IMPACT OF **BOVINE CORONAVIRUS (BCoV)** ON THE RESPIRATORY SYSTEM

MSD Animal Health

Calf pneumonia or **Bovine Respiratory Disease (BRD)** is a complex, multi-factorial disease which results in inflammation and damage to the tissues of the lungs and respiratory tract. It is one of the most common and costly diseases in young calves, having a long-term impact on productivity in both dairy and beef systems.[1,2,3]

IMPACT OF BOVINE RESPIRATORY DISEASE (BRD)

BRD IMPACT ON DAIRY SYSTEMS

BRD is the most common cause of death and poor performance in dairy cattle under one year[4] with 14.5% of dairy heifers failing to reach 1st lactation.[5]

- 525kg decrease in first lactation milk production.[2]
- 30 day increase in time to 1st calving.[4]
- Reduction of bodyweight at 14 months of 29kg.[4]

BRD IMPACT ON BEEF SYSTEMS

More than 70% of cattle had lung damage at slaughter despite only 35% being treated for BRD.[6]

Calves with a history of BRD have:

- Decreased growth performance (up to 6kg/month).[7]
- Longer fattening period (+33 to 59 days).[7]

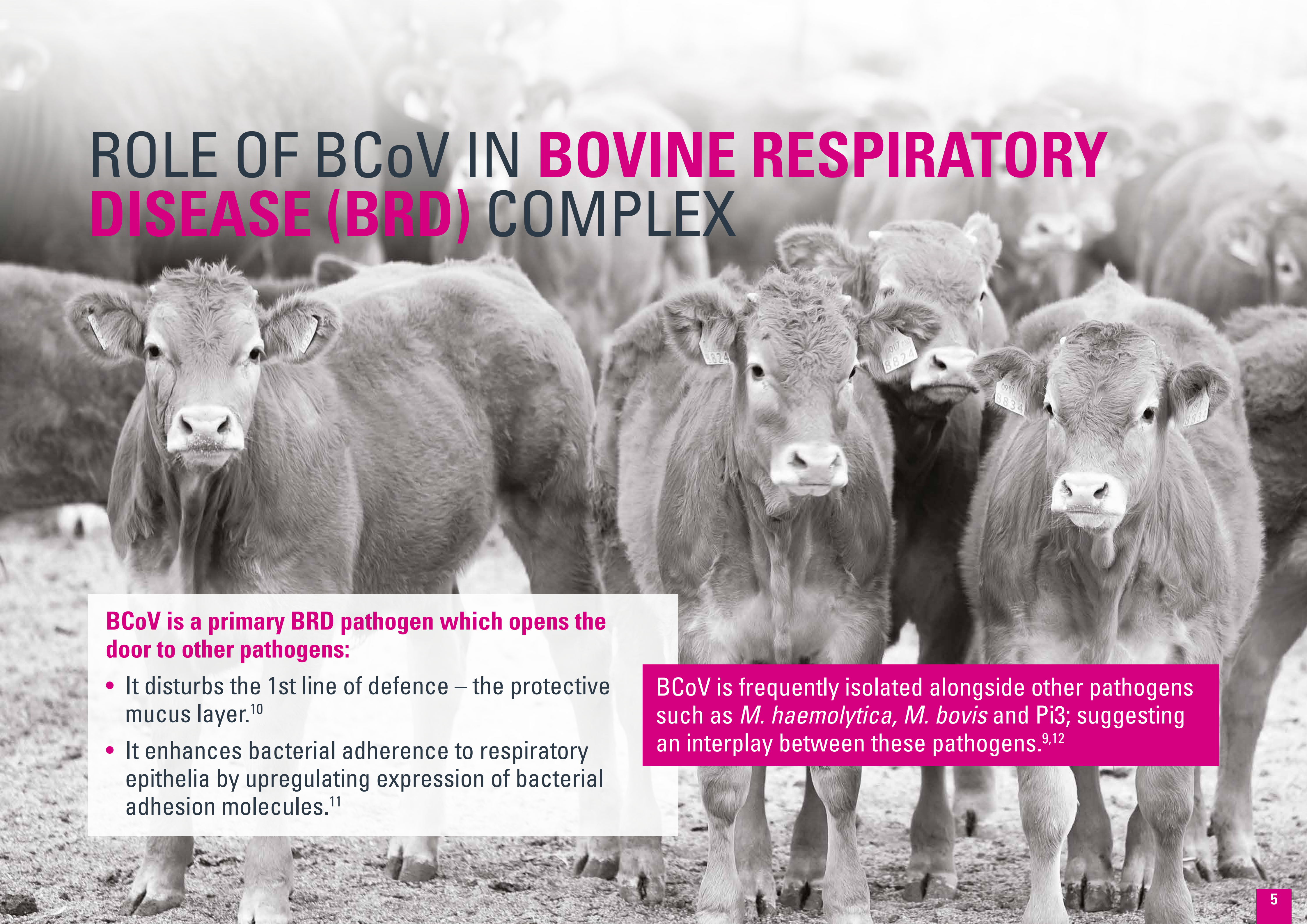
BCoV
BACKGROUND

BCoV is a pneumoenteric RNA virus that infects both the upper and lower respiratory tract and the intestines.[8]

