VITAMINS


Selected biochemical values were determined in venous blood plasma from 45 clinically healthy ostriches (Struthio camelus) of different age and sex at an altitude 2 200 m above sea level. Animals were divided by age into 4 groups and the group of adults was divided by sex into 2 subgroups. Group 1 included chickens (n=10) aged 26.5 d; Group 2 included 70-day-old chickens (n=10); Group 3 were juvenile birds (n=8) aged 232.4 d; Group 4 was formed by 10 females and 7 males (n=17), aged 6 years old. The diet was a mixture composed of chopped alfalfa hay, sorghum and soybean meal, supplemented with vitamins and minerals. Drinking water and diet were provided ad libitum. In all blood samples 17 biochemical analytes were determined. Significant (P<0.05) age effect was found in the values for glucose, uric acid, total protein, albumin, globulins, Ca2+, inorganic P, cholesterol, ALT, AST, creatine kinase, alkaline phosphatase and amylase. There was also a significant (P<0.05) sex difference in values for total protein, albumin, globulins, Ca2+, Mg2+ and inorganic P. Blood biochemical values determined in this study can be considered reference data for disease diagnosis in ostriches of different ages.


This chapter focuses on the anatomy, digestion, grazing behaviour, diet selection, drinking behaviour and nutrient requirements (energy, protein, amino acids, minerals and vitamins) of ostriches. Feeding strategies, results of growth performance studies and production norms and feeding guidelines are also discussed.


This review discusses current data on nutrition in ostrich breeding birds. Nutritional demands increase during breeding particularly the calcium and phosphorus requirements for egg production. The correct balance of amino acids, vitamins and carbohydrates is important for the maintenance of high fertility after the attainment of sexual maturity at 24 months of age for female birds and 36 months of age for male birds. Most problems relating to health and performance, including fertility, hatching, chick survival, growth rates and deformities in the early weeks, are usually traced to inadequate breeder rations.


The ostrich is an important animal in many livestock industries and, in the developing world, the export of meat and skins is a valuable source of foreign currency. As the successful growth and reproductive performance of ostriches depends on good nutrition it is extremely important to provide the correct diet. Some researchers have incorrectly assumed that poultry diets are useful for ostriches, but the vitamin and mineral requirements of these birds are unique and their diets should never be substituted with poultry or other livestock feeds. Producers should be knowledgeable about how different ingredients provide the essential nutrients for growth and development. Adequate nutrition is key to good flock performance and more research into ostrich nutrition is required. In Zimbabwe, one of the greatest costs involved in the keep of ostrich breeder birds is purchased feed, which can cost approximately US$ 4,555 for every 10 birds per annum. In order to cover these costs, the producer needs to ensure an adequate supply of birds for slaughter.

The ostrich is an important animal in many livestock industries and in the developing world. The digestive system of the ostrich differs considerably from that of non-ruminant animals or poultry. Described are the structures and functions of the oesophagus, proventriculus, ventriculus, duodenum, jejunum, proximal, and distal rectum. The genetic potential of an ostrich may be described by its characteristic growth curve. Males exhibit slightly faster maturation rates than females. Maximum growth is attained at 181 days in males and 199 days in females. The successful raising of ostriches from the egg to the breeder bird stage requires high standards of nutrition and the producer should be knowledgeable about how the ingredient will provide the essential nutrients for growth and development, the utilisation capacity of each nutrient and expected performance outcomes. Correct nutrition of chicks is critical, as they are most vulnerable up to the age of 3 months. Breeder bird nutrition should cater for increased calcium and phosphorus requirements during egg production, and include the correct amino acids, vitamins and carbohydrates for maintenance of high fertility after the attainment of sexual maturity at 24 months of age. This paper presents an account of the rearing, anatomy of the gastro-intestinal tract, and growth curves of this bird.


A deceased 10-yr-old male ostrich was diagnosed with severe necrotizing enteritis and septicemia. The bird was inappetent for 3 wk and had neurologic signs 2 days prior to death. Macroscopically, no significant lesions were noted aside from congestion of the liver, kidneys, and spleen. Histopathology revealed severe fibrinonecrotic enteritis associated with large numbers of gram-negative bacteria, multifocal fibrinoid necrosis in portal arteries, accumulation of fibrin in hepatic sinusoids, myocardial degeneration, and necrosis. There was also squamous metaplasia in the glands of the esophagus and external ears. A gram-negative rod was isolated in pure culture from intestine, liver, lungs, and trachea and identified as an Aeromonas species. The concentration of vitamin A in the liver was extremely low. The lesions seen in the intestine and liver and the isolation of an Aeromonas sp. from various tissues strongly suggest that this bacterium was the cause of the necrotizing enteritis, septicemia, and death of this ostrich. Vitamin A deficiency might have predisposed the bird to the Aeromonas infection.


Encephalomalacia in birds is commonly related to vitamin E deficiency. There are no reports of neurological signs associated to nutritional deficiencies in ostriches. 14 ostriches aged 1 day to 3 weeks old were sent to necropsy and showed apathy, progressive weight loss, twisting or S-shaped flexure of the neck and mortality. Gross changes were mild and consisted of congested blood vessels besides oedematous aspect of the cerebrum and cerebellum. Microscopic examinations revealed congested meningeal vessels. Capillaries were evident in the cortex and white matter of the encephalon. Focal spongy vacuolation and reactive gliosis were observed within the white matter of the cerebellum. Four birds that presented neurological signs were inoculated subcutaneously in the neck with 50 mg of vitamin E (alpha-tocopherol acetate) followed by clinical evaluation. These birds fully recovered within 24 h. Macroscopic and microscopic lesions associated to the clinical signs and the therapeutic improvement provided by vitamin E administration were strong evidences of nutritional encephalomalacia (vitamin E deficiency).

