

Behaviour of Captive Ostriches (*Struthio camelus*) at Universiti Malaysia Kelantan, Bachok Campus, Kelantan, Malaysia

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Abstract

The behavioural patterns of six captive ostriches (*Struthio camelus*) were studied at Universiti Malaysia Kelantan, Bachok Campus between July and September 2014. The main purpose of the study was to determine the behavioural patterns of ostriches in captivity to provide the useful information for better management action. The ostriches were observed daily for 11 hours from 0700 hrs until 1800 hrs for 45 days by using the focal sampling technique. Six categories of behavioural patterns were observed namely resting, locomotion, ingestive, comfort, aggression and thermoregulation. The highest behaviour observed was walking compared to other behaviours, while the lowest was running. The result of the study showed a significant difference of behavioural patterns of captive ostriches between different observational periods except for locomotion and aggression behaviours. The finding of the study showed that ostriches reared in captivity possessed similar behavioural patterns to those remaining in the wild, although some captive circumstances imposed minor differences.

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1. Introduction

Struthio camelus is originated from the Greek words meaning of 'camel sparrow' given by the Swedish scientist, Carl Linnaeus. *Struthio* means "ostrich" and *camelus* means "camel" based on the similarities between the ostrich and camel; inhabit dry habitat, long neck and two strong, long legs. The ostrich (*Struthio camelus*) is a sole representative of the order of birds known as ratites (running birds) or *Struthioniformes*; the heaviest and largest living bird in the wild (Hallam, 1992; Alden et al., 1996). They are flightless birds and the only extant bird with two toes on each foot (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). They have long neck and legs and the fastest land speed of bird with the speed up to about 70 km/h

(43 mph) (Davies, 2003). They can lay the largest eggs that can weigh up to 1.4 kilograms and the ostrich itself usually weigh from 63 to 103 kilograms or as much as two adult humans (Davies, 2003). For the life span, the maximum longevity reportedly is 50 years (Human Ageing Genomic Resources, 2006).

The meaning of behaviour is a response in a particular way to the environmental conditions. Ostriches in the wild habitat have certain behavioural patterns that enable them to adapt to their natural environment. However, behavioural patterns in captivity may differ due to different environmental factors. Normal behaviour of ostrich are usually relate to their daily living activities like socialization, feeding, communication, grooming and sexual activities. Among of the activities are twirling, thermoregulatory, pecking, grooming, trembling, and

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threat. As referred to the pecking behaviour, according to Newberry et al., (2007), in the wild, pecking is a natural behaviour that leads to the establishment of a pecking order in the group. While for the abnormal behaviours, captive environments can cause abnormality and several studies have already shown the effect of enclosure size in the behaviour of captive animals (Fisher et al., 1980; Estep et al., 1978; Innis et al., 1985; Hogan et al., 1988; Jensvold et al., 2001). Among of the examples are feather-pecking, toe and face pecking, anorexia and many others. Therefore, this study aimed to investigate the behaviour of ostriches in the enclosure to get useful information and deficiencies that can be overcome to serve as a guide to better management of this species in the future.

2. Materials and Methods

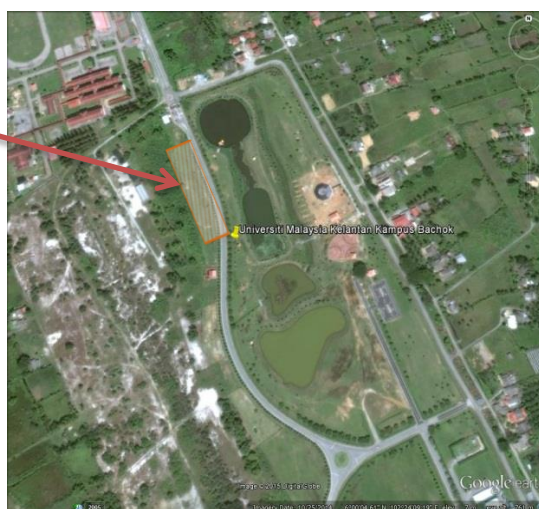
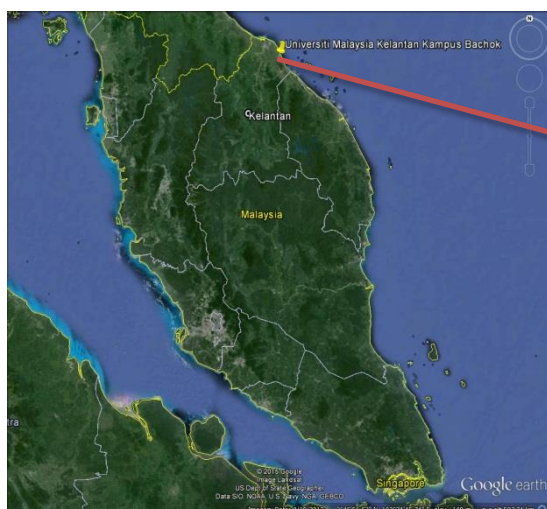


