

➤ Investigating individual variations and genetic determinism of vaccine responses in laying hens

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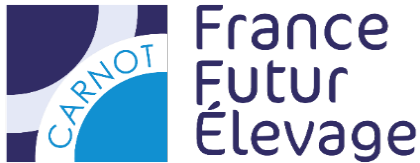
² INRAE, PEAT, Nouzilly

³ NOVOGEN, Plédran

➤ Project funders and consortium



(TRADE'OUT project)



(Vaccibiota project)



Investigating individual variations and genetic determinism of vaccine responses in laying hens

8-9/10/24 / Séminaire MP-SANBA / Fany Blanc & Alice Racanati

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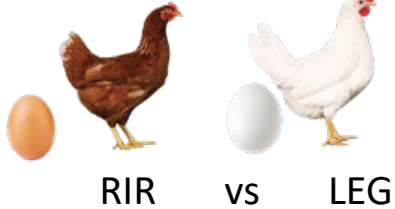
➤ In the previous episode: proof of concept of genetics, caecal microbiota, and rearing conditions effects on vaccination



vs

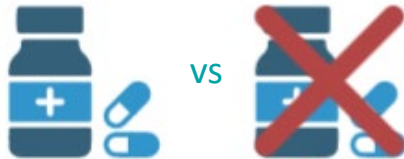


2 commercial lines



RIR vs LEG

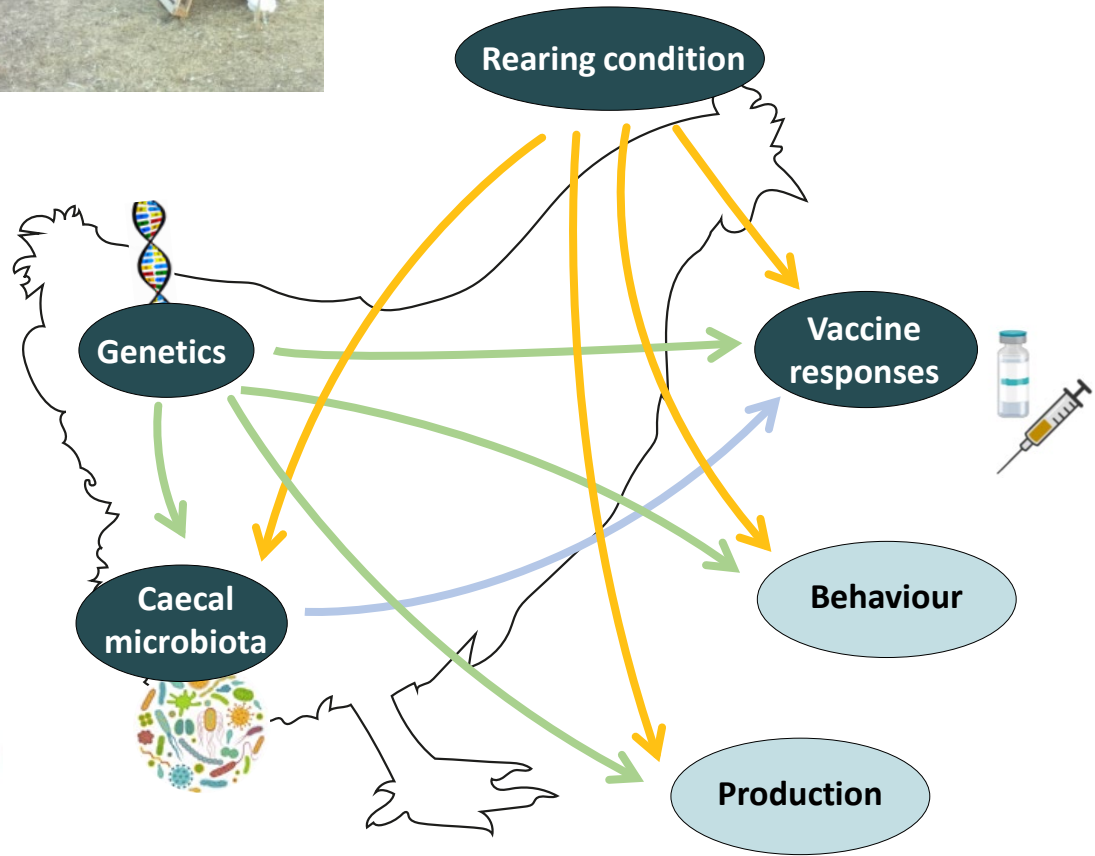
model of disruption by antibiotics treatment