The research was carried out in a microfarm initially populated by 4 adult birds and 8 chicks. It consisted of biochemical determinations of the main blood parameters and comparing them with reference values found in specialized literature. The parameters highlighted a vitamin and mineral imbalance caused by deficient and uncontrolled feeding. Testing showed deviations, of more or less importance, in the individual and mean values, compared with the reference values of the Merk Veterinary Manual (2007) and other reference sources. The blood calcium (10.18±0.551 mg/dl) and phosphorus (2.34±0.875 mg/dl) levels showed relative low values. Magnesium (2.46±0.472 mg/dl, 1.79-3.21 mg/dl) sodium (187.87±62.24 mEq/l, 115-311 mEq/l) and blood lipids (84.765±536 mg/dl) values were shown to be high. Potassium (2.90±0.993 mEq/l) and uric acid values were showed to be between physiological limits for the species. The wide differences of the reference values found in different sources highlights the need for further statistical studies of the various populations in order to determine the precise reference values for the species. Complex mineral imbalances (low calcium levels, high magnesium, low phosphorus levels) associated with vitamin B deficiencies seriously affected the health of the ostrich chicks causing two deaths. The recuperation of the birds and the normalization of the physiological parameters were based on the introduction of calcium and phosphorus balanced diet, a gradual increase of fibrous feed with succulent feed of 40%, vitamin B therapy along with reducing stress levels.


A case of pneumonitis, caused of P. aeruginosa, in an adult male ostrich in Zambia, Africa is reported [date not given]. The animal had severe greenish diarrhoea, fever, convulsion, respiratory distress and dehydration. It was treated orally with Baytril (5 mg/kg, body weight) and vitamin E for 3 days. Slight improvement was observed and restlessness, respiratory distress and nervous signs were still present despite of treatment. After one week of sickness, the ostrich died on 20 January 1996. Smear examination revealed gram negative rods and culture of specimen demonstrated pure growth of P. aeruginosa.


This article presents the first report of nutritional related micrognathia in ostrich chicks caused by an apparent deficiency in the feed of the parent flock. It was characterized by low hatchability, late embryo mortality, leg deformation and severe micrognathia. These signs were observed in ostrich eggs and new hatched ostrich chicks from one breeding farm located south of Israel. These problems were not observed in eggs or chicks originating from other ostrich farms incubated in the same setters and hatchers, in the same hatchery, at the same time. It was noted that on the farm where the affected eggs came from, the breeding flock of ostriches were fed with a self-prepared feed without vitamin and mineral supplement.


AIM: To generate clinical biochemical data to aid diagnosis of suboptimal performance in ostriches farmed under pastoral systems in New Zealand. METHODS: Blood and liver samples were sought from three categories of bird, viz 3-12-week-old chicks, 7-12-month-old growers, and from breeding hens, managed under pastoral conditions on farms in several locations in New Zealand. Concentrations of the minerals Ca, PO4, Mg, Na, K, Cu and Zn, activities of the enzymes gamma-glutamyl transferase (GGT), creatine kinase (CK), lactate dehydrogenase (LDH) and aspartate aminotransferase (AST), and concentrations of total protein (TP) and uric acid and vitamin E in plasma and Se in whole blood were determined from four flocks of chicks, two flocks of growing and one flock of breeding birds. Concentrations of Cu, Fe and vitamin B12 were determined from liver samples from chicks and growing birds. Bodyweight was recorded at the times of blood-sampling, where this was feasible. RESULTS: It proved impossible to obtain blood samples by venepuncture of the radial vein from chicks <3 months of age. Plasma concentrations of minerals, with the exception of K, which were higher, were within the normal range observed in the literature for ratite species. Activities in plasma of
AST and CK were almost double, and those of LDH similar, to those in the literature for ostriches. There was considerable variation in activities of the enzymes between farms, but no association with growth performance. Concentrations of Cu in plasma were lower and in liver were higher than would be expected in farmed ruminants. Though hindgut fermenters, the birds maintained concentrations of vitamin B12 in plasma and liver at least comparable to those observed in ruminants. CONCLUSIONS: Collection of blood samples by venepuncture via the wing in ostrich chicks younger than 3 months of age is difficult and unlikely to prove viable for routine diagnostic purposes. Clinical biochemistry data on mineral nutrients in ostriches farmed in New Zealand are similar to those in the literature from South Africa, but AST and CK are higher, and may be normal and a reflection of the high growth rates of the musculoskeletal system.


Among 96 young ostriches of 1-2 months old reared on a farm in southern Hunan, China, 29 died in March-April 1999. Samples were taken from tissues of the dead birds and their feed examined. The samples of both the tissues and feed had their Se level significantly lower than that in the normal birds and their standard feed. For its control, the young ostriches were injected subcutaneously with sodium selenite 1.0g/litre at 2 ml/bird, and vitamin E at 0.2 mg/bird at 15 days interval. In addition, sodium selenite and vitamin E were supplemented to their feed at 0.3 mg/kg and 20 mg/kg, respectively. Then, the disease was brought under control.