Figure 1: Study area (source: Google Earth).

3. Results and Discussion

Resting behaviour of ostriches (*S. camelus*) can be observed when they stopped moving from doing any activities. There are three positions that demonstrated the resting behaviour of the ostriches namely standing, sitting and sleeping. From the results, the most frequent resting behaviour observed was standing (92%) followed by sitting (8%). These results are similar with William et al., (1993), ostrich normally spent about 16% of their normal daily behaviour on standing followed by sitting which was 3%. Meanwhile, there was none sleeping position that was

The data were recorded by using focal sampling method. The observation was conducted at Universiti Malaysia Kelantan, Bachok Campus, Kelantan, Malaysia (6°00'12.0"N 102°24'06.4"E) where the ostriches were selected as the study subject (Fig. 1).

A total of six ostriches were kept in captivity and they were comprised of three males and females respectively. The observations were conducted accordingly for every 30 minutes intervals started from 0700 hrs until 1800 hrs. The observations were carried out at three different periods; morning started from 0700 hrs to 1030 hrs, afternoon from 1100 hrs to 1430 hrs and evening from 1500 hrs to 1800 hrs. The comparison of behaviours against periods of time was calculated using Chi-square test.

spotted during the observation period in which it suggested that the ostriches only tend to sleep during night time. This is due to the ostriches are diurnal animals where they are most active early and late in the day (Davies, 2003), but may be active on moonlit nights. This is supported by Degen et al., (1989) and Deeming (1998) that reported most ostriches sit during sunset and were inactive all night. According to period of time, the resting behaviours were highest in the morning followed by evening and afternoon. The difference in resting behavioural patterns between different observational periods was significantly difference ($\chi^2=80.23$, $df=2$, $p<0.05$).

Locomotion behaviour can be divided into three types namely walking, running and trembling. Walking (92%) was the most frequent locomotion behaviour observed followed by running (2%) and trembling (0%). It was supported by Berendsen (1995) which postulated that the ostriches at the farm in Germany spent most their time walking rather than running. According to Mushi et al., (2008), this behaviour was gender-dependent with males spending more time in walking probably because they watching around predators while the females brood over the eggs sitting on the nests. Meanwhile, trembling was a sign of stress like during being cornered or transported, but none of this behaviour was observed. Overall, this locomotion behaviour was highest in the afternoon followed by morning and evening. It was supported by Mushi et al., (2008) which stated that in general, all the age groups of ostriches spent about 60% of the afternoon either standing or walking. The difference in locomotion behavioural patterns between different observational periods was not significantly difference ($\chi^2=4.32$, $df=2$, $p \geq 0.05$).

Ingestive behaviour encompasses all eating and drinking behaviours. In this study, ingestive behaviour was divided into three namely tolerance, drinking and pecking. Based on the observations, pecking (69%) was the most frequent ingestive behaviour observed followed by tolerance (24%) and drinking (7%). Pecking activity was the most observed in the morning due to scanty food supply. Consequently they frequently walked around to forage for a food such as an insect within the enclosure. This was supported by Mushi et al., (2008) which stated that, since no supplementation was done in the game reserve, the ostrich had to make do with the available forage and insects which were abundant in the reserve. Meanwhile, tolerance was high during afternoon and evening periods because it coincided with the time when the food was distributed. It also supported by Sambraus (1994) and Deeming (1998), where they found that the higher food consumption was during the food was supplied. Overall, the difference in ingestive behavioural patterns between different observational periods was significantly difference ($\chi^2=6.62$, $df=2$, $p \leq 0.05$).

