Vaccination of poultry (Layers) against HPAI H5

Results of Transmission study at 24-weeks of age

Kim Bouwman WBVR

31st annual meeting of the NRLs for AI/ND, Oct 16th

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Research consortium for vaccine study (2021-2022)

- The Dutch Ministry of Agriculture requested a vaccine study
- Research Consortium formed with three institutes in NL

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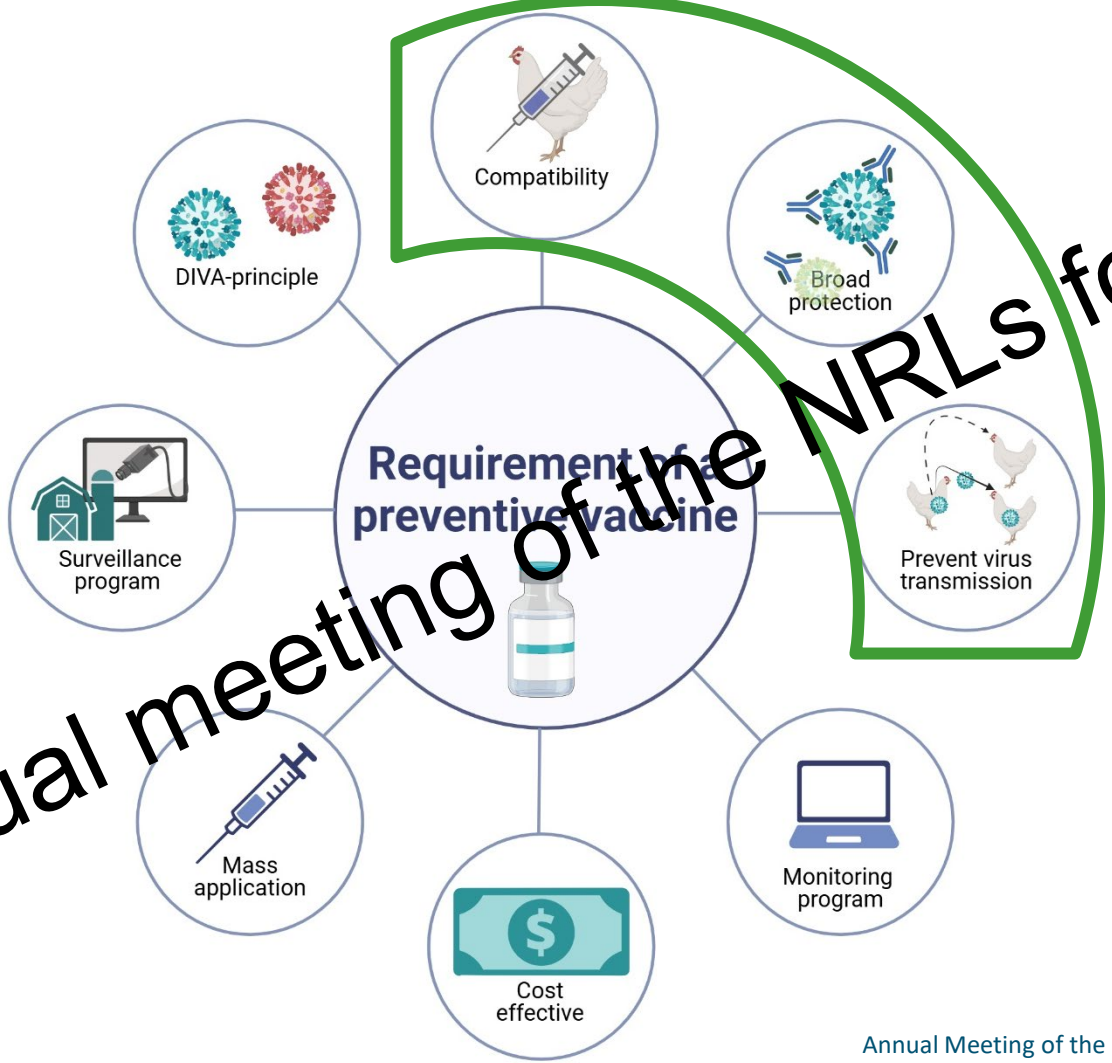
Universiteit Utrecht

