# Bovine Coronavirus prevalence & risks in EU dairy farms

Geert Vertenten, DVM, PhD
Global Technical Director Ruminant Biologicals
Anna Catharina Berge, MSc, DVM, MPVM, PhD
Berge Veterinary Consulting BV


MSD
Animal Health
The Science of Healthier Animals®

# The goals of this cross-sectional field study

The objective is to obtain a rough estimate of the farm prevalence of Coronavirus in dairy production in Europe

&

To characterize farm-level risk factors in management and biosecurity that are linked to BCoV infection in neonatal dairy calves and weaned dairy calves.

MSD Animal Health

# 130 EU Dairy farms


Austria, Belgium, Czech Republic, Denmark, France, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Romania, Sweden, Spain, Slovakia, United Kingdom (Scotland)



MSD Animal Health

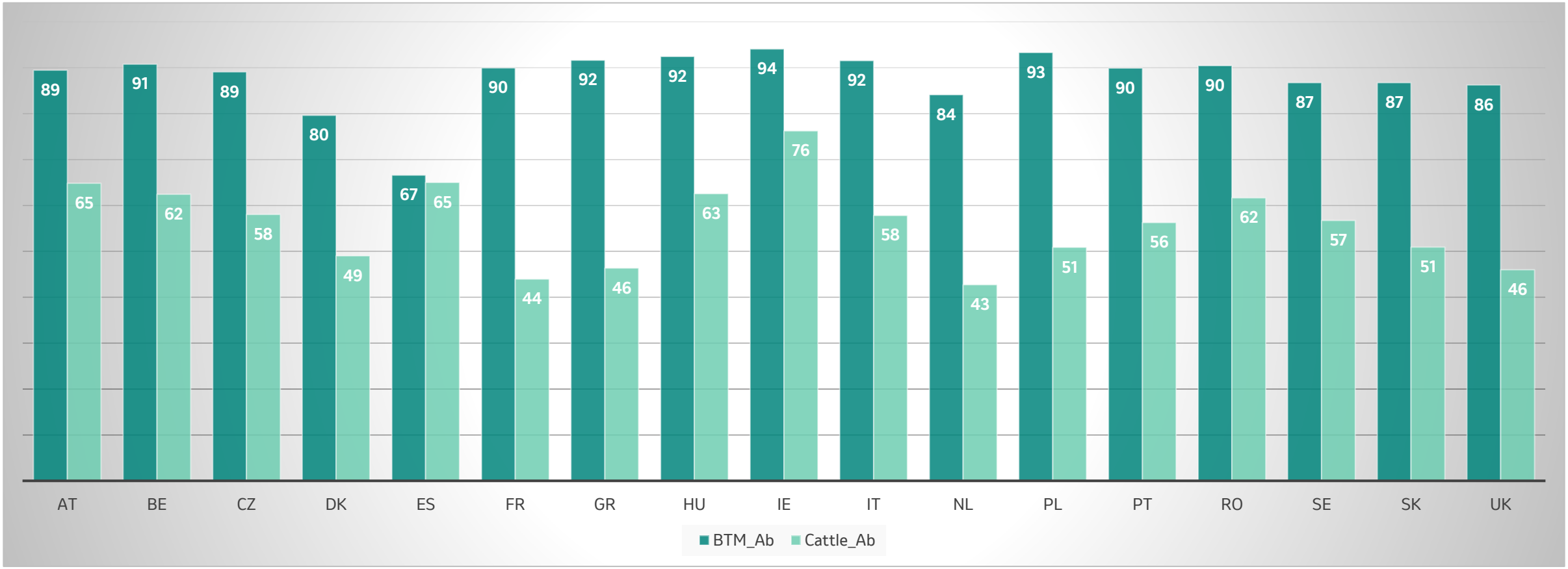
# MATERIALS AND METHODS

- Convenience sample of 130 European dairy farms with at least 100 lactating cows. Samples are taken between September 2021 and December 2022.
- From 10-20 neonatal calves, 10-20 recently weaned calves and 5-10 fresh cows. All samples are tested individually, no pooled samples.
- Nasal and faecal swabs : BCoV detection using semiquantitative Real Time PCR (RT-PCR)
- Blood samples : BCoV antibody detection (expressed in percent optical density (%OD))
- Bulk tank milk (BTM) samples : BCoV antibody detection (%OD)
- 2 questionnaires per farm :
  - General farm description and husbandry
  - Biosecurity (Biocheck survey, *https://biocheck.ugent.be*, Ugent, BE)
- Descriptive and interferential statistics were performed.

MSD Animal Health

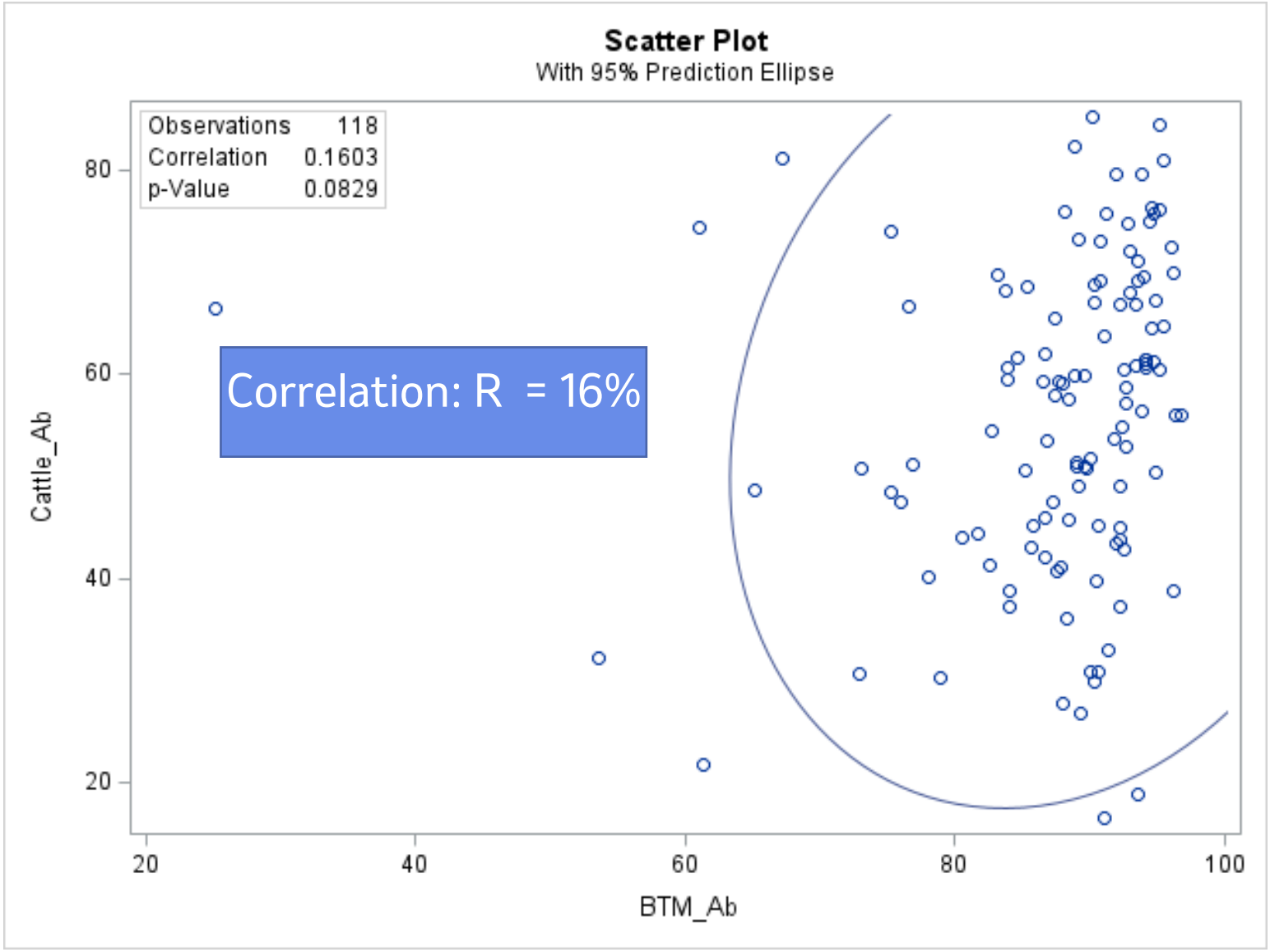
# Farm BTM and cattle BCoV antibody levels

