



Symposium
Sciensano
April 2022

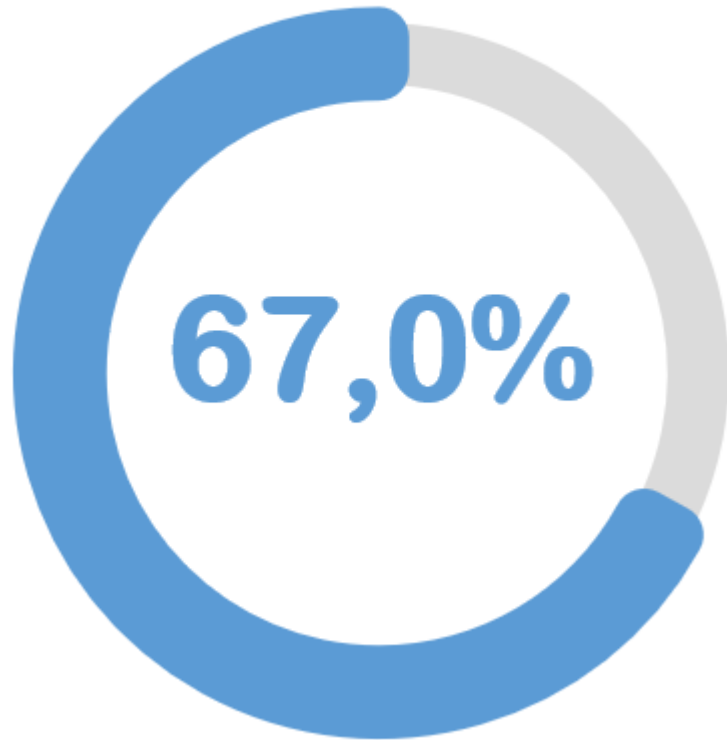
Why movement restrictions are of increasing importance in achieving the IBR-free status (BoHV-1) in Belgium?

Dr. Stefaan Ribbens, DVM, PhD

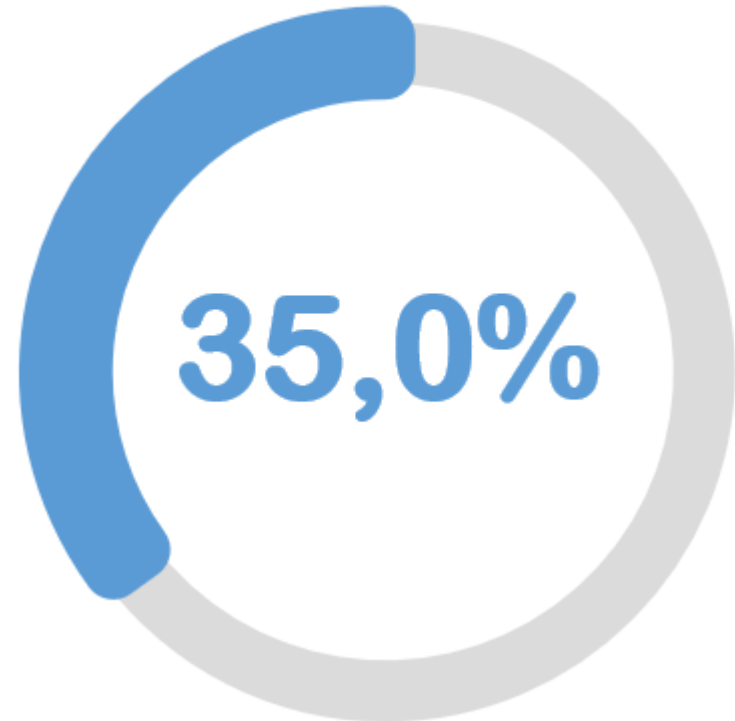


IBR-status Belgium in **1997** (Boelaert et al., 1997)

