

Understanding the Impact of Bovine Coronavirus in BRD

Classified under the Coronaviridae family in the Nidovirales order, Bovine Coronavirus (BCoV) presents a singular serotype but comes with 2-3 clinically relevant subtypes, each associated with distinct symptomatology (Vlasova and Saif, 2021).

Symptoms and Pathogenesis

BCoV can be isolated from a variety of bodily secretions—nasal, pulmonary, intestinal, and fecal. Enteric and respiratory BCoV subtypes both lead to lung lesions, although the impact is significantly more pronounced in respiratory forms (Fulton, 2020).

Virulence and Co-Infection

Stocker cattle and young dairy calves bear the brunt of BCoV, with weaning and shipping stresses often acting as triggers. U.S. herds are especially vulnerable in the colder months (Figure 1 A, B; Lubbers et al., 2017).

BCoV compromises both healthy and ailing cattle. Regardless of colostrum administration, calves can harbor BCoV antibodies for up to three years (Vlasova and Saif, 2021). The virus can be spread through fecal-oral and respiratory transmission routes. While both healthy and diarrhetic animals will test positive for BCoV, its co-infection rates are concerning. Comprehensive analysis of isolates obtained from the field has identified two clades: BCoV1 and BCoV2. BCoV1 is enteric doesn't act alone; it's frequently found alongside Bovine Rotavirus, and it's a key player in the high-mortality Bovine Respiratory Diseases.

The Economic Ripple Effect of BCoV via BRD

Bovine Respiratory Disease (BRD), often linked to BCoV-positive cattle, dramatically impacts the US cattle industry. Within feedlots, the economic impacts include higher mortality, diminished weight gain, less feed efficiency, increased veterinary costs, and reduced salvage value of chronically ill animals. In the cow-calf sector, the virus can also reduce pregnancy and calving rates as well as hamper milk production. According to USDA's 2017 figures, respiratory diseases accounted for 26.9% of all non-predatory cattle deaths, equating to a staggering \$370.8 million in losses annually (Figure 2). In feedlots, 16.2% of cattle receiving antibiotic treatments for respiratory diseases rack up an average cost of \$23.60/head or \$75 million annually.

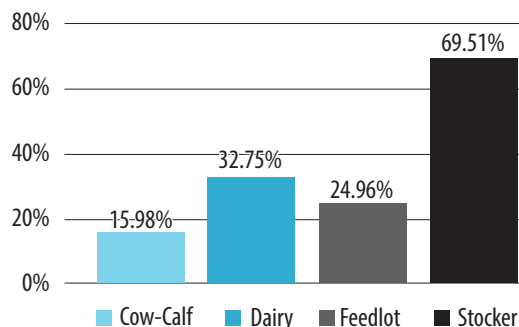
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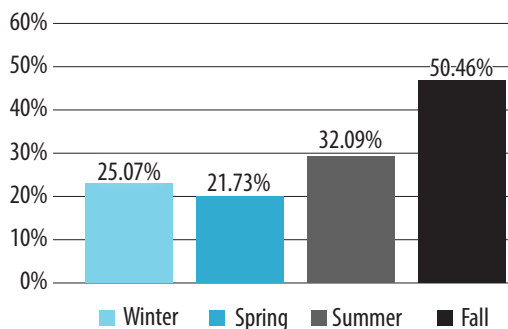
It's a new day for beef animal health