INRAE

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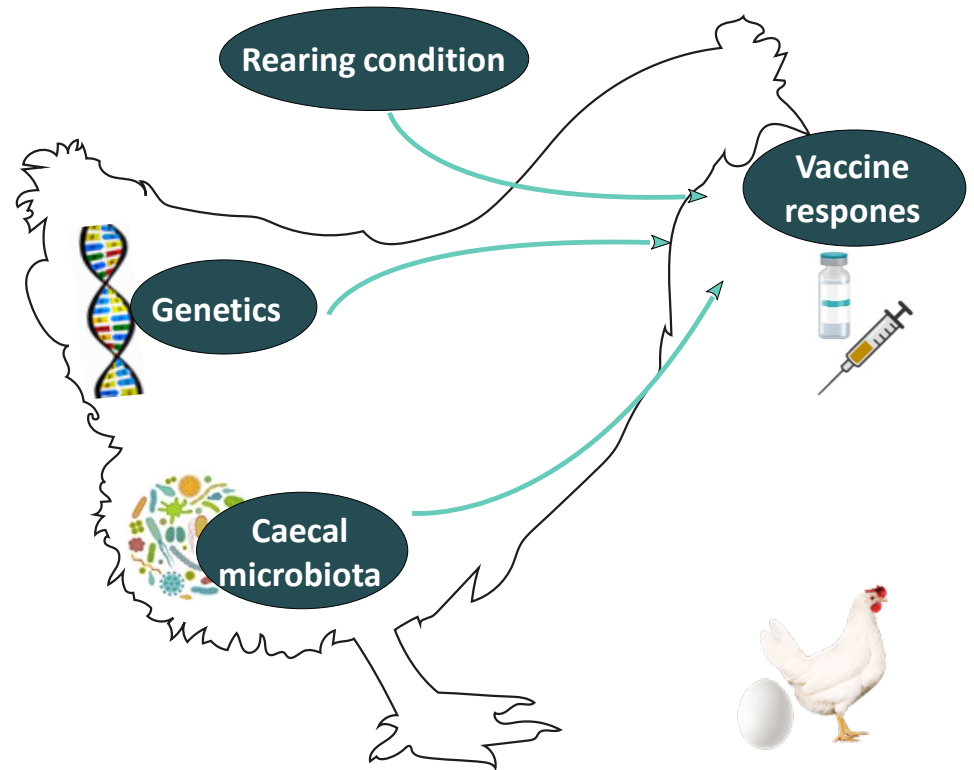
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Alexandre Lecoer's PhD

➤ Detailed understanding of the factors determining individual variability within a population

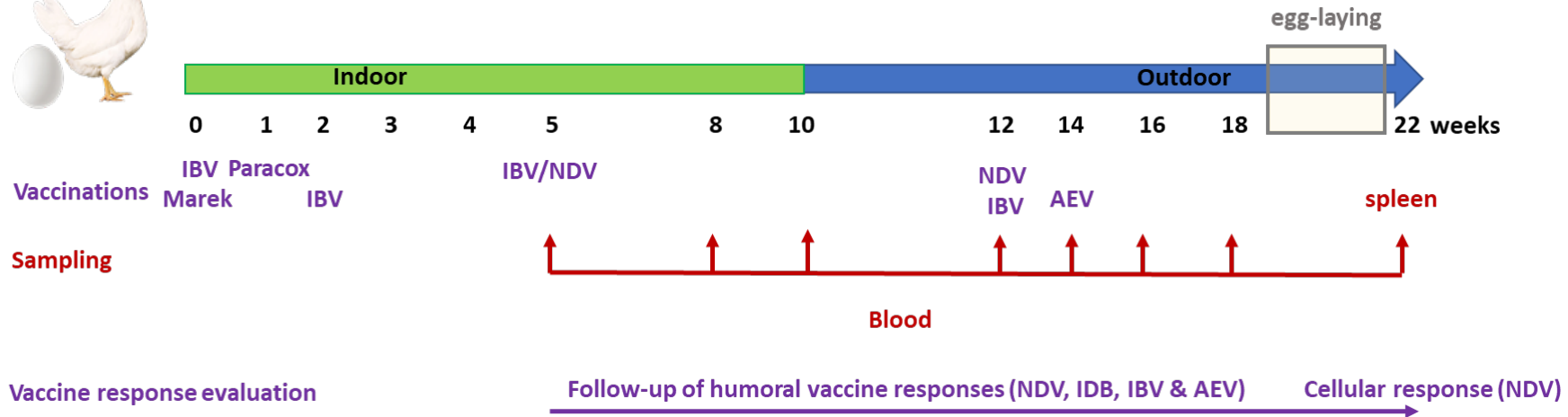
There is an individual variability of vaccine responses



