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ADDED VALUE OF LIGHTNING LOCATION DATA IN THE CONFIRMATION OF LIGHTNING-RELATED FATALITIES IN LIVESTOCK BY THE VETERINARY EXPERT

B. Pardo,1,2,3 E. Vanroey,2 D.R. Poehlman,4 K. Chierici,2 P. Deprez4
1. Department of Large Animal Internal Medicine, Faculty of Veterinary Medicine, Ghent University, Sint-L addItem University 133, B-9020 Meise, Belgium
2. Veterinary Emergency Services, Dr. P. Meyers, P.P. Rubbensstraat 29, B-9020 Meise, Belgium
3. Belgian Royal Meteorological Institute, Ringlaan 3, B-1180 Brussels, Belgium
4. Department of Pathology, Bacteriology and Animal Pathology, Faculty of Veterinary Medicine, Ghent University, Sint-L addItem University 133, B-9020 Meise, Belgium

Many veterans around Europe are sporadically contacted by insurance companies to advise them on the plausibility of a death by lightning impact in livestock. Confirmation of a diagnosis compatible with fatal lightning impact is always based on circumstantial evidence (such as position of the animal, impact in a tree,...) and pathological findings. Despite its importance, very little information is available in literature to help the veterinary expert in the evaluation of individual risk cases. Since lesions and the presence of feed in the oral cavity as a sign of appoplectic death have historically been reported to be present in over 50% of the lightning related fatalities (LRF). However, in the field, veterinarians are confronted with many LRF declarations which do not show pathognomonic signs. Moreover, it occurs that farmers attempt to confuse the investigation by creating false circumstantial evidence for animals which died from other causes. To deal with this issue, several expertise veterinarians contacted their national forensic or meteorological service to check whether lightning impacts were detected at the time and location of the suspected death. Whether this practice positively contributes to a correct diagnosis of LRF is currently unknown. Therefore, the objective of the present study was to determine which anatomic, environmental and pathological factors are associated with confirmation of LRF and to provide an added value of lightning location data (cloud-to-ground discharges (CG)) for predictive models for LRF in livestock.

A total of 414 LRF declarations, treated by the same veterinary expert in a 15 year period was available. All cases were treated in a systematic manner, which includes collection of anamnestic data by interview, of circumstantial evidence by inspection of the conditions in which the animal was found, and of pathological information by microscopic inspection of the animal and necropsy. A total of 23 parameters were evaluated for their possible association with LRF by multivariate logistic regression modeling and sensitivity (SE) and specificity (SP) of the models with the highest area under ROC curve were determined. In the studied practice an average 23% of the yearly treated doers involved LRF. Most (94.6%) declarations were cattle. Of the LRF declarations, 52.8% (n=217) was rejected (negative advice) by the expert. The positive advice in the 15 years period was 47.2% (n=194) was finally accepted as a mortality compatible with lightning positive advice. The highest number of lightning declarations, both positive and negative advice, were systematically found between June and August. Since lesions were present in 43.8% (n=94/194) of the confirmed cases, and absent in all negative advice. The final multivariate model to predict a positive advice by an expert veterinary- narian on a declared LRF case consisted of age at onset of illness (ratio OR 1.27 (1.03-1.57) for animals younger than 1 year old versus an animal older than 1 year old, presence of 10 meters of the cadaver (OR= 2.31 (1.24-4.5) , presence of open water within 10 meters (OR= 4.62 (2.01-10.96), proximity at the time of the injury (OR= 0.71 (0.29-1.69)) and a presence of feed in the oral cavity (OR= 2.4 (1.0-6.40)) and detection of CG discharges (OR=12.2 (5.8-25.9)) at the time and location of the reported case. When only relying on CG as a predictor for LRF, the logistic model had a SE and SP of 91.4% and 41.5% respectively, in contrast the basic model based on all significant predictors except for CG had a SE of 71.1% (0.3-1.56) and a SP of 58.0%. The basic model was corrected when adding CG to this basic model which increased SE to 88.1% and decreased SP to 67.5%, resulting in a correct prediction in 78% of all cases. This study clearly demonstrated that relying on detection of CG discharges at time and location of the case, will predict most of the positive cases (high sensitivity; CG detected in 94.3% of the positive cases), but performs very poor when it comes to what considers identification of negative cases (low specificity; CG detected in 58.9% of the negative cases), resulting in a large number of false positives. In contrast to what was observed for CG or CC, the basic model, constructed only on the veterinary expert- visit past, has a lower sensitivity, but a much higher specificity. In other words, it is much better at identifying false positives, but lacks discriminatory power for the true positives.

