INFECTIOUS DISEASES

Comparison between thoracic ultrasonography and visual observation for the detection of BRD in veal calves.

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INTRODUCTION

Bovine respiratory disease (BRD) morbidity/mortality, in combination with animal welfare and antimicrobial use are current challenges in the beef industry. BRD detection is frequently based on clinical signs although its low sensitivity (Se) 61.8% and specificity (Sp) 62.8%; and thoracic Ultrasonography (TUS) has shown the highest accuracy (Se 89% and Sp 95%; Berman et al. 2019).

OBJECTIVE

Then, the objective of this study was to compare Thoracic US with BRD clinical diagnosis performed by two senior veterinarians both at arrival to the rearing facilities and later along the first month on fattening.

MATERIALS AND METHODS

Two different batches of a commercial veal feedlot (B1=62 and B2=45 male calves) were evaluated at arrival by two experienced veterinarians (observer 1 and 2) who classify all calves as “BRD” or “Healthy” (based on clinical signs). Additionally, TUS was used as gold standard to classify the calves using Adams and Buczinski (2015) scoring system.

All veterinarians performed their scoring in a blind manner. All animals were scored again 7 and 21 days after arrival. Scoring results were recorded to evaluate BRD prevalence and concordance.

The comparison between the use of the diagnostic techniques (Se, Sp, positive predictive value - PPV- and negative predictive value-NPV-) and observers (concordance kappa index) was performed with free epidemiological software (https://http://www.winepi.net) using a confidence level of 95%.

Thoracic Ultrasonography can be used as a reference technique for BRD diagnosis. Clinical diagnosis by trained observers can be used as a screening technique improving their sensitivity and specificity.

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RESULTS

- TUS lesions at arrival was very similar in both batches: 35% (B1) and 36% (B2). However, clinical scoring differ by observers. **(Fig. 2 y 3)** in both batches: B1 (O1: 45%; O2: 29%) and B2 (O1: 47%, O2: 38%).

  7 days after arrival, BRD prevalence by TUS increased to 75% and 62%, for B1 and B2, respectively. BRD prevalence differed again by observer: B1 (O1: 65%; O2: 72%) and B2 (O1: 53%, O2: 47%).

  21 days after arrival, BRD prevalence by TUS was 67% and 49% for B1 and B2, respectively. BRD prevalence by the observers was (O1: 60%; O2: 52%) in B1 and (O1: 20%, O2: 27%) in B2.

- Although average Se and NPV were quite similar for both observers, the Sp and PPV was higher for O2 **(Fig. 4)** Concordance among both observers was moderated (kappa = 0.598, IC95% 0.29-0.71). Indeed, one of the observers consistently presented a better detection of BRD signs than the other. However, even for this observer, 28% of BRD cases detected by thoracic US were not identified as BRD using clinical diagnosis.

FIGURE 1. BRD prevalence was measured at 3 time points in both batches (B1 and B2).

FIGURE 2. BRD prevalence in BATCH 1: TUS vs clinical signs by observer (O1 and O2).

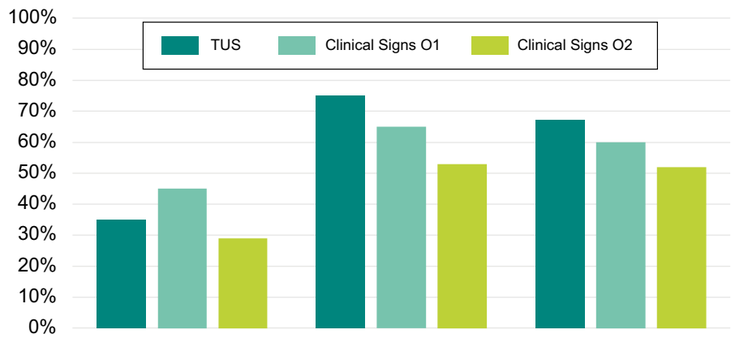

FIGURE 3. BRD prevalence in BATCH 2: TUS vs clinical signs by observer (O1 and O2).

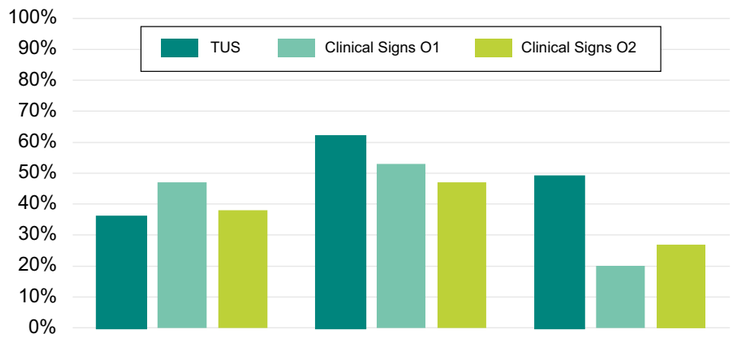

FIGURE 4. Comparison of clinical signs ability of O1 and O2 to detect BRD cases compared to TUS as “gold standard” technique.

	Se	Se NPV	Sp	Sp NPV
O1	63.80%	60.10%	66%	69.40%
O2	64.90%	65.30%	79.90%	79.65%

Sensitivity **(Se)**, Specificity **(Sp)**, Negative Predictive Value **(NPV)** and Positive Predictive Value **(PPV)**

NOTE:

O1 = Observer 1

O2 = Observer 2

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