Clinical signs of BCoV infection include calf diarrhoea, respiratory disease and winter dysentery.[8]

Infection is via the faecal-oral route or via aerosol inhalation; regardless of infection route, BCoV is shed in both faecal and nasal secretions[8] where the respiratory and enteric forms of BCoV are antigenically and genetically identical.[9]

ROLE OF BCoV IN **BOVINE RESPIRATORY DISEASE (BRD)** COMPLEX

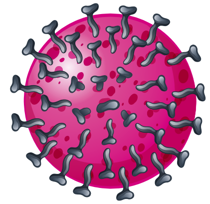


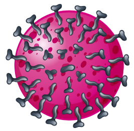
BCoV is a primary BRD pathogen which opens the door to other pathogens:

- It disturbs the 1st line of defence – the protective mucus layer.[10]
- It enhances bacterial adherence to respiratory epithelia by upregulating expression of bacterial adhesion molecules.[11]

BCoV is frequently isolated alongside other pathogens such as *M. haemolytica, M. bovis* and Pi3; suggesting an interplay between these pathogens.[9,12]

PREVALENCE OF BCoV ON-FARM



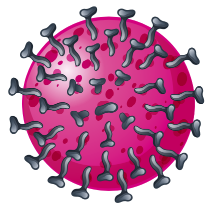


Recent analysis of UK BRD diagnostics indicates Bovine Coronavirus (BCoV) is the most reported virus identified on-farm in routine screening and in the face of an outbreak.

UK diagnostics	% Farms Positive	BCoV	BRSV	Pi3	*Mannheimia haemolytica*	*Mycoplasma bovis*
	Surveillance[*]	91.5%	35.6%	91.5%	91.5%	35.6%
	Outbreak[+]	38.6%	21.6%	11.5%	61.7%	39.1%

* Calf serology from 59 farms across UK which have had history of BRD issues (2021-2022).
\+ Nasal Swab PCR from 407 farms submitted to Biobest (2020-2022).

Additionally, a recent 16-country European study found every farm was seropositive for BCoV and herds containing BCoV-seropositive calves had an increased risk of suffering BRD outbreaks.[13]



BCoV **TRANSMISSIBILITY**

BCoV is incredibly widespread due to these 3 key reasons:

1| **Carrier animals:** Asymptomatic (carrier) animals shed the respiratory and enteric virus which serves as a source of infection to other animals on the farm.[14]

2| **Shedding:** Peak clinical signs (respiratory rate/fever) appeared more than a week after shedding starts.[15]

3| **Fomite transmission:** Infective BCoV was found on rinsed and visually clean fomites (clothes, boots, wristwatches and stethoscopes) after 24h indicating they could be vehicles for transmission.[16]

