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An Investigation into Kyphosis ('Humpy Back') in growing pigs.

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Kyphosis ('Humpy Back') is a spinal abnormality seen sporadically on some pig farms, usually involving individual growing pigs. The condition renders the pigs non-productive as they suffer substantial physical impairment, poor growth and welfare issues that result in pigs failing to attain slaughter weight. Affected pigs are usually culled by producers at an early age for welfare reasons. This report describes an investigation involving a unit in the south of Scotland that experienced an unacceptably high number of 'humpy backed' pigs.

Clinical History

The farm is an upland arable and beef farm that had expanded into pig-finishing about 9 months previously using converted cattle buildings and a new purpose-built large finishing shed. Newly weaned Duroc x Large White piglets were bought in at 4 weeks of age, every 3 weeks, from an outdoor High Health breeding unit, in batches of approximately 350. The piglets were fed on commercial compound weaner rations (Harbro Farm Sales Ltd) for the first 6 weeks. The grower and finisher rations were formulated by the same feed company using home-produced cereals, with other required ingredients supplied by the feed company. Concerns were raised by the producer over an increasing number of piglets in each batch that were showing humped backs and poorer growth by 10 weeks of age.

The investigation

For ease of inspection, the producer had separated 36 piglets of concern from the batch, many of which had obvious humpy back abnormalities (Figs 1 and 2). The average weight of this cohort was 21.5kg (range 11.5 – 22kg) as compared with an average of 24.5kg (range 23 – 39.5kg) for another cohort of 36 randomly-selected piglets without evidence of spinal deformity from the rest of the batch. Estimating the arrival weight as 7.5kg (average QMS/AHDB figure), the average growth rate of the poorer piglets from weaning to 10 weeks of age was 333 g/day and for the representative other piglets was 414 g/day.

Inspection of pigs in the grower and finishing stages showed small numbers of pigs with 'humpy backs' that had not shown obvious deformity at a younger age but had gone on to develop the lesion. One such pig is shown in Figure 3, as compared with its age-matched pen mates. That pig, though able to walk, had an abnormal side-to-side swinging gait and was evidently compromised. It was culled for welfare reasons and submitted to the University of Edinburgh for CT scanning and investigation into the cause of the deformity. That pig weighed 49kg as compared with the average estimated weight of 85kg for pen mates. Overall, the producer estimated that 3% of piglets from the recent batches had required culling on account of 'humpy back', a situation that he found emotionally difficult and unacceptable.

CT scanning report.

Full-body CT imaging was carried out at the University of Edinburgh and is reported in full as information with this level of detail is not described in the literature. There were 7 cervical, 17 thoracic and 6 lumbar vertebrae. Abnormalities were evident in the section of spine from T13 to T17 (Fig 4).

T13/T14 had mineralised material and a small, rounded gas pocket in the intervertebral disc space, plus marked T13 caudal endplate lysis. T14 had a hemivertebra malformation, with a left wedge-shaped vertebral body component and absent right component, causing scoliosis, kyphosis, and crowding of the right 14th and 15th ribs. There was also lysis of the T14 vertebral body. T15 had an unfused spinous process and was angled in relation to T16. The cranial endplate of T15 showed osteolysis. T15 was markedly deformed and moderately displaced dorsally and sinistrad. At the ventral aspect of the vertebral body there was irregular new bone formation. Marked osteolysis of the vertebral body was present, which was most pronounced caudally. Large isolated osseous fragments, which were irregular in outline were associated with this finding. The costal facets were ill-defined. The normal architecture of the articulation with T16 was completely lost, and the spinal canal was narrowed at the junction between T15 and T16. Similar changes affected the cranial aspect of T16 and the right rib was displaced ventrocranially, the left rib mildly dorsally. Both ribs were vestigial. T17 was a transitional vertebra with a vestigial right rib and a left transverse process.

In summary, there were supernumerary thoracic vertebrae, T14 had hemivertebra, T15 showed spina bifida and T17 was a transitional vertebra causing caudal thoracic kyphosis and scoliosis. The spondylitis and discospondylitis between T13 – 16 might have involved an opportunistic bacterial infection but this could not be confirmed.

Discussion

The causes of 'humpy back' are described as genetic, nutritional or traumatic. Genetic causes arise due to the condition having moderate heritability involving specific genetic loci. It is more prevalent in pigs selected for longer thoraco-lumbar spines to increase loin length. The number of spinal vertebrae in each section of the spine is highly heritable. This form of humpy back usually presents at an early stage, before 12 weeks of age. The supernumerary thoracic vertebrae confirmed in this pig is highly suggestive of a genetic cause in this instance.

Nutritional causes can be implicated if the mineral component of the ration is inadequate or imbalanced. This form is usually accompanied by pigs suffering from spontaneous fractures and limb deformities such as shortened and bowed front legs. No such problems were seen in the pigs on inspection. Although the diet was not analysed independently for mineral composition, this was not indicated on post mortem examination of pigs at SRUC (St Boswells Disease Surveillance Centre). The bone density and strength were considered to be normal.

Trauma can cause back problems in heavier pigs in instances where boars are prone to 'riding' submissive individual animals later in the grow-finish phase. This activity is not generally evident in weaners before 10 weeks of age and was not reported or seen in the affected piglets at the time of the visit.

Further investigation of potential genetic factors would require identification of piglets by litter and interrogation of breeding records. Identifying sows or boars strongly associated with breeding humpy backed piglets would assist in eliminating the problem through judicious genetic selection.