

searched, and inclusion in the study required the following criteria: 1) the cultured sample was from a bovine lung, 2) routine culture was positive for *Mannheimia haemolytica*, *Pasteurella multocida*, and/or *Histophilus somni*, 3) antimicrobial susceptibility results were available, and 4) the submission was from a clinical field case. Case submission forms and final diagnostic reports were individually reviewed for information regarding previous antibiotic treatments. Only those submissions that explicitly stated that no antimicrobials had been used were classified as “None”; cases where information regarding antimicrobial treatments was not given or was unclear were classified as “Unknown.” Isolates from cases with treatment histories indicating 3 or more antimicrobials were used were classified as “3+.”

Only antimicrobials with CLSI-approved breakpoints for respiratory disease cause by *M. haemolytica* were included in this study. These antimicrobials are ceftiofur, danofloxacin, enrofloxacin, florfenicol, oxytetracycline, spectinomycin, tilmicosin, and tulathromycin. Descriptive statistics were used to compare resistance of isolates to individual antimicrobials. One way analysis of variance and the Tukey-Kramer method were used to analyze the number of compounds to which each isolate was resistant.

Results

A total of 1,251 isolates met the above criteria and were included in the study: 540 isolates of *M. haemolytica*, 404 isolates of *P. multocida*, and 307 isolates of *H. somni*. Results showed a marked and often linear increase in the percentage of resistant isolates as the number of antimicrobial treatments increased. The percentage of isolates resistant to all antimicrobials with the exception of ceftiofur was greater

in treated cattle than untreated cattle. Resistance increased as the number of antimicrobial treatments increased. The most dramatic difference between isolates from animals that received no treatment and animals that received 3 or more treatments was seen in *M. haemolytica*. The percentage of isolates resistant to enrofloxacin, spectinomycin, tilmicosin, and tulathromycin increased from below 10% to over 70%. A similar trend of increasing percentage of resistance with an increase in the number of treatments was apparent in both *P. multocida* and *H. somni*. Multidrug resistance (MDR) was evaluated using susceptibility results to the 8 antimicrobials included in this study. Sixty-eight percent of isolates from animals that did not receive antimicrobials were pan-susceptible; 7.7% of those isolates were resistant to 3 or more antimicrobials. In contrast, 19.4% of isolates from animals treated with 3 or more antimicrobials were pan-susceptible; 62.1% of those isolates were resistant to 3 or more antimicrobials. Statistical analysis showed a significant difference in the number of resistant classifications when comparing untreated and treated isolates.

Significance

Previous antimicrobial treatment has a dramatic effect on antimicrobial resistance in isolates of *M. haemolytica*, *P. multocida*, and *H. somni*. The effect was also apparent in regards to MDR. A large percentage of the isolates (>84%) from this study were found to have either received an antimicrobial treatment or had an unknown treatment history. Due to these findings, we suggest that summarized VDL antimicrobial sensitivity data should not be used to assess changes in antimicrobial resistance patterns, unless such data includes some context regarding antimicrobial treatment history.

Influence of vaccination with an inactivated or modified live viral reproductive vaccine on reproductive parameters in beef cows

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Introduction

Previous research has described the detrimental effects of modified-live virus (MLV) vaccines on reproductive parameters in naïve heifers. Less is known about the poten-

tial effects of MLV vaccines on reproductive parameters in well-vaccinated beef herds. This work describes a 2-year study involving 9 herds of well-vaccinated cows and heifers (n=1436) to evaluate whether a pre-breeding MLV or inactivated reproductive vaccine administered per label

instructions had negative impacts on conception rates or calving distribution compared to a non-vaccinated control (saline) group.

Materials and Methods

Within herd, cows were blocked by parity and calving date and randomly assigned to receive 1 of the 2 treatments (MLV or Inactivated) or saline (Control). All females were synchronized with the 7-d CO-Synch + CIDR protocol and inseminated (AI) at the appropriate time after CIDR removal (cows 60 to 66 hrs; heifers 52 to 56 hrs). Cows remained separated from bulls for at least 10 d after AI. Pregnancy success and fetal age were determined on d 28 after AI, and > 30 after the breeding season. Data were analyzed using the GLIMMIX procedure in SAS with herd as a random variable.

Results

Days post-partum influenced conception rates with heifers and short-post-partum cows having decreased conception rates compared to cows that were further post-partum ($P < 0.05$). There was no difference in conception rates to AI between MLV and Control groups ($P = 0.21$; $40.0 \pm 4\%$

vs $43.3 \pm 4\%$) or between Inactivated and Control groups ($P = 0.49$; $46.5 \pm 4\%$ vs $43.3 \pm 4\%$). Rates tended to differ between MLV and Inactivated groups ($P = 0.055$). At 56 d after AI, MLV animals ($88.9 \pm 2\%$) had decreased pregnancy success compared to both the Inactivated ($93.2 \pm 2\%$) and Control groups ($92.5 \pm 2\%$, $P \leq 0.01$). Breeding season pregnancy success was similar between MLV and Control groups ($P = 0.34$; $95.2 \pm 2\%$ vs $96.4 \pm 1\%$) as well as between the Inactivated and Control groups ($P = 0.14$; $98.0 \pm 1\%$ vs $96.4 \pm 1\%$). Inactivated and MLV vaccine groups were different ($98.0 \pm 1\%$ vs $95.2 \pm 2\%$; $P = 0.01$). When cumulative calving distribution was evaluated, the proportion of females that calved by d 12 and 30 of the calving season were similar between MLV vaccine and Control groups ($P > 0.30$) and between the Inactivated and Control groups ($P > 0.30$). However, this proportion in the Inactivated group tended ($P = 0.09$) to be greater compared to that of the MLV group.

Significance

Vaccination of well-vaccinated beef cows and heifers with a MLV or inactivated reproductive vaccine 30 d pre-breeding resulted in similar pregnancy rates and calving distributions as non-vaccinated controls.

A randomized, controlled, blinded trial assessing the association between infectious bovine keratoconjunctivitis incidence and a commercial *Moraxella bovis* vaccine in beef calves

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Introduction

The objectives were to assess the association between a commercially available *Moraxella bovis* vaccine and cumulative incidence of infectious bovine keratoconjunctivitis (primary objective) and weight at weaning (secondary objective).

Materials and Methods

A randomized, controlled, and blinded 2-arm trial was conducted in the summer of 2015. Eligible calves were born in the spring of 2015 at an Iowa State University cow-calf research unit, at least 2 months of age, and had no visible lesions or scars on either eye. Calves were randomly allocated to 1 of 2 treatment arms: the *M. bovis* vaccine or saline. Enrollment and outcome assessors were blinded to calf allocation status.

Results

IBK was observed in 65/110 (59.0%) of the vaccinated calves and 62/104 (59.6%) of the unvaccinated calves (Mantel-Haenszel unadjusted risk ratio = 0.99, 95% CI: 0.79 – 1.24). The difference between weaning weights was not statistically significant between the vaccinated and unvaccinated calves (unadjusted effect size 9.68 lb (4.40 kg), 95% CI: -3.50, 12.29).

Significance

The results suggest that the commercially available *M. bovis* vaccine used in the study was not effective in reducing the cumulative incidence of IBK or yielding calves with higher weaning weights in our study population.