GD

- Literature study – contact with pharmaceutical companies
- Search for vaccines against HPAI H5 clade 2.3.4.4b viruses
- Requirements and selection of vaccine candidates in the study



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Summary of Lab study 2022

- Determine the effectiveness of **four** different AIV vaccines
- Commercial laying hens: Lohman Classic.
  - Vaccinated → Housed in WBVR animal facilities
  - Challenge at 8 weeks of age

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Summary of Lab study 2022

- HVT vaccines: high efficacy against HPAI H5 infection
  - 100% reduction of clinical symptoms/mortality
  - Strong reduction of virus shedding
  - No virus transmission to the sentinel birds

→ **(R<1)**

Results of the 2022 study

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How do these vaccines perform under field conditions?
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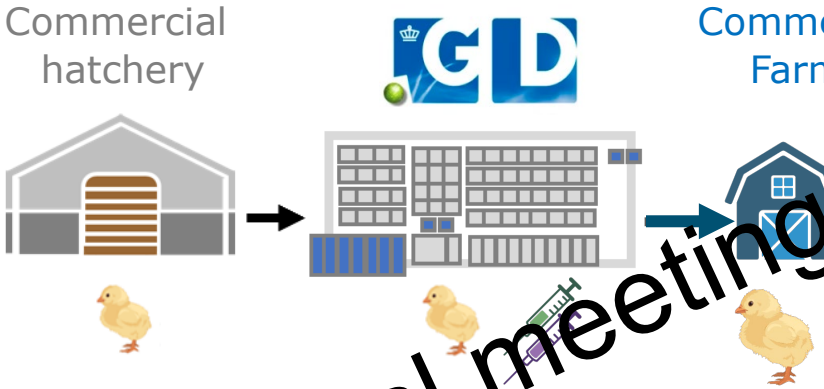
Follow-up: **Field study** (2023 onward)

- Vaccinations in the field
- Duration: Complete production period (wk ±80-90)
- Perform Transmission study at 4 timepoints during life
- Start in sept 2023
    - Evaluate health, production and immune parameters
    - Duration of protection in the field
    - Cellular immune response (additional immune parameters)
    - Study correlates of protection

Fieldstudy overview start 2023 until 2025



4 groups
of 600 chicks

Novogen Brown laying hens

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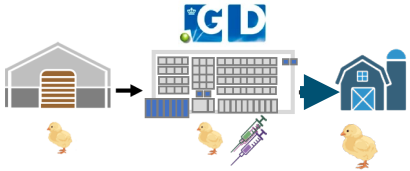
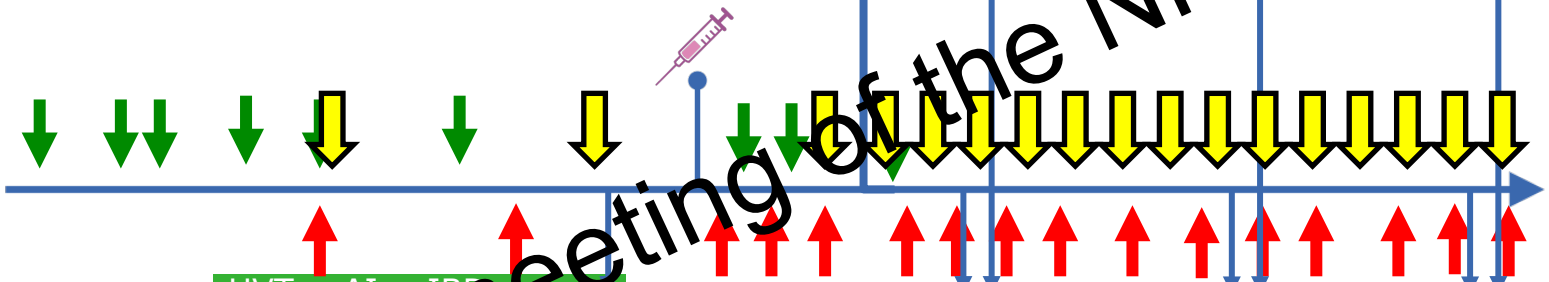
Fieldstudy overview start 2023 until 2025



Commercial Farm B



HVT + AI + IBD
IBV Multiple
Coccidiosis
Marek's disease
SE/ST
ND
ILT virus
FP virus
AMPV
EDS
AEV

