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COMPLEX VERTEBRAL MALFORMATION (CVM) IN A HOLSTEIN CALF: CLINICAL AND RADIOLOGICAL (X-RAY AND CT-SCAN) ASPECTS

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Complex Vertebral Malformation (CVM) constitutes the most recent genetic concern for the Holstein Breeders all over the world. We describe the clinical and radiological aspects (X-ray and CT-scan) of the first case which has been completely documented in Italy.

A two-day-old Holstein female calf, weighing 19.4 kg, was submitted due to bilateral symmetrical flexural contraction of the metacarpo-phalangeal and metatarso-phalangeal joints and medial rotation of the digits, which hindered the calf in maintaining the quadrupedal stance. Extension of carpal joints was also evident. The cervical part of the vertebral column was shorter than normal. The thoracic spinous processes were prominent whereas the lumbosacral vertebral tract resulted concave. The tail was bent and measured only 15 cm. Calf was alert and showed physiological appetite. Despite repeated attempts to stand up, the calf was not able to and remained laying down in a frog-like decubitus.

Lateral and ventrodorsal radiographs of the whole vertebral column, and mediolateral and dorsopalmar projections of both the distal forelimbs were obtained. In addition, a CT-scan of the vertebral column was performed.

The vertebral column showed multiple vertebral anomalies including hemivertebrae, fused and misshapen vertebrae and ribs, and scoliosis that affected mainly the caudal cervical and the thoracic regions. In particular, the vertebral column was composed of 42 vertebrae: 7 cervical, 12 thoracic, 7 lumbar, 5 sacral, and 11 caudal. Vertebrae C6 and C7 were fused and multiple hemivertebrae were observed in the thoracic (T1, T2, T7, T8) and lumbar (L2) regions. Each thoracic vertebra had a pair of ribs but the heads of the ribs and the dorsal spinous processes were fused at the level of each hemivertebra.

The radiographic features of the distal forelimbs revealed a severe medial rotation of the phalango-metacarpal joints associated with a medial deviation of the phalanges.

CT-images of the column provided sharp details of the cervical and thoracic malformed vertebrae and demonstrated a low density of the same bone structures.

At necropsy, besides the already described skeleton anomalies, complex malformation of the heart was observed, and included atrial and interventricular septal defects (the latter 2.0 cm diameter), and patent ductus arteriosus.

The calf resulted to be homozygous for CVM-mutation, based on the results of the DNA-PCR test.