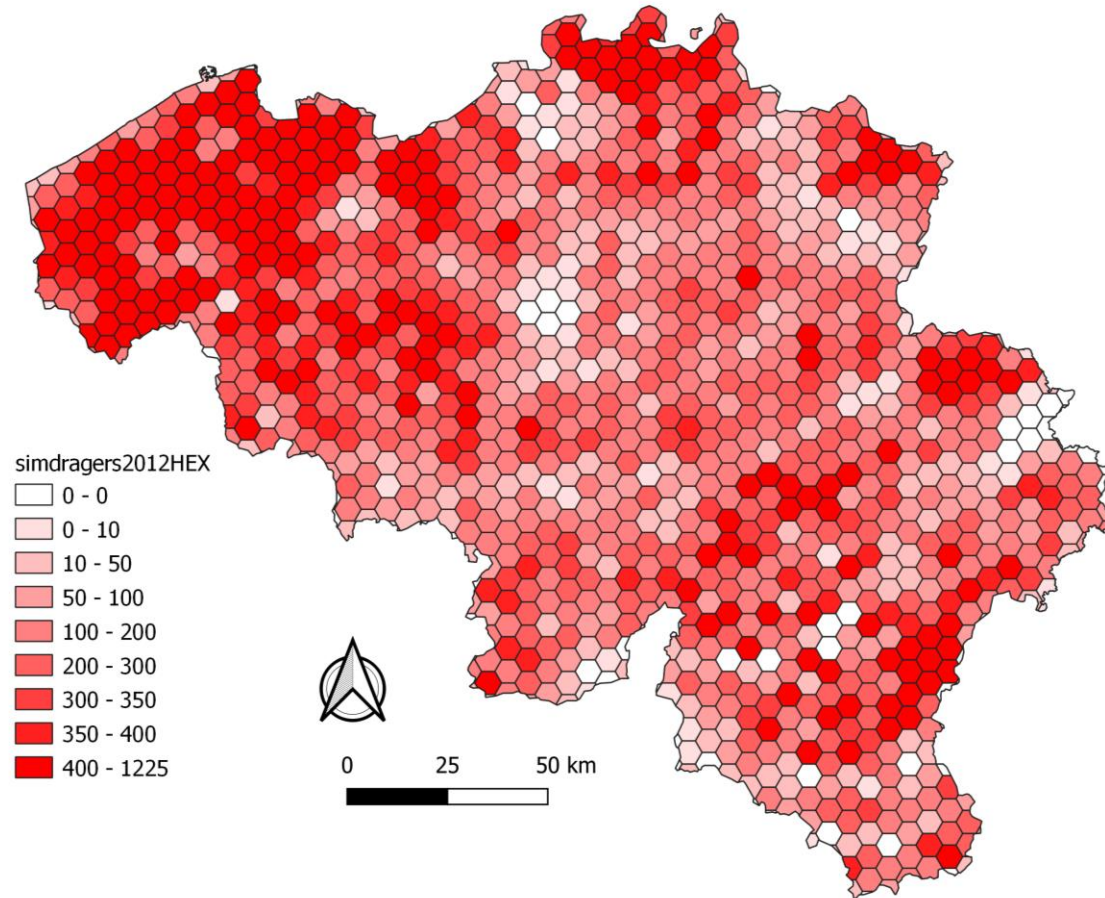
IBR-infected herds



IBR-infected cattle

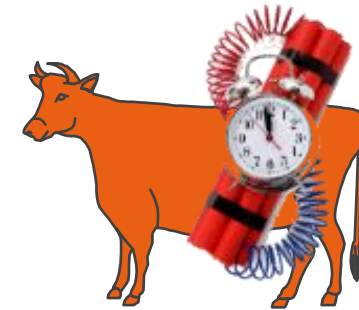


Numbers of gE+ cattle in 2012 (START of systemic control) – a simulation



$P(\text{gE+ cattle}) = 10,4\%$

$N=271.686$

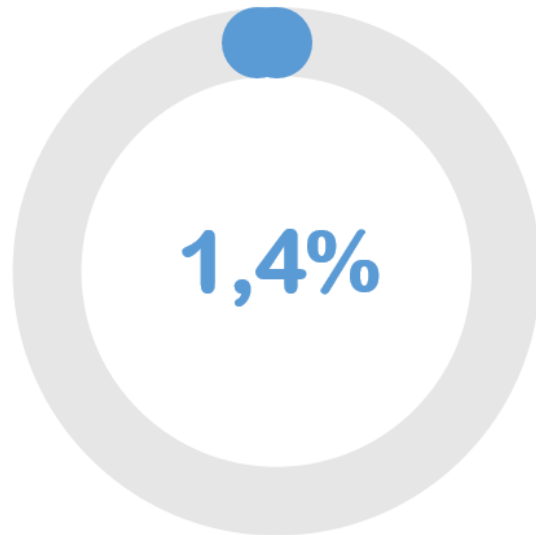


$P(\text{reactivation/year}) = 3\%$ (Noordegraaf et al., 2002 & 1998)

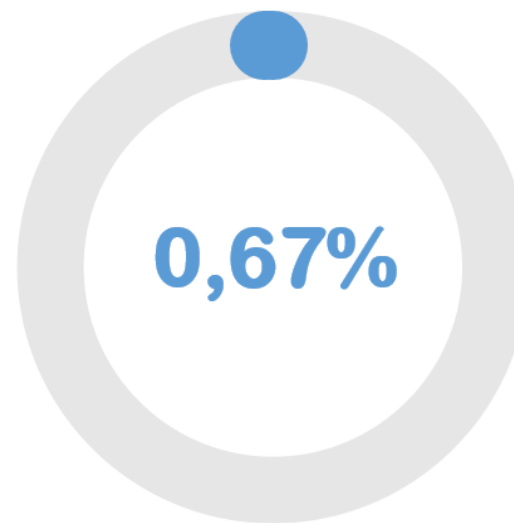
$P(\text{reactivation during transport}) = 25\%$ (Thiry et al., 1987 & expert opinion)

Actual IBR-status after 10 years of systemic control in Belgium (12 April 2022)

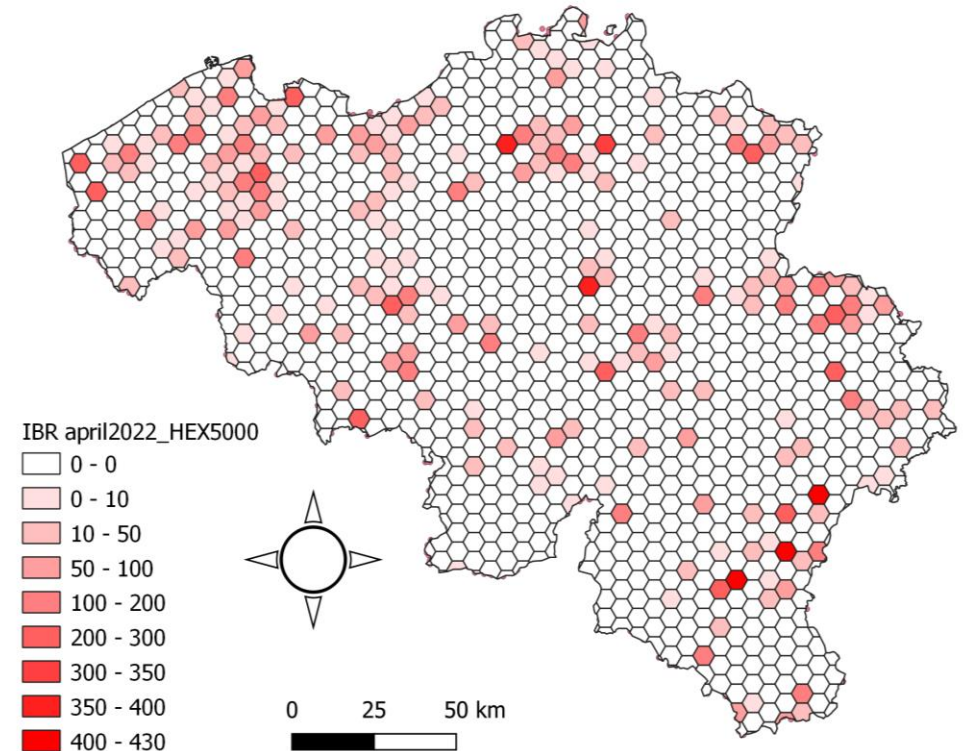
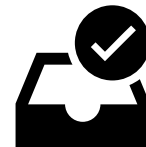
IBR-infected herds (n=275)



