



## **GROWTH RATE OF OSTRICH (*STRUTHIO CAMELUS*) CHICKS UNDER INTENSIVE MANAGEMENT IN BOTSWANA**

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### ABSTRACT

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Thirty-seven ostrich chicks raised artificially had their weights, lengths of metatarsus and heights measured weekly from hatching to the 16th week. Despite weight loss during the first week due to utilization of egg yolk by the chicks, the chicks showed an exponential growth up to the twelfth week with an overall mean weekly weight gain of 1.3 kg. Female chicks showed a superior mean weekly gain of 1.6 kg compared to 1.2 kg for males. The metatarsal length grew rapidly at a weekly rate of 2.5 cm, but began to decline in the 11th week even though the weights and heights of the chicks were still increasing. The correlation coefficient between body weight and metatarsal length was 0.97. Individual chicks also maintained their respective heavy or light weight hierarchies throughout the study period. Thus isolation of chicks into groups by weight and raising them separately could have a role in the artificial rearing of ostrich chicks. Furthermore, ostrich chick rearing may be improved by regularly weighing chicks as a means of detecting changes in the growth patterns.

### INTRODUCTION

The ostrich (*Struthio camelus*) is a member of the ratite family of flightless birds, and is native to semi-arid and desert areas of Africa (Smit, 1963). Ostriches are easy to farm and domestication began in the 1860s at Oudtshoorn, the Cape Colony of South Africa (Huchzermeyer, 1994). Initially ostriches were kept for their feathers but are now kept for their meat, which is low in fat and cholesterol, and for their skins (Shanaway, 1995). Ostrich farming is presently found in South Africa, the United States, Australia, New Zealand and Zimbabwe (Deeming and Ayres, 1994). Although Botswana has the highest number of wild ostriches estimated at 60 000 by aerial surveying (Hallam, 1992), it has yet to develop its ostrich industry.

Only limited data on the growth patterns of ostrich chicks are available (Degen *et al.*, 1991). A study to find the growth rate of ostrich chicks under intensive management was therefore carried out.

### MATERIALS AND METHODS

The study was conducted at the Maradu Ostrich Farm in Lobatse in the south-east district of Botswana. The chicks were from adult ostriches (*Struthio camelus australis*) caught from the wild and raised under an intensive management system where all the

feed and water are provided. The eggs were incubated in a single stage incubator-hatcher (Buckeye).

Thirty-seven day-old hatched chicks were weighed on an electronic balance (Adam Equipment Co., UK), tagged around the neck for identification and transferred to the brooder. The chicks were thereafter weighed weekly until 16 weeks old. When the chicks weighed more than 6.0 kg a platform balance was used. During the day chicks were kept on concrete pens with runs, but were housed at night when heating from infra-red lamps was also provided.

Weekly measurements were taken with a builder's flexible tape measure. The height of each chick was measured from the toe to the top of the head when the neck was stretched. The length of the metatarsus was measured on the caudal side of the leg from the back of the hock joint to the phalangeal joint. By pecking at the feed with a finger, the chicks were taught to eat commercially formulated ostrich chick mash with 20% crude protein. Water was supplied *ad libitum* and finely chopped lucerne was sprinkled periodically on the starter mash.

The chicks were moved to bigger pens with concrete floors on the fourth week. On the 14th week the chicks were again transferred from the concrete pens to larger sandy pens, and sex was determined by cloacal examination as described by Gandini and Keffen (1985).

## RESULTS

The mean weight of day-old chicks was 820 g, and on the 7th day it had dropped to 751 g (Figure 1). The chicks had lost on average 9.8 g per day. Thereafter the chicks' growth rate increased exponentially up to the twelfth week when the mean weight was 16.3 kg. The overall mean weekly weight gain was 1.3 kg. The growth was fast from week 7 and was fastest in weeks 9 and 10 (Figure 1) but began to decline in the 11th week. Although the weights were just beginning to level off in week 13, a fall occurred in week 15 when on average the chicks lost 1.5 kg each.

On day 7 it was possible to separate the chicks into 3 groups A, B, and C based on their individual weights. There were 15 chicks in group A dominated by females, 10 chicks in group B with almost evenly mixed sexes and 12 chicks in group C dominated by males, and group mean weights on day 7 were 0.7 kg, 0.5 kg and 0.4 kg respectively. Individual chicks maintained the weight hierarchy recognized on day 7 so that heavy chicks remained heavy and light ones remained light (Figure 2).

From the 27 ostrich chicks whose sex was determined, 12 were male and 15 were female. The females grew at a faster rate than the males with a mean weekly weight gain of 1.6 kg and 1.2 kg respectively (Figure 3). At week 12, the rate of growth for both females and males started to decline but was slower for females than males.

The mean length of the metatarsus on day 1 was 6.4 cm. The metatarsal bone grew rapidly from the first week and it increased at the rate of 2.5 cm per week (Figure 4). The rapid increase continued up to week 11 when it began to slow down, although the weight and height of the chicks were still increasing. The mean height increased rapidly reaching 134 cm in the 16th week (Figure 4).

