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Applied Animal Behaviour Science 103 (2007) 156–166
APPLIED ANIMAL BEHAVIOUR SCIENCE
www.elsevier.com/locate/applanim

Year-round behavioural sequences in captive ostrich (*Struthio camelus domesticus*) pairs

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Accepted 18 April 2006
Available online 5 June 2006

Abstract

Although the ostrich has been bred for several decades for feathers and/or meat, its behaviour has received limited attention. To our knowledge there are just descriptions of behavioural repertoire or detailed measurements of behaviour, but in limited contexts. We recorded the behaviour of six 4-year old Black neck ostrich (*Struthio camelus domesticus*) pairs, kept in and already acquainted to 900 m^2 paddocks. This longitudinal study spanned one solar year and the birds were observed individually during six 120-min observational sessions per month, although the statistical basis used was at season level. We focussed on the behaviour transitions, more than recording the behaviour duration only, as transition recording allows elucidation of the behaviour repertoire. The 22 behaviours considered were recorded continuously with a digital event recorder. Most transitions were one-way transitions in both sexes and had small variation among seasons. This suggests low variability in behaviour performance, although the existence of stereotypes is unlikely. Males displayed a slight, but constantly higher, number of transitions than females, showing that they possess a wider, or more varied, behavioural repertoire. There were many transition loops, not random and indicative of some rigidity in sequence repetition. In both males and females the total amount of transitions relied on a very few activities, indicative of a few widely used behaviours, particularly those connected to locomotion, which repeatedly followed or preceded many others. Walking was an activity greatly involved in transitions in both winter and spring, following and preceding many other behaviours, showing that even in captivity, locomotion maintains its importance for reproduction.

Keywords: Ostrich; Behaviour; Behaviour repertoire; Seasonal effect; Sex difference; *Struthio camelus*

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0168-1591/$ – see front matter
doi:10.1016/j.applanim.2006.04.018

1. Introduction

The ostrich (*Struthio camelus* L., 1758) has been bred for more than one century, but its behaviour has attracted little attention. Mitchell (1960) (quoted by 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). Even less attention has been paid to a detailed quantitative description of behaviours or behavioural patterns displayed by captive ostriches. In fact, most authors either considered gross daily temporal budgets for a few behaviours (Degen et al., 1989; Williams et al., 1993) or made more detailed behaviour descriptions in various contexts, but still in terms of just percentage of time (McKeegan and Deeming, 1997; Deeming, 1997, 1998). As far as we are aware, there are no studies devoted to the analysis of behaviour in terms of the sequences of behaviour forming the whole behaviour repertoire.

Recent increases in ostrich breeding, principally in South Africa and later in Israel and Europe, led to the necessity to learn more about its behaviour in restricted areas. The study of behaviour transitions helps understanding the sequences of behaviour. We believe such analysis allows understanding the relationships among different behaviours and their relative importance more deeply than simply ascertaining the duration of each behaviour, considered separately from the others (Cronin, 1985; Csermely, 1994).

Sexual differences in the behaviour displayed by ostriches were described by McKeegan and Deeming (1997) and Deeming (1998), but just as time–activity budgets and in limited periods of the year. In contrast, we recorded the same birds during the whole year and considered the whole behaviour repertoire displayed by them. Besides, a study of limited time duration does not shed light on how seasonal variation along the year affects the behaviour. This study aimed, therefore, to investigate the behaviour of pairs of farmed ostriches (considering the sexes separately), ascertaining their year-round behaviour transitions and assessing gender and seasonal effects on behaviour performance. A detailed analysis of behaviour sequences can be used for our understanding of the species' behaviour repertoire as well as from the captive breeding point of view for developing better husbandry techniques and interpreting welfare implications.

2. Materials and methods

This study was carried out at a private reproductive unit near Parma, northern Italy. We observed six pairs of Black neck 4-year old ostriches (*S. c. domesticus*). They had been living at the unit for at least 3 years and the females had started laying the previous year.

The part of unit used for the study consisted of two rows of three identical outdoor paddocks, separated by an inspection corridor 4 m wide. The paddocks were 60 m × 15 m (900 m^2) in size and delimited by 1.90 m high wire mesh. Each paddock had a wooden shelter of about 8 m^2 (three sides and roof), and contained a trough located at the middle of the paddock's short side in front of the inspection corridor and a plastic water container (80 cm × 40 cm × 45 cm) on the ground just outside the shelter. Two to three small trees (4–5 m high) were scattered in each paddock. The ground was natural, but the grass had been removed by ostrich locomotion and the ground became muddy after rains.

Food was offered twice daily and consisted of commercial balanced pellets, developed for ostrich breeding, in the morning and fresh salad in the afternoon. They were consumed before next meal offer. Fresh water was offered twice daily. Apart from these activities, the only contacts the ostriches had with staff were due to medical care, if necessary, and egg collection in the reproductive season. No observation session was