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Effect of dietary protein levels in growth performance of ostrich chicks during 2–10weeks of age

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Abstract: The present work was conducted to examine the effects of adding different concentrations of dietary crude protein (CP) (18, and 21%) on the growth performance parameters of the ostrich chicks that include; the initial and final body weight, daily body weight gain, feed consumption, feed conversion and the protein efficiency ratio during the period from2-10 weeks of age. A total of twenty African Black unsexed ostrich chicks were used in the present study in a simple randomized design and these birds were divided into two groups with ten birds per each group. The first group was feed with diet containing 18 % of the CP, while the second group was feed with diet containing 21 % of the CP. The results of the present work indicated that the initial and final live body weight, body weight gain, feed consumption, and feed conversion of ostrich chicks were non-significantly affected by the different concentration of the dietary CP that was used. Whereas, the results showed that there was a significant increase in the protein efficiency ratio in the first group in comparison with the second group. In conclusion, the results of the present study indicated that feeding of the ostrich chicks with the diet that containing different concentrations of the CP did not effect on the growth parameters, but it showed the best protein efficiency ratio with the diet that contained the lower levels of the CP

Keywords: Growth Performance, Ostrich, Crude Protein, The Protein Efficiency Ratio.

Introduction:

The ostrich (Struthio camelus var. domestics) is the largest of all birds and belongs to the order Ratitae, which also includes other birds such as the emu, cassowary, rhea and kiwi (Sibley C.G. and Ahlquist J.E. (1990). The nutrient requirements of an ostrich depend on its stage of growth (Brand and Olivier 2011). Knowledge about nutritional requirements during the various stages of growth, development, and production of the ostrich are vital (Bovera et al. 2014). The great interest in ostrich breeding has led to an increase in the demand for the information about this bird, especially its maintenance and nutritional requirements (Brand et al. 2015). Correct nutrition of chicks is critical, as they are most vulnerable up to the age of three months (Cooper R.G., 2000). Nutrition is also highly influential in the management of a successful ostrich farm, as seventy-five percent of the running costs are assigned to obtaining high quality feed for the breeding stock (Brand et al., 2002b; Aganga et al., 2003; Cooper et al., 2004; and Kritzinger, 2011). Approximate the following nutrient concentrations are adequate for ostriches, emus and rheas: 16%-20% protein, ≤10% fat, ≤10% fiber,

~2.5% calcium and ~1.5% phosphorus (Jensen J.M., et al 1992). Up to the age of ten months, the food conversion of the ostrich is 6.5 kg of food/kg body weight (b.wt) gained (Schmitt J. 1997). According to Schmitt (1977) unbalanced breeder or chick rations may increase the likelihood of the following: – reluctance to eat (if chicks do not eat properly within the first week, health problems arise following consumption of the yolk sac that usually resulting in death within the first three weeks, bad food conversion, poor growth despite good food intake, poor feather growth and loss, leg problems occurring from one week to three months of age, lowered immunity and increased stress levels. Correct nutrition of chicks is important, as they are most vulnerable up to the age of three months (Cooper R.G., 2000). Unbalanced ostrich breeder nutrition results in multifaceted nutrient deficiencies in embryos, some of which are suspected to cause abnormal yolk sac conditions (Hallam M.G., 1992). Ratite diets are currently formulated based on poultry values due to a lack of research in this field. Nutrient requirements of growing birds and breeders change constantly and therefore require frequent diet alterations according to stage of growth or production. This is essential for optimum growth with a maximum economical utilization of feed. To succeed in this goal, ostrich diets require ideal levels and inter balances between protein, energy, vitamins and minerals. A deficiency or imbalance in any of these nutrients will impair growth and production, resulting in poor utilization of feed (CILLIERS and ANCEL, 1999). Protein contents vary from 16 to 22 percent. Starter rations, very high in protein (28 percent), are not recommended because such diets may be associated with leg abnormalities in turkeys. These diets are based on limited scientific nutritional research, due to the fact that few studies have been conducted on ostriches. Therefore, the exact nutritional requirements of the ostrich are unknown and nutritionists still do not agree on the nutritional standards to be used for ostriches (BRAND et al., 1999 and BRAND et al., 2002).