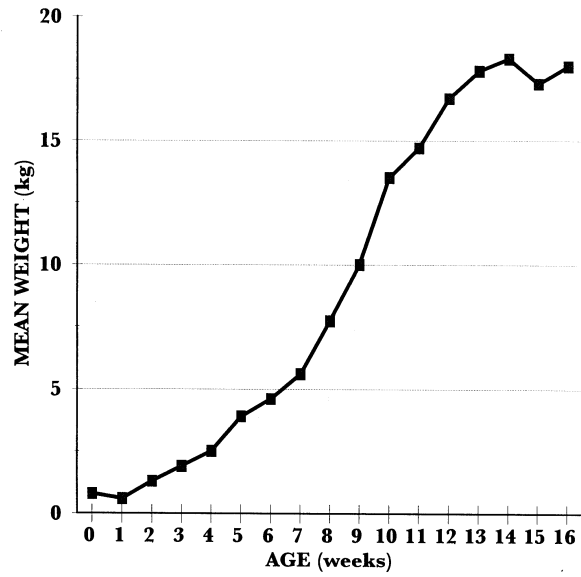


Figure 1. Average growth of ostrich chicks from hatching to 16 weeks

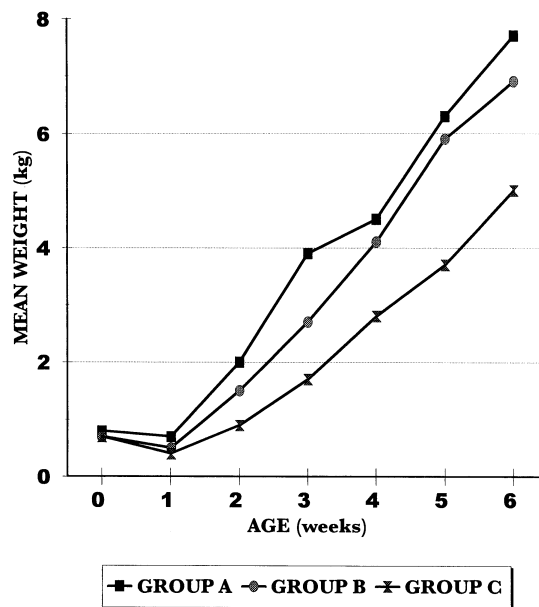


Figure 2. Average growth rates of three groups of ostrich chicks separated by weight at one week of age

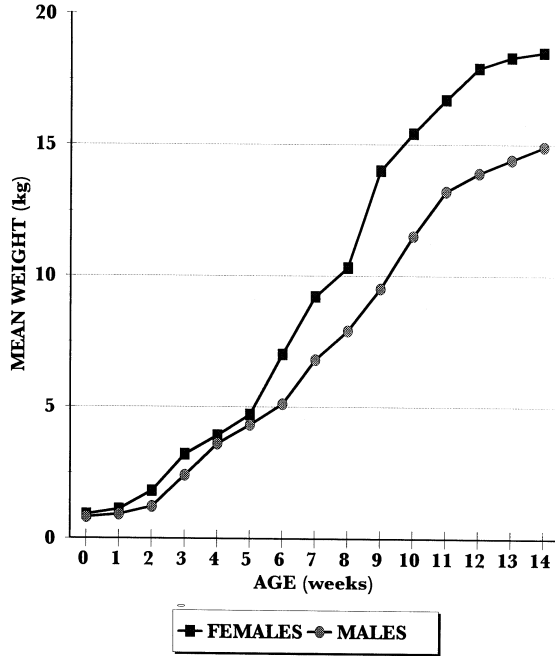


Figure 3. Growth rate of female and male ostrich chicks

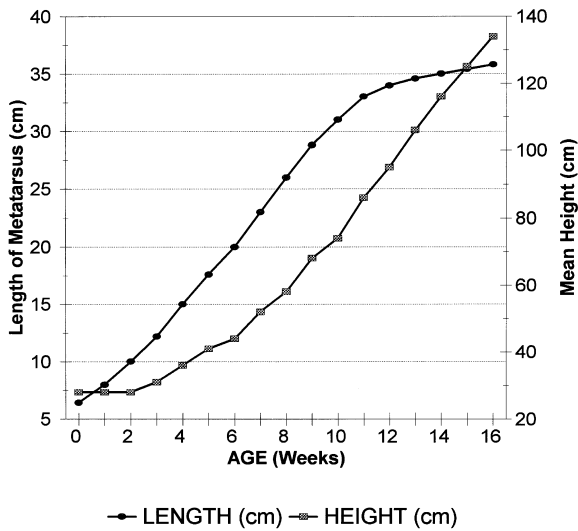


Figure 4. Growth of metatarsus and height of ostrich chicks after hatching to 16 weeks

Correlation analysis showed that body weight and metatarsal length were highly correlated with a coefficient of correlation of 0.97.