8 weeks

24 weeks

Vaccinations
Booster
Blood samples
Swabs

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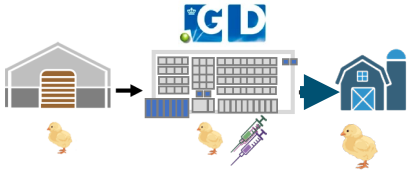
Fieldstudy overview start 2023 until 2025



Commercial Farm B

Group 1: VECTORMUNE® AI
Group 2: VAXXITEK HVT+IBD+H5
Group 3: VAXXITEK HVT+IBD+H5 + Volvac® B.E.S.T AI + ND
Group 4: Control group (No AIV vaccination)

All received in addition to the regular Layer vaccination program. starting in the commercial hatchery

Vaccinations
Booster
Blood samples
Swabs

- ST/ST
- ND
- ILT virus
- FP virus
- AMPV
- EDS
- AEV

8 weeks

24 weeks

Wageningen Bioveterinary Research (WBVR)

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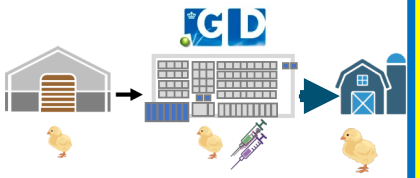
Fieldstudy overview start 2023 until 2025



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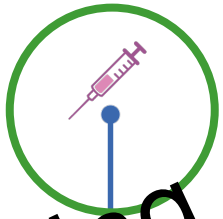
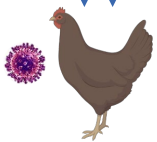
Commercial Farm B



8 weeks



24 weeks

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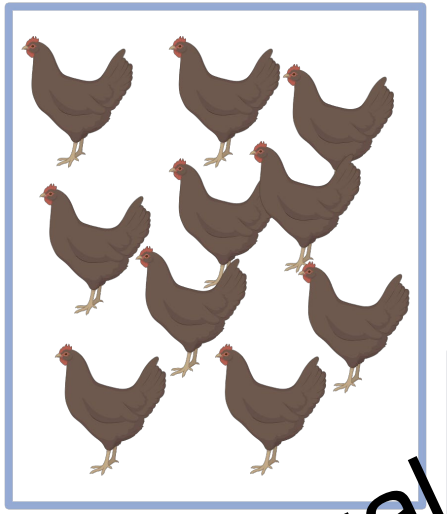
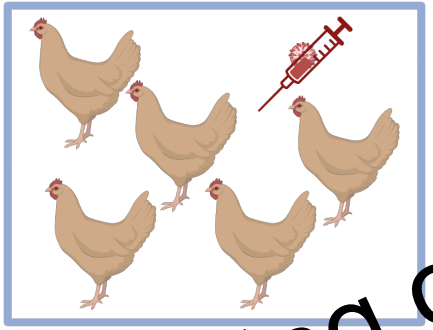
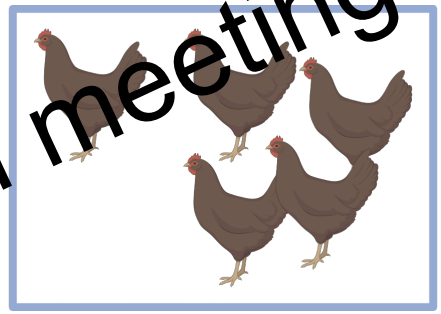
Transmission studies at WBVR

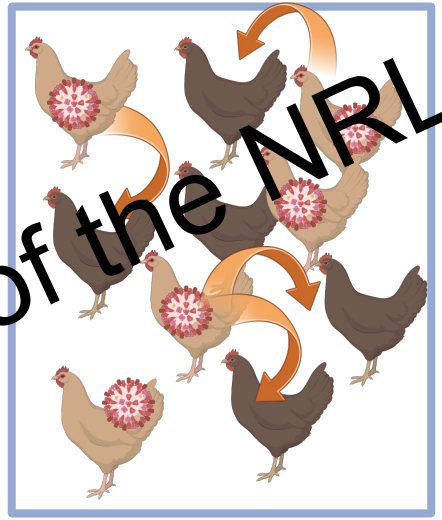
Day of Challenge



Vaccinated chickens arrived from field (2x 10 chickens /vaccine strategy)