IBR-infected cattle (n=14.246)



Reducing BoHV-1 infection pressure success, but is it sufficient?



Transmission of IBR- principles?

J. Brock et al.

Preventive Veterinary Medicine 192 (2021) 105375

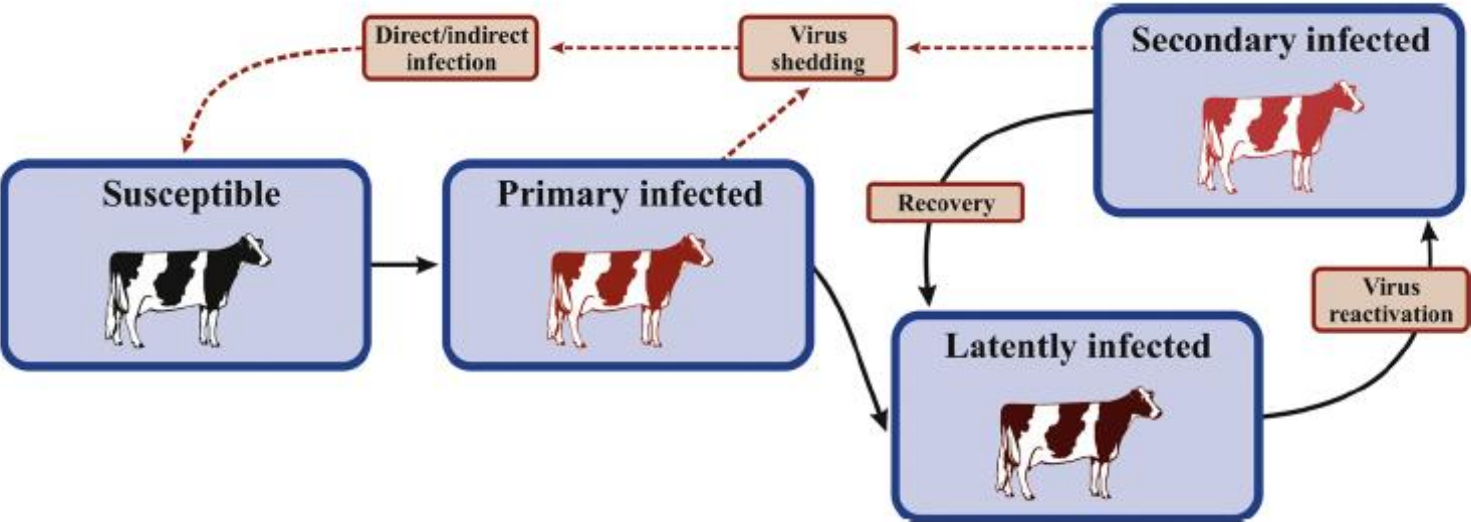
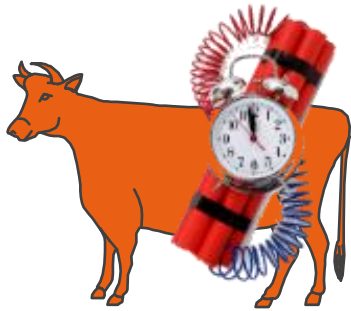


Table 3
Overview BoHV-1 related model parameters.

Parameter	Description	Value	Source/details
β_{Pi}^{wp}	Trans. rate primary infected animals within pools	1.1	Simulation experiments & expert input
β_{Pi}^{bp}	Trans. rate primary infected animals between pools	$1.1 \cdot 0.6$	Simulation experiments & expert input
β_{Pi}^{bh}	Trans. rate primary infected animals between herds	0.02	Adapted from Thulke et al. (2018)
β_{Si}^{wp}	Trans. rate secondary infected animals within pools	0.55	Simulation experiments & expert input
β_{Si}^{bp}	Trans. rate secondary infected animals between pools	$0.55 \cdot 0.6$	Simulation experiments & expert input
$r_{\text{reactivation}}$	Yearly virus reactivation probability per latently infected animal	3%	Noordegraaf et al. (2002, 1998)
$r_{\text{reactivation transport}}$	Virus reactivation probability after transport	25 %	Thiry et al. (1987) & expert input
t_{Pi}	Duration primary infection (weeks)	2	Bosch et al. (1997); Kaashoek et al. (1996); Kaashoek and Van Oirschot (1996)
t_{Si}	Duration secondary infection (weeks)	1	Bosch et al. (1997)