Only one chick out of the group developed leg deformity in the 6th week. The right leg was twisted outwards and hung back, and the chick was lame. It became recumbent, lost condition and was culled.

## DISCUSSION

The growth curve was sigmoidal as is usually the case with other poultry (Tzeng, 1981). After the loss in weight in the first week the body weight started to increase. This loss in weight was brought about by the utilization of the egg yolk by the chicks (Erasmus and Erasmus, 1993). Also the chicks had not yet learnt how to eat.

The rate of growth increased rapidly with age and by week 5 the chicks had attained a mean weight of 4.3 kg. Similar growth rates of ostrich chicks have previously been described by Degen *et al.* (1991) who reported a mean weight of 4 kg for chicks fed diets with 16%, 18%, or 20% crude protein.

At week 12 growth rates started to slow down, due perhaps to the genetics of these ostrich chicks (Emmans and Fisher, 1986). In contrast the rate of growth of the South African black ostriches started to decline after 18 weeks (Smit, 1963). A loss of weight of up to 1.5 kg occurred during the 14th week as the chicks were transferred from concrete to sandy pens and at the same time the feed was obtained from a different source. Weight loss could also have been due to the weather during this period which changed from hot and dry to cold and wet, hence stressing the birds and depressing their feed intake.

A wide variation in the weight of ostrich chicks is common and must be accepted as natural. The variation in the size of the chicks at a given age as described by Deeming and Ayres (1994) was also evident in this case. The chicks maintained their group sizes, and growth rates could be correlated with their weight hierarchy as recognized on day 7 after hatching. Thus ostrich chicks should be separated into groups based on their size and raised separately (Deeming and Ayres, 1994).

In this study the female chicks grew faster than the males as previously reported (Deeming and Ayres, 1994). The difference in the growth rates of the sexes could be due to a genetic component, although the extent of this genotypic influence has not been determined.

The length of the metatarsal bones increased at a rapid rate. This rapid growth rate has been regarded as the main cause of limb deformities in ostriches (Hallam, 1992). Regression analysis showed that the length of the metatarsus gave the best estimation of the body weight. This is in agreement with the findings of Deeming and Ayres (1994).

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### Taux de croissance de poussins d'autruche (*Struthio camelus*) dans des élevages intensifs du Botswana

**Résumé** – Le poids, la longueur des métatarses et la hauteur furent mesurés de façon hebdomadaire depuis l'éclosion jusqu'à 16 semaines chez trente-sept poussins élevés de façon artificielle. Malgré une perte de poids pendant la première semaine, due à l'utilisation des coquilles d'oeufs par les poussins, la croissance fut exponentielle jusqu'à la douzième semaine et le gain moyen fut de 1,3 kg par semaine. La moyenne pour les poussins femelles fut de 1,6 kg comparée à 1,2 kg pour les poussins mâles. La longueur des métatarses augmenta de l'ordre de 2,5 cm par semaines jusqu'à la onzième semaine puis diminua. Le coefficient de corrélation entre le poids et la longueur des métatarses fut de 0,97. Individuellement les poussins conservèrent leur hiérarchie, relative à leur poids, pendant toute l'étude. De cette façon l'isolement des poussins par groupes de poids et en les élevant séparément pourrait avoir un rôle dans l'élevage des poussins d'autruche. De plus, l'élevage pourrait être amélioré en suivant de façon régulière la moyenne des poids chez les poussins afin de détecter d'éventuels changements dans les profils de croissance.

### Tasa de crecimiento de pollos de avestruz (*Struthio camelus*) en condiciones intensivas en Botswana

**Resumen** – Se registró semanalmente – desde la eclosión hasta las 16 semanas de vida – el peso, longitud del metatarso y altura de 37 pollos de avestruz criados artificialmente. A pesar de la pérdida de peso que tuvo lugar durante la primera semana de vida debido a la utilización del vitelo, los pollos mostraron un crecimiento exponencial hasta la doceava semana de vida, con un crecimiento medio semanal de 1,3 kg. Las hembras tuvieron un crecimiento medio semanal de 1,6 kg, mientras que el de los machos fue de 1,2 kg. La longitud del metatarso aumentó rápidamente a un ritmo de 2,5 cm por semana; dicho crecimiento empezó a declinar en la onceava semana, a pesar de que los pesos y alturas de los pollos todavía estaban

aumentando. El coeficiente de correlación entre el peso corporal y la longitud del metatarso fue del 0,97. El orden de los pollos en relación al peso se mantuvo constante a lo largo de todo el período. Por tanto, la crianza de los pollos en grupos de peso homogéneo podría tener un efecto beneficioso. Además, la crianza de pollos de avestruz puede mejorarse pesando a los animales de forma regular, de manera que puedan detectarse cambios en el patrón de crecimiento.