The aim of this study was to investigate the effects of different dietary protein levels on growth performance of ostrich chicks during 2–10weeks of age.

Materials and methods:

The present work was carried out at the Ostrich breeding farm, OmHbesh Ajmail city, Al-nuqat al khams, western Libya.

A total of twenty unsexed African Black ostrich chicks were used in the present study in a simple randomized design to examine the effects of different concentration of dietary protein levels (18%and 21%) on growth performance parameters that include: The Initial and final body weight, weight gain, feed consumption, feed conversion ratio and the protein efficiency ratio) during 2 to10weeks of age.

Ingredients and composition of the experimental diets of ostrich chicks are found in Table 1.

Table (1) Ingredients and calculated analysis of ostrich chick's diets.

Ingredients %	18% CP.	21% CP.
Yellow Corn	37.70	43.80
Soybean meal44%	36.00	31.30
Gluten meal 62%	2.60	2.00
Hay	7.25	9.40
Wheat bran	10.00	8.90
Molasses	0.85	1.25
Vitamin Premix (1)	1.25	1.00
DL Methionine	0.20	0.20
L-Lysine	0.40	0.40
Di Calcium phosphate	2.00	2.00
Limestone	1.50	1.50
Na Cl	0.25	0.25
Sum	100	100
Calculated analysis %		
CP	18%	21%
ME kcal/kg	2456	2487
Growth vitamin and Mineral premix, each 1 kg consists of: Vit A 12000, 000 IU; Vit D_3, 2000, 000 IU; Vit. E. 10g; Vit k_3 2 g; Vit B_1, 1000 mg; Vit B_2, 49g; Vit B_6, 105 g; Vit B_{12}, 10 mg; Pantothenic acid, 10 g; Niacin, 20 g, Folic acid, 1000 mg; Biotin, 50 g; Choline Chloride, 500 mg, Fe, 30 g; Mn, 40 g; Cu, 3 g; Co, 200 mg; Si, 100 mg and Zn, 45 g.		

Unsexed ostrich chicks of 2 weeks of age were randomly divided into two groups (equal in body weights). The first group of chicks was fed with diet contained 18% CP, while the second group was fed diet contained 21% CP and all diets were isocaloric. Each chick was identified by a shank tag and kept indoors until 2 weeks of age and after that, they were allowed to practice outdoors during mid-day and kept indoors at night. Chicks were exposed to 16 hrs. light and 8 hrs. dark and the light intensity for the two groups were equal. All chicks were kept under the similar managerial and hygienic conditions during the experimental period. Feed was provided adlibitum to all groups during the experimental period. Fresh water was made at all times. A space requirement was 2 m2 for 10 chicks (0.20 m2 per chick) at 2 weeks of age and extended by 10% per week according to Hallam (1992).

All chicks were individually weighted using an electronic balance accurate to 5 g and body weight was recorded at the second and tenth weeks of the age (The Initial and final body weights). Daily body weight gain was calculated as the difference between the initial and the final body weight divided by the number of days. Feed consumption was recorded weekly for each group, and calculated as the gram of diet that consumed per each bird by dividing feed consumption of the group on the number of birds in this group. Feed conversion ratio (g feed/g gain) was also calculated. Protein efficiency ratio is calculated by dividing the weight gain by the amount of protein that was consumed.

Results and Discussion

The results of the final live body weights, daily body weight gain, feed consumption, feed conversion ratio and protein efficiency ratio are presented in Figures 1,2,3,4 and 5.

Final live body weights and daily body weight gain of ostrich chicks were insignificantly affected by the different concentrations of the dietary protein that was used, as shown in Figures 1and2.

