تأثير إضافة الحصى إلي غذاء أفراخ النعام على معدل الزيادة في الوزن، كفاءة التحويل الغذائي، معدل النمو ومعدل تناول الغذاء

Effect of Supplementation Grit to the Diet of Ostrich Chicks on Body Weight Gain, Feed Conversion Efficiency, and Average Feed Intake

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الملخص

هدف البحث إلى دراسة تأثير إضافة الحصى إلى غذاء أفراخ النعام على معدل الزيادة في الوزن، كفاءة التحويل الغذائي، معدل النمو ومعدل تناول الغذاء. تم استخدام عشرين نعامة في هذا البحث وتم تقسيمهم إلى مجموعتين وضعت كل مجموعة في حظيرة، ضمت كل حظيرة عشر أفراخ نعام واحدة من الحظائر ذات أرضية أسمنتية والأخرى أرضية عادية وتم إمداد كل حظيرة بالماء وتقديم علفه نمو مركزة للنعام في الحظيرتين وتم إمداد المجموعة الثانية بحصى في العلف. وتم أخذ القياسات الآتية: معدل الزيادة في وزن الجسم الحي، معدل تناول الغذاء، معدل التحويل الغذائي ومعدل النمو. استمرت التجربة ستة أشهر وكانت النتائج (1.91±0.25) هو معدل تناول الغذاء للمجموعة الأولي(بدون حصى) أما المجموعة الثانية التي تم إمدادها بالحصى فكانت (1.89±0.18). وبالنسبة لمعدل التحويل الغذائي كان (4.56 ±1.20) للمجموعة الأولي (بدون حصى) أما المجموعة الثانية التي تم إمدادها بالحصى فكان المعدل هو(5.28 ±0.93) أما معدل الزيادة في وزن الجسم الحي كان (0.36±0.04) للمجموعة الأولي (بدون حصى) و(0.37±0.03) للمجموعة الثانية التي تم إمدادها بالحصى، ولذا يجب إمداد أفراخ النعام بالحصى لان له تأثير ايجابي على كفاءة الجهاز الهضمي مما يؤدي لزيادة وزن الجسم الحي، معدل التحويل الغذائي ويقلل استهلاك الغذاء.

الكلمات المفتاحية: الحصى ، النظام الغذائي لكتاكيت النعام ، زيادة وزن الجسم ، كفاءة تحويل العلف ، متوسط تناول العلف

Abstract

The research aimed to study the effect of supplementation grit on the diet of ostrich chicks on body weight gain, feed conversion efficiency, and average feed intake. Twenty ostrich chicks were used for the study. The chicks were randomly allocated to two groups. In the two treatment pens of ten chicks each, one pen had a concrete floor, which is bare ground. Water was supplied on ad libitum basis The chicks in both treatments were fed on ostrich grow concentrate. The chicks that were on the earth floor were given small stones as grit. The measurements were calculated; body weight gain, feed conversion efficiency, growth rate, and average feed intake. The duration of the study was 6 months**.** The results were as follows; average feed intake was (1.91 ± 0.25) for the first group (no grit) and (1.89±0.18) for the second group (grit). Average daily body weight gain was (0.36±0.04) for the first group (no grit) and(0.37±0.03) for the second group (grit). Feed conversion efficiency was (4.56±1.20) for first group (no grit) and (5.28 ±0.93) for the second group (grit). From this study, grit should be supplemented to the diet of ostrich chicks because grit had a positive effect on the efficiency of the digestive system of ostrich chicks as it increases body weight gain, feed conversion efficiency, and reduce feed intake.

Key words: Grit, Diet of ostrich chicks, Body weight gain, Feed conversion efficiency, Average feed intake.

1. Introduction

The ostrich is an important animal in many livestock industries and, in the developing world, The ostrich industry is growing rapidly in many countries in the world instead of South Africa, like U.S.A, Australia, Canada, Zimbabwe, Botswana, Egypt, Kuwait and several European countries (Mahrose, 2002; Al-Nasser *et al.*, 2003; Horbanczuk, 2005; Cooper *et al.*, 2008; El-Safty and Mahrose, 2009; Mahrose, 2012; Gouda *et al.*, 2014)