Regrouped after 8h and samples collected up to 3 weeks

Schematic layout housing:

Ceva A	BIAH A	Control A
Ceva B	BIAH B	Control B

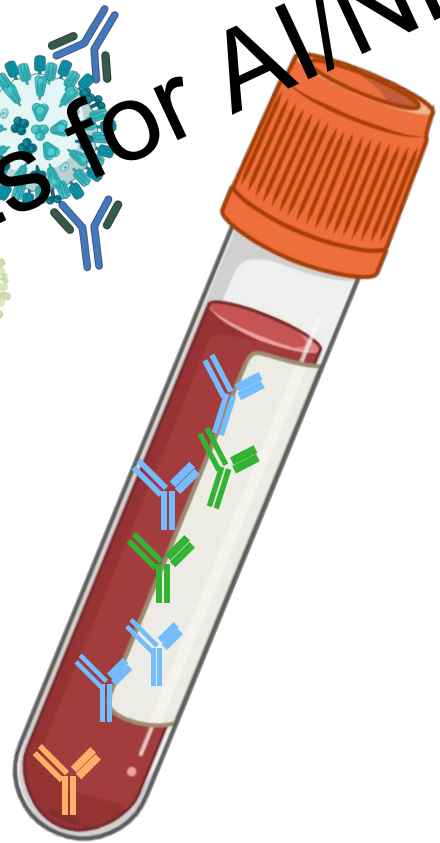
BIAH Boost A
BIAH Boost B

Timeline sample collection

- Virologic test → M-PCR
- Serologic test → NP-ELISA + Homologous & Heterologous HI-titers
- Cellular immunity
- Clinical observations and mortality

HI-titers 24-weeks post-prime vaccination

Vaccine	HI titers: Heterologous (agianst challenge)	HI titers: Homologous (close to H5 of the vaccine)
Control	-	-
VECTORMUNE® AI Inoculated	1,70	5,79
VECTORMUNE® AI Contact	1,75	5,1
VAXXITEK HVT+IBD+H5 Inoculated	2,00	6,65
VAXXITEK HVT+IBD+H5 Contact	2,00	6,95
VAXXITEK HVT+IBD+H5 + Volvac® B.E.S.T AI + ND Inoculated	3,30	7,35
VAXXITEK HVT+IBD+H5 + Volvac® B.E.S.T AI + ND Contact	3,30	6,95



Virologic & add. Serological test → all negative

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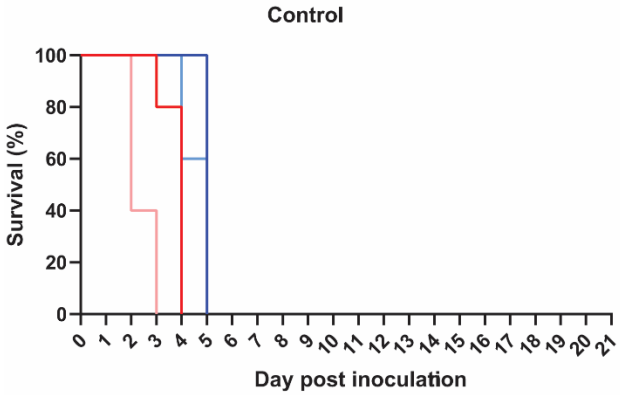
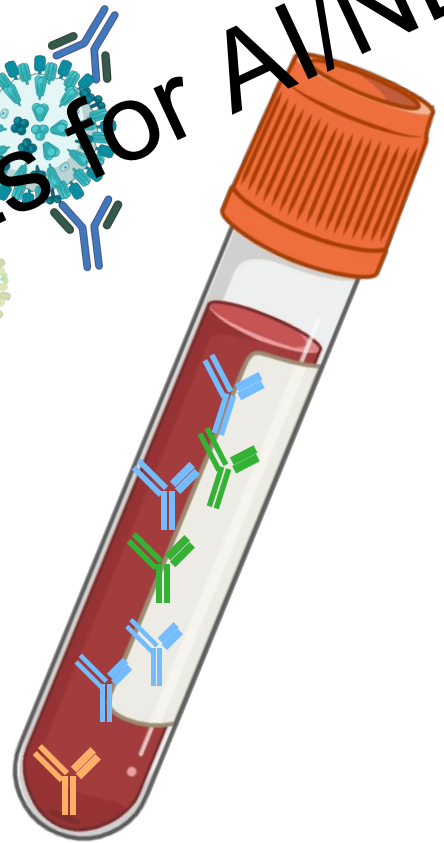
Survival 24-weeks post-prime vaccination



