

Research article

Behavioural Pattern of Ostrich (*Struthio camelus*- L) in Captivity and Perception of People on Rearing of the Bird Case Study: Sanda Kyarimi Park, Maiduguri, Borno State, Nigeria

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Abstract

The study was on behavioural pattern of ostrich in captivity. The study was carried out in Sanda Kyarimi Park, Maiduguri over a period of two (2) months. Focal sampling method was used to observe the behavioural activities of the bird in the morning and afternoon hours of the day. Focal sampling entails watching the birds and taking record of all the activity types and duration of time spent on the behaviours. Verbal interaction with the in-keepers and administration of questionnaire to visitors to the park were used to elicit information on their perception to rearing of ostrich for their economic values. The results showed that ostrich spend most of its time in locomotion. Activities exhibited by ostrich in the afternoon are less than in the morning hours because of the rise in temperature in the afternoon. This suggests that shade is an important factor in erection of ostrich enclosures. The economic values of ostrich products (meat, hides and skin, eggs and plumes were considered worthy for rearing of the bird as the wild population has declined drastically and vulnerable to extinction. It is recommended that more females (3-10) should be introduced to the two (2) males to satisfy their mating behaviour. Also, uniform should be provided to the zoo keepers so that they can be effective in controlling unruly behaviours such as feeding of inmates and throwing objects at the birds by visitors.

Keywords: Ostrich, products, behavioural patterns, focal sampling and rearing

Introduction

Ostrich is the largest living bird in the world with the adult standing 2.4m high and weigh over 100kg (Roots, 2006). The adult males are differentiated from the females and young males based on the colour of the

feather. Adult males have black feathers and white at the tail and primaries while females and young males look similar with ash, white or brown colour (Davies and Bertrem, 2003). The ostrich lays the largest eggs of any living bird. They are flightless birds with a great body size and reduced wing size which make them incapable of flight. They are distinctive in appearance with long neck, well developed muscles; unfeathered and long base legs with two toes which look like a hoof and with the advantage of the long well developed legs, ostrich can run up to about 70km/hour i.e. 43mph (Donegan, 2002).

According to Donegan (2002), ostrich diet consists mainly of plant matter though it eats invertebrates. It lives in nomadic groups of 5 to 50 birds. When threatened, the ostrich will either hide itself by lying flat on the ground or run away, and if cornered, it can attack with powerful sidekicks (Donegan, 2002). Mating patterns differ by geographical region, but territorial males court up to 2 to 7 females (Davies and Bertrem, 2003). It is a restless bird and spends most of its time walking (Williams, 1993 and Donegan, 2002). Ostrich are animals of multiple products such as meat, feather, hides and skin and important in recreational areas such as zoological gardens. It is farmed around the world, particularly for its feathers which are decorative and its skin is used for leather products while the meat is marketed commercially for consumption (Davies and Bertrem, 2003). The fat content of ostrich meat is less than half of that of chicken meat (Sales and Horbanezuk, 1998). Ostrich meat has a low cholesterol level compared to other traditional meat (Horbanezuk, 1998). The nutritive value of ostrich meat makes it a great consideration for consumers looking for a healthier alternative to traditional red meat.

Ostrich are not shade loving animals as they are distributed in a variety of open habitat with thick bush and heavy trees. This feature is due to the uric acid content of the urine carried in mucus like substance that helps to maintain water loss and most ostrich densities are located in semi-arid areas and can also survive in poorly vegetated areas (Levy 1990). They prefer open land and are native of the savannahs of Africa, both north and south of the equatorial forest zone. In South West Africa, ostrich inhabit the semi-desert to true desert (Donegan, 2002). The wild ostrich population has declined drastically in the last 200 years with most surviving birds in game reserves or on the farm (Davies and Bertrem, 2003). However, they have a conservation status of lower risk conservation dependent. The low status of ostrich in the wild and the economic value derived from the birds by man prompted this study for possibility of breeding, rearing and production of the bird in captivity because of its economic importance. The broad objective of the study is on the behavioural pattern of ostrich in captivity with specific objectives of assessing behavioural pattern of ostrich, estimate the time spent on daily behaviours and to investigate from visitors to the park on their perceptions on rearing of ostrich. The result of the study will help to establish the knowledge on the requirements of the bird species in captivity to those interested in rearing ostrich.

