Is Spondylitis an emerging disease in broiler breeders?

Cases of spondylitis caused by Enterococcus cecorum have been diagnosed in broiler breeder chickens in the USA. Why is the condition seen more often nowadays? Is it an emerging disease?

By Dr Tahseen Aziz and Dr H. John Barnes*

A condition characterised by bacterial infection of the articulating, freely movable thoracic vertebra (referred to in this article as T4) with segmental compression of the spinal cord by the damaged vertebra has been seen frequently in flocks of male broiler breeder chickens, usually between 6-10 weeks of age. Males in the flock are described as having “leg problems”, but the usual causes of lameness such as swollen joints or tendons are not seen. Affected birds are usually culled or die from dehydration.

We first diagnosed the disease in a flock of 10-week-old broiler breeder chickens in which approx. 5% of the males were culled between 6 and 10 weeks because of unexplained lameness. Affected birds sat on their hock joints and tails with their feet and occasionally shanks raised slightly off the ground (Figure 1). Other birds could not stand but lay on their sides with legs extended to the side (Figure 2). The back of many affected birds was distinctly arched, which was readily recognised by palpation.

Lesions
Postmortem examination revealed marked bony swellings involving the area of T4. In some birds, an irregular arrangement of the ribs also was seen. The enlargement in the spine was visible when the lungs were removed to expose the ribs and vertebral column. Small bits of lung tissue usually adhered to the lesion after removal of the lungs because of adhesions to the affected area of the spine (Figure 3). A carefully cut sagittal section through the centre of the thoracolumbar vertebrae and spinal cord revealed an area of severe necrosis filled with caseous exudate involving the body of T4 vertebral and adjacent vertebrae in the notarium or synsacrum. The lesion caused deformity of the vertebral column with subsequent compression of the spinal cord. Loss of bone in the vertebral bodies caused a dorsal buckling of the spine (kyphosis), which further compressed the spinal cord (Figures 4, 5, 6). Other lesions in joints or bones were not found; only the spondylitis affecting the T4 area of the vertebral column.

Microscopically, the lesion at T4 consisted of severe necrosis and caseous inflammatory exudate that contained bits and fragments of bone and cartilage. Numerous intraskeletal colonies of bacteria were present and are often associated with cartilage and bone (Figures 7, 8). These were found to be gram-positive cocci on gram stains of the lesions. The

Figure 1 - Typical posture of an affected 10-week-old broiler breeder male with spondylitis of T4 and segmental damage of the spinal cord. The bird is sitting on its hocks and tail with its feet and shanks raised off the ground. Note the arching of the back, which is also seen in this disease. This is often referred to as a “kinky-back” stance because birds with spondylolisthesis ("kinky-back") often assume this same posture.

Figure 2 - A 10-week-old broiler breeder male with T4 spondylitis is lying on its side because of leg paralysis caused by segmental damage to the spinal cord by the lesion in the spinal column.

Figure 3 - Thoracic vertebrae of a broiler breeder male with spondylitis. A marked bony swelling is located in the T4 vertebra at the level of the last two ribs. Note the fragments of lungs adhering to the lesion (arrows) and location of the kidneys (K).

Figure 4 - Sagittal section of the vertebral column of a 10-week-old broiler breeder male at necropsy showing a large area of necrosis (yellow arrow) in the body of T4 vertebra, which is deformed and impinges on the spinal cord (SpC). Note the severe compression of the spinal cord (black arrow) and necrotic area in the body of an adjacent vertebra (white arrow). Culture of the vertebral lesions yielded a pure growth of Enterococcus cecorum.

Figure 5 - Sagittal section of a formalin-fixed, decalcified segment of thoracolumbar vertebral column from an affected 10-week-old broiler breeder male. A large area of necrosis (yellow arrow) in the body of T4 vertebra has caused deformity, dorsal displacement, and spinal cord (SpC) compression (red arrow). Cultures of the vertebral lesion yielded a pure growth of Enterococcus cecorum.
compressed segment of the spinal cord had marked lesions characterised by fragmentation and loss of nerve axons, demyelination (loss of myelin sheath), neuronal necrosis, gliosis, and occasional small areas of mild hemorrhage (Figures 9, 10, 11).

Cultures of the swabs taken from the lesions yielded a pure growth of bacteria that was identified as Enterococcus cecorum. Identity of the isolate was confirmed by genomic analysis.

Why mainly breeder males?
Although Staphylococcus aureus and Escherichia coli are bacteria commonly associated with vertebral lesions (as well as with arthritis and osteomyelitis), E. cecorum is another one that should be looked for in lesions of bacterial spondylitis. The organism is an important inhabitant of the cecum of poultry. It is presently unknown why E. cecorum localises in the body of T4 and why the disease mainly affects breeder males. It may be that bacterial infection is preceded by mild traumatic injury to the vertebral body, but the pathogenesis and risk factors remain to be determined. Also unknown is whether E. cecorum reaches the vertebra via the blood stream or through the air sacs as some vertebrae are pneumatic.

In birds showing weakness, lameness, or paralysis of the legs without obvious reasons, a careful examination of the vertebral column and spinal cord should be conducted. Other conditions that are associated with leg weakness in broiler breeder chickens include arthritis of leg joints, tenosynovitis (inflammation of tendons and their sheaths), ruptured flexor tendons, osteomyelitis of leg bones, ionophore toxicosis, and traumatic injury to the leg muscles. However, birds with vertebral damage and spinal cord injury usually have a characteristic posture, which is similar to that seen in broiler chickens affected with spondylolisthesis (kinky back).

To our knowledge, this is the first report from North America of spondylitis caused by E. cecorum in poultry and the first report of it affecting broiler breeder males. Several additional cases have been seen in the past year suggesting this may be an emerging disease.

* Dr Tahseen Aziz1 and Dr H. John Barnes2;
1 Rollins Animal Disease Diagnostic Laboratory, North Carolina Department of Agriculture and Consumer Services, Raleigh, North Carolina, USA, 2 College of Veterinary Medicine, North Carolina State University, Raleigh, NC, USA.