Prevalent diseases of ostrich chicks farmed in Canada
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Abstract — In Canada, ostriches are now slaughtered for their meat and hides. The mortality rate in ostrich farming is highest in chick units. An increased chick survival rate impacts positively on production and profit. This paper will focus on common health disorders that affect chick production costs. These are discussed under the following categories: digestive, orthopedic, respiratory, and integumentary disorders. Methods for elimination or reduction of these mortality factors are also discussed.

Ostrich farming is an alternate agricultural enterprise, which started in western Canada in the early 1990s. Today, ostriches are being slaughtered at approximately 1 y of age for their meat and hide. This relatively new industry will be viable as long as farmers produce good quality birds for market in the most economical and humane way. At present, however, 1 of the weakest areas in ostrich farming is the relatively high chick mortality rate experienced when the birds are less than 3 mo of age. Although early mortality is a characteristic of most livestock, it is particularly prevalent in ostrich chicks, due to prolonged confinement over the fall and winter. Additionally, high morbidity results in a reduced growth rate during that time.

This paper focuses on the most common conditions affecting ostrich chicks raised in Canada. These problems are divided into digestive disorders, orthopedic problems, respiratory disorders, and integumentary anomalies. Immediate post-hatching problems are not discussed.

Digestive disorders

Impaction
This condition is characterized by an excessive accumulation of ingested material in the proventriculus and

ventriculus that is not being propelled normally into the small intestines (Figure 1). Impactions may be classified as acute (blockage that leads to debilitation within a few days) or chronic (blockage that leads to debilitation within weeks to months), hard (rocks, sand) or soft (fibrous material, such as, alfalfa hay and grass), and partial or complete.

Eighty-five percent of impactions are observed in birds 6 mo old or less (1). Impactions can lead to gastric stasis, whereby the contractions of the ventriculus stop, and koilin hypertrophy develops along the ventricular surface (2).
The most common clinical signs include failure to thrive, abnormal passage and quantity of feces, and a distended proventriculus, which can be palpated on the left side of the abdomen, cranial to the leg. Diagnosis can be made by palpation, especially in the case of a hard impaction, and by radiography or ultrasonography. Mild impactions can be relieved by flushing the proventriculus with water, mineral oil, or diluted propylene glycol (1:10). Severe impactions can only be relieved with a proventriculotomy (3) or an esophagostomy to remove the impacted material. The prognosis following surgery is very good, if the impaction is detected early and has not yet caused excessive distension of the proventriculus. If the latter has existed over an extended period of time, gastric atony will likely ensue after surgery, leading to starvation and death.

Common materials to be found in impacted proventriculi include long-stemmed alfalfa hay, grass, straw, rocks, and wood stems. Impactions appear to be stress-related (4), and thus are more common when chicks are exposed to such stressors as confinement; high pen densities; loud irregular noises, such as from nearby construction; and excessive human handling. Ostriches fed a fibrous nonpelleted diet must always have access to some form of grit to assist in the prevention of impaction. A chick relieved of an impaction will impact again if the stressors or the offending materials are not removed from the environment. As ostrich chicks thrive on social facilitation and mimic one another’s behavior, all birds in a pen must be checked when an impaction has been diagnosed. If 1 chick has ingested too much material, other chicks are likely to have imitated the same abnormal ingestive behavior.

**Hardware disease**

This disease, well documented in cattle and ostriches, involves the ingestion of sharp metal objects with an ensuing perforation of the gastrointestinal tract. The condition can be difficult to diagnose. Clinical signs include inappetence, loss of body condition, and scant passage of feces (5). Undetected hardware disease in ostriches can lead to gastric stasis. I have seen birds presenting no pain on abdominal palpation and having normal hemograms, even in the face of peritonitis. Metal detectors and radiographs can be used to detect the presence of some items, but are not reliable in ascertaining that these are causing abdominal problems. Surgical removal is the only therapeutic choice for hardware disease.

