



Breeding Behavioural Pattern in Ostrich a Key for Better Management for its Reproductive Life

KEYWORDS

sexual behavior, courtship, incubation, post play, nesting system.

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ABSTRACT

This review is about the breeding behavioral pattern of ostrich (*struthio camelus*). Male and female attains maturity at 30 months and 24 months respectively. Walking, feeding and running are the most common behaviour in both conditions. Breeding season begins from august to march in southern hemisphere. During this season kantling (male), soliciting (female) and agonistic (male and female) displays are the predominant reproductive characters of ostriches in both natural and captive conditions. Not much appreciable difference has been found among the genders related to these behaviour. Male cock shows territorial aggressiveness towards hen resulting in mating which may lead to fertile egg production. Cock dug nest bowl of about 15 -20cm deep and 1-2m in diameter and where the hens lay their eggs. Mature female can lay 40 to 60 eggs per year. Once a clutch of 20 -24 eggs is reached both genders of ostrich incubate egg for a period of 42 days. Change of shift between female and male is noticed during day and night respectively. The study of behaviour transitions helps understanding the sequences of behaviour and their relative importance more deeply.

Introduction

the ostrich is undoubtedly the world's largest living bird. Ostriches are flightless birds, with their great body size and reduced wing size rendering them incapable of flying. They have a long neck, long bare legs and two toes. Their strong legs allow them to run up to 70 km per hour when necessary. The ostrich has been bred for more than one century, but its behaviour has attracted little attention. Mitchell (1960) (bertram, 1992) published a list of 300 citations dealing with this species, but most of them were devoted to physiology, veterinarian aspects, husbandry and marketing, while not involving behaviour. This was described in detail only in recent decades, firstly by sauer and sauer (1966) and bertram (1992).

Features

south africa is the native of ostrich. Ostrich is now being raised worldwide in countries such as united states, china, korea, india, israel, england, france, iran, iraq, brazil, mexico, and canada. The preferred habitat is open, short-grass plains and semi-desert, although ostriches are found in the hot, fringing desert of the western sahara and the true deserts of namibia. They are omnivores, they feed on grass, grains in addition to that they also feed on insects and lizards etc. It has a remarkable tolerance to heat, withstanding air temperatures of 56°C without undue stress. Among the many ways of regulating its body temperature, it controls heat loss during cold weather by covering its thighs with its wings, and during hot weather, by lifting and moving its wings, it creates a gentle breeze. The feathers are excellent insulators, minimizing heat gain from direct solar radiation, as well as reducing heat loss during cold desert nights.

Male

Colour	Black
Sexual maturity	30 months
Height	7 – 8feet
Weight	130 - 150 kg
Speed	70 km/h

- laurent simon, 1997

Behaviour

noticeable point in ostrich cock is that they are polygamous, which mean birds use to mate with more than one female or bird having more than one sexual partner. Monotonous booming sound is initiation of mating in male. Male shows territorial aggressiveness (h. Lambrechts, 2000), in order to attract female kantling is displayed. Homosexuality was observed in male in the wild condition 1-2% of the male shows this behaviour occasionally (sauer, 1972). Copulation rate in wild is 3 time / day (bertram, .1993)

Female

Colour	Grey
Sexual maturity	24 months
Height	6- 7 feet
Weight	120 -130 kg
Speed	70 mph

- laurent simon, 1997

soliciting display is exhibited by female birds as a result of preparedness to mate. Major females are those who first lay their eggs in the nest prepared by territorial male. Minor females are those who lays eggs next to major female in the same nest which might be a major female in other males territory(bertram, 1992).excess eggs-ejected (bertram, 1992). The 'major' hen when she starts to incubate she rearranges the eggs and discards several from the nest until around 19-20 eggs remain (bertram, 1979, 1992). These eggs lie in a ring around the incubating bird and do not develop. Female birds seem to be more aggressive during incubation. Female –day time incubation. (bertram, 1992).

breeding season is heralded by courtship behaviour and hen starts to lay eggs shortly after mating. Eggs are laid every 1 or 2 day in clutches of 20-24 eggs. The hen stops laying for a period of 7 to 10 days, then she starts a new clutch. The average range is 35 to 55 eggs per hen, but

there are high-producing females laying between 50 to 90 eggs in the breeding season.(giulio aiudi, 2009)

Sexual behaviors

Clucking and fluttering

A breeding hen may express her physiological readiness to breed by emitting a clucking sound made by rapidly opening and closing her beak. Simultaneously, she may flutter her wings by dropping them low and forward, and vibrating them in sequence.

Kantling

This is a typical male territorial behavior in which the bird drops to his hocks, and fans both wings forward and backward while hitting his head on each side of his spine.

Soliciting

female bird shows this display as a part of her willingness to mate where she hold her wings forward and down flapping them backward and forward while holding her head close to the ground opening her beak repeatedly to make a clapping sound.

agonistic display

this is the sign of aggressiveness exhibited by male towards neighbouring male/female birds or other animals.

Courtship display

importance of this behaviour is that it leads to copulation (sauer and sauer, 1966) which is often initiated by monotonous booming sound (male). Reports proved that unsuccessful attempts at copulation are mainly due to mating without kantling display. Courtship display diminishes in frequency in both male and female when the clutch is being laid (bertram, 1992) as the bird usually goes for brooding

Breeding season

ostriches are seasonal breeders which means that the birds will mate successfully only during certain time or part of the year. Sexual interest and behaviours are expressed during this period. These should be differentiated from opportunistic (budgerigars) and continuous breeders (human). timing and duration vary based on the different parts of the world (shanawany, 1994a).