Introduction of IBR in a herd = Probability of a major outbreak

IBR gE POS = Latently infected

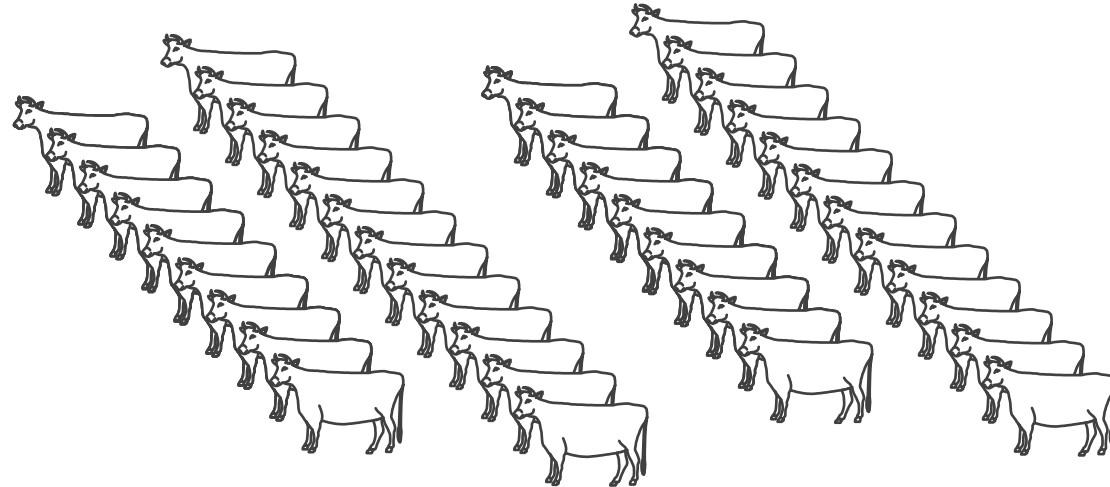


?



-Purchase!!!
-(Intern)
-other

$R_0 = 2.8 - 7$ – vaccinated (0.9-1.1)



0
0% gE+

P outbreak=12%/year
???

4 months
85-96% gE+

Mitigating the risk of
purchase = most important biosecurity measure!

IBR is a trade disease!!! - But Animal trade is of economic importance...

1970



2010



Mitigating risks of introduction through purchase?