➤ Experimental design



LEG
n=400



NDV: Newcastle Disease Virus
AEV: encephalomyelitis virus
IBV: infectious bronchitis virus

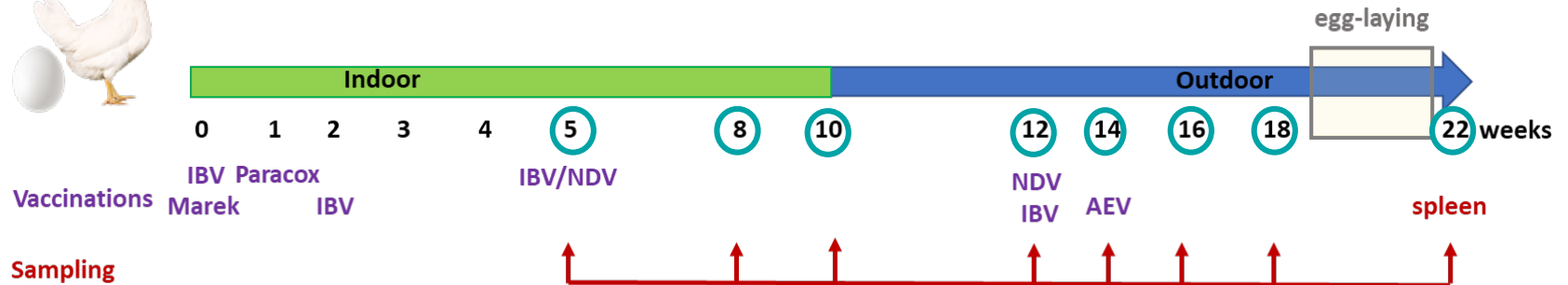


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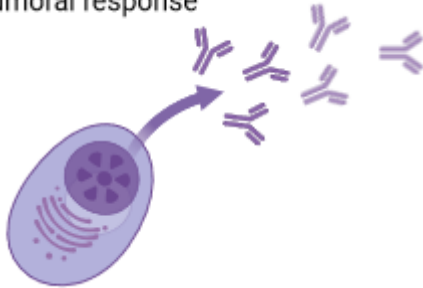
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➤ Experimental design

LEG
n=400



humoral response



Blood

Humoral response
-
vaccination

IBV: infectious bronchitis virus
IBD: infectious bursal disease

NDV: Newcastle Disease Virus
AEV: encephalomyelitis virus

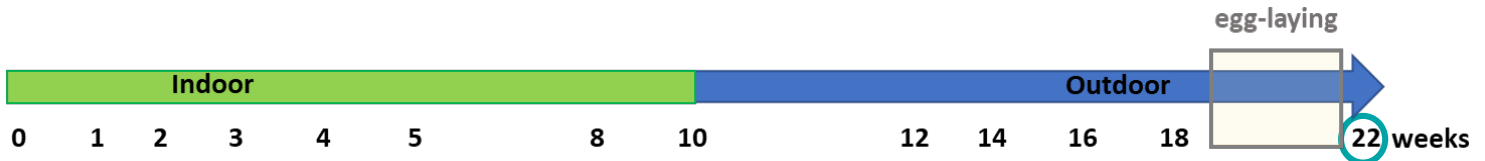
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Experimental design

LEG
n=400



Vaccinations
 0: IBV Paracox Marek
 2: IBV

5: IBV/NDV
 12: NDV, IBV
 14: AEV

Sampling



Blood

cellular response

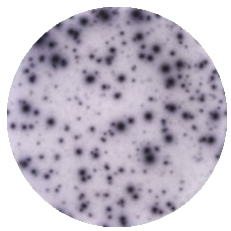
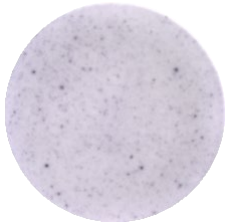


