OSTRICH REPRODUCTION BEHAVIOR UNDER FARMING CONDITIONS

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Abstract. *This study describes the ostrich reproduction behavior under farming conditions, observed during reproduction seasons. Behavioral observations were made in an intensive farm from Romania who implemented the trio breeding system that includes a male and two ostrich females. The main categories of identified behavior at captive ostrich were: courtship, feeding behavior, drinking, lithophagia, walking, resting and aggression. Both the male and major female participating in incubation and chick care. Presence of eggs incited ostriches to sit in the nest, because of this all the eggs were collected and hatched artificially. In early spring, complex courtship rituals begin, performed by both males and females, who spend about 30% of their time. Resting behavior is observed when ostrich stopped moving from doing any activities. The time spent at rest was about 25%. Locomotion behavior includes walking and running. Walking (20%) was the most frequent locomotion behavior observed. Regarding the feeding behavior of the breeding families, the highest share were fed with green fodder about 7% while concentrated food was 6%. During the breeding period, the male is very protective and guards his territory and nest and the aggressiveness towards the caretaker is high 4% when collecting eggs, precautions must be taken during the collection of eggs and at males kept in neighboring shelters. Understanding the ostrich reproduction behavior under farming conditions is a vital step in improving their welfare.*

Keywords*: reproduction behavior, ostrich, captivity*

INTRODUCTION

In Romania, ostrich farming is constantly evolving. The raising ostriches in Europe and implicitly in Romania could be a success because this birds adapt quickly to any environment respecting the minimum maintenance conditions (DRAGAN ET AL, 2019, FERICEAN ET AL, 2013, FERICEAN 2017).

The ostrich (*Struthio camelus*) is the sole member of its order of birds and is the tallest and heaviest living bird (HALLAM, 1992; DAVIES, 2003, ALDEN ET AL., 1996). They are flightless birds and the only existent bird with two toes on each foot (KREIBICH, 1995, SCHALLER ET AL., 2011). It is the largest flightless, herbivorous bird, found in a range of open habitat types and is endemic to Africa (BROWN ET AL., 1982, DEGEN, 1989, HALLAM1992, BIRAU, 2013, CRONEY, 2016).

In the European countries, the egg laying season of the ostriches starts at around February and March (Fericean et al, 2013). Compared with the countries of the Northern hemisphere, the ostrich egg laying season begins earlier in Tunisia (essentially in January). According to the studies of MAGIGE (2008), MADEKUROZWA AND KIMARO (2006) the beginning of an ostrich sexual activity takes place mainly during increasing photo-periods.

The femeles of this species are called hens and male ostriches are called cocks. They like to live in a flock consisting of a dominant male and a dominant female and several other females. Lone males come and go during mating season. MUSHI, 2008, KREIBICH, 1995, CSERMELY, 2007, NEWBERRY, 2007).

MATERIAL AND METHODS

Observations on breeding families of ostrich were made on a farm in Tinca, Bihor County, Romania, where ostrich breeding takes place in an intensive system.

In our country, three systems of ostrich breeding are used: in pairs, trio and colony group. The farm where we made the observations in implemented the trio breeding system that includes a male and two ostrich females.

Observations was made for five consecutive days, at three different periods per day. Period 1 - from 7:00 a.m. to 10:30 p.m.; period 2 – from 11:00 a.m. to 2:30 p.m. and period 3 - from 3:00 p.m. to 6:30 p.m.

To produce the ethogram, a few behaviors were observed: Courtship consisting of sequences of movement, jumping and skipping or different steps, bows made by both males and females; Feeding included the ingesting of green food or concentrated food. Drinking - the action of consuming liquid; Pecking - the beak was used for environmental exploration and social contact; Dust-bathing is a maintenance behavior performed by a wide range of avian species, characterized by rolling or moving around in dust or sand; Resting is a behavior ostrich stopped moving from doing any activities and include sitting and standing; Standing - is a resting position when the birds feet are in one place with head raised; Sitting is a resting position in which the body weight is supported primarily by the buttocks in contact with the ground; Walking - the activity with one of the feet always in contact with the ground; Aggression - hissing or kicking directed at other birds or defensive behavior toward people.

RESULTS AND DISCUSSIONS

At the farm where the observations were made, the selection of partners was done naturally, without intervention, the families are formed by a trio that included a male and two ostrich females held together in a paddock (figure 1).

Fig. 1. Trio families - one male and two females

In early spring, complex courtship rituals begin, performed by both males and females, who spend about 30% of their time. This ritual includes actions to impress the partner, followed by dances, vocalizations and synchronized movements.

At male, the ritual is very obvious trying to impress their partner by swelling their feathers and performing meticulous movements of the head, neck and wings and they make noisy sounds (figure2). The female responds by flapping her wings and banging her beak.

In captivity the ostriches mature at around 2-3 years. The first laying of eggs contains a small number of eggs that are used only for consumption. In the following season the number of eggs increases and can be used for hatching.

Fig. 2. The courtship rituals

During mating rituals, the sounds emitted can be heard over long distances. The courtship ritual is initiated by the male and continued by the female, she sits down and allows the male to mount her from behind (figure 3).