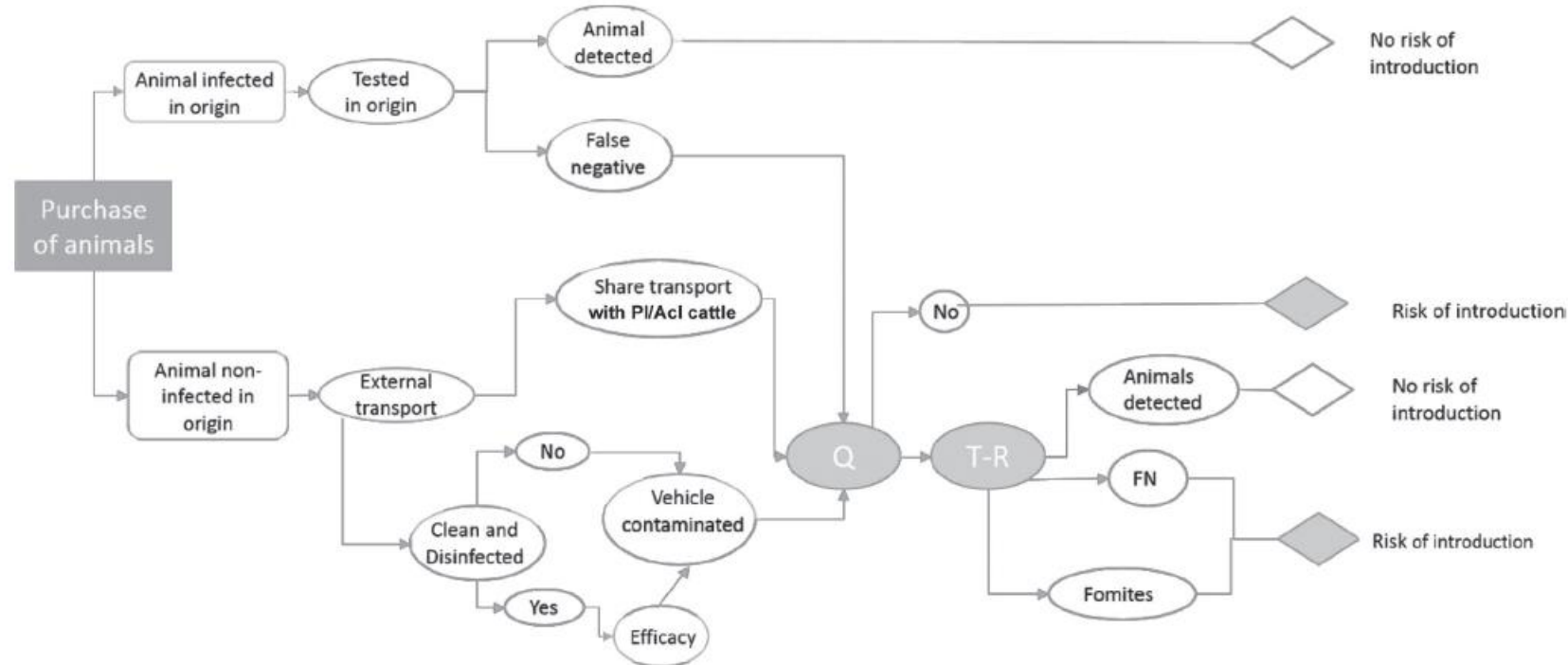
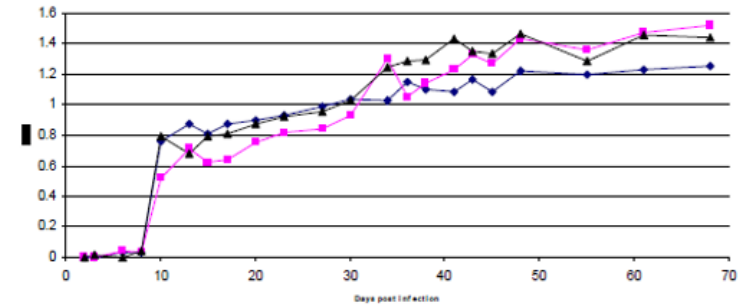
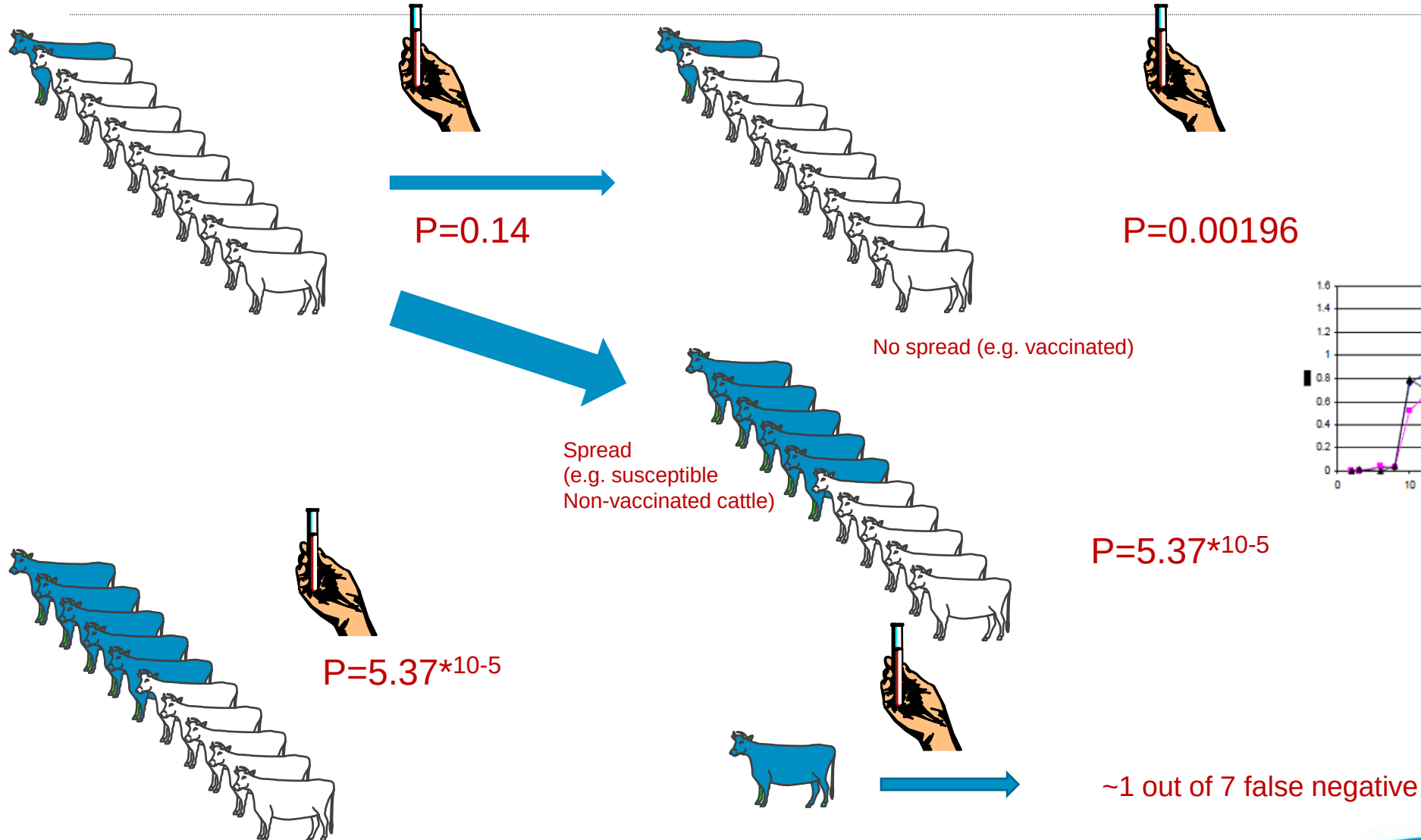
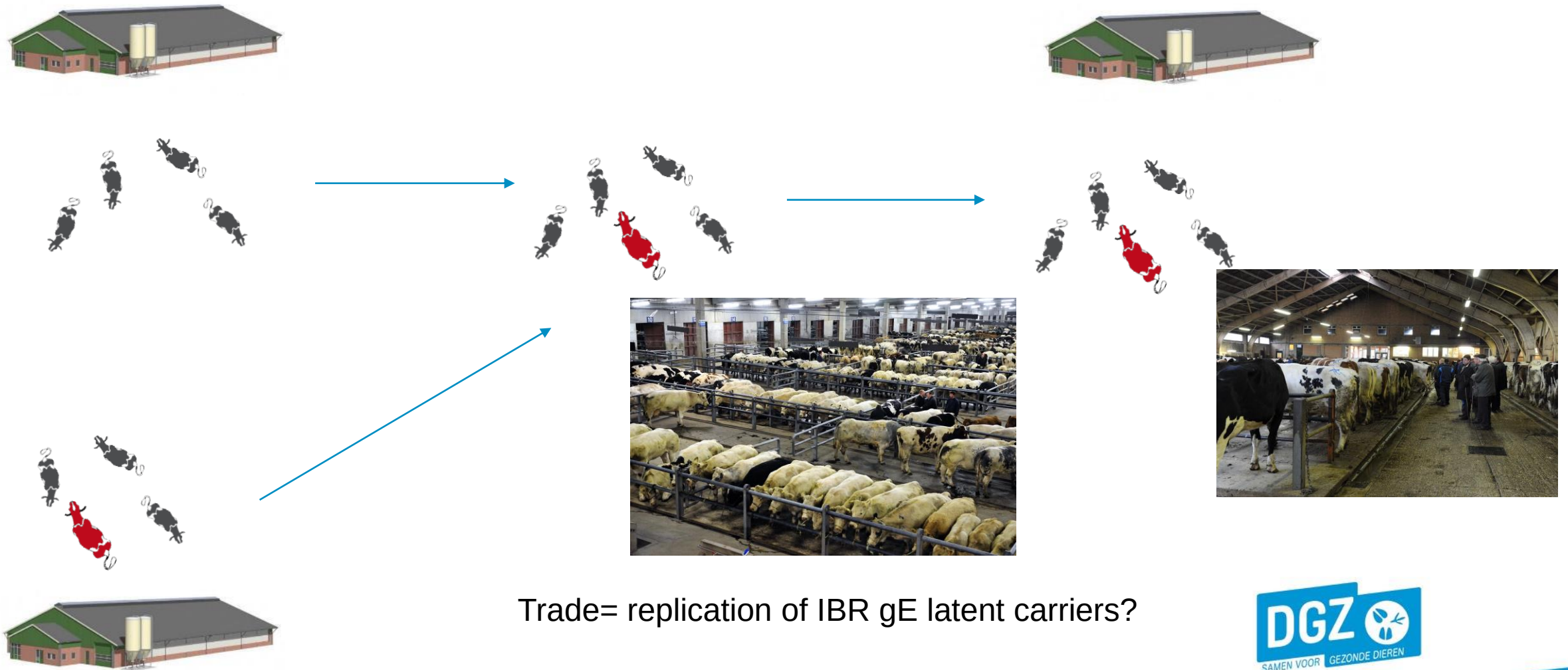