Spot Forming Unit (SFU) → number of cells secreting cytokines

Cellular Activity → cells responding + the intensity of the response

Cellular Response - vaccination

IFN γ secretion by ELISpot



NS

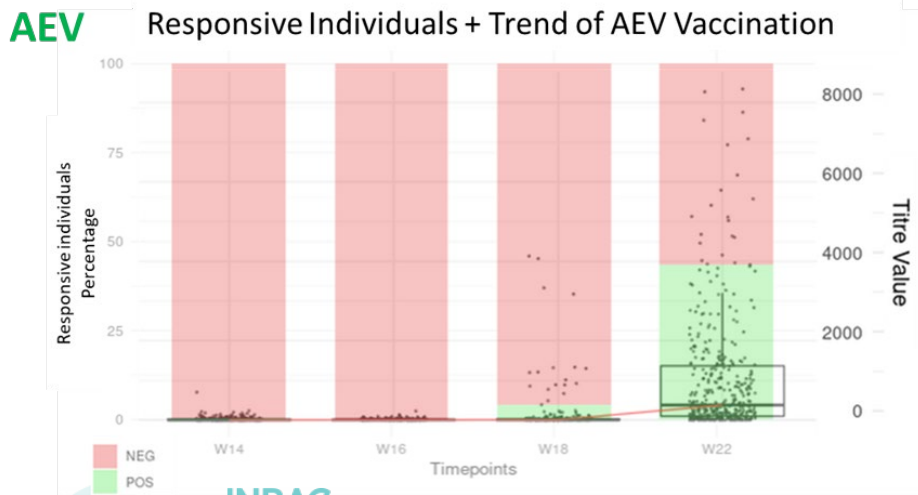
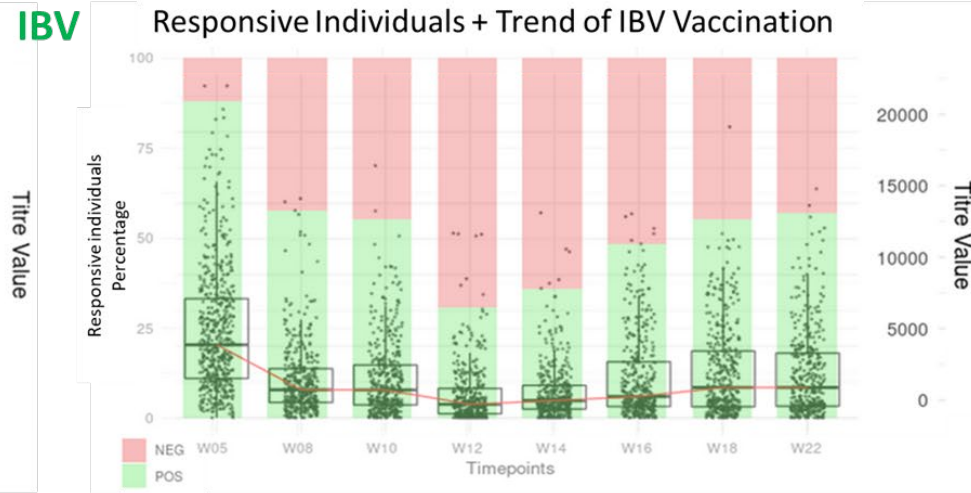
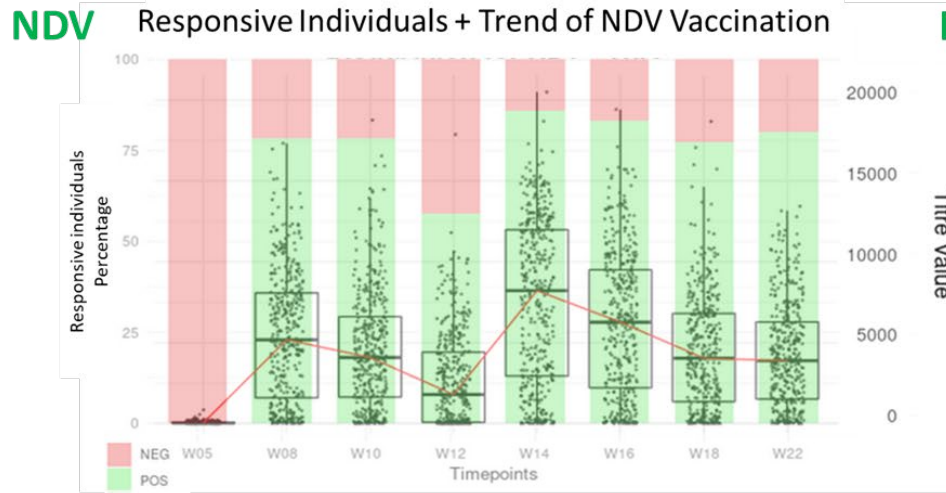
NDV antigen