According to Mushi et al., (2008), thermoregulations normally accomplished by flapping of wings, open-mouth breathes or yawning and were shown by ostriches in the afternoon as a means of dissipating heat from the body. From the observations, thermoregulation behaviour was found to be the highest in the afternoon followed by evening whereas none of thermoregulation behaviours were observed in the morning. This was due to the high temperature in the afternoon which required the ostriches to dissipate more heat during this period. Similar results were found by Muhsi et al., (2008). The difference in thermoregulation behavioural patterns between different observational periods was significantly difference ($\chi^2=178.76$, $df=2$, $p \leq 0.05$).

Comfort behaviours include sand bathing; care of plumage and other parts of body. During sand bathing, the ostrich would lie down in a dry sandy place. It would then push the neck into the sand using snake-like motions and shovel sand over the body (Muhsi et al., 2008). However, this behaviour has not been observed during the research period. This was due to the ostriches' enclosure has no sandy areas. In order to accustom the ostriches comfort behaviour, it would therefore be recommended to set up sandy areas within the enclosure for sand bathing activity to prevent stress among farmed ostriches. For ratites like the ostriches, the body care behaviour comprise of dust bathing and plumage care (Kreibich and Sommer, 1995). The ostriches are slightly different from the other species of birds where they do not have uropygial gland or formally known as the preen gland or the oil gland. The functional of the gland is to clean the feathers naturally. Based on the observations, grooming activity by ostriches were to get rid of foreign objects embedded at their feathers like leaves and dirt. This activity was frequently done in the afternoon followed by evening and morning. This may be because of dry conditions in the afternoon due to high temperature that had been a contributory factor to the highest frequency during this period. The difference in comfort behavioural patterns between different observational periods was significantly difference ($\chi^2=17.1$, $df=2$, $p \leq 0.05$).

The aggression behaviour observed was the threat behaviour. The threat was the behaviour when the ostrich stand tall with tail erect, hissing, wings

slightly open and feathers puffed up, especially around the neck. Based on the observations, aggression behaviour was demonstrated when the ostriches faced the disturbance like met the strangers and also when the keeper came to fed them. This was supported by Muhs et al., (2008) which stated that, aggressive behaviour was demonstrated between hens and cocks and also towards human intruders. This behaviour was exhibited by the male ostriches only. The aggression behaviour was prevalent in the morning compared to both afternoon and evening. The difference in aggression behavioural patterns between different observational periods was not significantly different ($\chi^2=0.57$, $df=2$, $p \geq 0.05$).

4. Conclusion

As the conclusion, behaviours of captive ostriches showed high difference between the different observational periods. Only some behaviour that showed the difference between male and female like the aggression behaviour that only showed by the male. Overall, standing recorded the highest occurrence for the resting behaviour, walking was the highest occurrence for the locomotion behaviour, and pecking showed the highest frequency for the ingestive behaviour. Lastly, it showed that the ostriches reared in captivity displayed similar behavioural patterns to those remaining in the wild, although some captive circumstances impose minor differences.

Recommendations

The ostrich lack of uropygial gland, where it was believed to help maintain the integrity of the feather structure and the flexibility of feathers that keeps feather barbules from breaking. Thus, in order to care for their feather, normally they would prefer for sand-bathing activity. However, during the carried out research, the ground were covered with the grass, where only small portion of sand, pebble and gravel could be found. This condition had limited the ostriches to do the sand-bathing activity and affected their behaviour. Thus, the management should add more sandy area in each pen, so that it will be available for them to do this activity.

Second, the provided shelter in each pen was not adequate for a pair of ostriches. It nearly only could

accommodate their drink and food where during the rainy days, they were all wet and shivering. The ostrich were originated from Africa, where they much adapted with the warm condition. Thus, during rainy days, they should have the shelter that could accommodate them for their health.

Lastly, based on the interviewed, the unsuitable type of land in the paddock had restricted the growth of plants. Thus, the management should further enhance the surrounding of enclosure on par to the wild. According to Kock, (1996a; 1996b) the supply of a more natural environment appears to ease the stress seen in ostrich chicks bred in captive condition.

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