These results are at in the same line with Mahrose et al. (2015) were they showed that both initial and final live weight and body weight gain of ostrich chickens during 2–9 weeks of age were not significantly affected by dietary protein level. Also Carstens et al. (2014) reported insignificant differences between the high (23.48% CP) and low (16.8% CP) diets on weight gain from 1 to 49 days of age and insignificant differences between the high and medium (20.28% CP) diets on weight gain from 1 to 77 days of age. In these studies, the highest body weight was observed in the case of the lowest level of protein. In turn, Tasirnafas et al. (2015) revealed that higher body weight was achieved by feeding lower dietary energy levels.

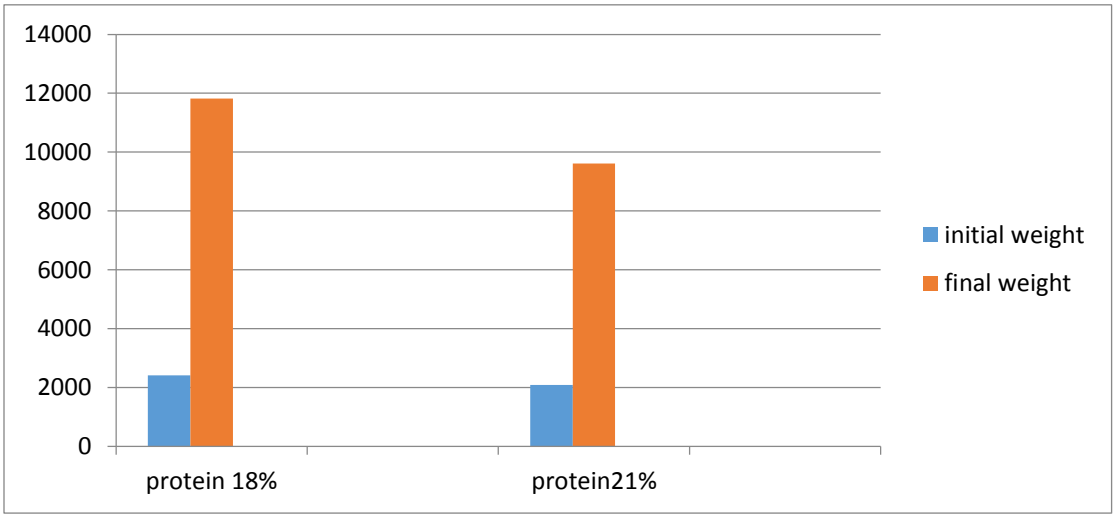

Figure (1) Initial and final live body weight of growing ostriches as affected by dietary protein levels.