Figure 1. Pathway for bovine viral diarrhea virus (BVDV) and bovine herpesvirus-1 (BHV-1) introduction in dairy cattle herds through the purchase of animals; Q = quarantine; T = test on quarantine; R = quarantine routines; PI = persistently infected with BVDV; AcI = acutely infected with BHV-1; FN = false negative.

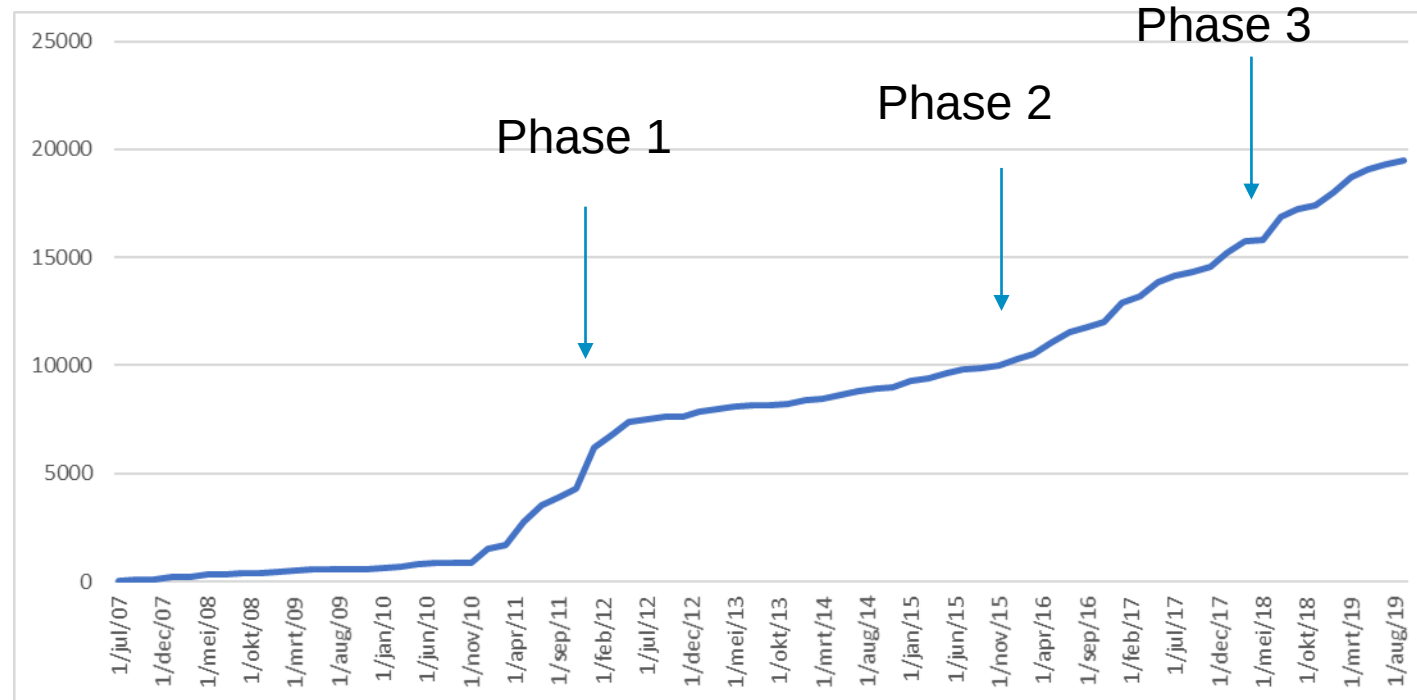
Principles and test characteristics at purchase



Infectious disease & trade = how to separate infectious from susceptible cattle?