100% of the sampled farms were antibody positive

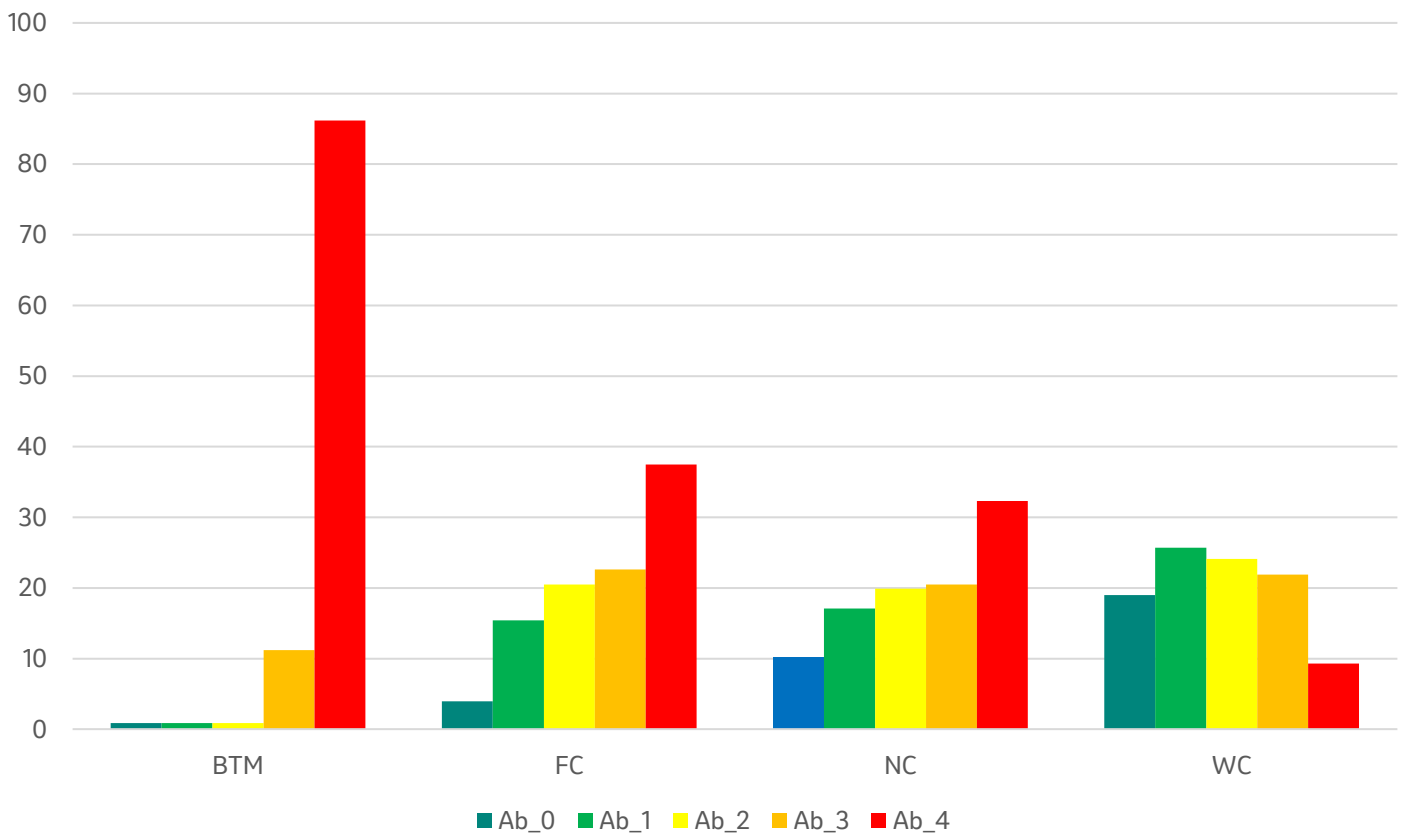



MSD Animal Health

# Poor correlation between BTM antibodies and cattle antibodies



# % Antibody distributions to BCoV in bulk tank milk and cattle categories




The Bulk tank milk samples nearly always show max levels of antibodies

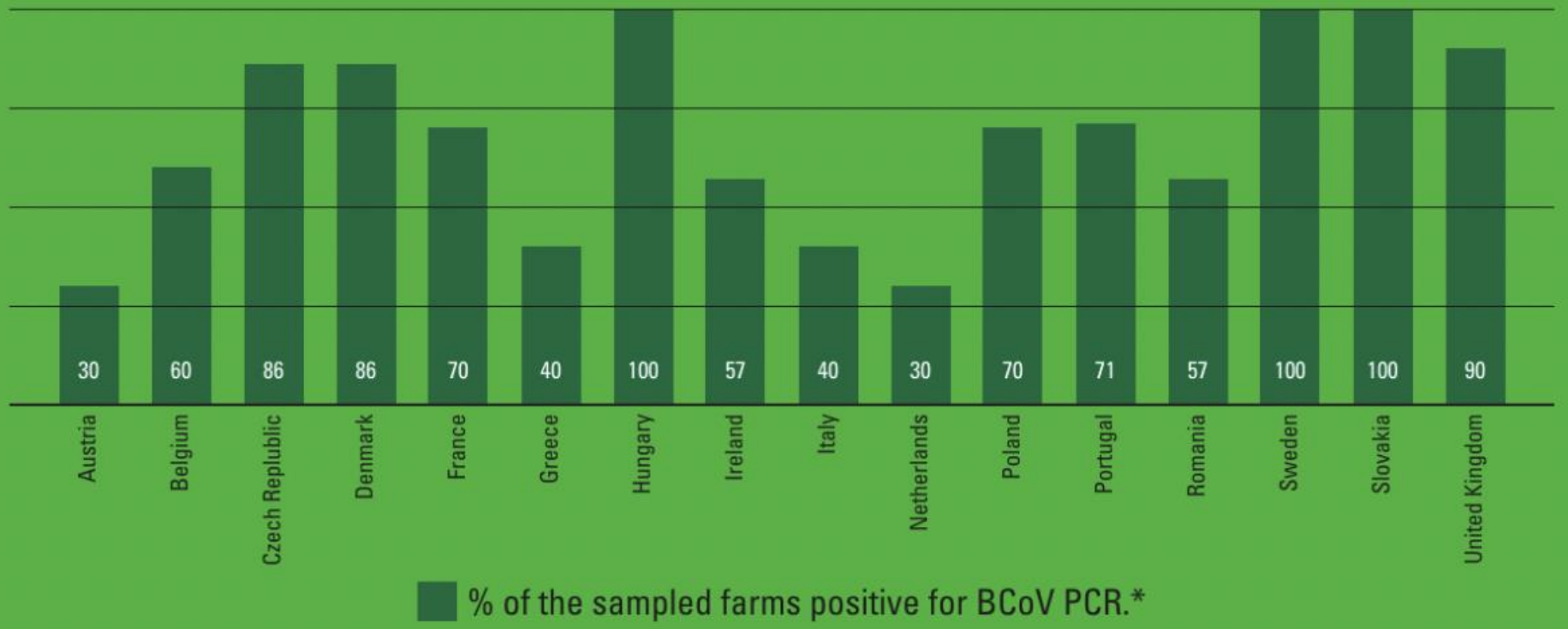
The Fresh cows nearly all have some level of antibodies, and most farms have cows with high antibody levels

The Neonatal calves show similar antibody level distribution as the fresh cows, and most neonatal calves have high antibody levels

The weaned calves have hte most calves with either no antibodies or low antibody levels.

MSD Animal Health

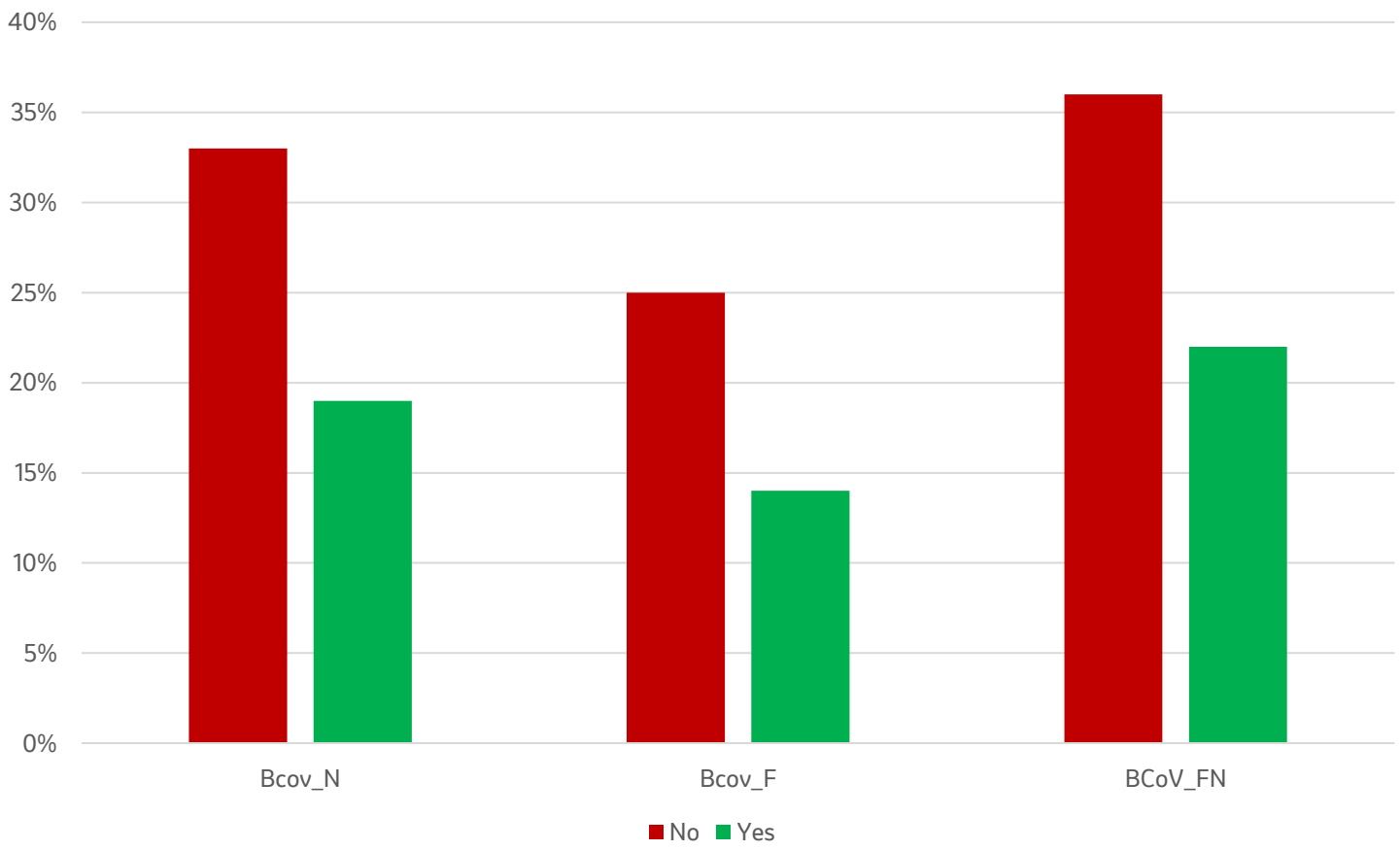
# Percentage of the sampled farms positive for bovine coronavirus PCR.*




Berge A.C., Vertenten G., PREVALENCE, BIOSECURITY AND RISK MANAGEMENT OF CORONAVIRUS INFECTIONS ON DAIRY FARMS IN EUROPE, European Buiatrics Congress, August 24-26, 2023, Berlin, Germany

MSD Animal Health

# BCoV recovered in calves under one month of age in herds with or without BCoV dry cow vaccination



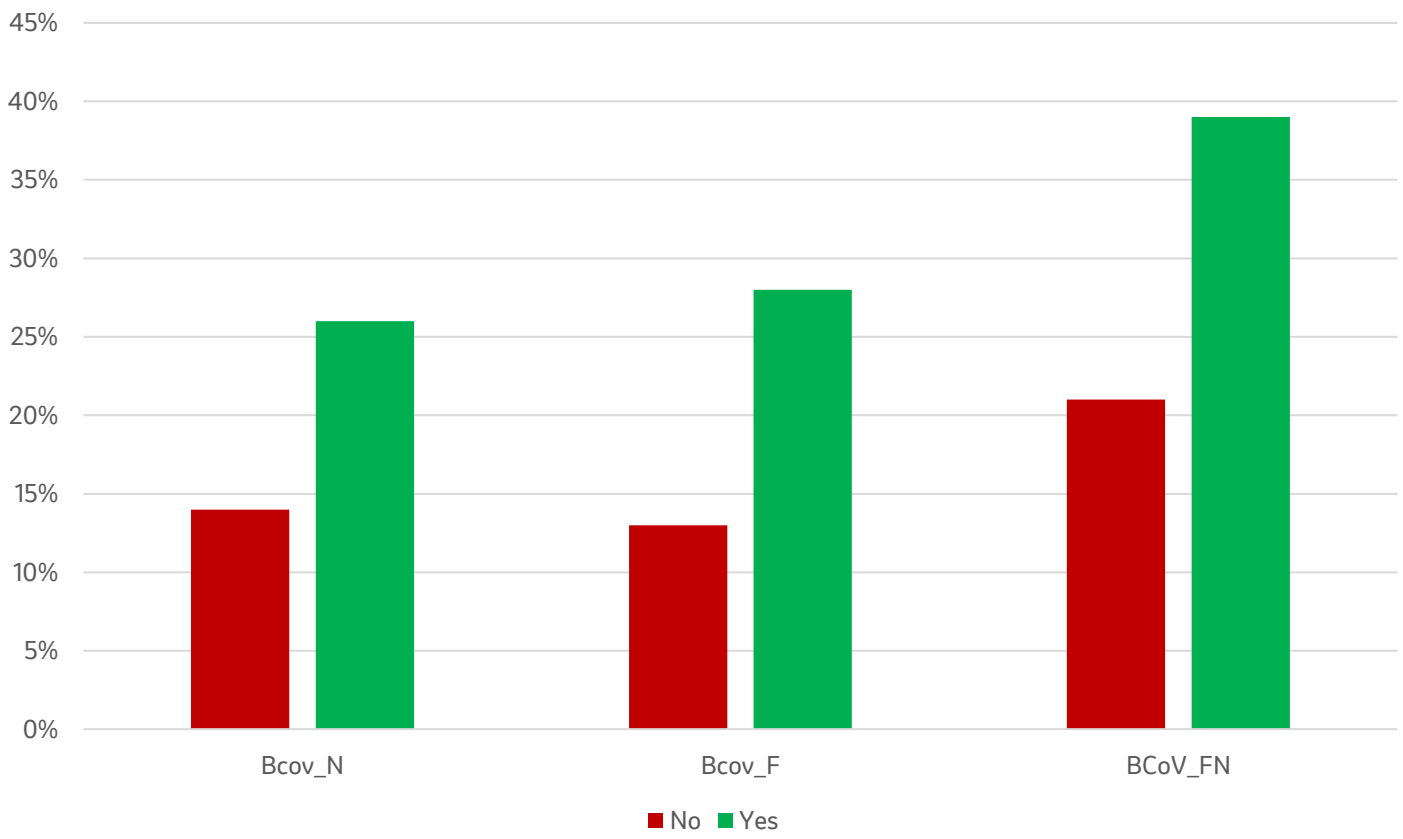

| | BCoV in calves < 1 month | | | |
|---|---|---|---|---|
| Dam - Vac | Bcov_N | Bcov_F | BCoV_FN | Ab |
| No | 33% | 25% | 36% | 47 |
| Yes | 19% | 14% | 22% | 69 |

**61% reduction** in neonatal calf shedding in herds that vaccinate their dry cows against BCoV

N = 1290
BCoV_N = BCoV in nasal samples,
BCoV_F= BCoV in faecal samples,
BCoV_FN = BCoV in either nasal or faecal sample from calf
Ab = Elisa antibody value.