Northern hemisphere	March - august/ september	(leuthold, 1977)
Southern hemisphere	July/august - end of march	(jarvis, jarvis and kefen, 1985)

Fore play

during the initiation of foreplay male birds shows dominant display such as erect tail, hissing and booming. If this sign of dominance is respected other females lower their tail. Researchers observed that by observing the height which a cock held its tail its social ranking in the flock can be estimated. Having reached the level of excitation male may urinate or defecate and displays its erected penis.

Courtship song

on the nesting-ground the males may be heard uttering the "booming" call by which they establish their territories and attract the females. Sauer and sauer regard this as "courtship song" which forms "part of the symbolic nest-site display between male and female during their precopulatory courtship. The court-

ship is initiated by male and female as they begin to feed, often with heads close together, while pecking in a nervous and highly synchronized fashion.

behavioural changes is noticed such as cock throws his wings and suddenly drops to ground, twists his neck in cork screw fashion (niels bolwig, 1972), whereas the hen walks with lowering her head, downward pointing of wings and drooping tail. As long as the breeding season lasted, the two birds were usually seen close together, hardly ever losing sight of one another. Courtship was usually initiated by the two birds standing side by side-the female with wings and tail hanging, while pecking nervously at the ground, probably without swallowing(ceremonial feeding). Urination such as described by sauer and sauer was noticed only occasionally.

in male kantling lasts for 5 minutes or more. If the hen was remotely interested in the males performance, she would spread her drooping wings forward, holding them as a vertical shield, anterior edge pointing downward. The pecking and snapping continued but, although directed toward the ground, the bill frequently did not achieve contact. The extent to which the wings were brought forward appeared to be an indication of the hens' preparedness to receive the cock. An extreme forward position seemed to be the signal for him to get up and storm toward her with lifted wings as when attacking. This is the hen's preparedness indication.

Play

intromission was marked by the hen lowering head to the ground while swinging her almost outstretched neck from side to side, virtually in a semicircle. While doing this, she pecked the ground, taking up small amounts of sand and letting them fall again. This resulted in a semicircle of small pits being formed in the dust. The cocks' behavior also changed during intromission. He bent his neck forward, still swinging it from side to side but now with half its former speed and while doing so he poked his bill alternately under the hens' right and left clavicular region. The spread wings which had stopped beating were held horizontally and quivered vigorously in a vertical plane. The intromission usually lasted for about 40 sec.

Post play

after intromission, the hen would rise to her feet, thereby throwing off the cock, and the two birds would part. During the peak of the breeding season, it would be about so-55 min before the next mounting could take place. Successful mounts with intromission were observed only within two very limited areas where the birds also liked to dig their nests. These areas were low-lying and close to the fence where the excited public easily disturbed them. Exact records of the proportion of successful and unsuccessful intromissions were therefore not kept most of the time. During the time notes were taken, intromission was achieved in only 25- 30% of the cases. Unsuccessful intromission did not appear to shorten the courting cycle. in breeding season it would be 50-55 min before the next mounting could take place. Sometimes 5minutes is enough for next mounting but most often it results in false mounts. Successful mounts with intromission were observed only within very limited areas where birds likely to build their nest.

Communal nesting system. (bertram, 1992)

each territorial male digs a number of nest scrapes which

he shows to any female which enters his territory. In each territory a 'major' female pairs with the male and lays most of her eggs in the nest site she chooses.

In addition, other 'minor' females visit the territory and may lay an egg within an already established nest. These birds may be 'major' females in another male's territory. The average number of minor females lying in a nest was three (range one to five). Each 'major' hen usually contributes about 11 eggs (range of 9–14) to her nest and the total number of eggs in the clutch (average of 26 with a range of 15–39) depends on the number of 'minor' hens lying in the nest. This breeding system is reported for birds throughout the natural range of the ostrich (Sauer and Sauer, 1966b; Jarvis et al., 1985; Bertram, 1992) and hence is considered to be typical of the species.

During incubation period the nest is attended by both male and female, the male bird sitting during the night (Bertram, 1992) and female during day. Although full incubation does not proceed until the clutch is complete (Sauer and Sauer, 1966b). One unusual aspect of the ostrich breeding system is once the 'major' hen starts to incubate she rearranges the eggs and discards several from the nest until around 19–20 eggs remain (Bertram, 1979, 1992). These eggs lie in a ring around the incubating bird and do not develop. At the first sign of danger the birds rely on camouflage to conceal them from predators, although they perform distraction displays or attack potential predators if necessary (Sauer and Sauer, 1966b; Bertram, 1992).

Nest building

Nest-building was observed a couple of times and was

distinctly different from sand-bathing. During the latter activity, the bird was merely sitting rubbing its body and neck into the sand, while beating the dust with its wings. On both occasions it was the cock that dug the nest bowl. He did this by resting his chest on the ground and kicking the sand backward with his feet (fig. 4a, b). He then proceeded to peck sand up with his bill and to throw it away from him. While doing so, he moved his head from side to side, describing a semi-circle. The action was reminiscent of that performed by the copulating hen, but differed by virtue of its greater vigor and was performed with a fully outstretched neck. As during copulation, the result was a semicircular row of small pits in the sand. After a couple of minutes, he got to his feet and walked away. Most eggs were laid in the nest bowls, but a considerable number were also dropped at other places. All eggs were collected and artificially incubated. Average size of a nest bowl may be around 15–20cm deep and 1–3m in diameter.

Natural incubation

In natural incubation both males and females brood the eggs. Male during night and female during day time egg-temperature usually varies over its surface. It is higher in top than at the bottom. Eggs usually come in contact with the parent birds bare skin. Egg usually turned and aired when the changing shifts occurs.

Conclusion

A detailed analysis of behaviour sequences can be used for the understanding of the species behaviour pattern, as well as from the captive breeding point of view for developing better husbandry techniques and interpreting welfare implications.

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