Different movement restrictions in each phase (& continuing)



Phase 1: Towards free herd – direct transport



Free



Free



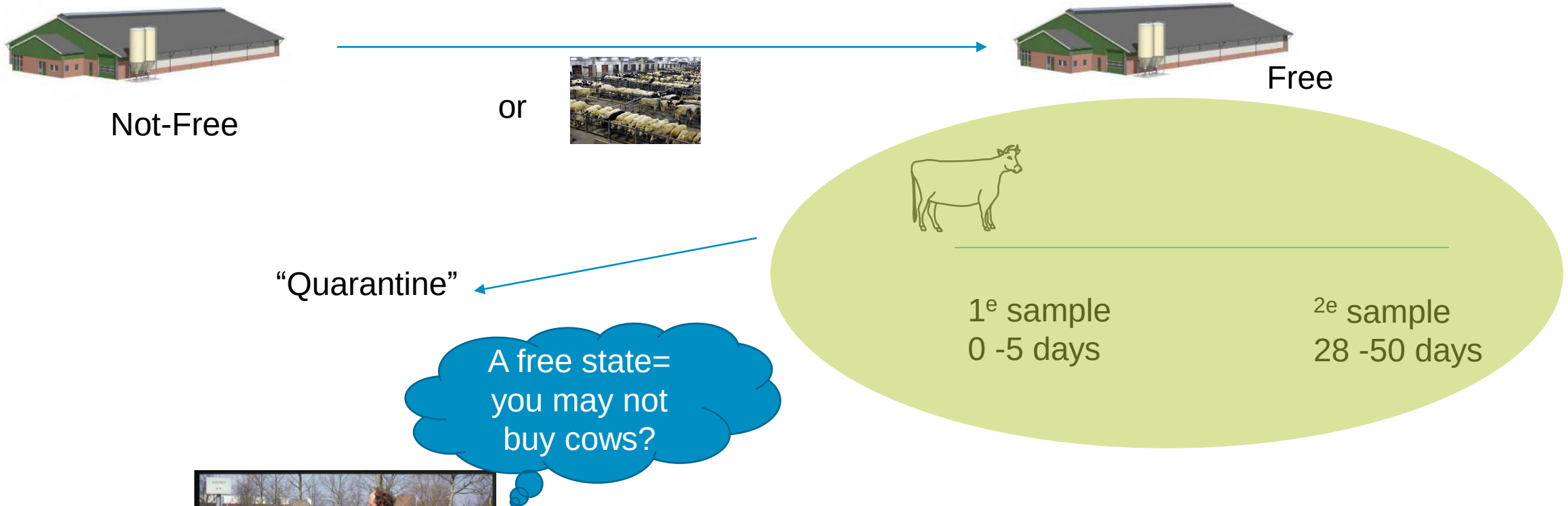
1^e sample
0 -5 days

“Quarantine”

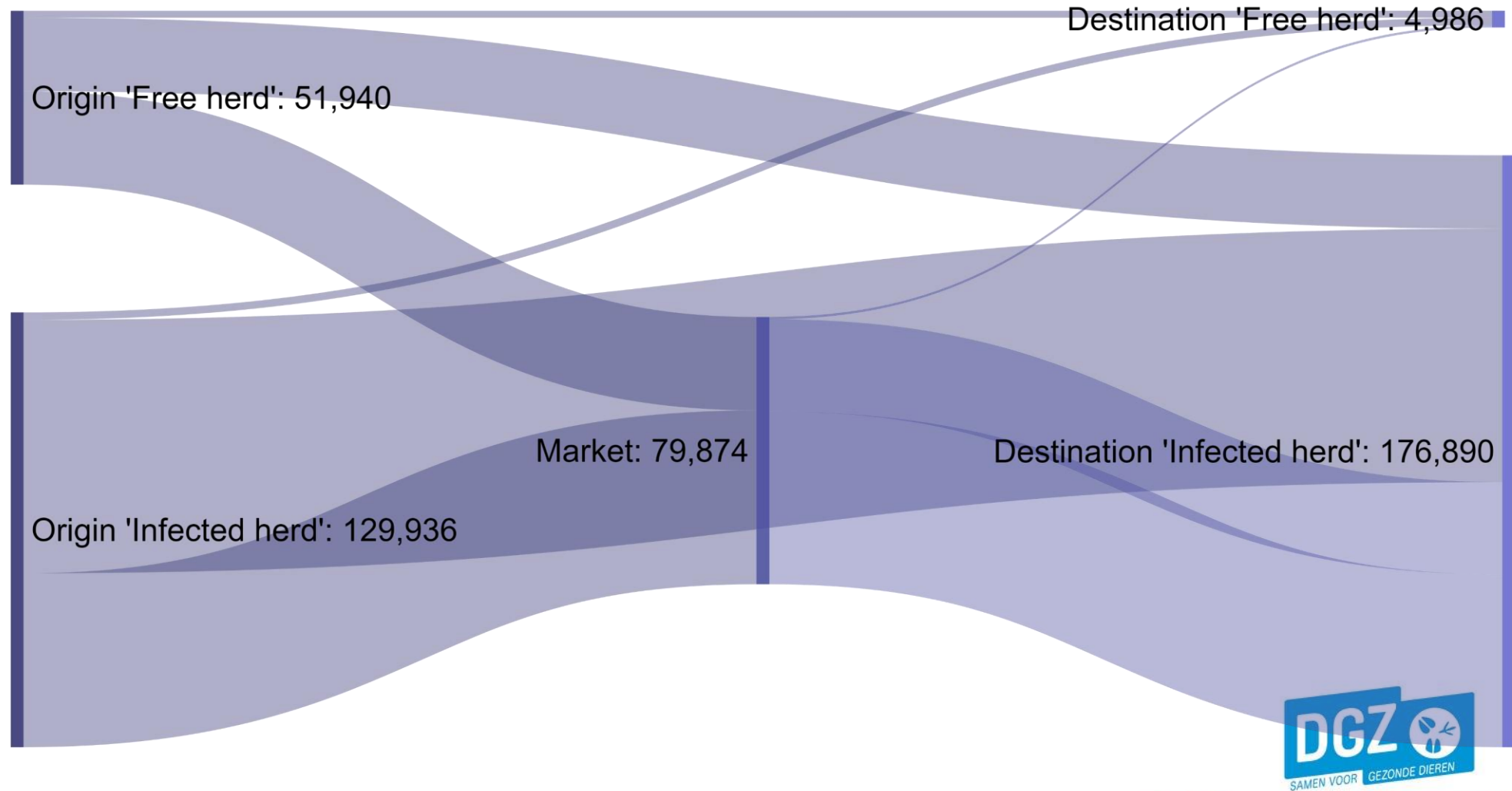
Blood
sampling &
quarantine?!