HI-titers 24-weeks post-prime vaccination

	HI titers:			
	Heterologous (agianst challenge)		Homologous (close to H5 of the vaccine)	
Vaccine	Pre-challenge	Post-challenge	Pre-challenge	Post-challenge
Control	-	-	-	-
VECTORMUNE® AI Inoculated	1,70	5,89	5,79	7,00
VECTORMUNE® AI Contact	1,75	5,89	5,71	7,44
VAXXITEK HVT+IBD+H5 Inoculated	2,00	6,70	6,85	9,10
VAXXITEK HVT+IBD+H5 Contact	2,00	5,88	5,95	8,19
VAXXITEK HVT+IBD+H5 + Volvac® B.E.S.T AI + ND Inoculated	3,30	6,25	7,35	8,60
VAXXITEK HVT+IBD+H5 + Volvac® B.E.S.T AI + ND Contact	3,10	4,85	6,95	7,15



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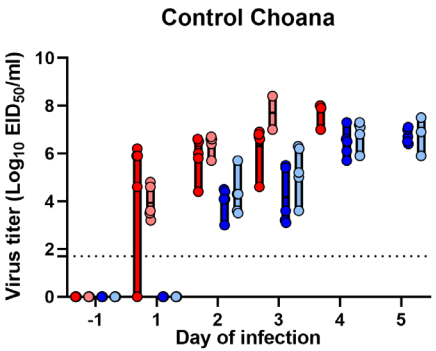
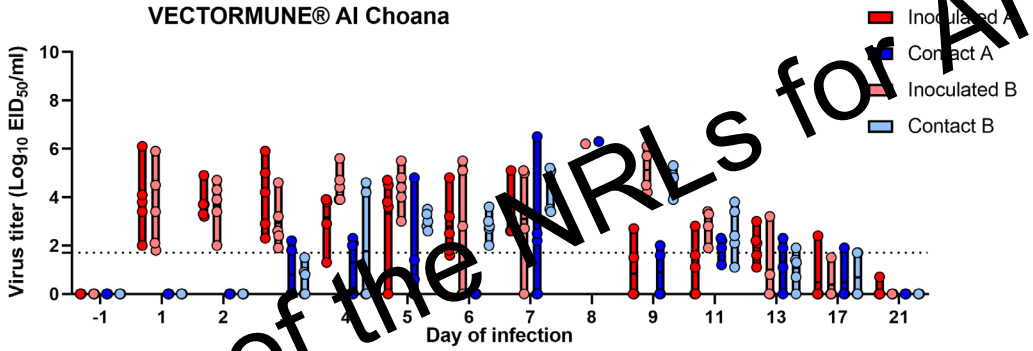
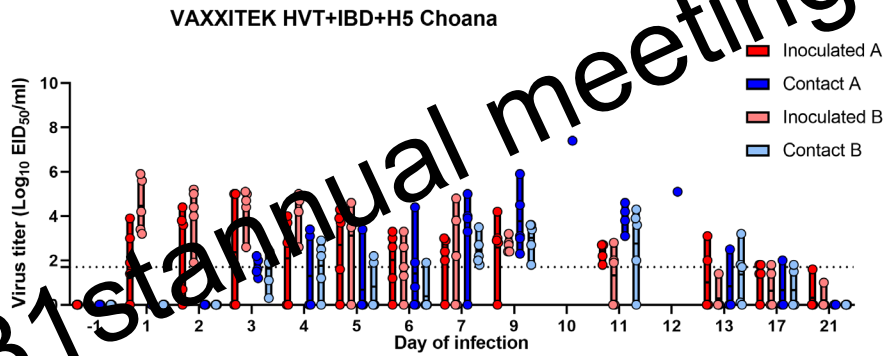
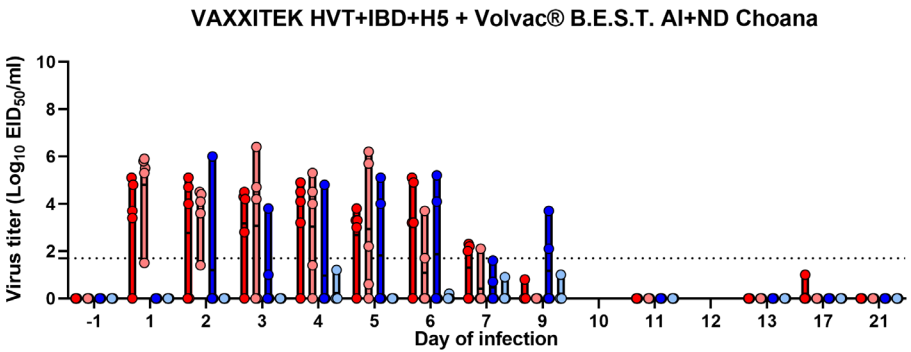
Shedding 24-weeks post-prime vaccination