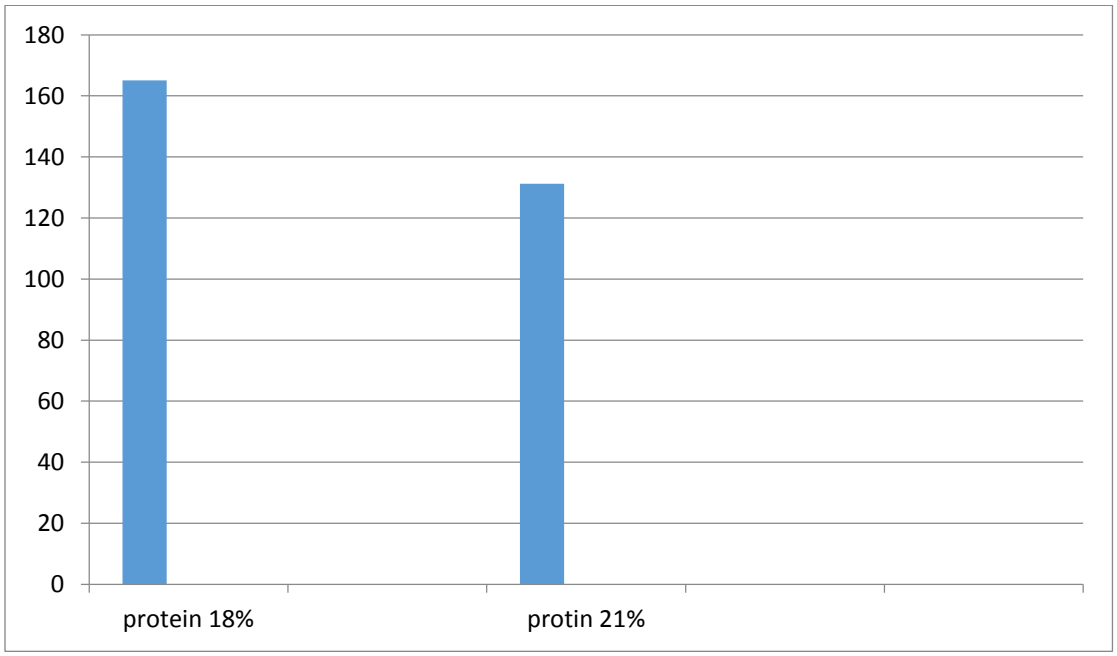

Figure (2) Weight gain of growing ostriches as affected by dietary protein levels.

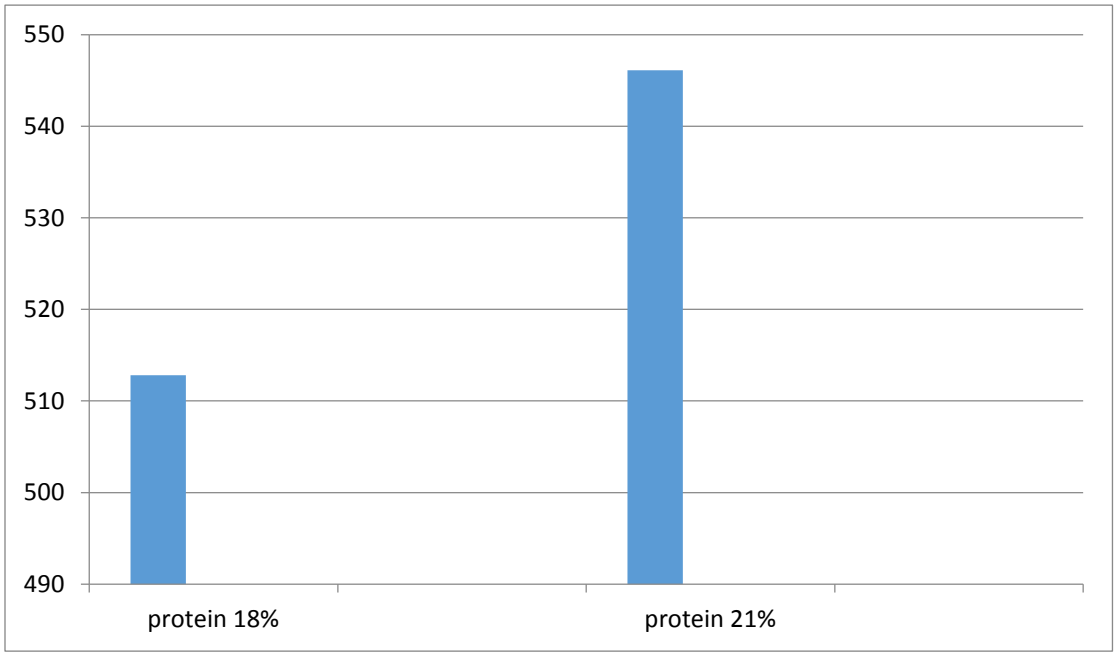

Figure (3) Feed consumption of growing ostriches as affected by dietary protein levels.