MSD Animal Health

# BCoV recovered in weaned calves in herds with or without BCoV dry cow vaccination




| | BCoV in calves weaned calves | | | |
|---|---|---|---|---|
| Dam - Vac | Bcov_N | Bcov_F | BCoV_FN | Ab |
| No | 14% | 13% | 21% | 39 |
| Yes | 26% | 28% | 39% | 48 |

**100% increase** in weaned calf shedding in herds that vaccinate their dry cows against BCoV

N = 1388
BCoV_N = BCoV in nasal samples,
BCoV_F= BCoV in faecal samples,
BCoV_FN = BCoV in either nasal or faecal sample from calf

MSD Animal Health

# Correlation nasal and fecal swabs (RT-PCR values)

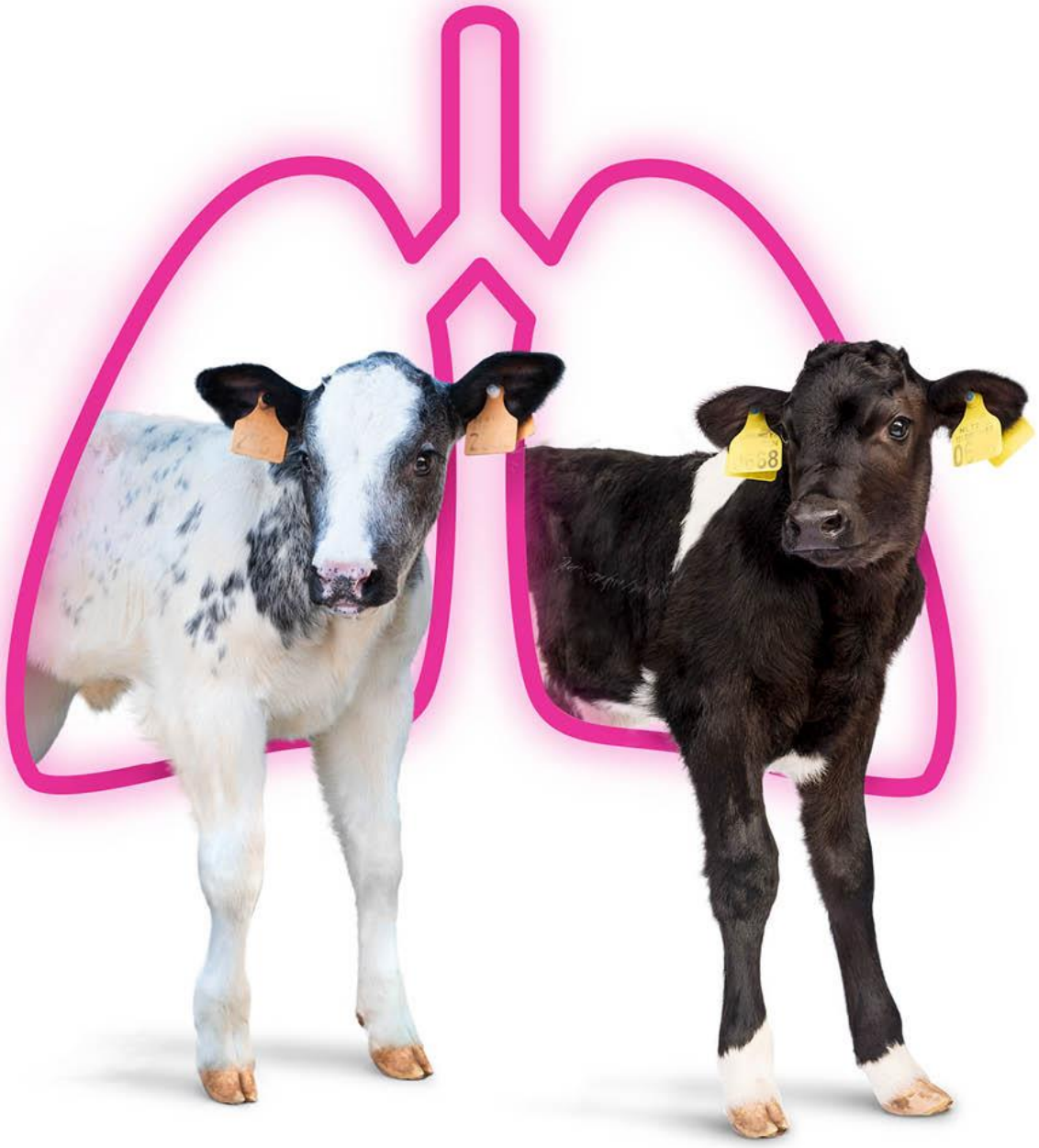
| | BCoV-Feacal | | |
|---|---|---|---|
| BCoV-Nasal | No | Yes | % BCoV-F+ |
| No | 2167 | 225 | 9% |
| Yes | 291 | 423 | 59% |
| % BCoV-N + | 12% | 65% | |
| Chi-square P-value = 0.03 | | | |

Congruent results in 83% of sampled calves

# Conclusions

1. Bovine Coronavirus (BCoV) is highly present in both the respiratory and enteric pathway in the dairy cattle population in Europe.
2. Preliminary results of field study found 80% of farms tested positive for BCoV
3. BCoV is associated with increased risk for Bovine Respiratory Disease (BRD).

MSD Animal Health



BOVILIS EVENT

# THE NEXT STEP IN LUNG HEALTH

MSD Animal Health

# Inhoud

1. Eigenschappen van het vaccin
2. Aanvang en duur van de immuniteit
3. Vaccinatie vanaf de geboorte
4. Invloed van maternale antistoffen
5. Gelijktijdig gebruik met Bovilis INtranasal RSP Live
6. In-Use Stabiliteit

MSD Animal Health

# Eigenschappen van het vaccin: Overzicht

- Eerste respiratoir corona virus vaccin voor runderen
- Levend verzwakte BCoV stam CA25
- 2 ml per dosis in één neusgat
- Toediening met of zonder nozzle
- Vanaf de dag van de geboorte
- Snelle aanvang van de immuniteit (5 days)
- Lange duur van de immuniteit (12 weeks)
- Stimulatie van de aspecifieke aangeboren immuniteit
- Werkzaam in aanwezigheid van maternale antistoffen
- Na reconstitutie 24 uur houdbaar
- Gelijktijdig toe te dienen met Bovilis INtranasal RSP live


MSD Animal Health

# Eigenschappen van het vaccin: Overzicht

- Eerste respiratoir corona virus vaccin voor runderen
- Levend verzwakte BCoV stam CA25
- 2 ml per
- Toedien
- Vanaf d
- Snelle a
- Lange d
- Stimulat
- Werkzaa
- Na recon
- Gelijktijdig toe te dienen met Bovilis INtranasal RSP live

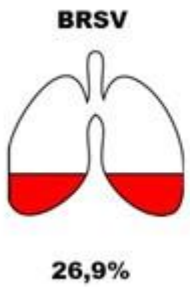
**Eerste respiratoir coronavirus vaccin voor runderen**

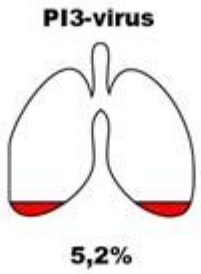
MSD Animal Health

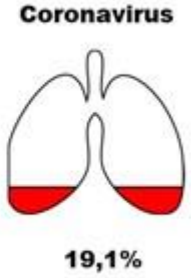
# Griepbarometer

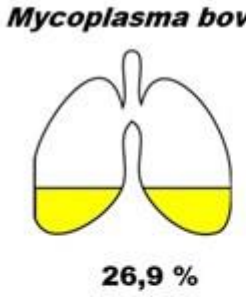
De Griepbarometer brengt de griepsituatie bij kalveren in beeld.

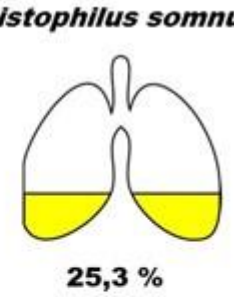
PERIODE: 1 december 2016 tot 14 augustus 2023
AANTAL GEVALLEN: 4086

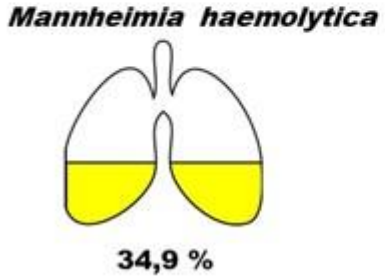


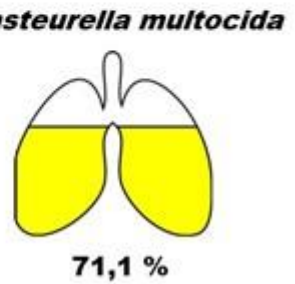



Preventive Veterinary Medicine 120 (2015) 169–176

Contents lists available at ScienceDirect

Preventive Veterinary Medicine

journal homepage: www.elsevier.com/locate/prevetmed

# Prediction of respiratory disease and diarrhea in veal calves based on immunoglobulin levels and the serostatus for respiratory pathogens measured at arrival

Bart Pardon[a,*], Jeroen Alliët[a], Randy Boone[b], Sophie Roelandt[c], Bonnie Valgaeren[a], Piet Deprez[a]

[a] Department of Large Animal Internal Medicine, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium
[b] Veterinary Practice Venhei, Geelsebaan 95-97, 2460 Kasterlee, Belgium
[c] Unit for Coordination of Veterinary Diagnosis, Epidemiology and Risk Assessment (CVD-ERA), Veterinary and Agrochemical Research Centre (VAR-CODA-CERVA), Brussels, Belgium

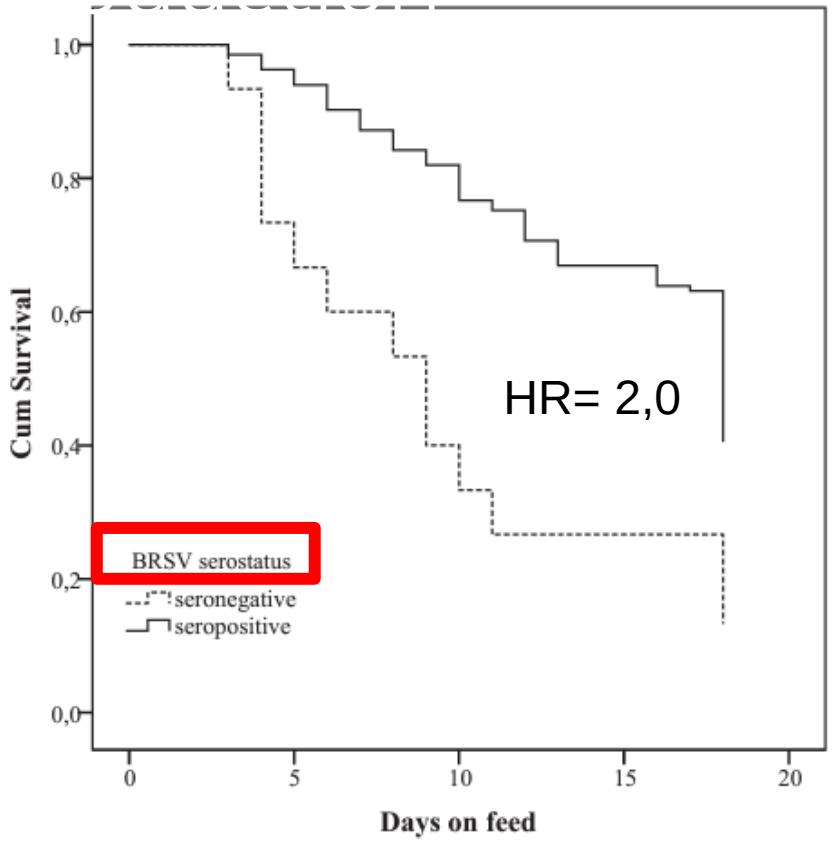



**Fig. 3.** Survival graph for occurrence of BRD in rosé veal calves in the first weeks after arrival, according to the serostatus for bovine respiratory syncytial virus (BRSV) measured upon arrival (Log Rank test: $\chi^2 = 13.8$, df = 1; $P < 0.001$)

