Differences in stride between healthy ostriches (*Struthio camelus*) and those affected by tibiotarsal rotation

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ABSTRACT

Twenty healthy ostriches (ten cocks and ten hens), and twenty birds with tibiotarsal rotation (nine cocks and 11 hens) (14 months old) were isolated, hooded and weighed. A run (50 m × 2.5 m) was divided into sections marked 5 m, 10 m, 15 m and 20 m. Time taken for each bird to pass these points was recorded and speed computed. The degree of tibiotarsal rotation in the right foot was mean ± SEM, 156 ± 2.69°. Comparisons between left and right foot length in healthy birds showed no significant differences. Foot length was significantly lower in tibiotarsal rotation ($P = 0.03$). The right foot in tibiotarsal rotation was significantly shorter than the left foot. The number of strides per each 5 m division were significantly ($P < 0.05$) greater in tibiotarsal rotation by comparison with healthy birds. At 20 m, healthy cocks had more strides than hens. The stride length in hens was significantly ($P < 0.05$) greater than cocks at 5, 10 and 15 m, respectively, but lower throughout in tibiotarsal rotation ($P = 0.001$). The speed of hens was significantly ($P < 0.05$) greater than cocks. Tibiotarsal rotation resulted in significantly ($P < 0.05$) reduced speeds. Hens may be able to escape danger faster than cocks. The occurrence of tibiotarsal rotation necessitates consideration of genetics, management, sex, nutrition and growth rates.

Key words: ostrich, stride, tibiotarsal rotation.

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INTRODUCTION

Ostriches have evolved equipped with very strong legs that provide support and rapid locomotion. Apart from some studies on musculature and innervation of ostrich legs and feet[6,7], there are only a few studies on ostrich locomotion and stride[1,8]. Tibiotarsal rotation has been widely reported in ostriches up to 6 months of age[2,5]. The reason for the current research is that it has production importance on the farm relating to the efficiency of movement of birds about their paddocks. This has implications on feeding, resting and mating. The aim of the current study was to compare the stride between healthy cocks and hens, and to make a comparison between healthy birds and those suffering from tibiotarsal rotation.

MATERIALS AND METHODS

Twenty healthy ostriches (ten cocks and ten hens) and twenty birds (9 cocks and 11 hens) suffering from tibiotarsal rotation were chosen. All were approximately 14 months old. Measurements of the degree of valgus deformity in the right foot were made. The birds were permitted to graze freely in a 20-acre enclosure and fed daily with fresh, chopped lucerne, and feed mix consumed at 1.5 kg/day/bird (14.5 % protein; 9.5 MJ/kg). Water was freely available.

Birds were isolated, hooded and weighed individually on a platform scale (precision of 100 g). A run, constructed of wooden poles (50 m × 2.5 m) was specially prepared. Fine sand was raked the length of the run and sprinkled with water. The run was divided up into sections marked 5 m, 10 m, 15 m and 20 m. Each bird was unhooded and allowed to run along its entire length. Time recordings (in seconds) were taken at each 5 m division from which speed was computed.

The right and left footprint (heel to distal end of the claw) were measured. The effective stride between each 5 m division was recorded from the distal ends of the claw between left and right footprints. The number of strides per each 5 m division was recorded.

In order to eliminate error, a trial run was performed and each set of experiments was repeated 3 times on 3 consecutive days. Birds were identified by tag. Statistical comparisons were performed using ANOVA to determine stride differences between healthy cocks and hens, and to compare differences between healthy birds and those suffering from tibiotarsal rotation. Results were presented graphically (Figs 1–4) as mean ± SEM. $P < 0.05$ was taken as significant.

RESULTS AND DISCUSSION

There were significantly lower lengths in both feet of birds with tibiotarsal rotation by comparison with healthy birds ($P = 0.03$) (Fig. 1). The degree of deformity in the right foot was mean ± SEM, 156 ± 2.69 ($n = 20$). The right foot in tibiotarsal rotation was also significantly shorter

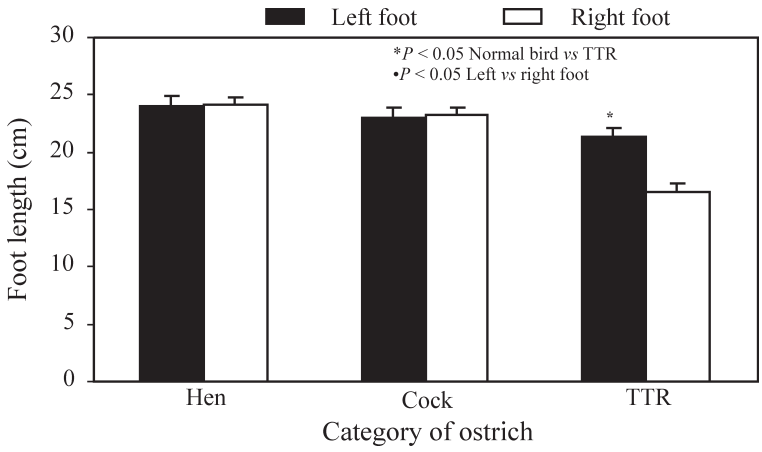

Fig. 1: **Comparison of left and right foot length** (cm) **between normal ostrich hens and cocks, and tibiotarsal rotation (TTR)** ($n = 20$)**.**