IBV: infectious bronchitis virus
 IBD: infectious bursal disease

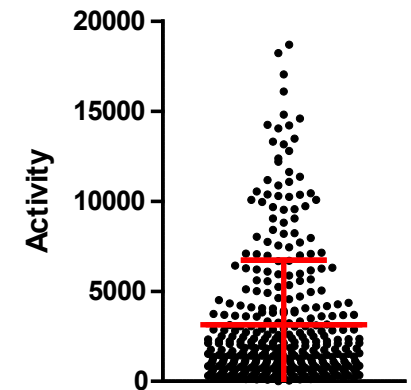
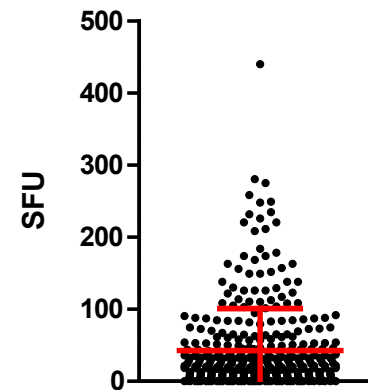
NDV: Newcastle Disease Virus
 AEV: encephalomyelitis virus



➤ Traits – trend of vaccinations

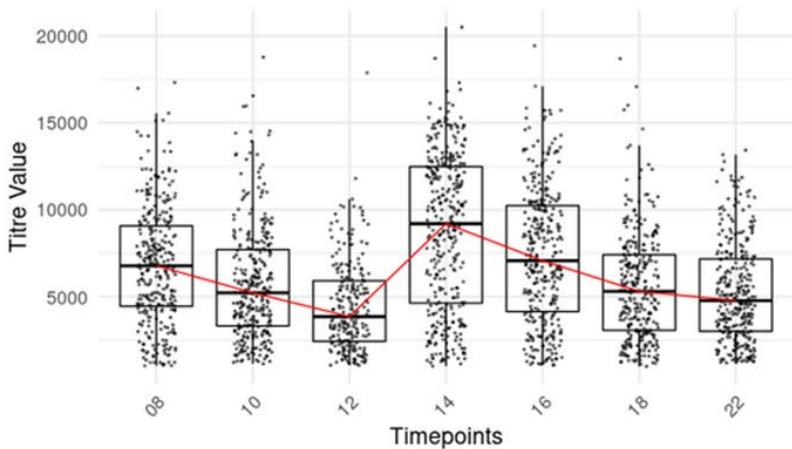


