

The Effect of Clutch Size on Egg and Hatchling Mass and Measurements in the Common Coot *Fulica atra*

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Abstract

Studies were conducted in 2008 on Poyrazlar Lake, located in NW Turkey. The clutch size of the Common Coot *Fulica atra* varied from 3 to 14. The mean clutch size was 6.6 ± 0.34 (N=23 clutches). The clutch size increased with the increase of nest distance from the edge of the Lake. As the clutch size increased, the average egg mass decreased. With the increase of clutch size, the egg diameter and egg perimeter slightly increased but, there was no correlation between these parameters. Out of 66 marked and measured eggs, 54 (81.8%) hatched, 5 (7.6%) were unfertile, and 7 (10.6%) were lost. There was a positive correlation between the egg mass and hatchling mass, hatchling length, beak length, and leg length.

Keywords: Breeding biology, clutch size, common coot, hatching success, Poyrazlar Lake

Sakar Meke *Fulica atra*'da Yumurta Sayısının Yumurta ve Yavru Ağırlığı ile Boyutları Üzerine Etkisi Özet

Çalışmalar 2008 yılında Türkiye'nin kuzeybatısında yer alan limnetik bir göl olan Poyrazlar Gölü'nde yapılmıştır. Sakar meke *Fulica atra*'nın yumurta sayısı 3 ile 14 arasında değişir. Ortalama yumurta sayısı 6.6 ± 0.34 (N=23 yuva) idi. Yuvaların kıyıdan uzaklığı arttıkça yuvadaki yumurta sayısı arttı. Yumurta sayısı artarken ortalama yumurta ağırlığı azaldı. Yumurta sayısındaki artış ile yumurtanın çapı ve çevre uzunluğu biraz artsada bu parameteler arasında bir korelasyon yoktu. İşaretlediğimiz 66 yumurtanın 54 (% 81,8)'ünden yavru çıktı, 5 (% 7,6)'sı kısır ve 7 (% 10,6)'sı kayboldu. Yumurta büyüklüğü ile yavru ağırlığı, yavru boyu, gaga uzunluğu ve bacak uzunluğu arasında pozitif bir korelasyon vardı.

Anahtar Kelimeler: Poyrazlar Gölü, sakar meke, üreme biyolojisi, yavru çıkma başarısı, yumurta sayısı

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INTRODUCTION

The correlations between the clutch size and other variables have been extensively investigated in various bird species (Kopij 1997, 1998, 1999a, 1999b, 2004, Kopij and De Swardt 1998, Uzun et al. 2008). In some water birds a positive correlation has been shown between the clutch size and the nest location (Kopij 1997), geographical location (Uzun et al. 2008) and other parameters (Humphrey et al. 1993). In the Common Coot *Fulica atra*, Bezzel (1967) and Samraoui and Samraoui (2007) have related the clutch size to the time of breeding, while Jankowski (1983) studied the year-to-year variation in the clutch size. In the study we have tested the

correlation between the clutch size, egg mass, and egg dimensions and also measured the clutch size and chick mass. These correlation in water birds in large has been rather poorly investigated.

MATERIAL AND METHODS

The study was conducted at Poyrazlar Lake, which is located 6 km NE of Sakarya city center, in NW Turkey (40°50'N, 30°28'E). The Common Coots built their nests on emerged water vegetation composed of the following species: the Sea Club-rush *Scirpus maritimus* (45%), Common Spike-rush *Eleocharis palustris* (30%) and Reed *Phragmites australis* (25%). All nests were located in clumps of Sea Club-rush vegetation height increased to 128 cm, while

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the water depth decreased to 20cm during the breeding period.

The study was conducted from March-August 2008. Between April and June, surveys were conducted each day, while in March, July, and August - once a week. In total, the lake was visited 59 times during this period and approximately 295 hours were spent on observation. Nests were searched from a boat, when sedge vegetation was short and sparse at the beginning of the breeding season. Later, surveys were conducted in the water, wearing boots covering the waist. Each nest found was marked with a number, while eggs were marked with a letter (for instance 1A: the first egg in the first nest, 2B: the second egg in the second nest, etc.). Letters were written on the eggs with an ink pen. Numbers were written on a small metal table and was attached to each nest. The same registration number of the egg was given to the nestling hatched from the egg. Egg dimensions such as linear, perimeter, diameter, and linear depending on the diameter were measured in nine nests an electronic scale for egg weight, and calipers for eggs measurements were also used. String was used for the horizontal and vertical measures of the egg perimeter.

