Understanding the Impact of Bovine Influenza D

It is well established that bovine respiratory disease (BRD) is one of the most common, deadly, and costly diseases for the cattle industry, especially in younger cattle. This disease is considered multifactorial that includes both viruses and bacteria. In 2011, a new species of RNA virus of the Orthomyxoviridae family has been documented, Influenza D Virus (IDV), to play a role in BRD. Not only does IDV pose a threat to cattle herds, but it is also a zoonotic disease and can spread to swine and other mammals.

Much like other influenza strains (A, B, and C), IDV primarily targets the epithelial cells of the respiratory tract. While IDV on its own can result in mild manifestations, it is often encountered as a co-infection contributing to severe BRD. This combination leads to pronounced lung or pleural lesions.

Epidemiology and Virulence

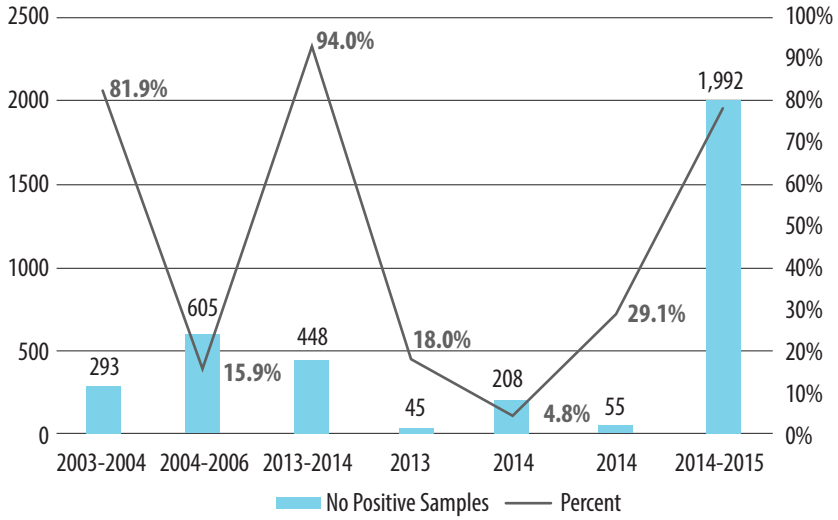
The earliest identification of IDV-positive samples dates back to 2003, with the first confirmed case documented in 2011. The subsequent years saw relatively consistent diagnostic reports until a notable surge occurred in 2014-2015, as detailed by Ruiz et al. (2022) (Figure 1). Genotype analysis revealed the presence of seven distinct genotypes (Collin et al., 2015; Figure 2). Presently, Influenza D predominantly affects bovines but can also affect other mammals such as swine, poultry, sheep, goats, and even humans (Liu et al., 2020). The potential for genetic shifts, which may instigate human pandemics, is a legitimate concern.

Economic Implications

Broadly speaking, the economic burden of BRD stems from multiple facets, including the necessity for multiple injectable antibiotic treatments and compromised growth performance. According to the American Society of Animal Science (ASAS), the financial toll of BRD ranges from $137.45-$384.97 per animal, contingent upon severity. Timely and effective treatment or preventive measures can substantially enhance animal profitability, translating to a potential increase of $67.11 per animal (ASAS, 2020). In the feedlot sector, annual costs attributed to BRD surge to approximately $900 million.

Conclusion

The emergence of IDV within the spectrum of BRD introduces complexity to livestock health and zoonotic threats. Its journey from discovery to broader prevalence emphasizes the interconnectedness of ecosystems and the need for proactive surveillance and preventive strategies. The potential for IDV to amplify into a wider pandemic underscores the importance of collaborative efforts at the animal-human health interface. As we navigate the complexities of managing BRD, understanding IDV equips us to safeguard livestock and public health.



▲ **Figure 1.** Before Bovine Influenza D was discovered in 2011, stored samples indicated that it was in USA cattle herds as early as 2003, with an increasing number of herds testing positive by 2015. This figure is adapted from the review by Ruiz et al., 2022.