Materials and Methods

Study Area

The study was carried out in Sanda Kyarimi Park situated in Maiduguri Metropolitan Council of Borno State along Shehu Laminu Way opposite Borno Radio Television (BRTV) Corporation and adjacent to the Open Air Theatre, Museum and Children Amusement Park. The climate is hot and dry for most part of the year. The area has a minimum temperature range of 20⁰C-25⁰C and maximum temperature range of 37⁰C-45⁰C, rainfall ranges from 500-1000mm annually, low relative humidity of 42-49% with evaporation of 203mm per annum (BOSG, 2013). The vegetation consists mainly of annual grasses such as *Cenchrus biflorus*, *Pennisetum*

pedicellatum, *Digitaria* spp, *Loudetia* spp and *Aristida* spp. Trees are of the drought resistant species which include *Acacia* spp, *Adansonia digitata*, *Ziziphus mauritiana*, *Ziziphus spina-christi*, *Azadirachta indica* and *Khaya senegalensis* among others.

Data Collection and Analysis

Data on activities of ostrich were collected through focal sampling of the activities of the bird adopting Mayer *et al* (2002), verbal interactions with the in-keepers and participatory approach. Focal sampling entails watching the birds and taking record of all the noted activity types. The following data were collected as they occur; date, time, activity type and duration of behaviour. Record sheets were used for the focal sample to enable easy, quick, efficient and accurate recording of observed data. Focal sampling was carried out for a period of two (2) weeks and means were used in presenting the results. Questionnaire was administered to 15 persons sampled at random as to any visitor seen at the ostrich enclosure. Questions asked were whether they were aware of the economic values of ostrich, whether they have ever seen the bird somewhere apart from that in the park, part(s) of the bird they considered worthy for rearing of the bird and whether they would like to rear the bird because of its economic importance.

Descriptive statistics using tables, frequency and percentages were used to present the result. Analysis of variance (ANOVA) was used to analyze the significance between the daily activities and time spent on the activities by male and female ostrich in the park in the morning and afternoon hours of the day.

Results

Behavioural Patterns of Ostrich in Captivity

Frequency of behavioural activities of male and female ostrich in the morning hours of the day (8:00-11:00am) is shown in Table 1. The result shows that male ostrich changes activities for 42 times with locomotion, 12 times (28.57%); ingestion, 11 times (26.19%); roosting, 8 times (19.08%) with the least of ground pecking, 2 times (4.76%). The female changes activities for 40 times with ingestion, 12 times (30.00%); locomotion, 11 times (27.50%); roosting, 8 times (20.00%) with the least of ground pecking, 1 time (2.50%). The observed differences among the daily behavioural activities of male and female ostriches in the morning hours were not significant at $p < 0.05$ (Table 2) Table 3 shows the frequency of behavioural activities of male and female ostrich in the afternoon hours (1.00-3.00pm). The result shows that lesser activities were performed in the afternoon than in the morning hours. The male changes activities for 19 times with resting, 6 times (31.58%); locomotion and ingestion 4 times (21.05%) with the least of ground and object pecking for 1 times (5.26%) equally. The female changes activities for 20 times with resting, 6 times (30.00%); locomotion, 5 times (25.00%) ; ingestion, 4 times (20.00%) and the least of 1 times (5.00%) for ground and object pecking equally. The result of Analysis of variance shows that there were significant differences among the daily behavioural activities of male and female ostriches in the afternoon hours observed at $p < 0.05$ (Table 4).

Duration of time spent on activities recorded for male and female ostriches in minutes in the morning hours (8:00-11:00am) is shown in Table 5. The result shows that out of the total of 180 minutes of observation, the male spent 80 minutes (44.44%) in locomotion; 55 minutes (30.56%), ingestion; 30 minutes (16.67%), resting; 10 minutes (5.56%), roosting; 3 minutes (1.67%), object pecking and 2 minutes (1.11%), ground pecking. The female spent 94 minutes (52.22%) in locomotion; 34 minutes (18.89%) equally on resting and

ingestion; 15 minutes (8.33%), 2 minutes 1.11%) and 1 minute (0.56%) on roosting, ground and object pecking respectively. The differences in duration of time spent on daily behavioural activities by male and female ostriches in the morning hours were significant observed at $p < 0.05$ (Table 6). Table 7 shows the duration of time spent on activities by male and female ostriches in the afternoon hours (1:00-3:00pm). Out of the 180 minutes of observation, the male spent 75 minutes (41.67%) in locomotion; 62 minutes (34.44%), ingestion; 24 minutes (13.33%), resting and 5 minutes (2.78%), 3 minutes (1.67%) and 1 minute (0.56%) in roosting, ground and object pecking respectively. The female was observed to spend 88 minutes (48.89%) in locomotion; 51 minutes (28.33%) on ingestion; 30 minutes (16.67%), resting; 10 minutes (5.56%), roosting and 1 minute (0.56%) ground pecking. The female had not been observed pecking at objects in the afternoon hours. The observed differences in duration of time spent on daily behavioural activities by male and female ostriches in the afternoon hours were significant at $p < 0.05$ (Table 8).

