Evaluation of the healing process of lung lesions following treatment with florfenicol and meloxicam in veal calves affected by bovine respiratory disease during one production cycle

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Objectives

Bovine respiratory disease (BRD) is a major disease affecting the veal calf industry. Its diagnosis relies on clinical scores reflecting clinical examination (CE) of respiratory signs. However, CE low sensitivity and specificity can delay diagnosis and caused treatment failure. Furthermore, CE is not indicative of the healing process in consolidated lungs following treatment. In contrast, lung ultrasonography (LUS) has gained recognition as performant tool to detect BRD that can be used to document the healing process.

To better characterize the occurrence of BRD during veal calves' production cycle and document the effects of treatment on lung healing process, a field study was performed using LUS as investigation tool and a combination of florfenicol and meloxicam for treatment.

Material and methods

Animal care and procedures were in accordance with the European Directive 2010/63/EU and the national law D.L. 2014/26. A single stock of 84 veal calves were enrolled with an average age of 30.6±9.6d at arrival. CE and LUS examinations were performed twice weekly for the first 60d and then weekly until the end of the production cycle (180d). Nasal and ocular discharges, rectal temperature, cough, ear position, and abnormal breathing were assessed to calculated two clinical scores: Wisconsin (BRD≥4) and California (BRD≥5) Scores. LUS evaluations were performed in six lung's regions (cranial 4^{th}–3^{rd} intercostal space (ICS), middle 6^{th}–5^{th} ICS, and caudal 10^{th}–7^{th} ICS regions; right and left side). The LUSs were used to establish ultrasonography score (US; 0-5 points score) and modified lung lesion score (LLS; BRD≥10.5). Lung consolidations were measured to provide thickness (cm) and area (cm^2) of each lesion. The sum of all consolidated areas provided the total lung consolidation area (cm^2).

Animals with the US≥3 or consolidation thickness ≥3cm on cranial region were treated with one-shot of florfenicol and meloxicam (40mg/Kg+0.5mg/Kg; Zeleris®, Ceva Santé Animale). Treated group was monitored at +1, +3, +5, +7, +9, +11, and +14d post-treatment. The non-treated animals during the production cycle were classified as control group (CTR).

Differences over production cycle, clinical and LUS follow-ups were assessed by PROC GLIMMIX procedure of S.A.S.-software using the effect of time, groups, sex, breeds, and animal (random and repeated effect). Groups comparisons were performed at arrival, treatment days (for CTR group were used the examination at the same date of treated animals), and at the day before slaughter of each animal. A post-hoc pairwise comparison was performed using Bonferroni correction. A *p-value*<0.05 was accepted.

Results

Thirty-six and 48 calves were included in TRT and CTR groups, respectively. At their arrival, clinical scores and LUS were comparable between groups. Clinical scores, US, LLS, and total lung consolidations were significantly higher in TRT*vs*. CTR calves at the treatment day. At the end of the study, clinical scores and LUS examinations were similar or marginally different between groups. In addition, growth performances and beef quality were similar in both groups (p≥0.23).

A vast majority of BRD cases (88.9%) occurred within first 30d after arrival with another 11.1% occurring until 60d. Overall BRD treatment success rate was 94.3%. BRD chronicity rate was 2.9%; and fatality rate was 2.9%. Interestingly in TRT calves, overall clinical scores were not indicative of disease at treatment day (Wisconsin 2.1±0.4; California 2.8±0.5), but a peak was observed at +5d after treatment (Wisconsin 4.5±0.6; California 5.7±0.8). US, LLS and total lung consolidation were high at the day of BRD diagnosis (US=4.7±0.3; LLS=15.6±1.9; total lung consolidation 30.06±1.98cm^2) with cranial regions showing the largest lesions as determined by consolidation thicknesses and measurements of the different consolidated areas. Following treatment, a swift lung healing process was observed with significative decrease in US at +3d (US=3.64), +5d (US=2.41), +11d (US=1.68), in LLS at +1d (LLS=12.52), +5d (LLS=6.98), +7d (LLS=4.33) and in the total lung consolidation at +1d (15.56cm^2), at +5d (8.57cm^2), and at+9d (3.26cm^2).

Conclusions

In this field study in veal calves, BRD mainly occurred within the first month after arrival. Systematic LUS examinations (US and LLS scores) at multiple timepoints during the production cycle allowed to detect BRD 5 days before the clinical scores which ensured prompt treatment. The evaluation of the lung healing process also revealed the fast and beneficial effects of florfenicol and meloxicam (Zeleris®) in affected calves.