NDV cellular response

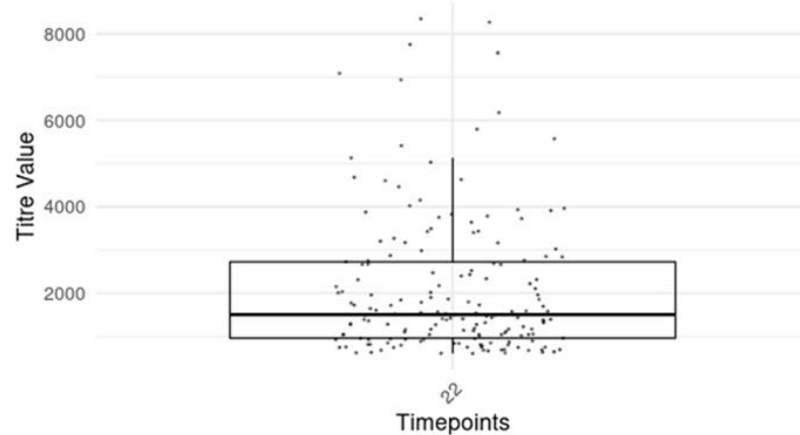


➤ Traits

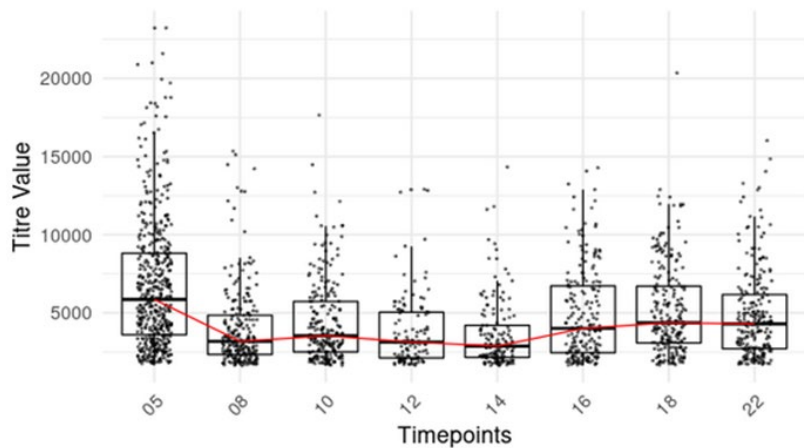
NDV Distribution for NDV - Titer



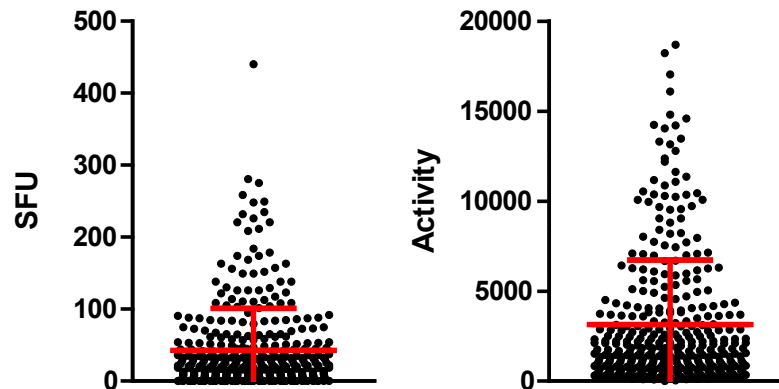
AEV Distribution for AEV - Titer



IBV Distribution for IBV - Titer