Mean duration of time spent on daily behavioural activities by male and female ostriches in the morning and afternoon hours in minutes is presented in Table 9. The result shows that more time was spent in locomotion; followed by ingestion, resting, and roosting. Less time were spent in ground and object pecking in both morning and afternoon hours. The observed differences between the time spent on daily activities in the morning and afternoon hours were significant at $p < 0.05$ (Table 10).

Perception of Visitors to the Park on Rearing Ostrich

The relevance of captive rearing of ostrich as stated by visitors to the park is shown in Table 11. Over 93% of the respondents indicated that rearing of ostrich in captivity is good and desirable and 6.70% indicated that it is not good to rear ostrich in captivity but should be left in the wild as they are aggressive in nature. Opinions of respondents on the economic value of ostrich they considered to be worthy for rearing is presented in Table 12. The result shows that 26.67% of the respondents considered rearing of ostrich for the egg; 20.00% for the feather; 13.33% equally for the skin and meat and 26.67% considered rearing ostrich for all the products listed.

Table 1: Mean Frequency of Daily Behavioural Activities of Male and Female Ostriches in the Morning Hours (8:00-11:00am)

Activity	Male		Female	
	Frequency	Percentage	Frequency	Percentage
Resting	6	14.29	8	20.00
Ground Pecking	2	4.76	1	2.50
Object Pecking	3	7.14	2	5.00
Locomotion	12	28.57	11	27.50
Ingestion	11	26.19	12	30.00
Roosting	8	19.05	6	15.00
Total	42	100	40	100

Mean	7	6.67
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Table 2: Analysis of variance (ANOVA) Table for data in Table 1

SV	df	SS	MS	F-Cal
Treatments	1	0.34	0.34	0,08
Error	11	187.67	18.77	
Total	12	188.01		

Table 3: Mean Frequency of Daily Behavioural Activities of Male and Female Ostriches in the Afternoon Hours (1:00-3:00pm)

Activity	Male		Female	
	Frequency	Percentage	Frequency	Percentage
Resting	6	31.58	6	30.00
Ground pecking	1	5.26	1	5.00
Object pecking	1	5.26	1	5.00
Locomotion	4	21.05	5	25.00
Ingestion	4	21.05	4	20.00
Roosting	3	15.79	3	15.00
Total	19	100	20	100
Mean	3.17		3.33	

Table 4: Analysis of Variance (ANOVA) Table for data in Table 3

SV	df	SS	MS	F-Cal.
Treatments	1	126.83	126.83	31.57
Error	10	40.17	4.02	
Total	11	167		

Table 5: Mean Duration of Time Spent on Daily Behavioural Activities by Male and Female Ostrich in the Morning Hours (8:00-11:00am) in Minutes

Activity	Male		Female	
	Minutes	Percentage	Minutes	Percentage
Resting	30	16.67	34	18.89
Ground pecking	2	1.11	2	1.11
Object pecking	3	1.67	1	0.56
Locomotion	80	44.44	94	52.22
Ingestion	55	30.56	34	18.89
Roosting	10	5.56	15	8.33
Total	180	100	180	100

Table 6: Analysis of Variance ANOVA) table for data in Table 5

SV	df	SS	MS	F-Cal
Treatments	1	10800	10800	9.80
Error	10	11016		
Total	11	21816		

Table 7: Mean Duration of Time Spent on Daily Behavioural Activities by Male and Female Ostrich in the Afternoon Hours (1:00-3:00pm) in Minutes

Activity	Male		Female	
	Minutes	Percentage	Minutes	Percentage
Resting	24	13.33	30	16.67
Ground pecking	3	1.67	1	0.56
Object pecking	1	0.56	00	00
Locomotion	75	41.67	88	48.89
Ingestion	62	34.44	51	28.33
Roosting	5	2.78	10	5.56
Total	180	100	180	100