The healthy red meat and skins of ostriches make the animal very important for many livestock industries. Ostriches are well adapted to the environmental conditions, and interest in rearing them commercially is growing in many countries of the world (Cloete et al. 2012). The great interest in ostrich breeding has led to an increase in the demand for information about this bird, especially its maintenance and nutritional requirements (Brand et al. 2015) Knowledge of nutritional requirements during the various stages of growth, development, and production of the ostrich are vital (Bovera et al. 2014). The link between adequate nutrition and health Adequate nutrition is essential for good ostrich productivity and an effective way of providing the required nutrients is by using mixed feed formulations with green feed and grit for efficient digestion (De Jong B. (1994). the largest portion of an ostrich production system's expenses (Brand et al., 2002). This has been the driving force behind a number of studies that have been conducted on ostrich nutrition, with the aim of reducing feed costs and thus making ostrich production more profitable (Swart et al., 1993a; Farrel et al., 2000; Glatz et al., 2003). The over- or undersupply of nutrients in the diet can have a large influence on profitability by increasing

Table.2: The composition of ostrich grower concentrate

Nutrient	composition
protein	180 g *lkg* (max)
Cured fat	*40gl*kg(min)
Cured fibre	160g *l*kg(min)
Calcium	12 g *lkg* (max)
Phosphorus	4g *lkg* (max)
Lysine	8g *l*kg(min)

The chicks that were on the earth floor were given small stones as grit. The feed given to chicks was weighed every day and the let-over was also weighed separately. The feed conversion efficiency was calculated by using data on body weight and feed intake. The growing chicks were weighed for initial body weight and monthly thereafter, which was used for the calculation of the growth rate. Weight was taken using an electronic balance. The SAS system was used to analyze the data.

3. Results and Discussion

The daily feed intake from the first to the sixth month is given in (Table. 3). The first-month data revealed that chicks in the first group (no grit) had higher feed intake(1.60 ± 0.11)than the second group (with grit) (1.32 ± 0.11)

Table.3: Average feed intake (Kg/day)

Days	Feed intake No grit	Feed intake With grit
Day 1-30	1.60 ± 0.11	1.32 ± 0.11
Day 31-60	1.88 ± 0.13	1.87 ± 0.13
Day 6 1-90	1.92 ± 0.12	1.94 ± 0.02
Day9 1-120	1.93 ± 0.28	1.91 ± 0.16
Day 121-150	1.93 ± 0.26	2.3 ± 0. 22
Day 151-180	2.2 ± 0.21	2.1 ± 0.20
Day 0-180	1.91 ± 0.25	1.89 ± 0.18

In the second month, the second group (with grit) increase average feed intake from (1.87±0.13) to (1.94±0.02) more than the first group (no grit) from (1.88±0.13) to (1.92 ± 0.12). In the fifth month, feed intake of the second group (With grit) was higher (2.3 ± 0. 22) than the first group (no grit) (1.93±0.26). During the study, the average daily feed intake of the second group(With grit) (1.89 ± 0.18)is lower than the first group (no grit) (1.91± 0.25).

The lower feed intake in the first month may be associated with the metabolic process which is high, hence a costs or decreasing It is important for modelling requirements to know what the feed intake of the animal would be if the feed was available ad libitum (Gous andBrand, 2008; Schinckel et al., 2012). According to McDonald et al. (2002), improved production efficiency is usually obtained when feed intake is increased.

2. Materials and Methods

Twenty ostrich chicks were used for the study. The duration of study 5 months and the age of ostrich chicks were 1 month old. The chicks were randomly allocated to two groups and were reared intensively. In the two treatment pens of ten chicks each, one pen had a concrete floor, which is bare ground. The structure was rectangular enclosures made up of sheep mesh wire with wooden poles along the sides with corrugated iron sheets. Feeding trough and watering trough were provided in each pen. The feeding troughs were plastic troughs with 1.5 m length,0.5 width and 0.25 depth, while watering trough measure2.5 m long by 0.75 m width by 0.30 depth. The ostrich chicks in each pen were identified by numbers on their neck tags. Water was supplied ad libitum basis. Vitamins were added to drinking water for both at rate of 1ml per 5 litter of water for 5 days. The composition of vitamins at (table1). The chicks in both treatments were fed on ostrich grow concentrate from *Al Sahel Al- Akhdar* with the composition shown in (Table2).

Table.1: The composition of vitamins (Trade name Aminovital) manufactured for MWI meridian ID 83680 Made in U.K. each one Litter contain;

Vitamin A	20000000 i.u
Vitamin D3	5000000 i.u
Vitamin E	9 gm
Vitamin B1	5 gm
Vitamin B2	10 gm
Vitamin B6	3 gm
Vitamin B12	30 mgm
Vitamin C	50gm
Nicotinic Acid	20 gm
Folic Acid	1 gm
Glutamic Acid	26.4 gm
Glycin	15.30 gm
Lucin	908 gm
Lysine	20.7gm
Tryptophan	3.6gm

the first group(no grit)and(0.37 ± 0.03)for the second group (With grit).