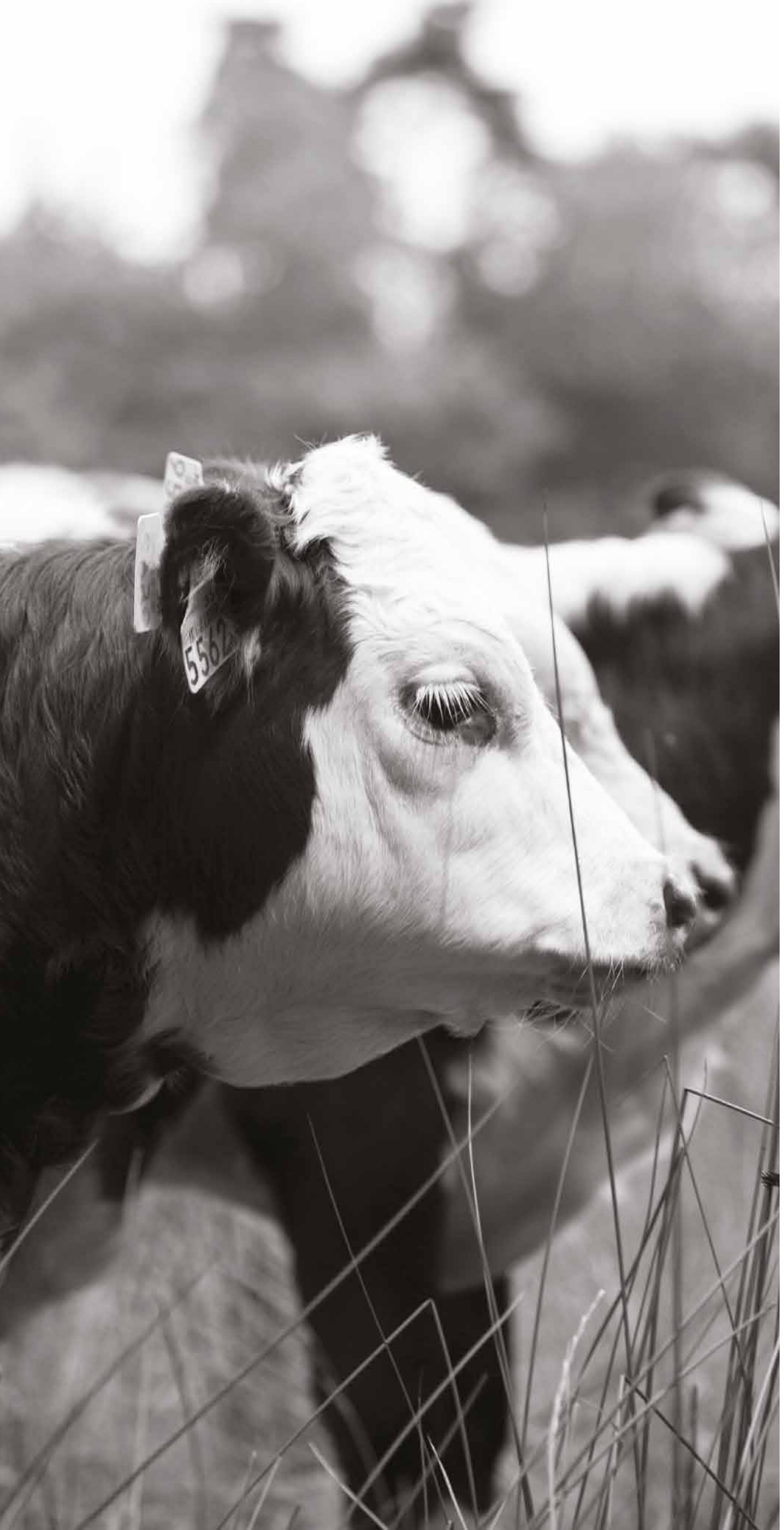
IMPACT OF BCoV ON PRODUCTIVITY

BCoV's impact on productivity is characterised as part of the overall BRD Complex but there have been some key findings specific to BCoV in field investigations:

Seropositive calves had an **increased risk of BRD** vs. seronegative calves.[17]

Calves shedding BCoV nasally were **1.5x**[18] and **2.7x**[19] more likely to have BRD than those that did not shed.

Cattle shedding BCoV nasally at entry to a feedlot system were **13.7x** more likely to die vs. those not shedding.[20]



BCoV ON-FARM **RISK FACTORS**

The following key risk factors are significantly associated with respiratory BCoV issues:[21]

- Detection of BCoV (in diarrhoeic calves)
- Detection of *M. haemolytica* on the farm
- Purchase of colostrum
- Recent purchase of cattle

BCoV has also been found as a co-infective agent in 72% of *M. bovis* positive outbreaks.[21]

Farms which have positive respiratory diagnosis or at least one of these risk factors could benefit from a specific BCoV prevention plan.

CLOSING THE DOOR ON BRD THROUGH **BCoV VACCINATION**

BCoV is traditionally associated with enteric disease, however this information highlights its importance within the BRD Complex.

Based on BCoV's ability to disturb the critical mucus lining of the respiratory tract which opens the door to secondary BRD pathogens and its high on-farm prevalence, this is a pathogen which should be included in farm disease prevention plans.

Colostral protection against BCoV is important for enteric infection but protection derived from colostrum has minimal impact on immunity at the nasal mucosa,[22] therefore intranasal vaccination using Bovilis Nasalgen-C is a key tool to help protect against respiratory BCoV.

Part of the MSD Animal Health Respiratory Programme.

Contact us for further information or visit www.msd-animal-health-hub.co.uk

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Bovilis Nasalgen®-C contains live bovine coronavirus, strain CA25. **POM-V**. Bovilis® INtranasal RSP™ Live contains live BRSV and Pi3. **POM-V**. Bovilis® Bovipast® RSP contains inactivated BRSV (strain EV908), Pi3 virus (strain SF-4-Reisinger) and inactivated *Mannheimia (Pasteurella) haemolytica* (serotype A1). **POM-V**. Bovilis® IBR Marker Live contains live bovine herpesvirus type 1 (BHV-1), strain GK/D (gE⁻)*: $10^{5.7}$ - $10^{7.3}$ $TCID_{50}$**. *gE⁻: glycoprotein E negative. **$TCID_{50}$: tissue culture infective doses 50%. **POM-V**. Bovilis® Huskvac contains viable *Dictyocaulus viviparus* 3rd stage irradiated larvae. **POM-V**. Further information is available from the respective SPC, datasheet or package leaflets.
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