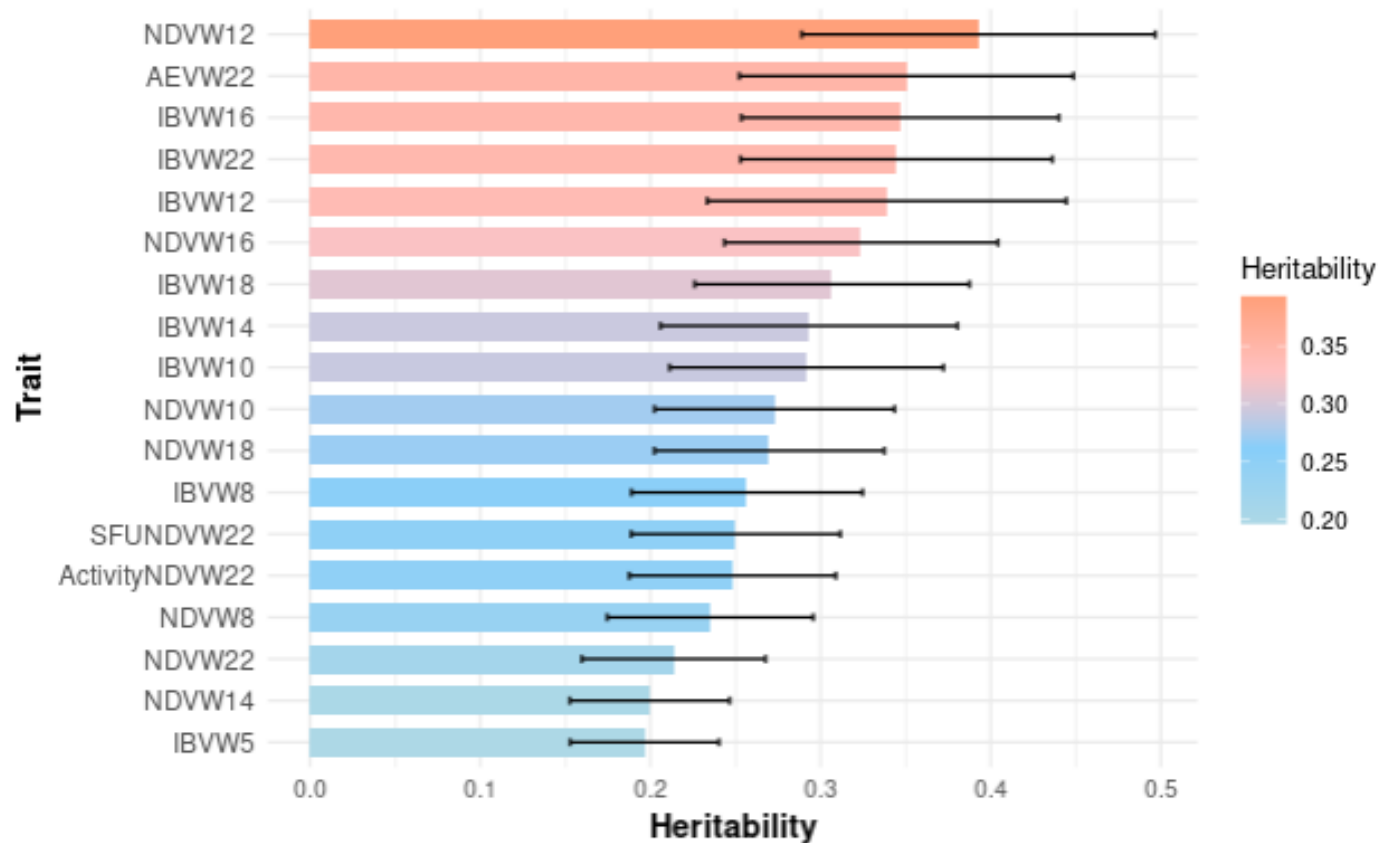


NDV cellular response



➤ Heritability

$$P = G + E$$



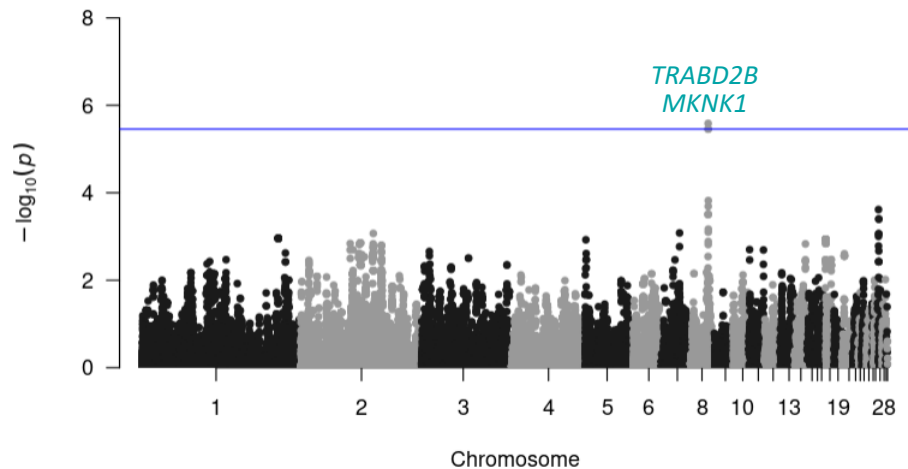
➔ Low-mild heritability



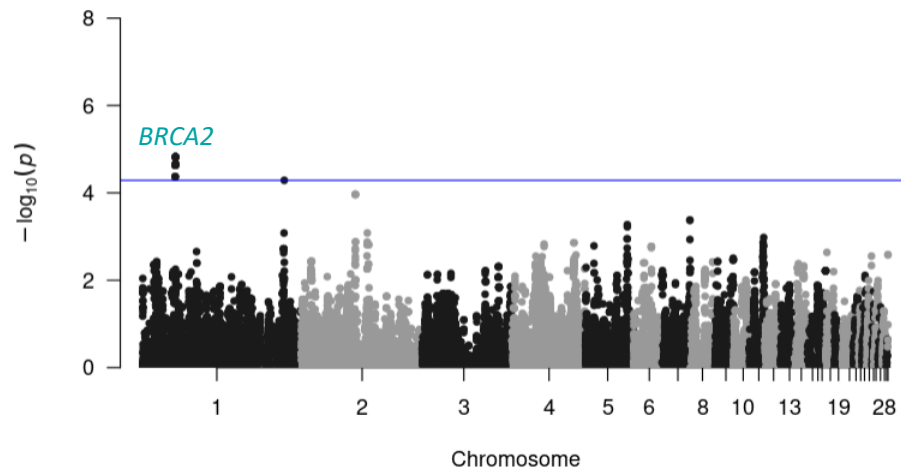
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GWAS