**Cloacal prolapse**

This condition is usually seen in birds less than 3 mo old and is generally associated with intestinal problems (5). I have observed the condition most often in chicks not drinking enough water, resulting in the passage of dry feces with dyschezia, followed by a prolapse of the cloacal tissue (Figure 2). Cryptosporidial enteritis also has been implicated in cloacal prolapse in young ostriches in South Africa, as well as in adults imported into Canada from Botswana (2). Depending on the cause and severity of the condition, therapy will involve application of an anti-inflammatory antibiotic ointment, replacement of the swollen tissue into the cloaca under anesthesia, and placement of a purse-string suture that will allow defection. Adequate hydration can be maintained with regular gavage if affected birds are not drinking enough, and oral or parenteral antibiotic therapy may be warranted.

**Bacterial enteritis**

This condition is most commonly observed in ostrich chicks less than 6 wk old. Affected chicks exhibit depression, diarrhea, and dehydration. Bacterial enteritis is most prevalent when management practices are inadequate, that is, when hygiene is poor, overcrowding exists, and stressful factors, such as, improper temperature and excessive handling, are present (5). Necrotic enteritis is a common form of bacterial (*Clostridium* spp.) enteritis diagnosed in Alberta. The pathology involves necrosis of the intestinal wall, characterized by a cheese-like lining and contents (2,5). Gas in the intestines without lesions is not indicative of enteritis.

Since coprophagia is a normal behavior in ostrich chicks, bacterial enteritis rapidly becomes contagious. Treatment and control of this condition includes correction of the inadequate management practice, optimal sanitation to prevent spreading of the disease between pens, and the use of proper antibiotics based on culture of the intestines. The use of probiotics immediately after hatch, based on the principle of competitive exclusion, seems beneficial in curtailting the problem (2,5) and I have used them successfully.

**Orthopedic disorders**

**Rolled toes**

This condition is most often observed in chicks less than 6 wk old, where 1 or both main toes roll laterally.

The etiology is unknown but may include genetic aberrations, incubation problems, or an inadequate substrate that causes slipping (1). Huchzermeier (2) has reported riboflavin deficiency as a cause for rolled toe syndrome. Rolled toes can easily be corrected by applying corrective shoes (6). I recommend regular nail trimming, since once a toe has rolled, the nail will overgrow and prevent the affected toe from returning to its normal position.

**Rotational deformities of the leg**

This syndrome most often involves a thickening and a lateral deviation of the tibiotarsometatarsal joint in chicks

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**Figure 2. Cloacal and rectal prolapse in a 4-week-old chick.**
Figure 3. Deformed rib cage of a 9-week-old chick that also suffered from a chronic angular leg deformity.

Figure 4. A 3-week-old chick with an acute lateral rotation of the left leg.

less than 3 mo old (Figure 3). The deviation can cause 1 foot to rotate as much as 180° from the dorsoplantar axis of the normal leg in only a few days. In general, only 1 leg is severely affected. Several etiologies have been suggested: low serum calcium (7), rapid weight gain from a high protein starter ration (8,9), and genetic aberrations (1). Deformation of the chest wall with a skewing to 1 side has been noticed coincident with leg rotations (5) (Figure 4). I have observed hatchlings with skewed chest walls that have subsequently developed a leg rotation, likely as a result of an abnormal stance caused by the chest deformation.

A prevalence of chicks with leg deformities greater than 5% of the chick population on a farm usually indicates a mismanagement problem that requires correction (10). Observations from Canadian ostrich farms experiencing severe leg rotation problems shared some common characteristics: chicks growing too fast without proper exercise (body weight exceeding 4.5 kg at 28 d of age); hard substrate, such as cement floors, with high indoor pen densities, leading to frequent falls and presumably traumatic injuries to growth plates of the tibiotarsometatarsal joints; malnutrition due to deficient diets; and impact problems.

Surgical corrections of leg deformities have been attempted but with poor results (1). These include derotational osteotomy and periosteal stripping. Conservative therapy, such as the use of anti-inflammatory drugs and increased exercise, may work if the leg is only minimally rotated outward (less than 15°). Considering present market prices, breeders generally euthanize any birds exhibiting leg deformations and forego expensive treatments.