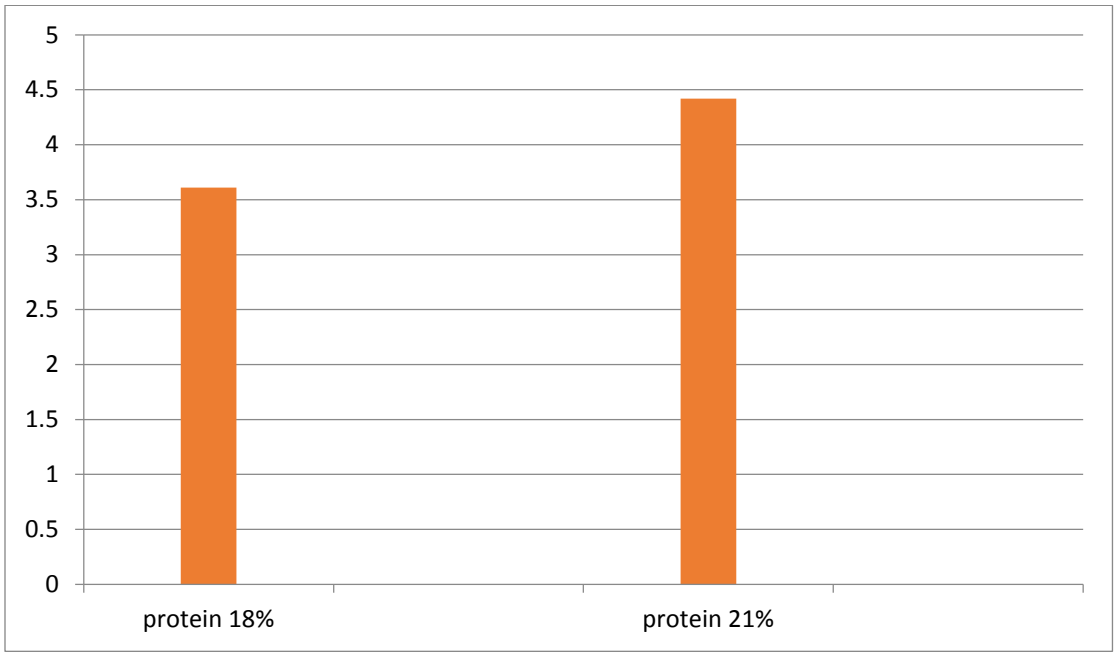

Figure (4) Feed conversion of growing ostriches as affected by dietary protein levels.