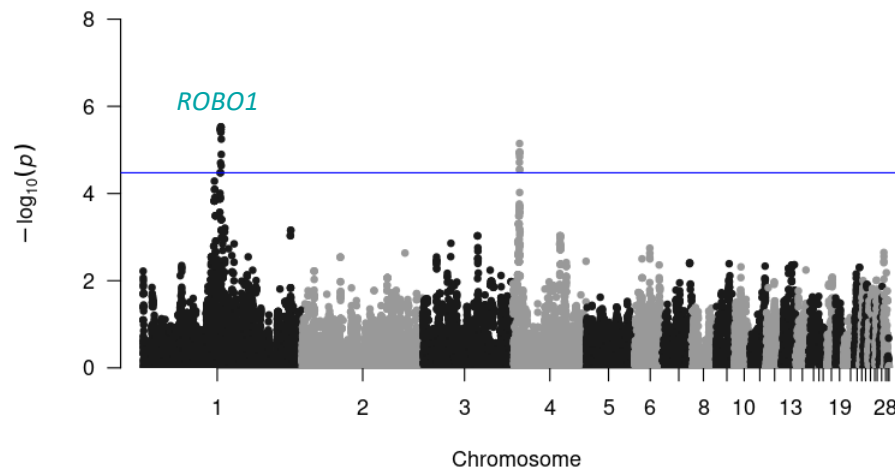
Manhattan plot IBVW18



Manhattan plot NDVW22



Manhattan plot Activity

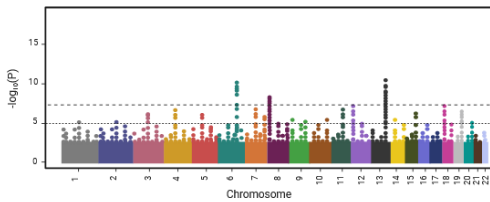


→ 4 QTLs highlighted

➤ Conclusions & perspectives

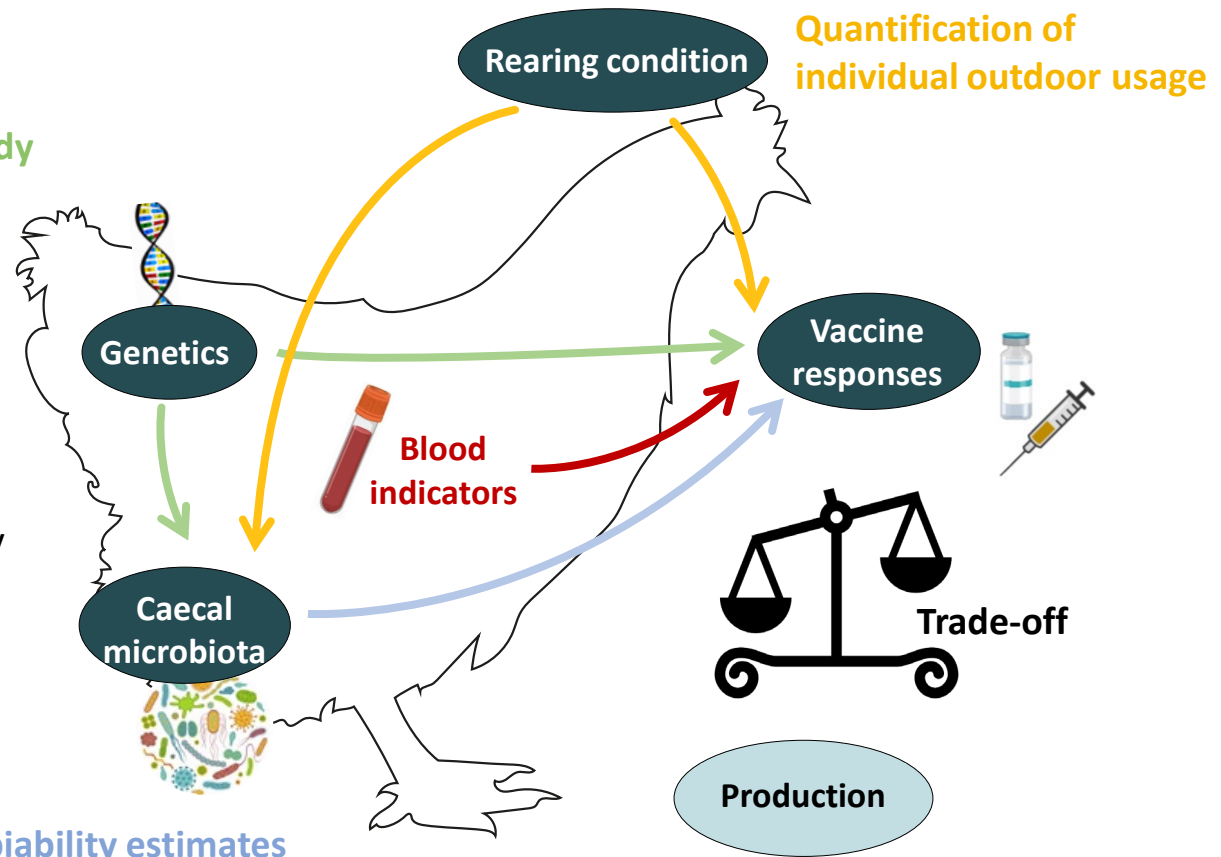
Heritability estimates

Genome-Wide Association Study



- Individual variability of the vaccine response
- Low- to intermediate heritability
- Polygenic determinism
- Post-GWAS analyses need to be performed

Microbiability estimates Association study



Thank you for your attention

Questions?



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