Ostrich chicks in the second group (With grit) had a higher average daily body weight gain than the first group(no grit)

The Average daily body weight gain was high in the first month of the two groups (0.53±0.01) (0.48±0.05) (no grit& With grit, respectively), this may be attributable more to the metabolic process which tends to be high during their early stage of growth(Cooper.2005)rather than to the presence of grit.

There was no significant difference (p>0.05) observed between the two groups in daily body weight gain in the third month they both gained (0.30 ± 0.04).

Ostrich chicks at the second group (With grit) had higher Feed Conversion Efficiency (5.28 ± 0.93) than the first group (no grit) (4.56 ± 1.20) (Table.5).

Table (5) Feed Conversion Efficiency (F E)

Days	F E (no grit)	FE (With grit)
Day 1-30	3.09 ± 0.27	2.8 ± 0.64
Day 31-60	3.09 ± 1.26	4.42 ± 0.67
Day 61-90	6.45 ± 0.86	6.65 ± 0.93
Day 91-120	6.71 ± 4.7	5.08 ±0.97
Day 121-150	6.9 ± 41.8	6. 9 ±1.1
Day 151-180	7.04 ± 15.15	5.83 ± 1.12
Day 0-180	4.56 ± 1.20	5.28 ±0.93

The growth rate of the two groups shows that, in the first to the third month, both groups grew at a relatively constant rate, but the first group (no grit) had a faster average growth rate of about 0.550 kg per month than the second group (With grit) which grow at a rate of 0.450 kg per month.

In the fourth month, the two groups grow at the same rate (p>0.05), but increased for the second group (With grit) grow at the last two months at a rate of 1.62 kg per month and the first group (no grit) reduce growth rate to 0.58 kg per month.

The steady growth rate of the second group (With grit) from the fourth month to the end of the study might be due to the effect of grit. Grit improved the digestive efficiency of ostrich chicks and an efficient digestive system means a good growth rate (Gionfriddo and Best.1995).

more efficient digestive process of chicks when chicks are still young (Cooper, 2005). The increased feed intake during the second and third months for the second group (grit)could be attributed to the effect of grit which means that more feed was digestive efficiency and increase growth rate. While the first group (no grit) was lower digestion, take more feed to compensate for the poorly digestive feed. There was a significant difference ($p<0.05$) observed between the two groups on feed intake during the last three months. The first group(no grit) had a higher average daily feed intake (table. 3) (1.91±0.25) than the second group(With grit) (1.89± 0.18). The difference could be due to improved digestibility as a result of grinding capability enhanced by the presence of grit. In addition, the grit stimulates the secretion of digestive enzymes and aided the mixing of these enzymes with ingesta (Gionfriddo and Best.1995), this means that ingesta feed was efficiently digested and the body nutrient requirements were well met (Ryan,2002). From the fourth to sixth month there was significant average feed intake hence high output can be mit of grit is introduced to the diet of ostrich chicks.

The body weight gain (Table 4)in the first and second months for the first group(no grit)was higher (0.53 ± 0.01) (0.48 ±0.11) than the second group (with grit) (0.48 ± 0.05) (0.40±0.03) and in the third month no difference between the two groups(0.30 ± 0.01). From the third month tell the last month of study, the body weight gain of the first group(no grit) was reduced from (0.29±0.03) to (0.26±0.04) and at the last month of study started to rise (0.31± 0.05), while the second group (with grit) they gained more weigh (0.37 ± 0.04) (0.31±0.03) (0.35± 0.03).

Table (4)Average daily body weight gain (ADG kg\day)

Days	Average daily body weight gain No grit	Average daily body weight gain With grit
Day 1-30	0.53 ± 0.01	0.48 ± 0.05
Day 31-60	0.48 ± 0.11	0.30 ± 0.40
Day 61-90	0.30 ± 0.01	0.30 ± 0.04
Day 91-120	0.29 ± 0.03	0.37 ± 0.04
Day121-150	0.26 ± 0.04	o.31 ± 0.03
Day151-180	0.31 ± 0.05	0.35 ± 0.03
Day 0-180	0.36 ± 0.04	0.37 ± 0.03

The Average daily body weight gain between the two groups during the duration of the study was (0.36±0.04) for

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4. Conclusion:

From this study, grit should be supplemented to the diet of ostrich chicks because grit had a positive effect on the efficiency of the digestive system of ostrich chicks as it increases body weight gain, feed conversion efficiency and reduce feed intake.

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