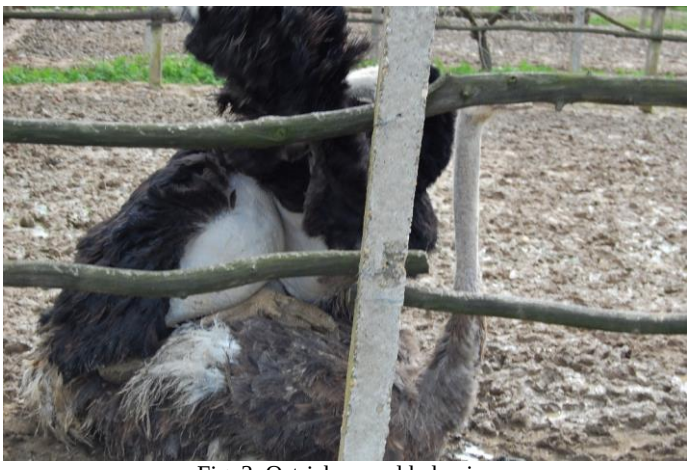

Fig. 3. Ostrich sexual behavior

Resting behavior is observed when the ostrich stopped moving from doing any activities. The time spent at rest was around 25%, The most frequent resting behavior observed was standing (20%), the percentage was low in the morning, but increased in the afternoon. Results obtained by WILLIAM ET AL, (1993), show that ostriches spent around 16% of their normal daily behavior standing and 3% lying down.

Locomotion behavior includes walking and running. Walking (20%) was the most frequent locomotion behavior observed Dupa BERENDSEN (1995), MUSHI ET AL., (2008) walking (92%) was the most common locomotion observed behavior followed by running (2%).

Short periods of rest with the eyes closed, between a few seconds and up to a few minutes were observed.

During the day, rare nibbles of fences, wooden poles and other plants inside the paddock were observed while walking. On hot days, they sprayed the body with water. At the slightest noise they became vigilant and stopped all activities.

Regarding the feeding behavior of the breeding families, the highest share was fed with green fodder about 7% while the concentrated food was 6%. Most of the time spent feeding was in the morning.

Feeding with concentrated food is performed in two period during a day: in the morning at 6 o'clock and in the afternoon at two o'clock, and the feeding with green fodder takes place only once a day at 12:00 (table 1). It is recommended to add foods that ensure an optimal level of vitamins, minerals, proteins and amino acids such as alfalfa, sugar beet, fodder carrots, chopped grass and a mixture of wheat, oats, barley, sunflower, soybeans, premix, calcium and sunflower oil.

The watering had a percentage of 2%. It is good to keep drinking water always fresh and clean.

Table 1

Feeding breeding families

Hour	Type of feed
6:00-6:30	Concentrated feed
12:00 -13:00	Green fodder
14:00-14:30	Concentrated feed

In the conditions of our climate, the laying of eggs takes place in February-March and is influenced by several factors, the most important being: feed quality, age and condition of birds.

The male is the one who builds the nest by digging a hole in the ground After mating, females begin laying eggs, a female can lay 20 to 65 eggs, a trio family consisting of one male and two females can lay up to 130 eggs per season.

Hatching and care of the chicks takes place by both the main female and the male (figure 4), while the secondary females lay eggs in the nest that is prepared by the dominant male, but do not hatch them.

Fig. 4. The hatching eggs by male

In the farm where the observations were made, all the eggs were collected and hatched artificially because if the eggs remain in the female's nest, they start hatching and interrupt the laying of the eggs until the chicks grow, leading to large financial losses.

In the first part of the mating season the fertility of the eggs is higher, it decreases towards the end of the mating season. At the end of the mating season, the males are separated from the females.

During the breeding period, the male is very protective and guards his territory and nest, and the aggressiveness towards the caretaker is high 4% when collecting eggs, precautions must be taken.

Although the chicks obtained by hatching are much healthier, the effort is higher and the number of chicks obtained is smaller. In the first months of life, the chicks are very sensitive, during this period the highest mortality is registered.

The aggressiveness had a low weight of 4% and was observed only at the male towards the caregiver (figure 5), during the collection of eggs, and also at males kept in neighboring shelters.

Fig. 5. Aggressive behavior at males towards the caregiver

CONCLUSIONS

In early spring, complex courtship rituals begin, performed by both males and females, ritual that takes around 30% of their time.

Both the male and the principal female investing in the incubation and the chick care. Presence of eggs incited ostriches to sit in the nest, which is not wanted. Because of this all the eggs were collected and hatched artificially.

Regarding the feeding behavior of the breeding families, the highest share was fed with green fodder around 7%, while the concentrated food was 6%. Most of the time spent feeding was in the morning.

Feeding with concentrated food is performed in two period during a day: in the morning at 6 o'clock and in the afternoon at 2 o'clock, and the feeding with green fodder takes place only once a day at 12:00

The time spent at rest was around 25%, The most frequent resting behaviour observed was standing (20%), the percentage was low in the morning, but increased in the afternoon.

The aggressiveness had a low weight of 4% and was observed only at the male towards the caregiver, during the collection of eggs and at males kept in neighboring shelters.

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