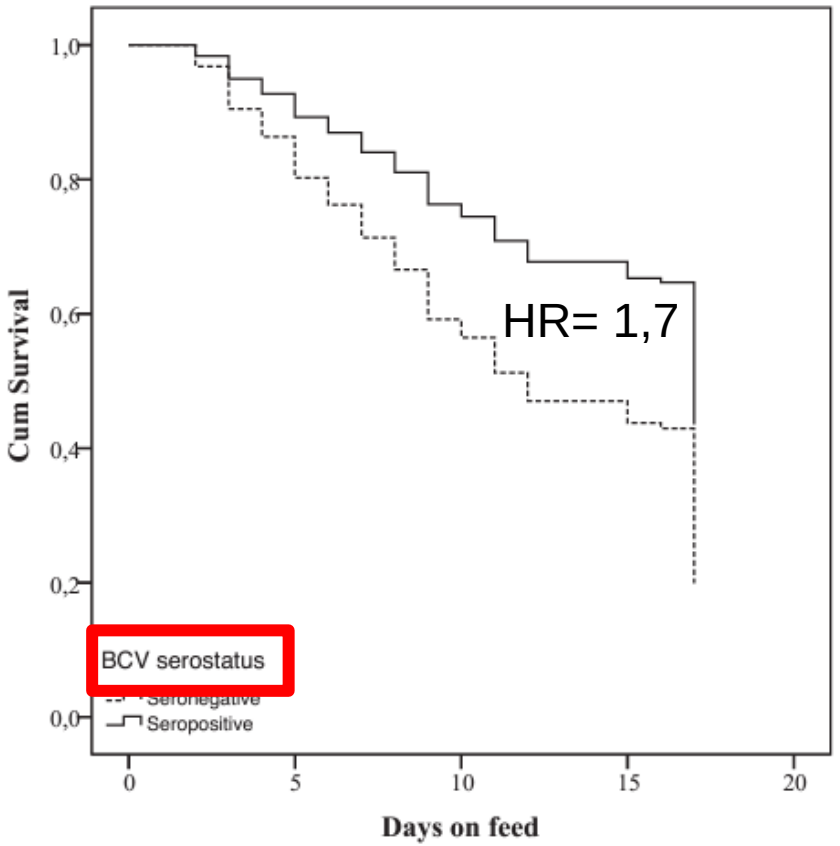



**Fig. 4.** Survival graph for occurrence of BRD in rosé veal calves in the first weeks after arrival, according to the serostatus for bovine coronavirus (BCV) measured upon arrival (Log Rank test: $\chi^2 = 10.7$, df = 1; $P < 0.01$).

MSD Animal Health

J. Dairy Sci. 103:2556–2566
https://doi.org/10.3168/jds.2019-17486


# Pathogen-specific risk factors in acute outbreaks of respiratory disease in calves

B. Pardon,[1]* J. Callens,[2] J. Maris,[3] L. Allais,[2] W. Van Praet,[2] P. Deprez,[1] and S. Ribbens[2]
[1]Department of Large Animal Internal Medicine, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium
[2]Animal Health Service Flanders (DGZ Vlaanderen), Industrielaan 29, 8820 Torhout, Belgium
[3]Boehringer Ingelheim Belgium, Arianelaan 16, 1200 Sint-Lambrechts-Wolume, Belgium

MSD Animal Health

## ABSTRACT

Respiratory tract infections (bovine respiratory dis-

**VIRALE AGENTIA:** **BCoV 38.4%**
**BRSV 29.4%**
**PI3 8.1%**

**BACTERIËLE AGENTIA:** **Pasteurella multocida 89.1%**
**Mannheimia haemolytica 41.2%**
**Histophilus somni 36.4%**
**Mycoplasma Bovis 33.3%**

*Histophilus somni* were detected in 33.3, 41.2, 89.1, and 36.4% of the herds, respectively. Specific risk factors for

MSD Animal Health

**Table 5.** Final multivariable logistic regression model describing the association between risk factors and detection of bovine coronavirus by PCR on pooled broncho-alveolar lavage samples from epidemic respiratory disease in calves[1]

| Independent variable | Category | n | % positive | b | SE | OR | 95% CI | *P*-value |
|---|---|---|---|---|---|---|---|---|
| Intercept | | | | −1.8 | 0.5 | | | <0.001 |
| *Mannheimia haemolytica* | Negative | 50 | 34.0 | Referent | | | | |
| | Positive | 36 | 55.6 | 1.0 | 0.5 | 2.8 | 1.1–7.5 | 0.03 |
| Detection of coronavirus in neonatal calves in the last year | No | 66 | 37.8 | Referent | | | | |
| | Yes | 20 | 60.0 | 1.3 | 0.6 | 3.6 | 1.2–11.1 | 0.03 |
| Herd size (per increase of 100 animals) | | 86 | | 0.3 | 0.1 | 1.3 | 1.0–1.8 | 0.03 |

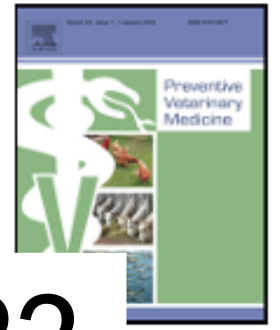
[1]b = regression coefficient; OR = odds ratio.

MSD Animal Health

Preventive Veterinary Medicine 120 (2015) 169–176

Contents lists available at ScienceDirect

Preventive Veterinary Medicine




# Subclinical respiratory disease ???

# or

# Thoracic ultrasound scanning ???

Bart Pardon[a,*], Jeroen Alliët[a], Randy Boone[b], Sophie Roelandt[c], Bonnie Valgaeren[a], Piet Deprez[a]

[a] Department of Large Animal Internal Medicine, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium
[b] Veterinary Practice Venhei, Geelsebaan 95-97, 2460 Kasterlee, Belgium
[c] Unit for Coordination of Veterinary Diagnosis, Epidemiology and Risk Assessment (CVD-ERA), Veterinary and Agrochemical Research Centre (VAR-CODA-CERVA), Brussels, Belgium

MSD Animal Health

# European Buiatrics Congress Berlijn 2023

# Serologic predictors for pneumonia in male dairy veal calves

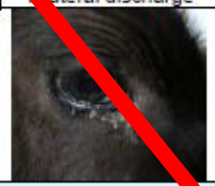
G. Hoflack, T. Lowie, S. Jourquin, F. Debruyne, L. Chantillon, J. Clinquart, M. L. Pas, R. Boone, G. Vertenten, B. Sustronck, B. Pardon

MSD Animal Health

# Serologic predictors for veal calf pneumonia

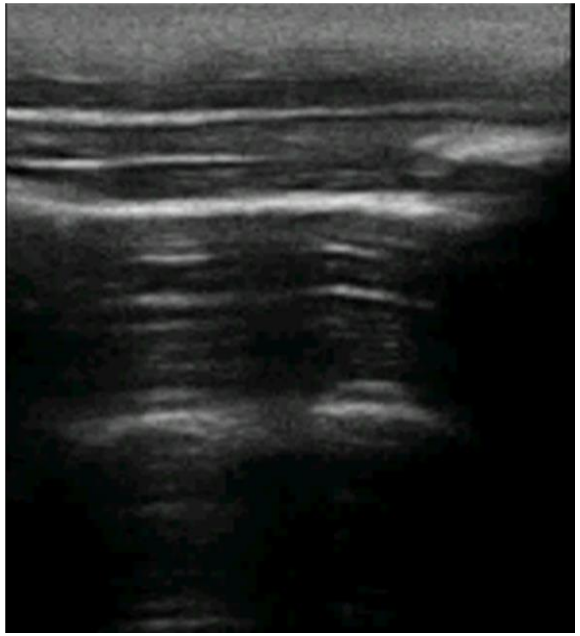
SCHOOL OF VETERINARY MEDICINE
University of Wisconsin-Madison

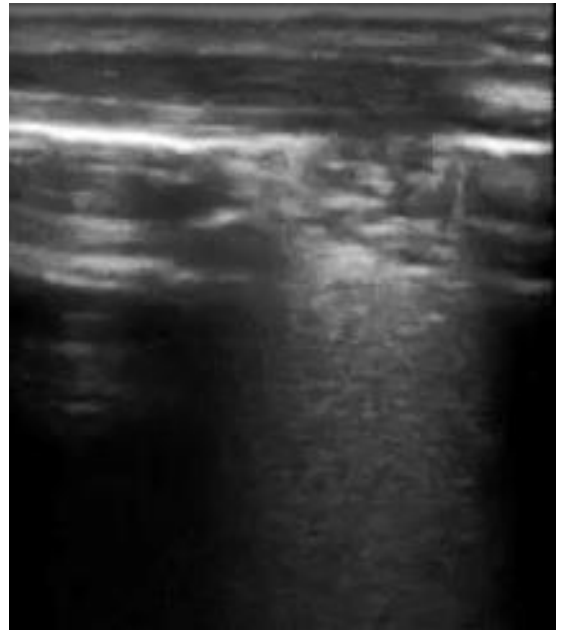
**Calf Health Scoring Criteria**

| 0 | 1 | 2 | 3 |
|---|---|---|---|
| **Rectal temperature** | | | |
| 100-[illegible].9 | 101-101.9 | 102-102.9 | [illegible]103 |
| **Cough** | | | |
| None | Induce single cough | Induced repeated coughs or occasional spontaneous cough | Repeated [illegible]ontaneous coughs |
| **Nasal discharge** | | | |
| Normal serous discharge | Small amount of [illegible]ilateral cloudy discharge | Bilateral, cloudy [illegible] excessive mu[illegible]s discha[illegible] | Copious bilateral mucopurulent discharge |
|  |  |  |  |
| **Eye scores** | | | |
| Normal | Small amount [illegible] ocular discha[illegible]ge | [illegible]oderate amount of [illegible]lateral discharge | Heavy ocular discharge |
|  |  |  |  |
| **Ear scores** | | | |
| Normal | Ear flick or head shake | Slight unilateral droop | Head tilt or bilateral droop |
|  |  |  |  |

**Wiconsin-Score ≥ 5 : Klinische BRD**

qTUS





**Consolidatie diepte ≥ 1 cm : Pneumonie (qTUS positief)**

MSD Animal Health

# Serologic predictors for veal calf pneumonia

**BCoV seronegatieve kalveren bij aankomst hebben een 2.4 keer hogere odds om pneumonie te ontwikkelen binnen de eerste weken na aankomst**

**BRSV seronegatieve kalveren bij aankomst hebben een 1.6 keer hogere odds om pneumonie te ontwikkelen binnen de eerste weken na aankomst**

**BRSV seropositieve kalveren bij aankomst hebben een 2.6 keer meer kans op afwezigheid van pneumonie na de eerste metafylactische behandeling**

MSD Animal Health

# Eigenschappen van het vaccin: Overzicht

- Eerste respiratoir corona virus vaccin voor runderen
- Levend verzwakte BCoV stam CA25
- 2 ml per dosis in één neusgat
- Toediening met of zonder nozzle
- Vanaf de dag van de geboorte
- Snelle aanvang van de immuniteit (5 days)
- Lange duur van de immuniteit (12 weeks)
- Stimulatie van de aspecifieke aangeboren immuniteit
- Werkzaam in aanwezigheid van maternale antistoffen
- Na reconstitutie 24 uur houdbaar
- Gelijktijdig toe te dienen met Bovilis INtranasal RSP live