In conclusion, the present study shows that LRF in livestock is relatively frequent in Flanders, and to the primary reason for vet- erinary expertise. Pathomorphologic and necropsy procedures are present, and wrong or fraudulent declarations are frequent. Light- ning detection data are very valuable to increase the proportion of confirmed fatal lightning related LRF, but a correct diagnosis is a veterinary expert visit will rule out fraudulent declarations.

CERVICAL OESOPHAGEAL PERPERSION BY A COLOSTOMY TUBE WITH METAL END-PIECE IN NEONATAL CALVES

B. Pardi,1,2 V. Vajg,1 E. Van der Veken1,2, K. Chierici2, J. Saum1,2, P. Deprez4
1. Department of Large Animal Internal Medicine, Faculty of Veterinary Medicine and Imaging and Small Animal Orthopaedics, Ghent University, Sint-L addItem University 133, B-9020 Meise, Belgium
2. Department of Pathology, Bacteriology and Animal Pathology, Faculty of Veterinary Medicine, Ghent University, Sint-L addItem University 133, B-9020 Meise, Belgium

A cervical swelling in neonatal calves is a rather rare condition, which mostly affects individuals, but can in certain cases involve a large number of calves within a herd. Infection related infections (lactocolitis, phlegmonous, pleuritis, ...) can be found, calving after stillbirth (rhabdomyolysis), due to congenital cardiac abnormalities, ectopia cordis or oesophageal injuries by application of an anhebbiotic bolus (in older calves) are possible differential diagnoses.

In a Belgian Blue beef farm, in the past 6 months 5 out of 25 calves born, developed a marked swelling in the whole cervical region and anorexia. The lesions only occurred in calves younger than 5 days, but neither farmer nor veterinary clinician could estimate when the swelling was already present or when it appeared at time of birth. Treat- ment failed and all animals died between 12 hours and 1 week after birth. A 2 days old calf with a neck circumference of 30 cm, had normal cervical swelling was trans- ferred to this clinic for further examination. The calf had been normal before the examined period (160 beats per minute) and tacty- pnea (40 breaths per minute). The cervical region was diffusely warm from the sternal border upward to the thoracic inlet. The palpation values were not visible nor palpable by the swelling. The swelling was edematous, painful and a palpation could be felt due to the presence of a limited amount of subcutaneous gas in the cranial cervical vertebrae region. Ultrasonic examination showed the presence of liquid content in the caudal part of the oesophagus, but no contrast filled stomach was visualised with a linear high frequency probe. The stomach had normal content and confirmed the presence of normal effusion and a pneumomediastinum. In the whole of the cervical region soft-tissue swelling of the oesophagus was noted. This radiograph was diagnostic as evidenced by the marked exophthalmia of the oesophagus. The calf was euthanised. Necropsy showed a 3 cm perforating tear in the oesophageal wall, which was correctly diagnosed LRF, but a communication with a veterinary expert visit will rule out traumatic lesions.

In conclusion, this case report shows that cervical swellings in multiple neonatal calves could be caused by the wrong use of a colo- stomy tube or the use of a non-sterile tube for the animal. Veterinarians should be aware of the possibility of this issue and should be advised farmers on the correct use.