Slipped tendons
This term is used to describe a lateral slip of the gastrocnemius tendon over the tibiotarsometatarsal joint. The condition is most often observed in birds that are less than 6 mo old, but it can occur in older birds. The prognosis is fair for young birds, provided that the skin over the tibial condyles has not ruptured. If a rupture has occurred, euthanasia is usually recommended. Treatment involves replacing the tendon in the tibial groove and holding it there with bandages on either side of the joint but not across the cranial aspect to prevent skin laceration. Birds older than 6 mo suffering from a slipped tendon are euthanized immediately, as the prognosis for recovery, whether the skin is ruptured or not, is extremely poor.

The Achilles tendon can also slip medially over the tarsometatarsophalangeal joint in young chicks. There is usually no successful treatment, unless detection is early, in which case bandaging the tendon back in its normal position may resolve the problem. Most affected chicks will develop an abnormal stance with ensuing leg deformities or poor growth, presumably due to pain.

Respiratory disorders
Respiratory problems are common in ostriches of all ages, especially when they are confined for long periods with inappropriate ventilation (11). Lower respiratory problems, such as, unilateral or bilateral air sacculitis and pneumonia, present with similar clinical signs, such as, open-mouth breathing at rest, chest excursion with inspiration, and exercise intolerance.

A specific antemortem diagnosis can be reached by culture for bacterial growth and a smear of the sputum to check for fungal hyphae. Sputum can be obtained by massaging and putting pressure on the trachea to elicit a cough. Other diagnostic techniques, such as transtracheal and air sac washes, are also valid but usually cost-prohibitive for farmers.

I have recovered the following bacteria from the trachea and air sacs of affected birds: Klebsiella spp, Escherichia coli, Pseudomonas spp, Corynebacterium spp, and alpha Streptococci, and fungi (Aspergillus...
spp). Chronic respiratory diseases in chicks less than 6 mo old usually have a poor prognosis, regardless of the infectious agent involved, since affected birds soon become anorexic or, at best, inappetent. Gavage may be attempted if affected birds are not cyanotic. If they are cyanotic, the stress from handling and tube-feeding often terminates these birds.

High ammonia levels from urine excretion and high dust levels in indoor pens will exacerbate respiratory problems. This explains why the prognosis for recovery is often worse in winter, when birds are confined, than in summer, when birds are continuously outside.

Integumentary disorders

Feather pecking

In ostriches, feather pecking is a social behavior; that is, birds will peck the feathers of penmates rather than their own. This abnormal behavior seems precipitated by overcrowding, boredom, or sleep disturbances, such as excessive lighting at night (12). In juveniles and adults, feather pecking is strongly seasonal, with severe occurrences in the winter when confinement is prolonged (13).

In young chicks, this aberrant behavior seems contagious. Since social facilitation is a strong behavioral trait in ostrich chicks, feather pecking soon becomes contagious within a pen. Therefore, as soon as a chick is observed pecking penmates, it should be moved to a pen with older and larger birds.

Pantothenic acid deficiency

Clinical signs of pantothenic acid deficiency include loss of appetite and reduced growth, dermatitis with inflammatory changes in the corners of the beak and eyelids, and roughening and loss of feathers (14). Although these abnormalities have been experimentally induced, they rarely occur in poultry (14), whereas they are not uncommon in ostriches (1,15). I have observed signs in malnourished ostrich chicks, that is, chicks that were chronically impacted or had ingested excessive amounts of grass and dirt. They can be resolved by correction of the malnutrition problem, in addition to daily injections of vitamin B complex.

Currently, farms with excellent husbandry techniques should aim for a chick mortality no greater than 20% (10). This, however, includes post-hatching losses, such as, inappropriate weight loss during incubation, congenital anomalies, omphalitis, and yolk sac retention, which were not discussed in this paper. Most producers venturing into ostrich farming have difficulty in understanding the deleterious effects of stress and confinement, and hence the prevalence of the above disorders. Large exercise pens are mandatory to raise healthy ostrich chicks. When ostrich chicks are allowed to exercise properly, they are less likely to behave abnormally. Coprophagia, dietary indiscretion that leads to impaction, hardware disease, and bacterial enteritis will be reduced. Additionally, the prevalence of leg problems, such as, rolled toes and rotational deformities, are less likely to occur, and respiratory disorders are much reduced in the summer when birds are exercised outside. Ostrich rearing in a cold climate can be successful but requires excellent husbandry techniques and sound infrastructures.

References