Influenza D Virus Genotypes

	Genotypes						
Virus	**PB2**	**PB1**	**P3**	**HEF**	**NP**	**P42**	**NS**
D/OK	■	ND	■	■	■	■	■
D/660		ND	■				
D/628				■			■
D/729		ND		■			■
D/14-22		ND	■	■	■	■	■
D/1-35		ND	■	■			
D/3-13	■	ND					■
D/13-21		ND					
D/11-8		ND	■				
D/9-5		ND	■				

Adapted from ColLin et al., 2015

▲ **Figure 2.** After discovering Bovine Influenza D in 2011, genotype sequencing by Collin et al. (2015), depicted seven distinct genotypes for IDV in the USA.

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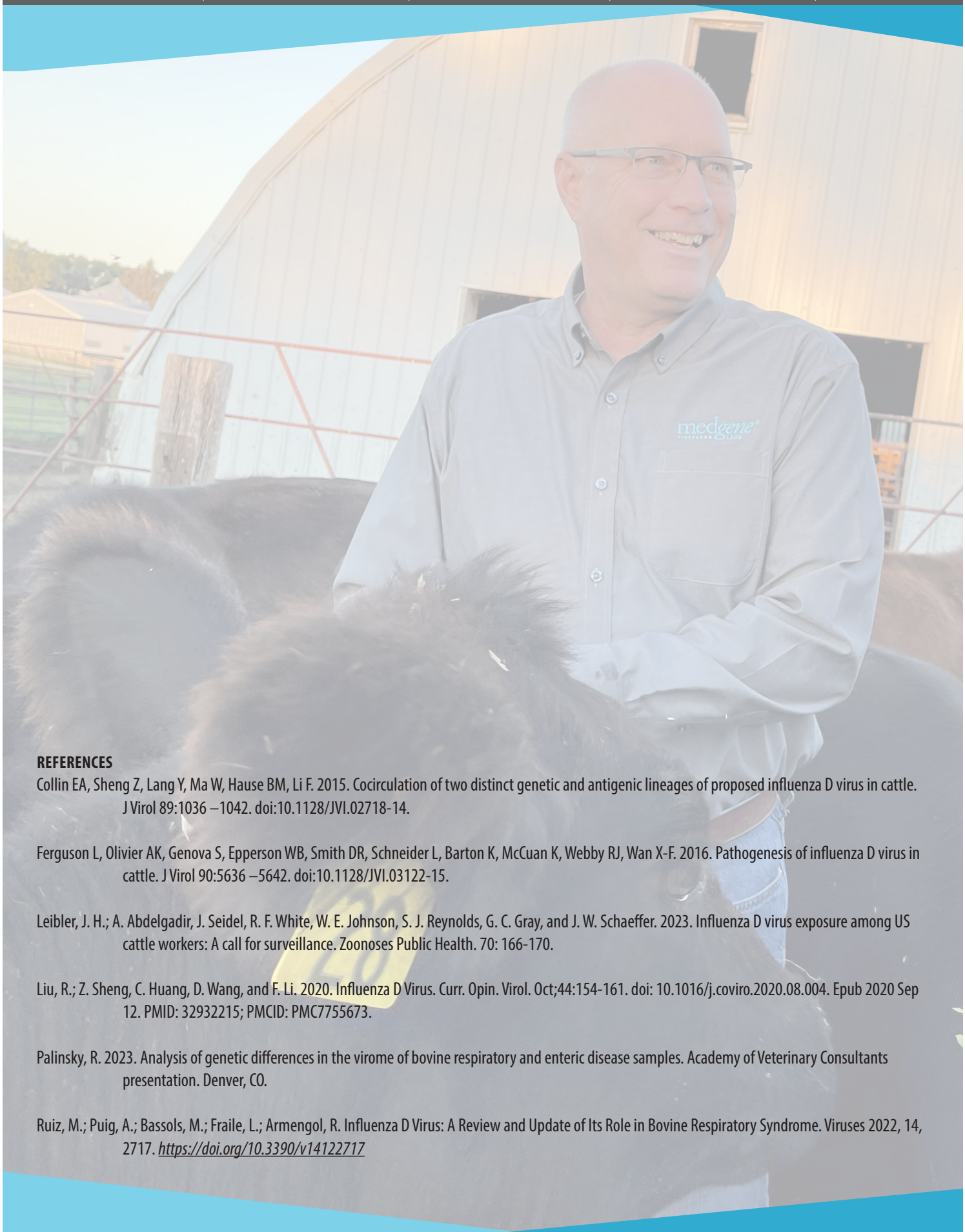

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