MSD Animal Health

# Eigenschappen van het vaccin: Overzicht

- Eerste respiratoir corona virus vaccin voor runderen
- Levend verzwakte BCoV stam CA25
- 2 ml per
- Toedien
- Vanaf de
- Snelle a
- Lange d
- Stimulat
- Werkzaa
- Na recon
- Gelijktijdig toe te dienen met Bovilis INtranasal RSP live

**Levend verzwakte BCoV stam CA25**

**Stimulatie van de aspecifieke aangeboren immuniteit**

MSD Animal Health

vaccines

MDPI

*Article*

# Early Activation of the Innate Immunity and Specific Cellular Immune Pathways after Vaccination with a Live Intranasal Viral Vaccine and Challenge with Bovine Parainfluenza Type 3 Virus

Piet Nuijten, Natalie Cleton, Jeroen van der Loop, Birgit Makoschey, Wilco Pulskens and Geert Vertenten *

Received: 10 November 2021
Accepted: 29 December 2021
Published: 11 January 2022

MSD Animal Health

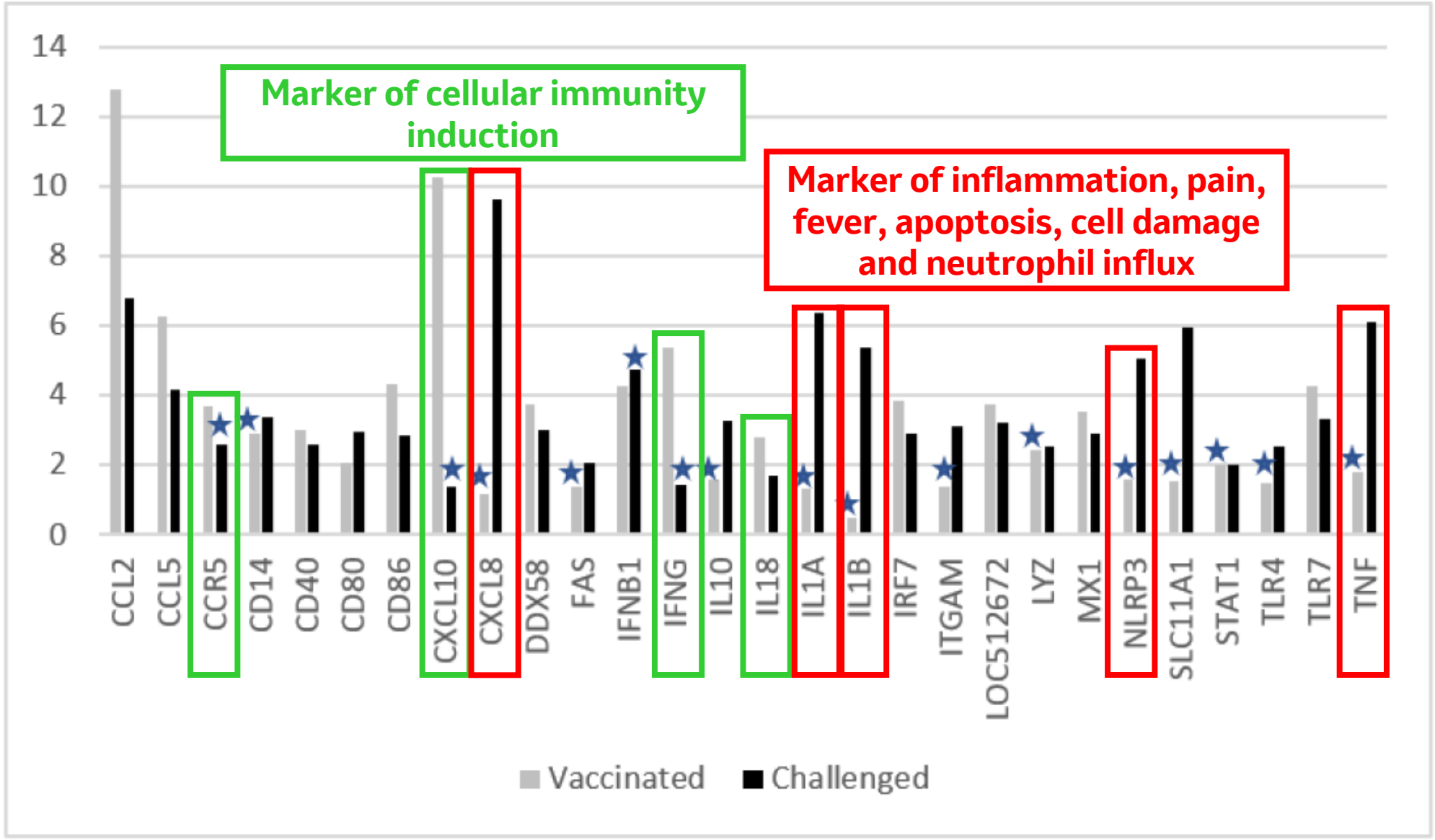



**Figure 3.** Comparison of gene expression (fold-change on *Y*-axis) of vaccinated- versus nonvaccinated-challenged animals. Genes are shown which had significant changes in Ct values five days after vaccination or five days after challenge (see materials and methods). Asterisks indicate non-significant changes according to the arbitrary criteria described in the materials and methods section.

# Eigenschappen van het vaccin: Overzicht

- Eerste respiratoir corona virus vaccin voor runderen
- Levend verzwakte BCoV stam CA25
- 2 ml per dosis in één neusgat
- Toediening met of zonder nozzle
- Vanaf de dag van de geboorte
- Snelle aanvang van de immuniteit (5 days)
- Lange duur van de immuniteit (12 weeks)
- Stimulatie van de aspecifieke aangeboren immuniteit
- Werkzaam in aanwezigheid van maternale antistoffen
- Na reconstitutie 24 uur houdbaar
- Gelijktijdig toe te dienen met Bovilis INtranasal RSP live


MSD Animal Health

# Eigenschappen van het vaccin: Overzicht

- Eerste respiratoir corona virus vaccin voor runderen
- Levend verzwakte BCoV stam CA25
- 2 ml per dosis in één neusgat
- Toedienin
- Vanaf de
- Snelle aa
- Lange du
- Stimulat
- Werkzaa
- Na recon
- Gelijktijdig toe te dienen met Bovilis INtranasal RSP live

**Vanaf de dag van de geboorte**

MSD Animal Health

Veterinary Vaccine 2 (2023) 100014

Contents lists available at ScienceDirect

Veterinary Vaccine

journal homepage: www.elsevier.com/locate/vetvac

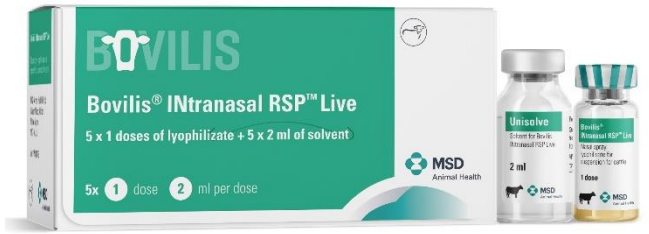
# Vaccination of calves at day of birth with attenuated vaccines against bovine respiratory syncytial virus, bovine parainfluenza type 3 virus and respiratory bovine coronavirus

Mark H. van Rooij[a], Mélodie Schmitz[b], Joris M.H. Meessen[a], Pieter A.W.M. Wouters[c], Mieke P. Vrijenhoek[d], Birgit Makoschey[a,*]

[a] *Global Ruminant R&D Bio, MSD Animal Health, Wim de Körverstraat, Boxmeer 5831AN, the Netherlands*
[b] *CER Groupe, Novalis Science Parc, Rue de la Science, Aye 6900, Belgium*
[c] *Animal Health Clinical Research, MSD Animal Health, Wim de Körverstraat, Boxmeer 5831AN, the Netherlands*
[d] *R&D Animal Research, MSD Animal Health, Wim de Körverstraat, Boxmeer 5831AN, the Netherlands*

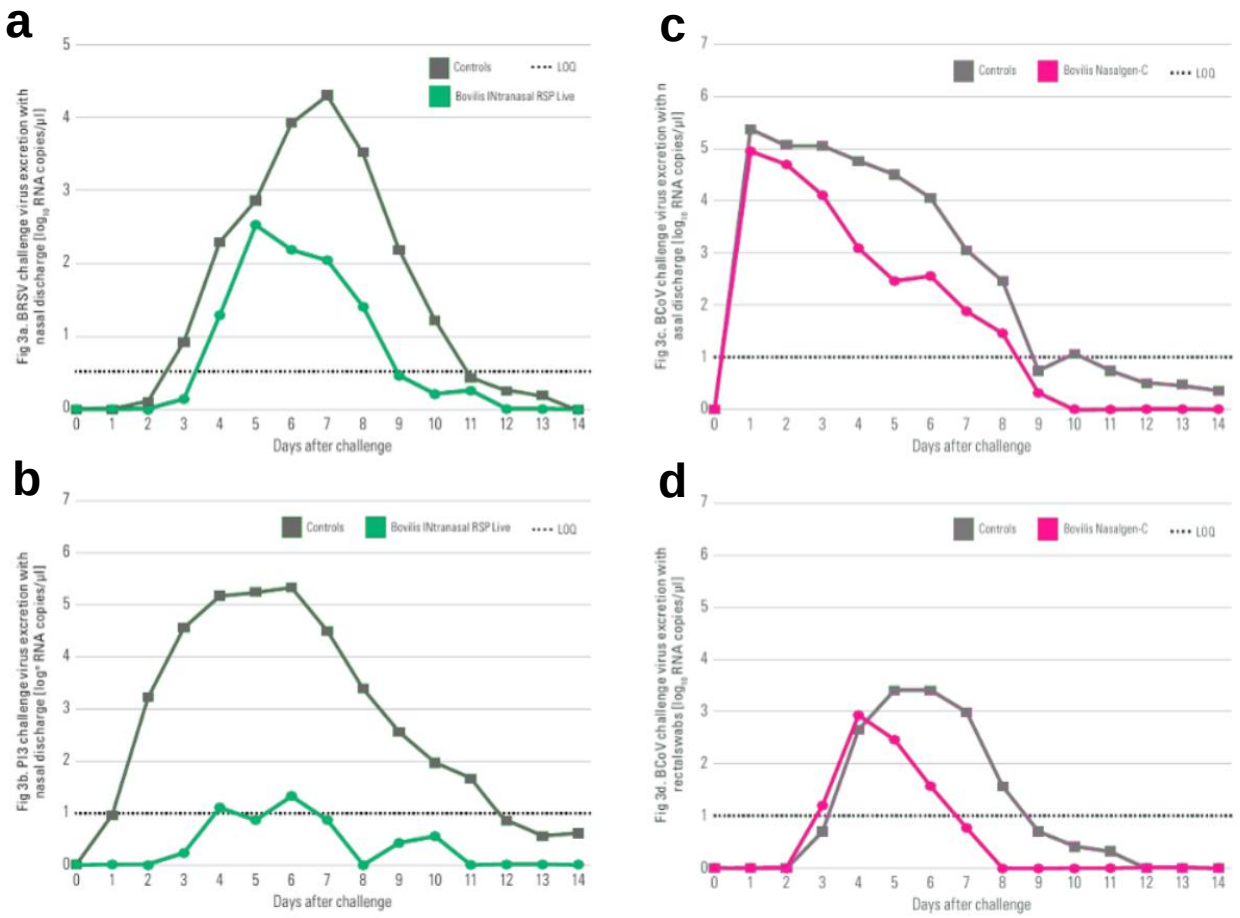
MSD Animal Health

| Study / Group | Number of animals | Vaccination (D0/D1) | | Challenge | |
|---|---|---|---|---|---|
| | | Vaccine | Route | Study day | Virus |
| BRSV control | 6 | Not vaccinated | | D 6 | BRSV |
| BRSV IN | 6 | BRSV/PI3 | IN | | |
| PI3 control | 5 | Not vaccinated | | D 7 | PI3 |
| PI3 IN | 5 | BRSV/PI3 | IN | | |
| BCoV control | 5 | Not vaccinated | | D 5 | BCoV |
| BCoV IN | 5 | BCoV | IN | | |