A: BCoV Prevalence by Production Class



B: BCoV Prevalence by Production Season

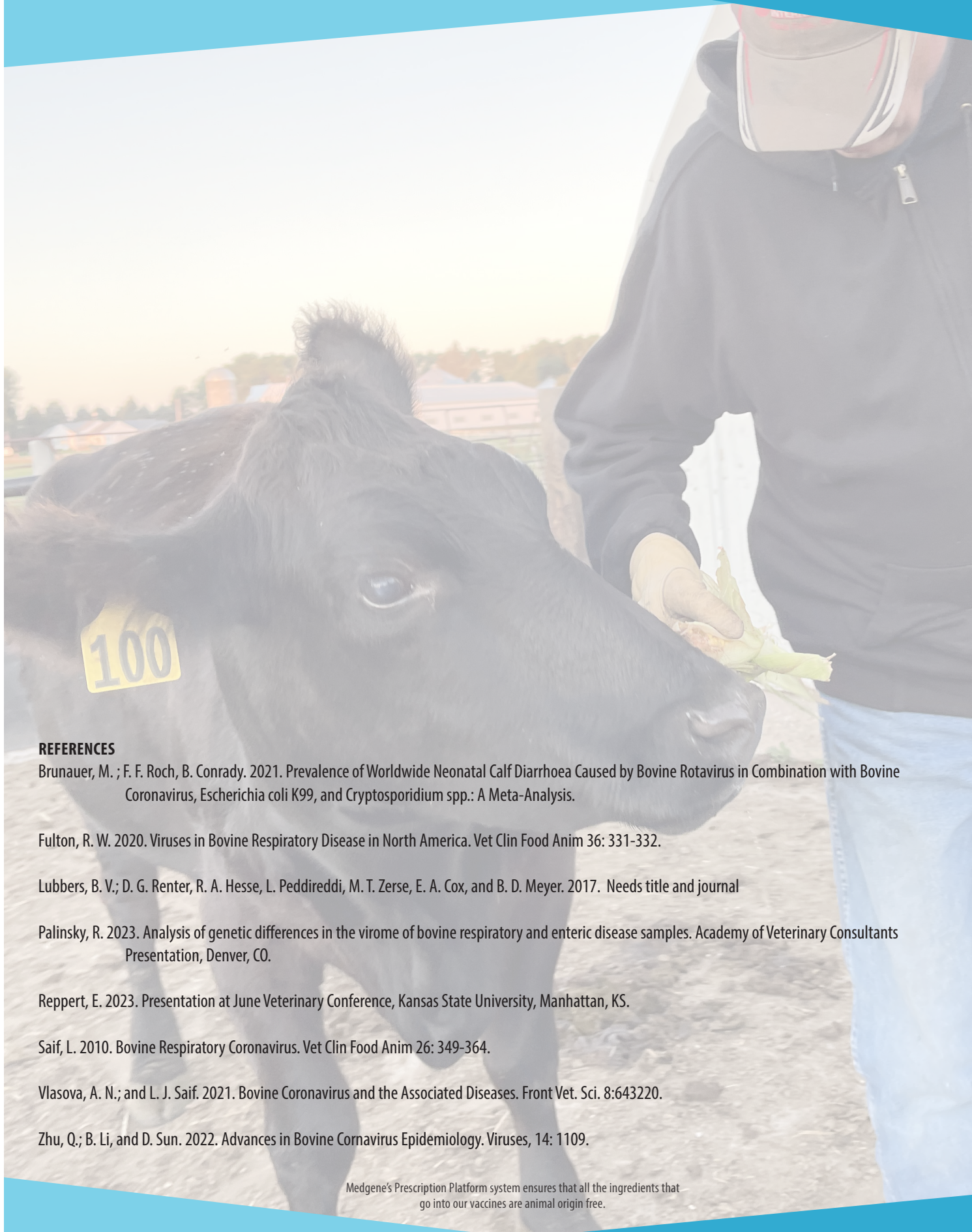


▲ **Figure 1.** Kansas State Veterinary Diagnostic Laboratory reported from 3,215 samples associated with BRD that BCoV was most present in stocker operations (A) and during the fall (B; Adapted from Lubbers et al., 2017).

BRD Mortality and Associated Economics

	Mortality	Cost
All Cattle	1.5% Total Mortality	\$907.8 Million
Beef Cow Operations	15.9% of Cow Mortality	\$370.8 Million
	23.0% of Calf Mortality	
Feedlots/Stocker	55.0% of Cattle Mortality	274.84 Million
	36.3% of Calf Mortality	
Dairy Operations	16.0% of Cattle Mortality	\$197.89 Million
	32.7% of Calf Mortality	

▲ **Figure 2.** Associated mortality and subsequent economics of bovine respiratory disease (BRD), in which BCoV can be a leading coinfection (adapted from Peel, 2020).



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