Bovine Respiratory Disease Pathogens in Pre-weaned Holstein Calves

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Abstract

Bovine respiratory disease (BRD) is the leading natural cause of death in beef and dairy cattle, resulting in annual losses of over one million animals and $692 million. The objective of this study was to determine the prevalence of BRD pathogens in pre-weaned Holstein calves infected with BRD between day 10 and day 63-73 of life. One day old Holstein calves were transported to a calf ranch in Hanford, California where they were housed in elevated hutches and monitored 4 days a week for signs of BRD using an established calf-health scoring criteria (McGuirk, 2008). Calves with BRD were defined as those with a score ≥6 and controls had scores of ≤5. Controls were selected from hutches adjacent to cases. Over 200,000 calves were screened to obtain 940 cases and 1,090 controls over 180 days. Blood samples and diagnostic swabs (mid-nasal and 2 deep pharyngeal) were obtained for each calf. Diagnostic results for bovine viruses (bovine viral diarrhea [BVDV], bovine respiratory syncytial virus [BRSV], and bovine coronavirus [CV]), bacteria (*Manheima haemolytica [MH]*, *Pasteruella multocida [PM]*, *Histophilus somi [HS]*) and mycoplasma species were conducted at the California Health and Food Safety Laboratory in Tulare and Davis, California. Results are shown in Table 1. The most common combination of pathogens for cases and controls were mycoplasma and *PM*, mycoplasma and *MH*.

Introduction

Bovine respiratory disease (BRD) is the leading natural cause of death in beef and dairy cattle, resulting in annual losses of over one million animals and $692 million. Typically, cattle with BRD have clinical symptoms such as fever, rapid breathing, repetitive coughing, nasal and/or eye discharge, diarrhea, dehydration, and appetite depression. Environmental factors that increase the risk for BRD include: the stress of sudden feed changes, crowding, extreme temperatures, transportation, and air contaminated with ammonia, dust and pathogens. Genetic factors also play a role in the susceptibility of cattle to BRD. The etiologic agents associated with BRD include bovine herpesvirus, bovine parainfluenza virus, bovine viral diarrhea virus, bovine respiratory syncytial virus, bovine adenovirus A-D, bovine coronavirus, *Arcanobacterium pyogenes, Manheima haemolytica, Pasteruella multocida, Histophilus somi*, and mycoplasma species. Mycoplasma species, *Pasteruella multocida (PM)*, *Manheima haemolytica (MH)*, *Histophilus somi (HS)*, arcanobacterium pyogenes, bovine viral diarrhea virus (BVDV), and bovine respiratory syncytial virus (BRSV) are the most prevalent pathogens reported in cattle with BRD. This study was undertaken to characterize the pathogens present in pre-weaned Holstein calves. Further studies will focus on the interaction of the genotype of the calves with pathogen prevalence.

Objective

The objective of this study was to determine the prevalence of BRD pathogens in pre-weaned Holstein calves infected with BRD between day 10 and day 63-73 of life.

Materials and Methods

Calves were diagnosed with BRD based on a scoring system based on the sum of points from 4 categories of clinical signs, with severity reflected by increasing health scores. The clinical sign categories consisted of rectal temperature, presence of nasal discharge and cough, and eye or ear appearance. Scores ranged from 0 to 12 with calves with a score ≥6 diagnosed with BRD and served as cases. Controls were calves in adjacent hutches with scores ≤5. Cases and controls received three swabs (mid-nasal, 2 deep pharyngeal) to determine the pathogens present. Diagnostic tests were run in Tulare and Davis, California.

Conclusion

The identification of pathogens associated with BRD is the first step in selection of animals that are less susceptible to disease, resulting in improved production, and increased profitability. Future research will focus on the interaction of pathogens and susceptibility loci in selecting cattle that are less likely to become infected with BRD.

Results

Table 1. Prevalence of Pathogens in BRD Cases and Controls

Test	Prevalence Overall	Prevalence Cases	Prevalence Controls
One pathogen	1594	826	768
BRSV	267	188	79
BVDV	0	0	0
CV	162	88	74
M. haemolytica	346	224	122
P. multocida	598	352	246
H. somi	20	16	4
Mycoplasma	1227	607	620
Mycoplasma & BRSV	102	78	24
Mycoplasma & CV	119	62	57
Mycoplasma & H. Somni	18	14	4
Mycoplasma & P. multocida	470	279	191
Mycoplasma & M. haemolytica	251	166	85
H. somni & P. multocida	3	3	0
H. somni & M. haemolytica	5	4	1
BRSV & CV	24	21	3
BRSV & H. somni	1	1	0
BRSV & P. multocida	43	37	6
BRSV & M. haemolytica	42	32	10
CV & H. somni	5	2	3
CV & P. multocida	64	41	23
CV and M. haemolytica	36	24	12
P. multocida and M. haemolytica	38	26	12
Mycoplasma, BRSV, CV	15	13	2
Mycoplasma, BRSV, P. multocida	28	24	4
Mycoplasma, BRSV, M. haemolytica	21	17	4
Mycoplasma, BCV, H. Somni	5	3	2
Mycoplasma, BCV, P. multocida	51	34	17
Mycoplasma, BCV, M. haemolytica	29	18	11
Mycoplasma, H. Somni, P. multocida	3	3	0
Mycoplasma, H. Somni, M. haemolytica	4	3	1
Mycoplasma, P. multocida, M. haemolytica	35	24	11
BRSV, BCV, H. Somni	4	3	1
BRSV, BCV, P. multocida	9	9	0
BRSV, BCV, M. haemolytica	5	5	0
BRSV, H. Somni, M. haemolytica	1	1	0
BRSV, P.multocida, M. haemolytica	3	2	1
BCV, H. Somni, P. multocida	1	1	0
BCV, H. Somni, M. haemolytica	1	0	1
BCV, P. multocida, M. haemolytica	6	4	2