# Administratie van Bovilis Nasalgen-C en Bovilis Intranasal Live RSP vanaf de geboorte




Virus hoeveelheid in nasale swabs significant lager bij de gevaccineerde dieren (Fig a-c)

BCV virus hoeveelheid in rectale swabs significant lager bij de gevaccineerde dieren (Fig d)

MSD Animal Health

# Eigenschappen van het vaccin: Overzicht

- Eerste respiratoir corona virus vaccin voor runderen
- Levend verzwakte BCoV stam CA25
- 2 ml per dosis in één neusgat
- Toediening met of zonder nozzle
- Vanaf de dag van de geboorte
- Snelle aanvang van de immuniteit (5 days)
- Lange duur van de immuniteit (12 weeks)
- Stimulatie van de aspecifieke aangeboren immuniteit
- Werkzaam in aanwezigheid van maternale antistoffen
- Na reconstitutie 24 uur houdbaar
- Gelijktijdig toe te dienen met Bovilis INtranasal RSP live

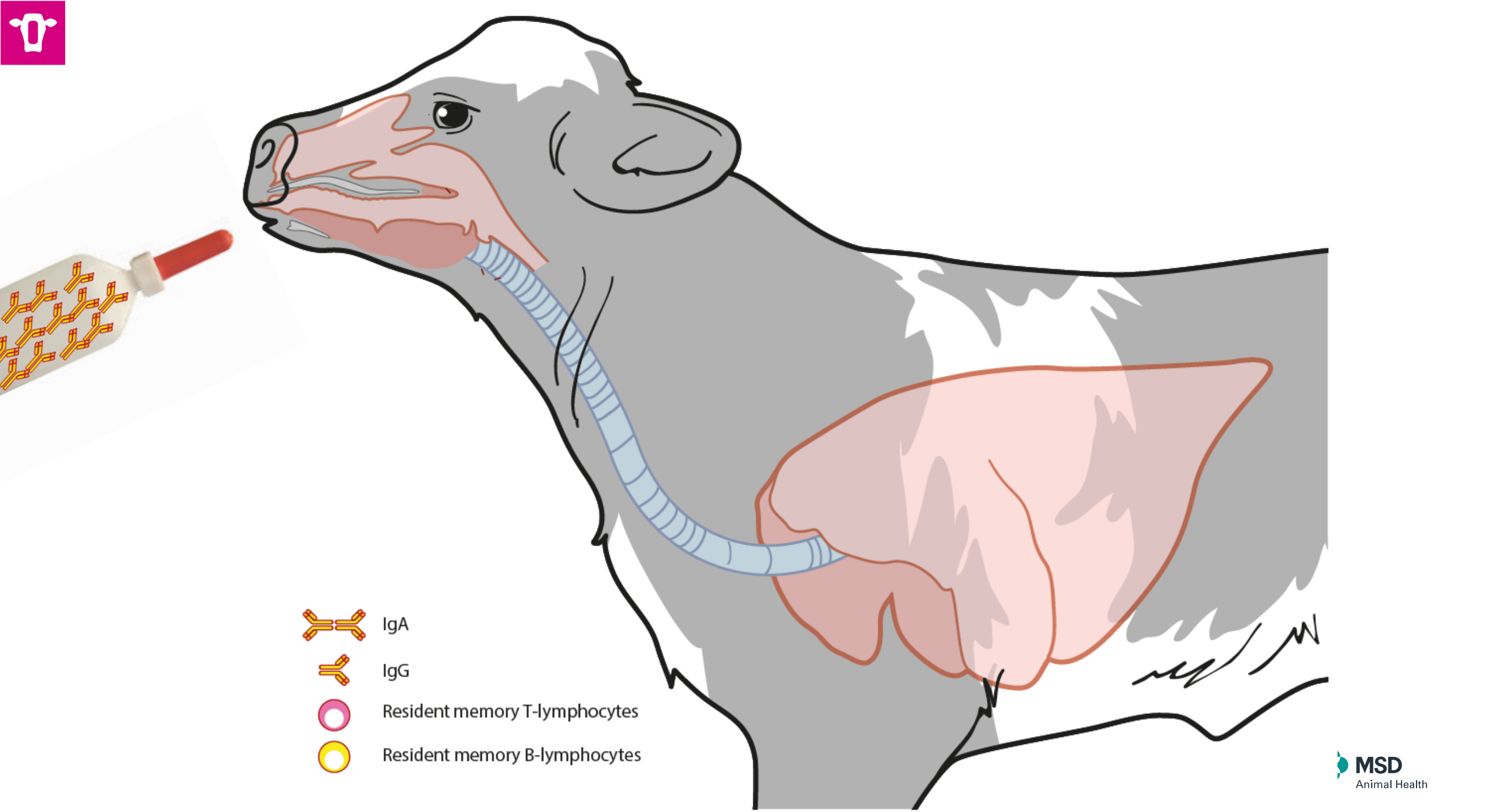

MSD Animal Health

# Eigenschappen van het vaccin: Overzicht

- Eerste respiratoir corona virus vaccin voor runderen
- Levend verzwakte BCoV stam CA25
- 2 ml per
- Toedien
- Vanaf de
- Snelle a
- Lange d
- Stimulat
- Werkza
- Na recon
- Gelijktijdig toe te dienen met Bovilis INtranasal RSP live

**Werkzaam in aanwezigheid van maternale antistoffen**

MSD Animal Health




MSD Animal Health

Available online at www.sciencedirect.com
SCIENCE DIRECT®
Veterinary Immunology and Immunopathology 98 (2004) 85–89
Veterinary immunology and immunopathology
www.elsevier.com/locate/vetimm

# The neonatal Fc receptor (FcRn) is expressed in the bovine lung

Balázs Mayer[a], Zsuzsanna Kis[a], Győző Kaján[a], László V. Frenyó[a], Lennart Hammarström[b], Imre Kacskovics[a,*]

[a]*Department of Physiology and Biochemistry, Faculty of Veterinary Science, Szent István University, István u. 2, H 1078 Budapest, Hungary*
[b]*Center for Biotechnology, Karolinska Institute, Novum, SE 141 57 Huddinge, Sweden*

Received 10 July 2003; accepted 22 October 2003

Available online at www.sciencedirect.com
SCIENCE DIRECT®
Veterinary Immunology and Immunopathology 98 (2004) 85–89
Veterinary immunology and immunopathology
www.elsevier.com/locate/vetimm

# The neonatal Fc receptor (FcRn) is expressed in the bovine lung

Balázs Mayer[a], Zsuzsanna Kis[a], Győző Kaján[a], László V. Frenyó[a], Lennart Hammarström[b], Imre Kacskovics[a,*]

[a]*Department of Physiology and Biochemistry, Faculty of Veterinary Science, Szent István University, István u. 2, H 1078 Budapest, Hungary*
[b]*Center for Biotechnology, Karolinska Institute, Novum, SE 141 57 Huddinge, Sweden*

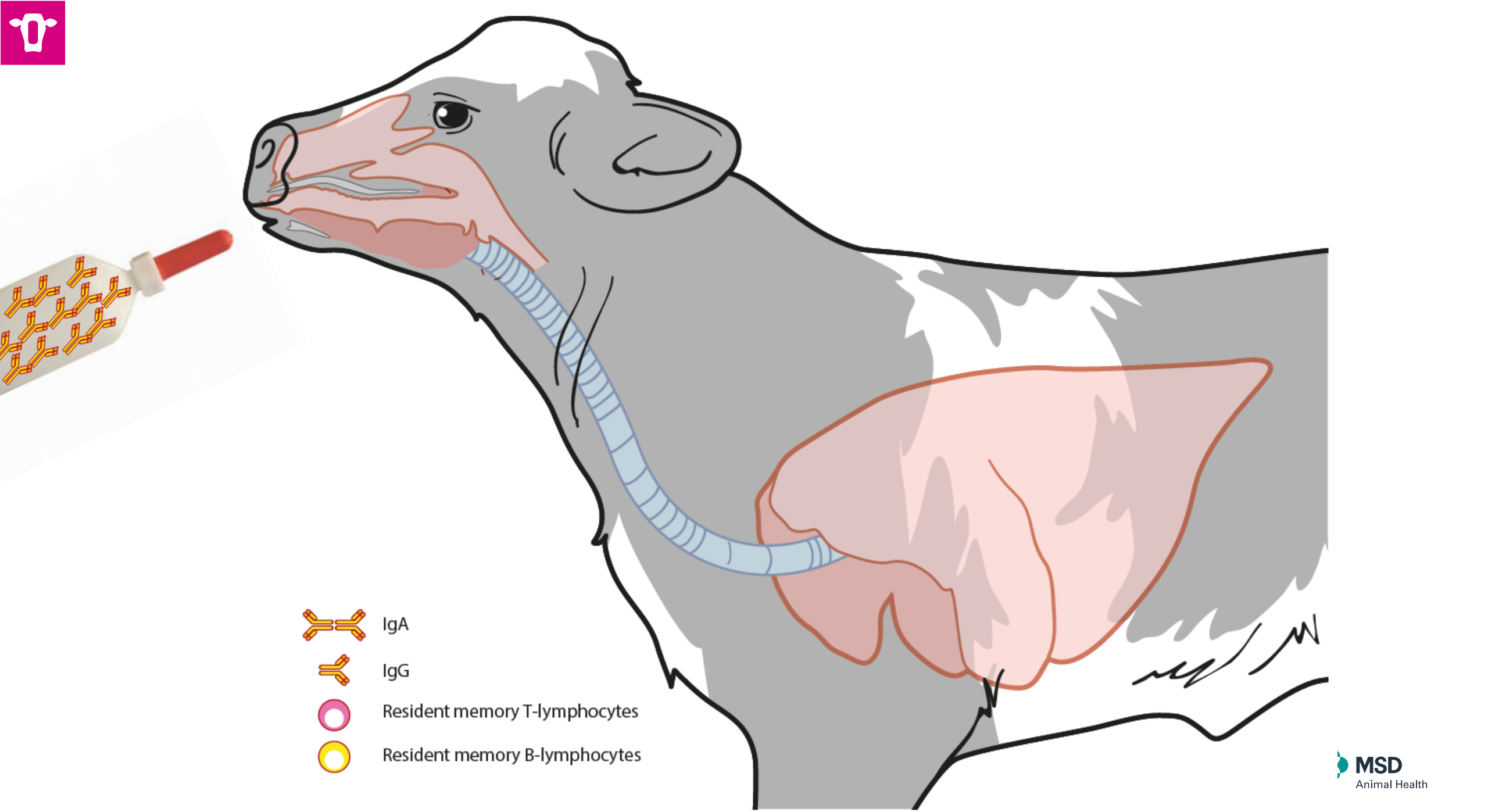
Received 10 July 2003; accepted 22 October 2003