RESULTS AND DISCUSSION

In Poyrazlar Lake, the first coot egg was laid on the 2nd of April 2008, the last one on the 26th of May 2008. Six of the 23 nests (26.1%) were built in April and the remaining 73.9% - in May. Incubation lasted from 23-25 days. The clutch size varied from 3 to 14 (Fig. 1). The mean clutch size was 6.6 ± 0.34 (N=23 clutches). The clutch size increased with the increase of nest distance from the edge of the lake ($r = -0.39$).

As the clutch size increased the average egg mass decreased ($r = -0.54$, Fig. 1). Egg length and perimeter decreased in a similar way ($r = -0.47$, Figure 2, 3). Such a relationship was recorded in a few passerine species, e.g. the Common Treecreeper *Certhia familiaris* (Enemar 1997) and Collared Flycatcher *Ficedula albicollis* (Cichon 1997).

With the increase of the clutch size, the egg diameter and egg perimeter slightly increased, although there is no correlation between these parameters (Fig. 4, 5). No consistent, or only minor correlations were recorded in a few passerine species which were investigated in Europe (Ojanen et al. 1978, Enemar 1997). This may indicate that the

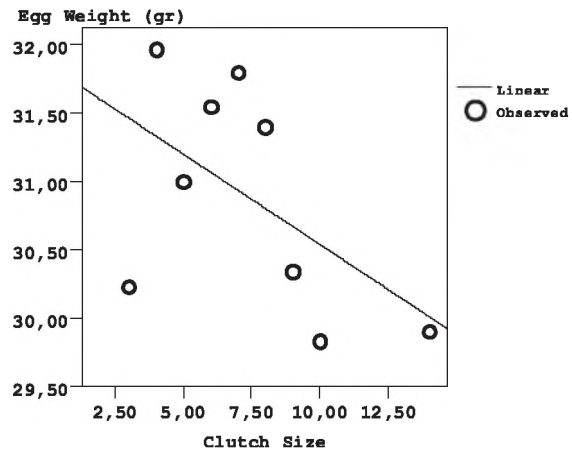


Fig 1. The Correlation between egg weight and clutch size.

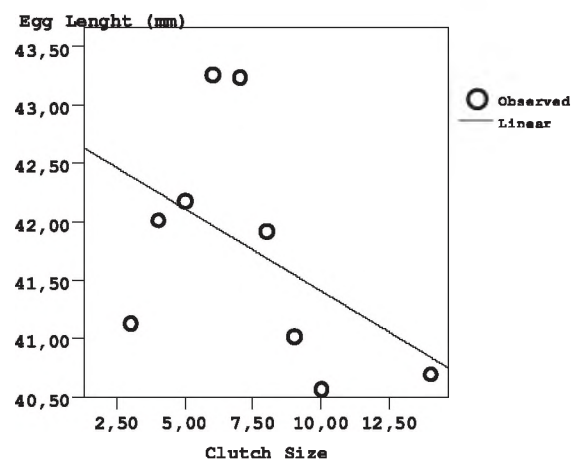


Fig 2. The Correlation between egg length and clutch size.

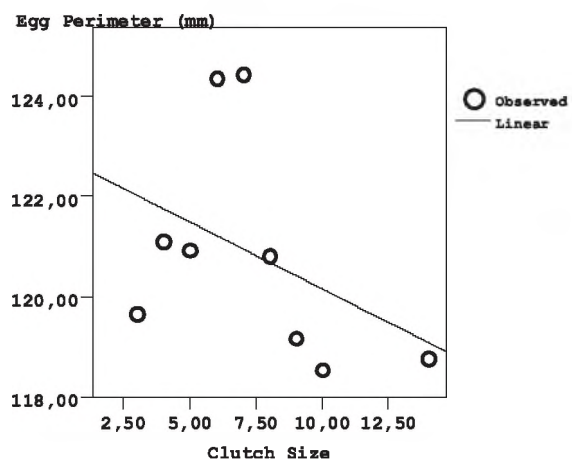


Fig 3. The Correlation between egg perimeter and clutch size.

trade-off between the clutch size and egg measurements has no adaptive value for birds.