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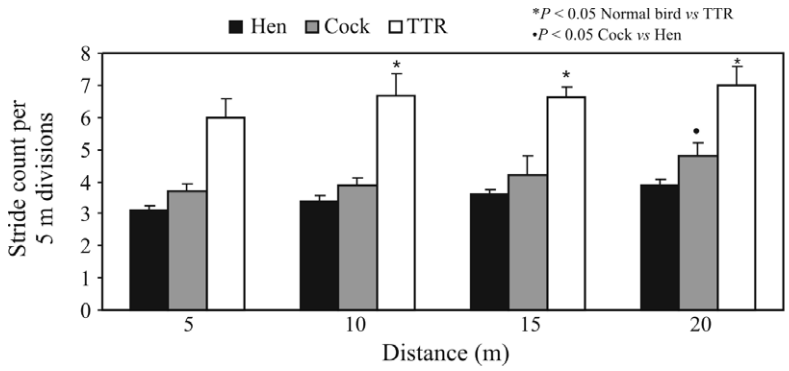

Fig. 2: **Comparison of count of strides per 5 m divisions between normal ostrich hens and cocks, and tibiotarsal rotation (TTR)** (*n* = 20)**.**

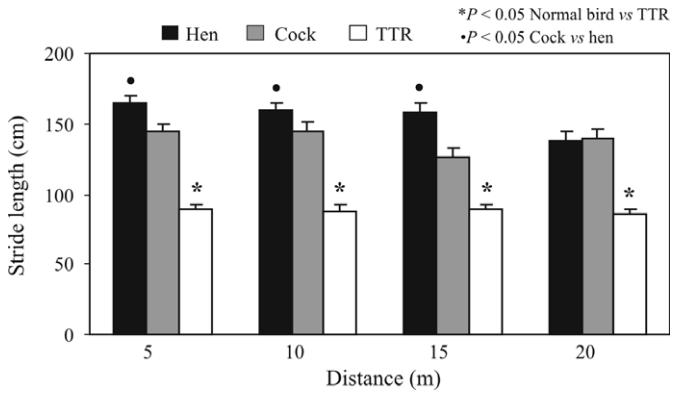

Fig. 3: **Comparison of stride length** (cm) **per 5 m divisions between normal ostrich hens and cocks, and tibiotarsal rotation (TTR)** (*n* = 20)**.**

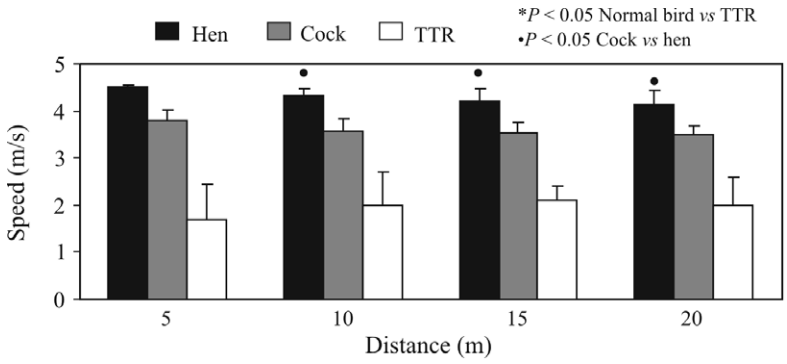

Fig. 4: **Comparison of speed** (m/s) **at 5 m distances between normal ostrich hens and cocks, and tibiotarsal rotation normal** (*n* = 20)**.**

than the left foot (16.53 ± 0.78 cm *vs* 21.33 ± 1.74 cm, respectively; $P = 0.01$) (Fig. 1). The substantial presence of tibiotarsal rotation on the farm necessitates that the farmer considers various etiological factors including genetics, management, sex, nutrition and growth rates[4].

The number of strides in each 5 m division were significantly ($P < 0.05$) greater in tibiotarsal rotation compared with healthy birds (Fig. 2). At 20 m, the cocks had a significantly larger number of strides compared to hens (4.80 ± 0.41 *vs* 3.90 ± 0.41, respectively; $P = 0.02$) (Fig. 2). It was interesting to note that the number of strides at each 5 m division were higher in cocks compared with hens, and at 20 m, they were significantly ($P < 0.05$) higher in cocks (Fig. 2). On closer examination, at 20 m, the mean number of strides in hens was 0.9 lower than in cocks. This suggests that after 20 m, hens require 1 stride less than cocks.

The stride length in hens was significantly ($P < 0.05$) greater than cocks at 5, 15 and 15 m (Fig. 3). It did not differ at 20 m. At each of the 5 m divisions, the stride length of tibiotarsal rotation was significantly lower ($P = 0.001$) than healthy birds (Fig. 3). This correlated well with the degree of deformity, which were approximately 156° in each bird.

The speed of hens at each 5 m division was significantly ($P < 0.05$) greater than cocks (Fig. 4). Tibiotarsal rotation resulted in significantly ($P < 0.05$) reduced speeds every 5 m compared to healthy birds (Fig. 4). The measurement of the degree of rotation in the right foot was severe and commensurate with a progressive pathological condition associated with age[3]. This resulted in a great reduction in the length of the stride (Fig. 3) and speed (Fig. 4) at each 5 m division. The faster speed at 20 m in hens suggests that, in the natural environment, they may have an added advantage of escaping during periods of danger thus ensuring the survival of maternal breeders. Cock tends to patrol about.

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