Table 8: Analysis of Variance (ANOVA) table for data in Table 7

SV	df	SS	MS	F-Cal
Treatments	1	10800	10800	10.06
Error	10	10626		
Total	11	21426		

Table 9: Mean Duration of Time Spent on Daily Behavioural Activities by Male and Female Ostrich in the Morning (8:00-11:00am) and Afternoon (1:00-3:00pm) in Minutes

Activity	Morning		Afternoon	
	Minutes	Percentage	Minutes	Percentage
Resting	30	16.67	24	13.33
Ground pecking	2	1.11	3	1.67
Object pecking	3	1.67	1	0.56
Locomotion	80	44.44	75	41.67
Ingestion	55	30.56	62	34.44
Roosting	10	5.56	5	2.78
Total	180	100	180	100

Table 10: Analysis of Variance (ANOVA) table for data in Table 9

SV	df	SS	MS	F-Cal
Treatments	1	9718	9000	125.35
Error	10	718		
Total	11	10436		

Table 11: Perception of Visitors to the Park on Whether Rearing of Ostrich in Captivity is good or not good

Variable	Frequency	Percentage
Good	14	93.30
Not Good	1	6.70
Total	15	100

Table 12: Opinion of Visitors to the Park on Economic Value of Ostrich they considered to be Worthy for Rearing

Variable	Frequency	Percentage
Skin	2	13.33
Feather	3	20.00
Meat	2	13.33
Egg	4	26.67
All Listed	4	26.67
Total	15	100
Mean	3	
Mode	3	

Discussion

The results on morning and afternoon activities displayed by the male and female ostriches (Tables 1 and 3) and time spent on the activities (Tables 5 and 7) shows that they are more active in the morning hours. They showed to be less active with high frequencies of resting in the afternoon because of the increase in temperature of the environment. The high incidences of ingestion in the morning and afternoon were because it co-incides with the daily routine periods of feeding by the in-keepers. The high frequencies of locomotion recorded in this study agrees with Williams (1993) and Donegan (2002) who stated that ostrich is a restless bird and spends most of its time walking. Frequencies and duration of time spent on locomotion as shown by the birds were also due to the fact that males always run after the females in order to synchronize their mating behaviour (Davies and Bertrem (2003). This chase behaviour makes the female ostrich restless and always moving about to keep distance from the male.

The opinion of respondents on the economic values of ostrich they considered to be worthy for rearing depended on individual interest. Ostrich, according to Davies and Bertrem (2003) are animals of multiple products which are all of high economic values. The meat of ostrich has high nutritive value with low cholesterol level compared to other traditional meat (Horbanezuk, 1998). The feathers are used for ornamentals and decoration of fabrics, bags, clothes and hand fans. The hide of ostrich has an attractive quality which makes it to be grade one due to the fact that the quarter of the hide is completely free from defect (Deming, 1995). The skin of ostrich is considered to produce top quality leather comparable to that of crocodile and elephant skins. Also, according to Kerstin-deike *et al* (1995) leather from ostrich skin has better resistance to water than leather from crocodile skin.

Conclusion

The results of the study on behavioural pattern of ostrich in captivity in the morning and afternoon hours of the day showed that the bird spends most its time in locomotion which qualifies the popular saying that ‘Ostrich is a Restless Bird’. Ground and object pecking normally amount to picking of foreign objects, thus; ridding the environment from pins, nuts/bolts insects and even dead birds and reptiles Activities exhibited by

ostrich in the afternoon hours are less than in the morning hours. The rise in temperature in the afternoon hours may be the reason why they are less active in the afternoon hours. Shade is therefore an important factor in erecting of ostrich stalls or enclosures.

The high economic values of ostrich products (meat, hides and skin, eggs and feather/ plumes make rearing of ostrich to be good because of the low conservation status of the bird in the wild. The population of ostrich in the wild has declined drastically with most surviving birds in protected areas which are still being threatened by poaching incidences for their products which are highly priced.

Recommendations

The population of ostrich in the park is too low with two (2) males and one (1) female. This is contrary to the mating behaviour of ostrich which exhibits territoriality and is polygamous; one male courts 2 to 7 females. More females should be introduced to eliminate fighting by the 2 males courting 1 female. During the period of the study, it was observed that viewers attempt to feed the birds. The management should as a matter of urgency place notice against this act. Notices should be placed boldly, conspicuously and easily understandable. Penalties can be spelt out for such acts as an offence. Uniform should be provided to the zoo keepers so that they can police the activities of visitors to the park. This will minimize illegal and unruly behaviour of visitors.

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