## Abstract

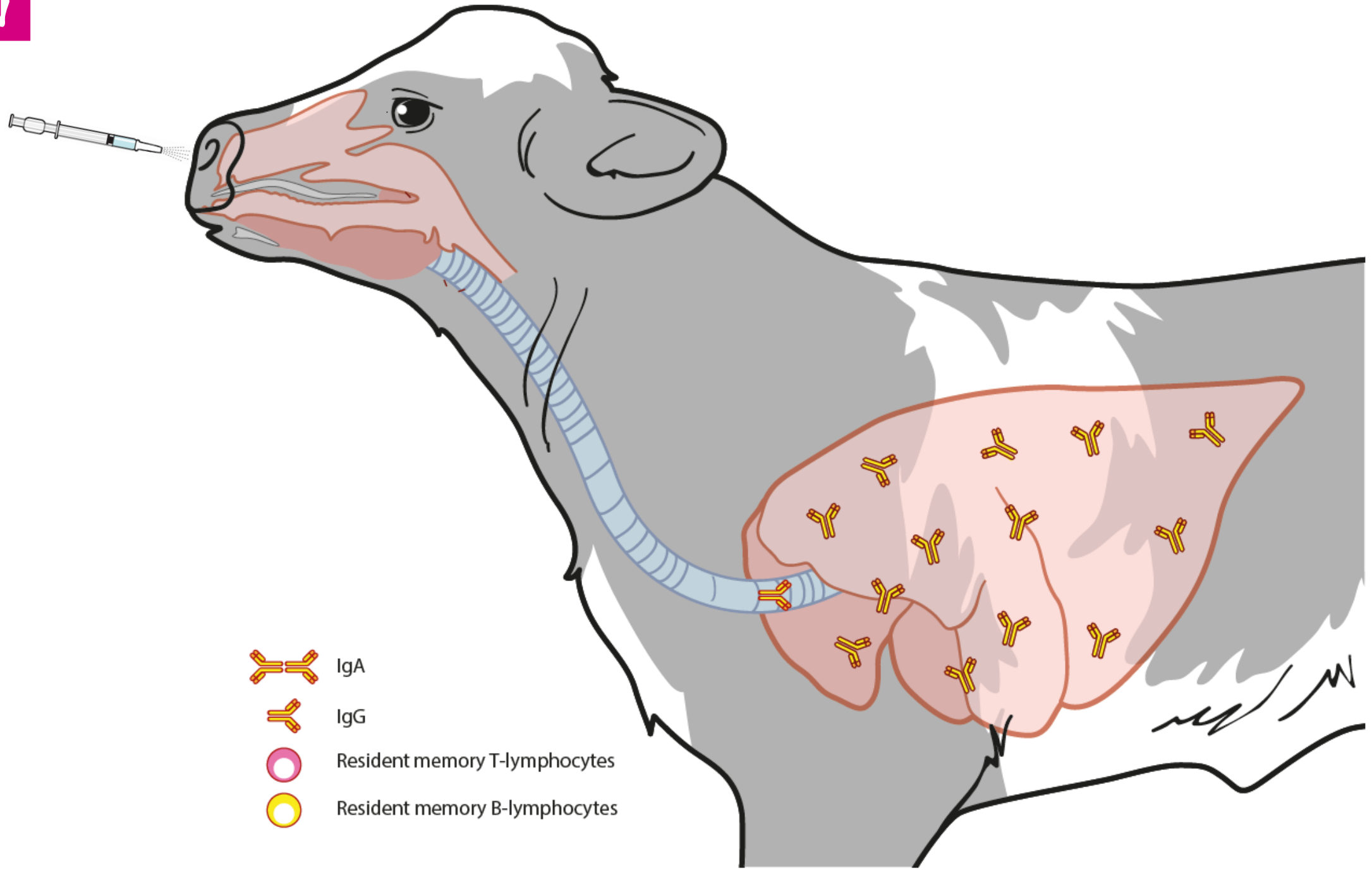
In neonatal calves, maternal immunoglobulin (Ig) is transferred into respiratory secretion which contributes to protection against pathogens. The early predominance of IgG1 in respiratory tract secretions is progressively reduced in favor of IgA by age but in the lower, bronchoalveolar system secreted IgG remains the dominant secreted Ig even in adulthood. The trans-epithelial transport of secretory IgA into mucosal secretions is carried out by the polymeric Ig receptor. However, the mechanism by which IgG crosses epithelial cells to provide defense on mucosal surfaces is still unknown. In order to investigate the possibility that the neonatal Fc receptor, FcRn is involved in this transport we have first analyzed the localization of this receptor in the upper and lower respiratory tracts.

Consistent with the in situ hybridization data, immunohistochemistry showed undetectable expression in the tracheal epithelial cells, relatively weak expression in epithelial cells of the bronchi, apparent staining those lining the bronchioli and randomly scattered signal over the alveolar tissue. The bovine FcRn may thus play a role in IgG transport across mucosal epithelial barriers as a trafficking receptor and ensure IgG predominance in the lower respiratory tract.

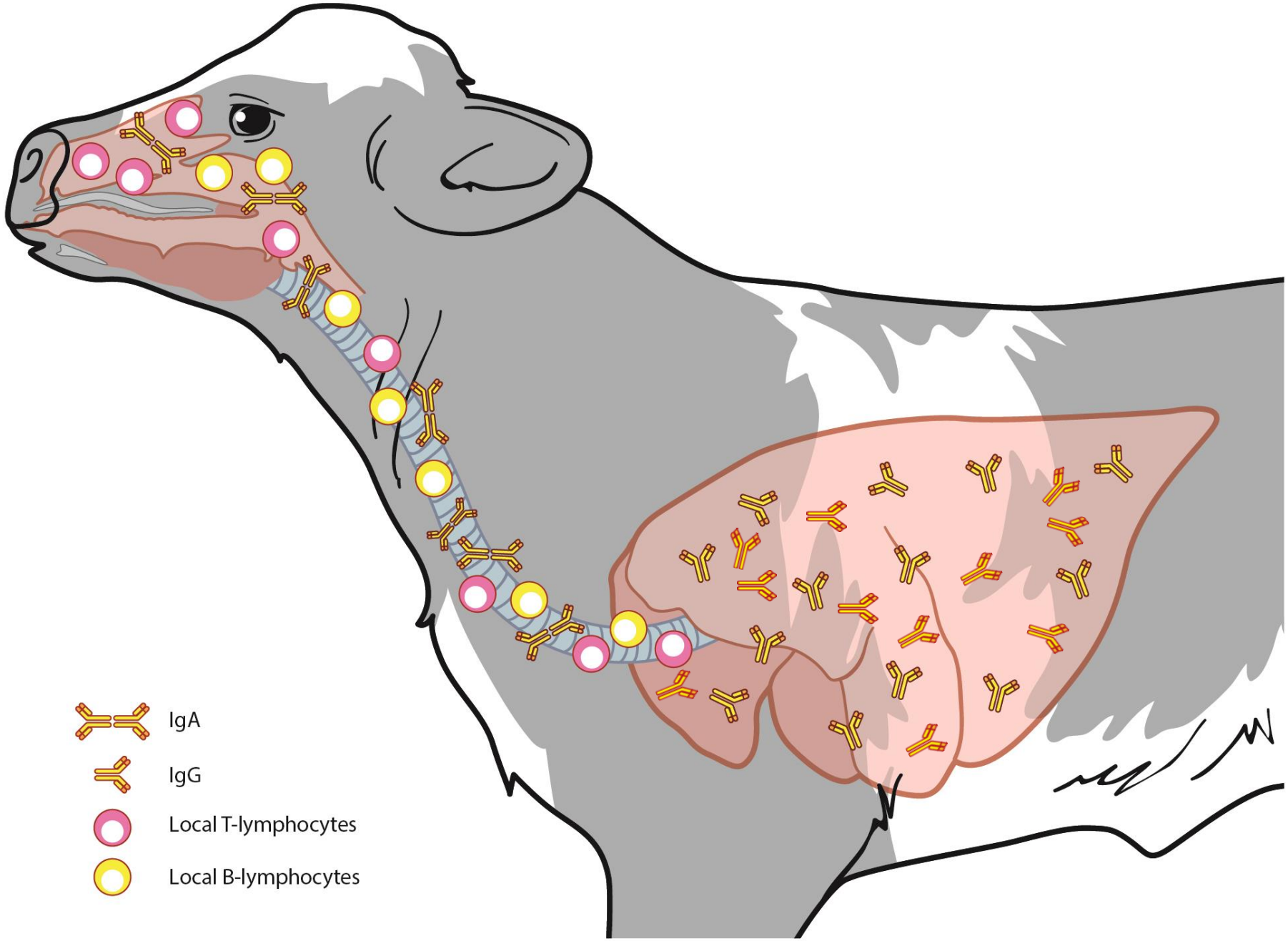

*Keywords:* Neonatal Fc receptor; Lung; Respiratory tract; IgG transport; Cow




MSD Animal Health




MSD
Animal Health




MSD Animal Health

# Bovilis Nasalgen-C en invloed van maternale antistoffen

- Twaalf conventionele kalveren (tussen 5 en 8 dagen oud bij vaccinatie)
  - Groep A: niet gevaccineerd
  - Groep B: Bovilis Nasalgen-C intranasaal

- Aerosol challenge met BCV veld virus 3 weken na vaccinatie

- Dagelijkse opvolging van algemene, respiratoire, and enterische klinische symptomen

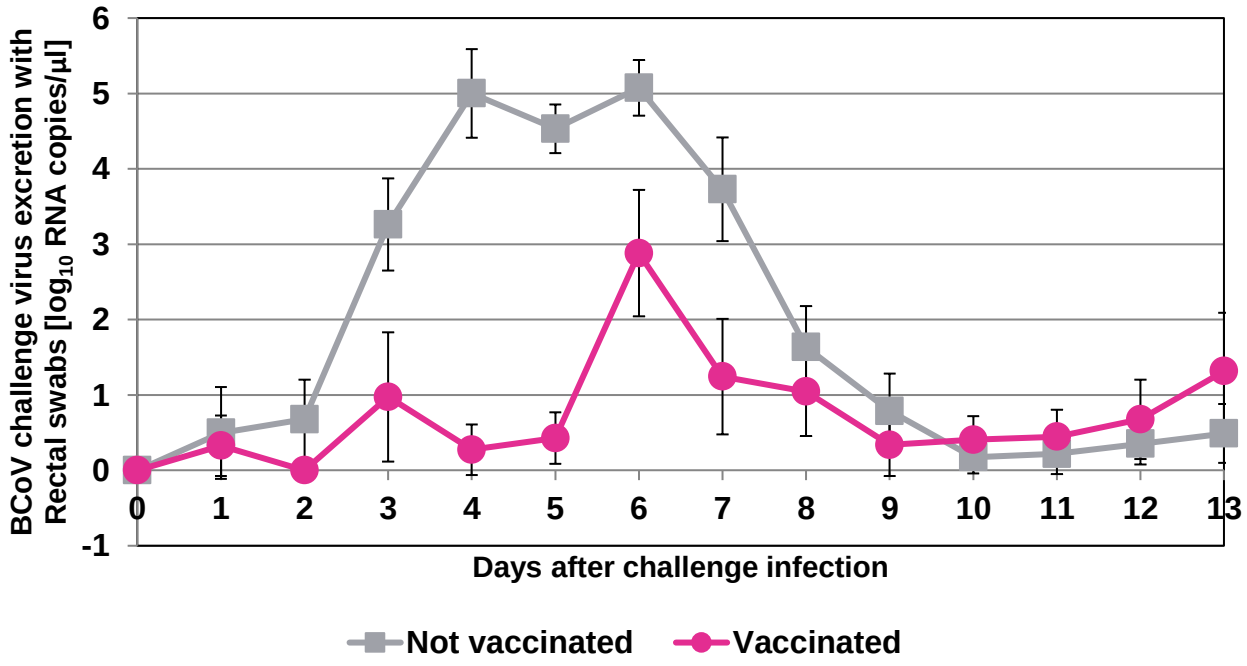
- Staalnames voor BCV :
  - Dagelijks nasale swabs
  - Dagelijks rectale swabs
  - Broncho-alveolaire lavage 3 dagen na challenge

MSD Animal Health

# Bovilis Nasalgen-C en invloed van maternale antistoffen

- Significante reductie van de hoeveelheid BCV in
  - Nasale swabs ($p<0.02$)
  - BALs ($p<0.04$)
  - Rectale swabs ($p<0.04$)