Weight and measurements of the 66 eggs are listed in Table 1. There was a correlation between

Table 1. Egg and hatchling mass [g] and measurements [mm] at the common coot.

Parameters	Mean	SD	Min.	Max.
Egg				
Weight	30.9	0.18	29.3	34.4
Length	41.6	0.15	40.0	43.5
Diameter	29.2	0.06	28.4	30.0
Horizontal parameter	120.5	0.33	118.0	124.3
Vertical parameter	102.6	0.10	102.1	103.6
Hatchling				
Weight	21.8	0.02	21.7	21.9
Beak length	7.1	0.04	7.0	7.5
Carpometacarpus aperture	95.3	0.15	95.0	96.8
Tarsometatarsus length	75.4	0.20	75.0	76.1

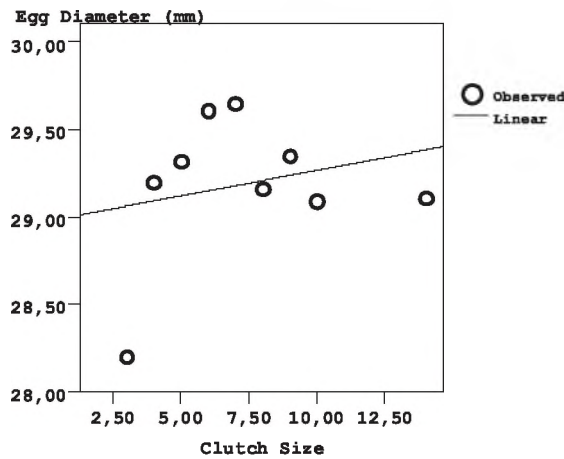


Fig 4. The correlation between egg diameter and clutch size.

egg mass and its height ($r=+0.81$), perimeter ($r=+0.81$), diameter ($r=+0.49$), and vertical perimeter ($r=+0.41$). However, the perimeter and length dependence on the mass, increased much faster in comparison to the diameter and vertical perimeter.

Out of 66 marked and measured eggs, 54 (81.8%) hatched; 5 (7.6%) were unfertile, and 7 (10.6%) were lost. Hatchling weights and dimensions are listed in Table 1. There was a positive correlation between the egg mass and hatchling mass ($r=+0.65$), hatchling length ($r=+0.68$), beak length ($r=+0.47$) and leg length ($r=+0.46$). The length and mass increased much

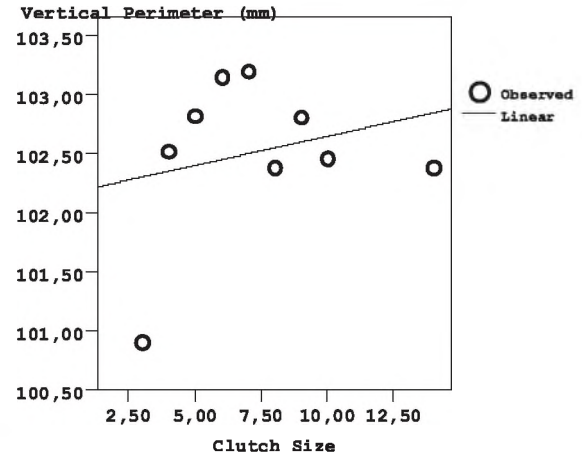


Fig 5. The correlation between vertical perimeter and clutch size.

faster than the other parameters.

The coot egg grows towards its length instead of its width. This is supported by the fact that the correlation between the length and weight is higher than between the length and width. Also, the eggs become smaller, as the clutch size increases. This may be caused by such factors as nest size, age of the female, and laying season. However, internal egg diameter does not change in relation to the clutch size. As a result, the species may minimize the eggs to make them fit into nest.

Brinkhof et al. (1993) reported that clutch size and egg weight in the Common Coot increased towards the end of the breeding season. The maximum mean egg weight was at nests with seven eggs, which was also the optimal clutch size. The minimum egg weight was in clutches of 10-14 eggs. In our study, all hatchlings had similar size, and their weight and measurements were not related to the egg size. Therefore, hatchling weight and size are not considered to be adaptive. Enemar (1997) has arrived at a similar conclusion while studying these relationships in the Common Treecreeper.

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