen of the groups were similar. The fertility values of all the groups found in this study were in the same range as those in previous studies on rock partridges, which vary from 14.4 to 93.48% (1,4-7). However, this value varies between 57.14 and 89.06% for chukar partridges (2).

The hatchability values of the groups were higher than those reported by Woodard and Morzenti (8), but were similar to those reported by Woodard et al. (5) and Woodard et al. (6). However, these values were lower than those reported by Kırıkçı et al. (1) and Çetin et al.

(7). Although the material of this study and of the studies mentioned above was obtained from the same flock, the low hatchability can be attributed to different housing. On the other hand, these values were higher than the hatchability values of chukar partridges mated in pairs in single cages but lower than the values obtained from a free mating system in a room (2).

The average hatchability values of the fertile eggs in this study were similar among the groups. These values were lower than those reported in various studies (1,2,8) but were similar to those in one study (7).

In conclusion, it is recommended that a mating ratio of one male to four females be used for partridges because the fertile eggs/hen of the 1:4 group were higher than those of the others. Therefore, the extra males that might have been kept for breeding purposes can be slaughtered.

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