



# Bovine Neonatal Pancytopenia is a heritable trait for dams

L. Benedictus<sup>1</sup>, V.P.M.G. Rutten<sup>1,2</sup>, M. Nielen<sup>3</sup>, G van Schaik<sup>3,4</sup>, H.C.M. Heuven<sup>3,5</sup>, A.P. Koets<sup>1,3</sup>

## Introduction

- Bovine Neonatal Pancytopenia (BNP) is characterized by pancytopenia and bleeding of the newborn calf.
- It is widely suggested that bovine alloantigens present in a commercial BVD vaccine induce alloantibodies in the dam, that are transferred to the calf via the colostrum and cause BNP
- Alloantigens are genetically determined antigens that are present in some but not all individuals of a species and are capable of inducing alloantibodies in individuals lacking the antigen

### Hypothesis:

Production of maternal alloantibodies and susceptibility of the calf to these antibodies depends on the combination of the alloantigen repertoires of the dam, the calf and the bovine proteins present in the vaccine

## Objective

- Estimate the heritability of BNP as a Dam- and as a Calf-trait
- Estimate the effects of the number of Pregsure© BVD vaccinations and Lactation Number on the incidence of BNP

## Materials and methods

- 411 Dam-Calf combinations from a Dutch epidemiological study
- Diagnosis of BNP based on pathology and/or blood analysis
- All Dams were Pregsure© BVD vaccinated
- Calves received colostrum only from their own dam
- Pedigree traced back up to 22 generations
- Heritability of BNP as a calf trait modeled as sire effect
- Variance components estimated using a sire - dam model

## Results

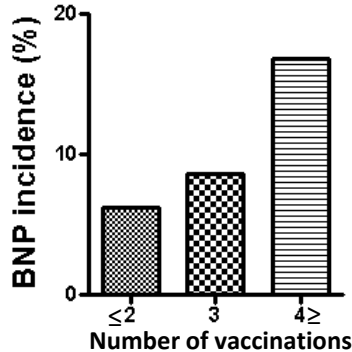


Figure 1. The estimated incidence of BNP for the number of vaccinations with Pregsure© BVD (p = 0,023)

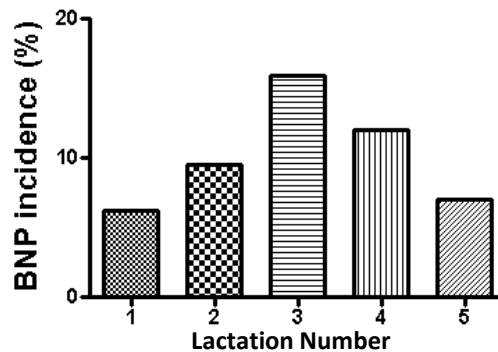


Figure 2. The estimated incidence of BNP for different lactation numbers (p = 0,033)

Table 1. Heritability (h<sup>2</sup>) of BNP as a dam- or sire-trait.

	h <sup>2</sup> (sd)
Dam	0,186 (0,077)
Sire	0,000 (0,000)

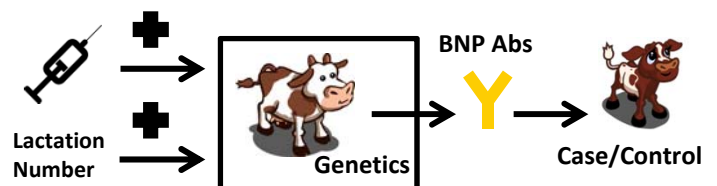
## Discussion

The immune response of the dam to the alloantigens present in the vaccine depends on the genetic background of the dam. There is no genetic difference between BNP case and control calves, suggesting that case and control calves are equally susceptible to BNP antibodies and indicating that the dams allo-immuneresponse is not stimulated by the alloantigen repertoire of the case calf.

The risk of alloantibody production by the dam increases with the number of Pregsure© BVD vaccinations and is higher for multiparous dams.

## Conclusion

- BNP is a heritable trait for Dams, with a high heritability estimate of 19%
- BNP is not a heritable trait for Calves
- The risk of BNP increases with the number of Pregsure© BVD vaccinations and is higher for multiparous dams



I.benedictus1@uu.nl  
<sup>1</sup>Division of Immunology,  
Faculty of Veterinary Medicine  
Utrecht, the Netherlands

<sup>2</sup> Dep. of Veterinary Tropical Diseases, Fac. of Veterinary Science, Pretoria, Republic of South Africa

<sup>3</sup> Dep. of Farm animal Health, Fac. of Veterinary Medicine, Utrecht, the Netherlands

<sup>4</sup> GD Animal Health Service Ltd, Deventer, the Netherlands

<sup>5</sup> ABGC, Wageningen-UR, Wageningen, the Netherlands