*Gemiddeld aantal BCV RNA copies in rectale swabs*




MSD Animal Health

# Eigenschappen van het vaccin: Overzicht

- Eerste respiratoir corona virus vaccin voor runderen
- Levend verzwakte BCoV stam CA25
- 2 ml per dosis in één neusgat
- Toediening met of zonder nozzle
- Vanaf de dag van de geboorte
- Snelle aanvang van de immuniteit (5 days)
- Lange duur van de immuniteit (12 weeks)
- Stimulatie van de aspecifieke aangeboren immuniteit
- Werkzaam in aanwezigheid van maternale antistoffen
- Na reconstitutie 24 uur houdbaar
- Gelijktijdig toe te dienen met Bovilis INtranasal RSP live

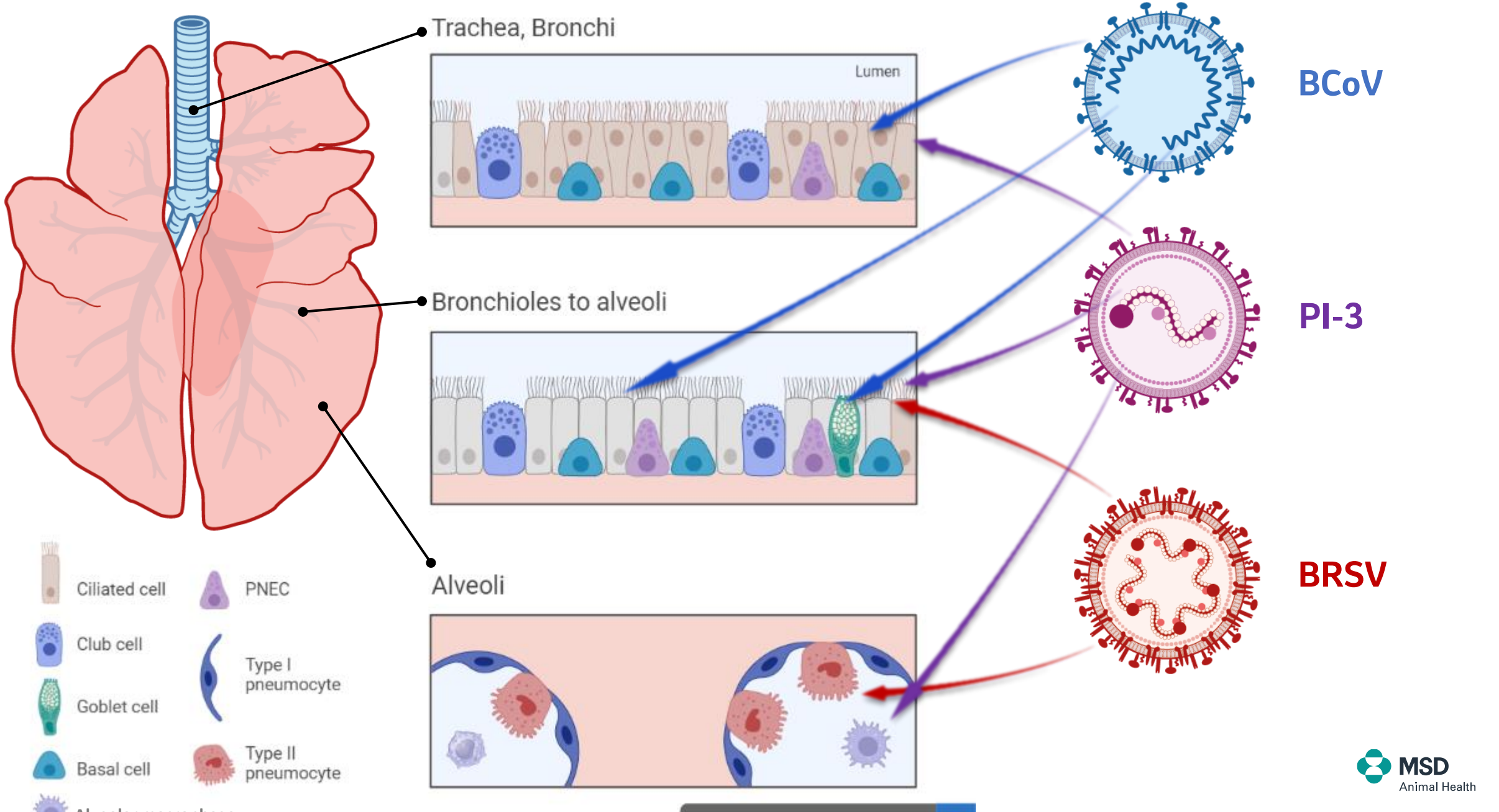

MSD Animal Health

# Eigenschappen van het vaccin: Overzicht

- Eerste respiratoir corona virus vaccin voor runderen
- Levend verzwakte BCoV stam CA25
- 2 ml per
- Toedien
- Vanaf d
- Snelle a
- Lange d
- Stimulat
- Werkza
- Na recon
- Gelijktijdig toe te dienen met Bovilis INtranasal RSP live

**Gelijktijdig toe te dienen met Bovilis INtranasal RSP live**

MSD Animal Health




MSD Animal Health

# Gelijktijdige toediening van Bovilis Nasalgen-C en Bovilis INtranasal RSP Live

- Twee studies bij colostrum vrije kalveren (6 dieren per groep, leeftijd 4 – 9 dagen bij vaccinatie):
  - Groep A: niet gevaccineerd.
  - Group B: IN vaccinatie met Bovilis Nasalgen-C (studie 1) of Bovilis® INtranasal RSP® Live (studie 2).
  - Group C: IN vaccinatie gelijktijdig met Bovilis Nasalgen-C en Bovilis® INtranasal RSP® Live
- Studie 1: BCV challenge 3 weken na vaccinatie.
- Studie 2: opeenvolgende challenge met PI3 (1 week na vaccinatie) en  BRSV (3 weken na vaccinatie).

| Observations | Study 1 | Study 2 |
|---|---|---|
| Daily observation for general, respiratory and enteric clinical signs | yes | yes |
| Lung lesions | no | yes |

| Sampling and testing for viral load after challenge | Study 1 | Study 2 |
|---|---|---|
| Daily nasal swabs | yes | yes |
| Daily rectal swabs | yes | no |
| Broncho-alveolar lavage | 4 days post challenge | 5 days post challenge (only BRSV) |

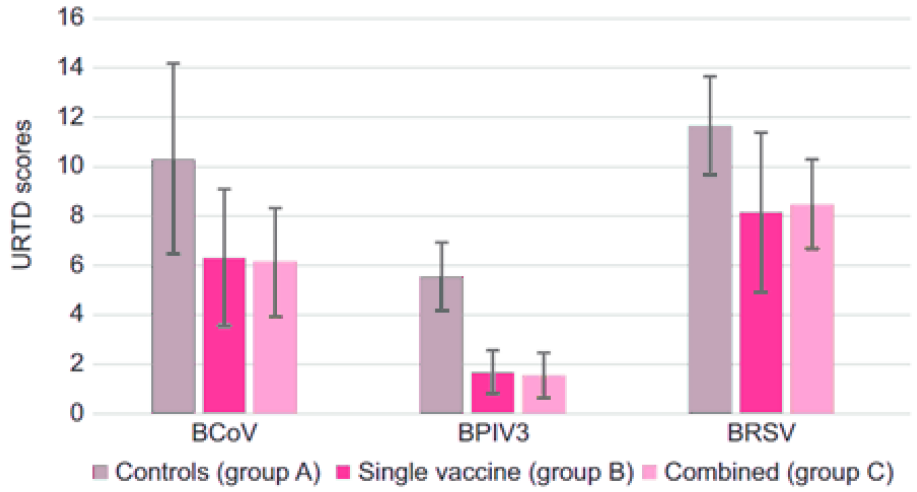
Van Rooij et al. 2022 Intranasal vaccination of calves with a live vaccine against respiratory coronavirus combined with a bivalent vaccine against respiratory syncytial virus and parainfluenza type 3 virus. WBC Madrid 2022.

MSD Animal Health

# Gelijktijdige toediening van Bovilis Nasalgen-C en Bovilis INtranasal RSP Live

## Bovenste luchtweg score (URTD) lager bij gevaccineerde dieren

**FIGURE 1.** Scores of upper respiratory tract disease (URTD) after challenge infection three (BCoV, study 1), one (BPIV3, study 2) and three (BRSV, study 2) weeks post vaccination.

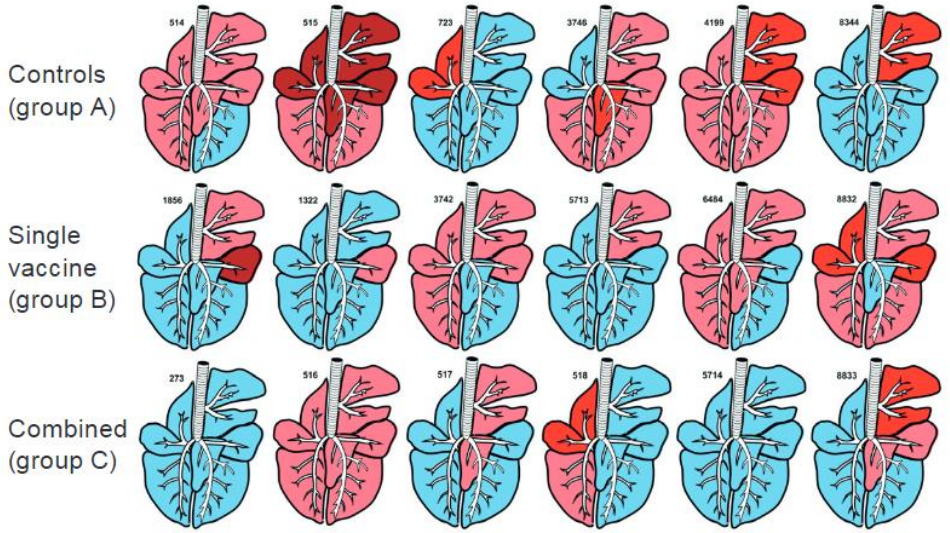



The columns represent the average value per group and the bars mark the standard error of the mean.

## Long consolidatie na BRSV challenge aanzienlijk lager in de gevaccineerde groepen

**FIGURE 2.** Extent of gross pneumonic consolidation 14 days post BRSV challenge expressed as percentage affected area per lung lobe.

| | |
|---|---|
| - | 0 |
| + | <5 |
| ++ | >5 <10 |
| +++ | >10 |




MSD Animal Health

# Eigenschappen van het vaccin: Overzicht

- Eerste respiratoir corona virus vaccin voor runderen
- Levend verzwakte BCoV stam CA25
- 2 ml per dosis in één neusgat
- Toediening met of zonder nozzle
- Vanaf de dag van de geboorte
- Snelle aanvang van de immuniteit (5 days)
- Lange duur van de immuniteit (12 weeks)
- Stimulatie van de aspecifieke aangeboren immuniteit
- Werkzaam in aanwezigheid van maternale antistoffen
- Na reconstitutie 24 uur houdbaar
- Gelijktijdig toe te dienen met Bovilis INtranasal RSP live


MSD Animal Health

# Eigenschappen van het vaccin: Overzicht

- Eerste respiratoir corona virus vaccin voor runderen
- Levend v
- 2 ml per
- Toedien
- Vanaf de
- Snelle aa
- Lange du
- Stimulat
- Werkzaa
- Na recon
- Gelijktijd

**2ml één neusgat**

**Met of zonder nozzle**

**24 uur houdbaar na oplossen**

**Bescherming na 5 dagen gedurende 12 weken**

MSD Animal Health


- ✓ **EERSTE RESPIRATOIR CORONAVIRUS VACCIN**
- ✓ **ÉÉN NEUSGAT 2ml**
- ✓ **MET OF ZONDER NOZZLE**
- ✓ **VANAF DE GEBOORTE**
- ✓ **GELIJKTIJDIG MET BOVILIS INTRANASAL RSP LIVE**
- ✓ **24 UUR HOUDBAAR NA OPLOSSEN**

MSD Animal Health