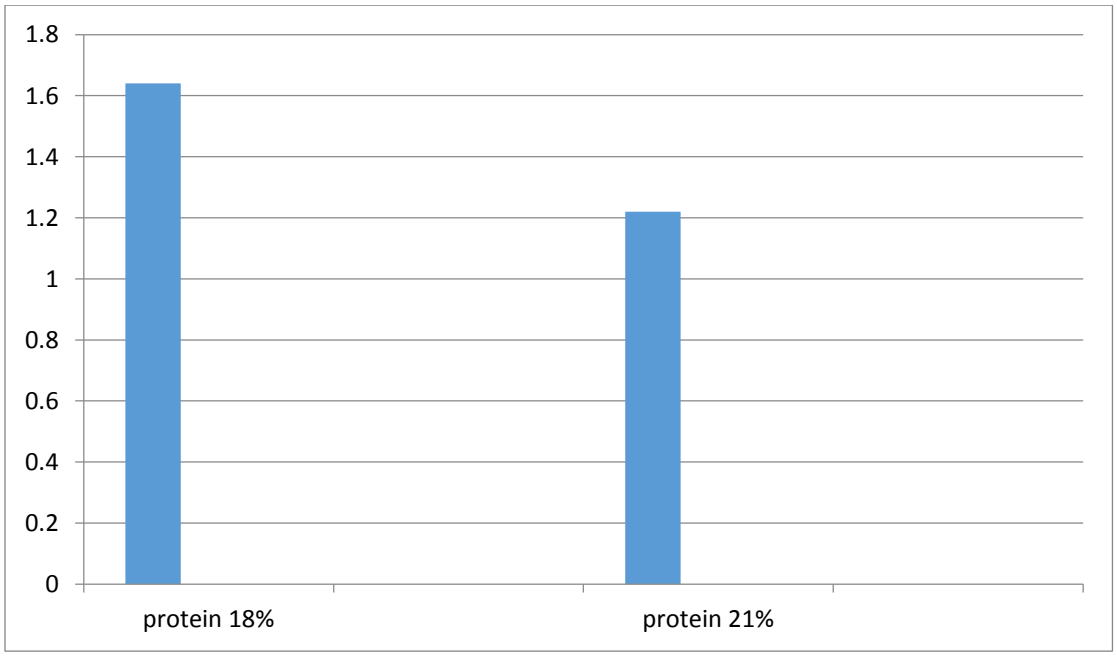

Figure (5) Protein efficiency ratio of growing ostriches as affected by dietary protein levels.

Results of the present study indicated that the extra protein consumed by birds could not be utilized productively by ostrich chicks and were probably eliminated via fecal nitrogen as reported in other publications (Ahmed et al., 2011and Bovera et al., 2011). Figures3 and 4 reveal that dietary protein level did not significantly changed feed consumption and feed conversion ratio. However, the best (P≤0.05) value of

protein efficiency ratio (1.64%) was observed in ostrich chicks fed diet contained 18%, followed by those fed 21% CP (1.22%) as shown in figure 5. In the present work, the best value of feed conversion ratio was observed (3.61) in the group of chicks which fed on 18% CP diet that was in the same line with the average of the feed conversion ratio from hatch to 9 months of ostrich age which was ranged from 3.6 to 3.9 (Bunter, 2002).

Conclusion:

In conclusion, the results of the present study indicated that feeding of the ostrich chicks with the diet that containing different concentrations of the CP did not effect on the growth parameters, but it showed the best protein efficiency ratio with the diet that contained the lower levels of the CP.

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تأثير البروتين الغذائي على نمو أفراخ النعام من عمر 2 إلى 10 أسابيع

الملخص: هدفت الدراسة الحالية إلى معرفة تأثير تغذية أفراخ النعام على عليقه ذات تركيزات مختلفة من البروتين (18%-21%) على قياسات كفاءة النمو في أفراخ النعام والتي تشمل: معدل الزيادة اليومية في الجسم الحي، معدل استهلاك الغذاء، معدل التحويل الغذائي ومعدل كفاءة البروتين خلال الفترة من 2 إلى 10 أسابيع من عمر النعام. تم استخدام عشرين طيراً من أفراخ النعام الغير مميزة جنسياً، وتم تقسيمهم إلى مجموعتين، حيث احتوت كل مجموعة على عشرة أفراخ. المجموعة الأولى قدمت لها عليقه تحتوي على 18% بروتين، بينما المجموعة الثانية قدمت لها عليقه تحتوي على 21% بروتيناً. وأشارت نتائج هذه التجربة إلى أن الوزن البدائي والنهائي للجسم الحي، والوزن المكتسب، معدل استهلاك الغذاء وكذلك معدل التحويل الغذائي لم يتغيرا تغيراً معنوياً باختلاف تركيز البروتين في العليقة، بينما أوضحت النتائج أن هناك زيادة معنوية في معدل كفاءة البروتين في المجموعة الأولى مقارنة بالمجموعة الثانية. كما أظهرت نتائج الدراسة الحالية بأن تغذية أفراخ النعام على عليقة ذات تركيزات مختلفة من البروتين لم تؤثر على كفاءة النمو، بينما أوضحت النتائج بأن أفضل معدل لكفاءة البروتين كان نتيجة تناول أفراخ النعام عليقة تحتوي على بروتين أقل.

الكلمات المفتاحية: النعام، البروتين، كفاءة النمو، كفاءة البروتين.