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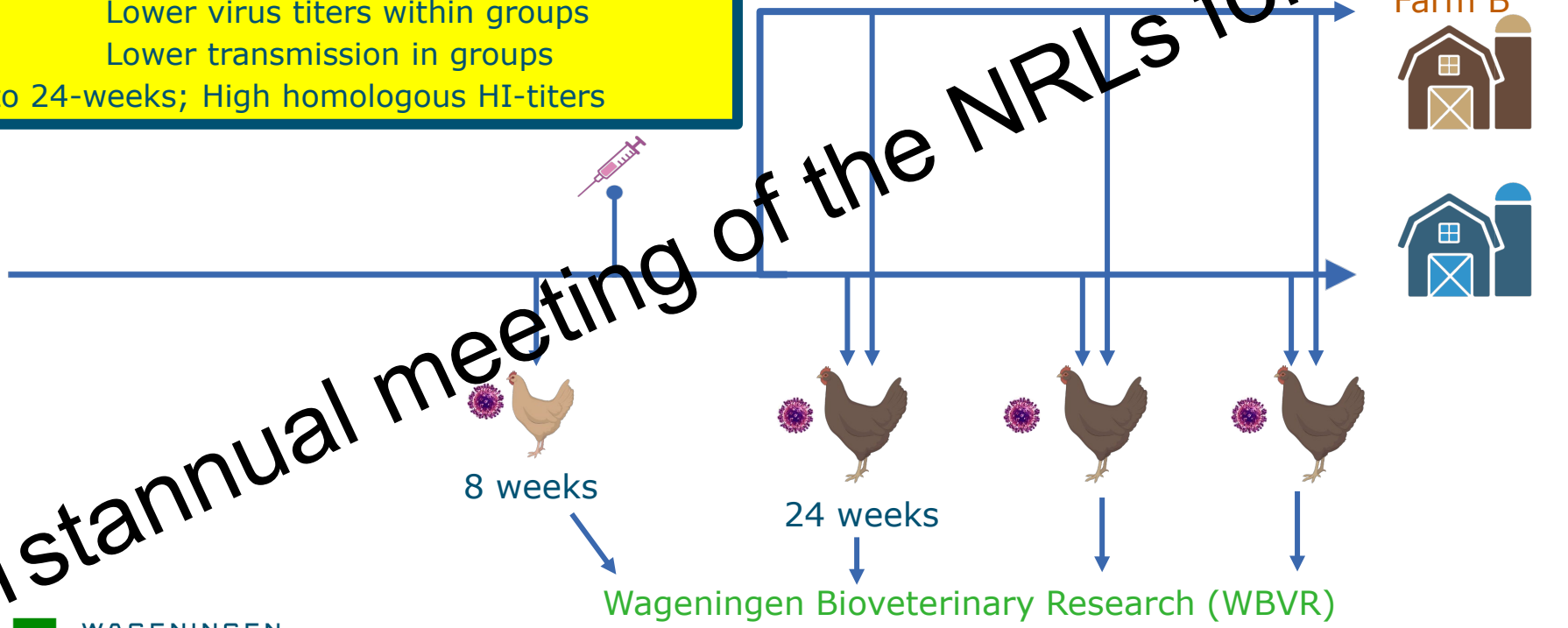
Transmission parameters 24-weeks post prime vaccination

Treatment	Beta (β) (95% CI)	R-value Virus (95% CI)	R-value Final size (95% CI)
Control	5.00 (2.89- 9.46)	15.40 (6.00- 32.99)	(> 1.52)
VECTORMUNE® AI	**0.20 (0.12-0.48)**	**1 * (0.37- 2.13)**	1.89 (0.55-5.22)
VAXXITEK HVT+IBD+H5	**0.80 (0.40-1.43)**	**2.76* (1.12-5.67)**	(> 1.52)
VAXXITEK HVT+IBD+H5 + Volvac® B.E.S.T AI + ND	**0.08 (0.01-0.24)**	**0.28* (0.07-1.01)**	0.39 (0.05- 1.77)

Fieldstudy overview start 2023 until 2025

Vaccinated chickens demonstrate upon challenge:
- Higher survival rates
- Lower virus titers within groups
- Lower transmission in groups

Up to 24-weeks; High homologous HI-titers



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Results of all studies so far…

Results Study 2022

Results Transmission study 1

Results Transmission study 2

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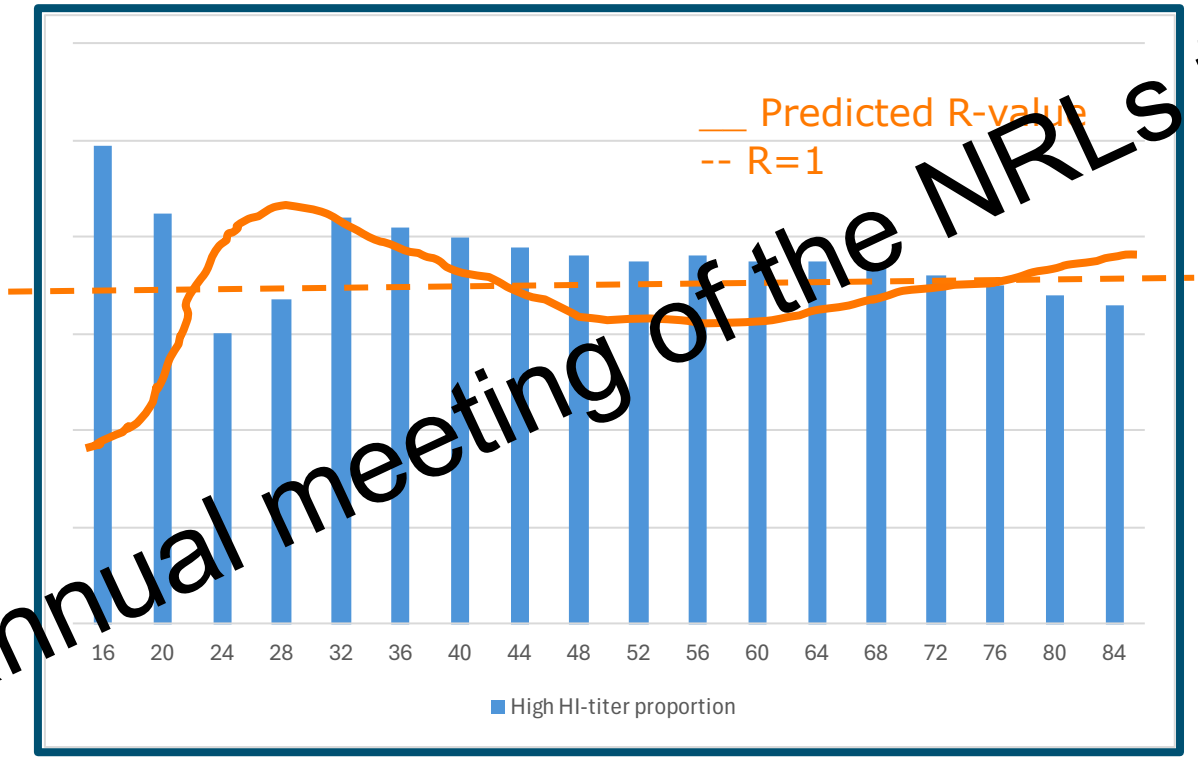

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