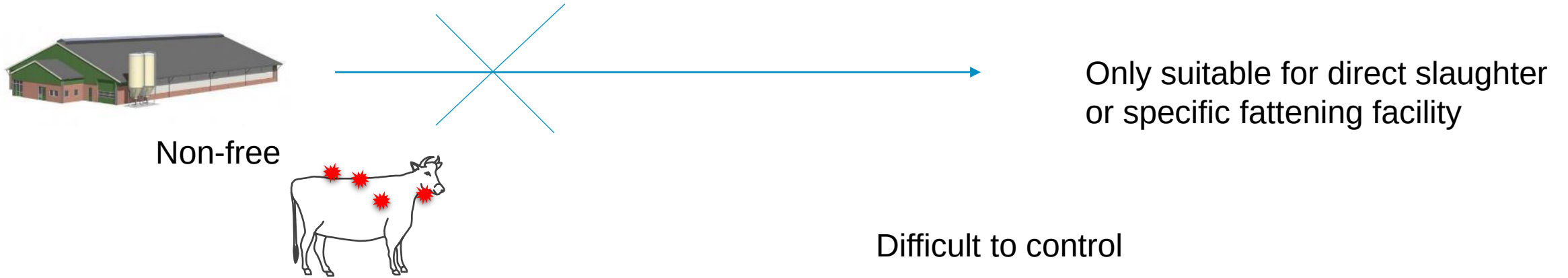
Phase 1: Towards free herd – indirect transport or origin ‘non-free’ herd



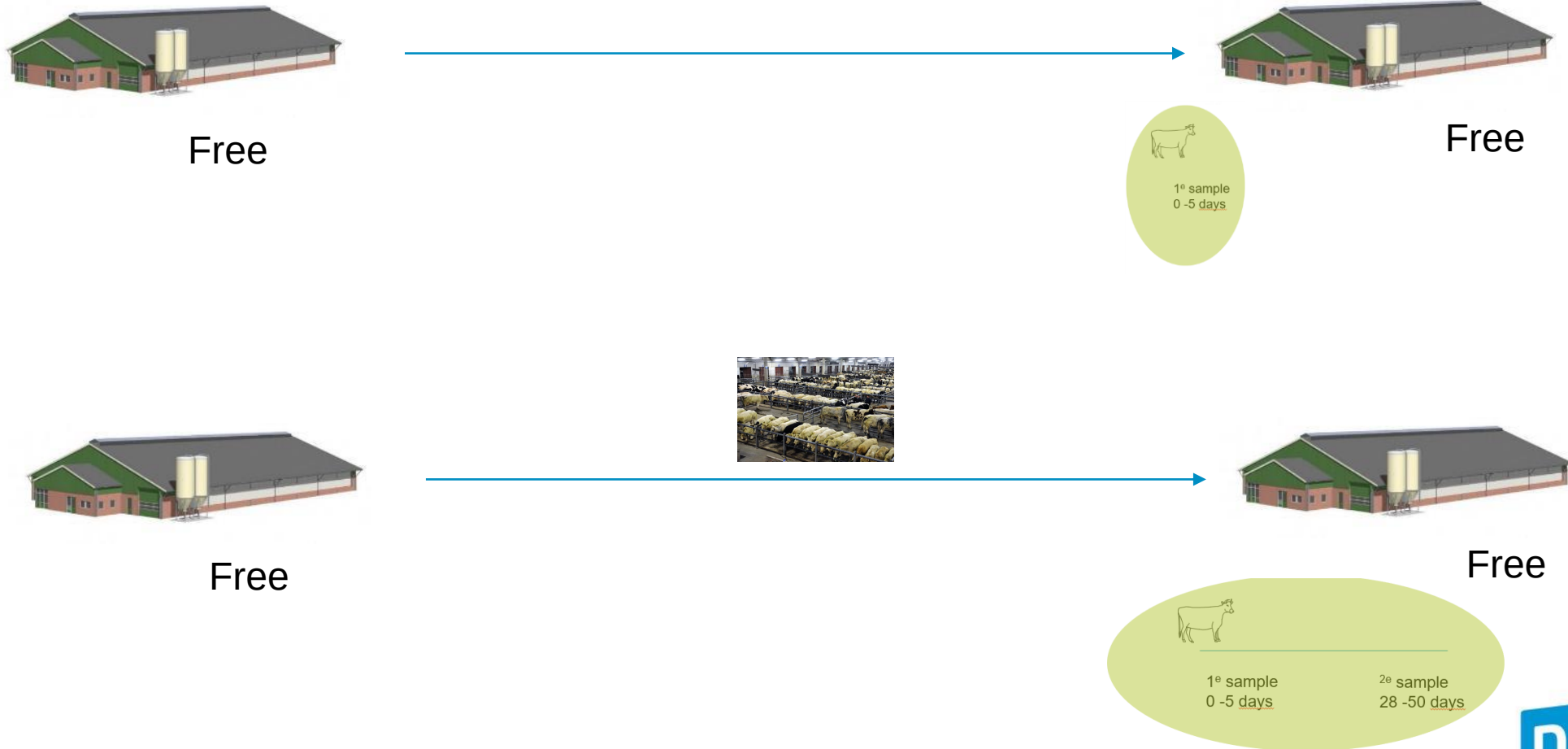
Trade pattern 2012 (destination Northern-Belgium)



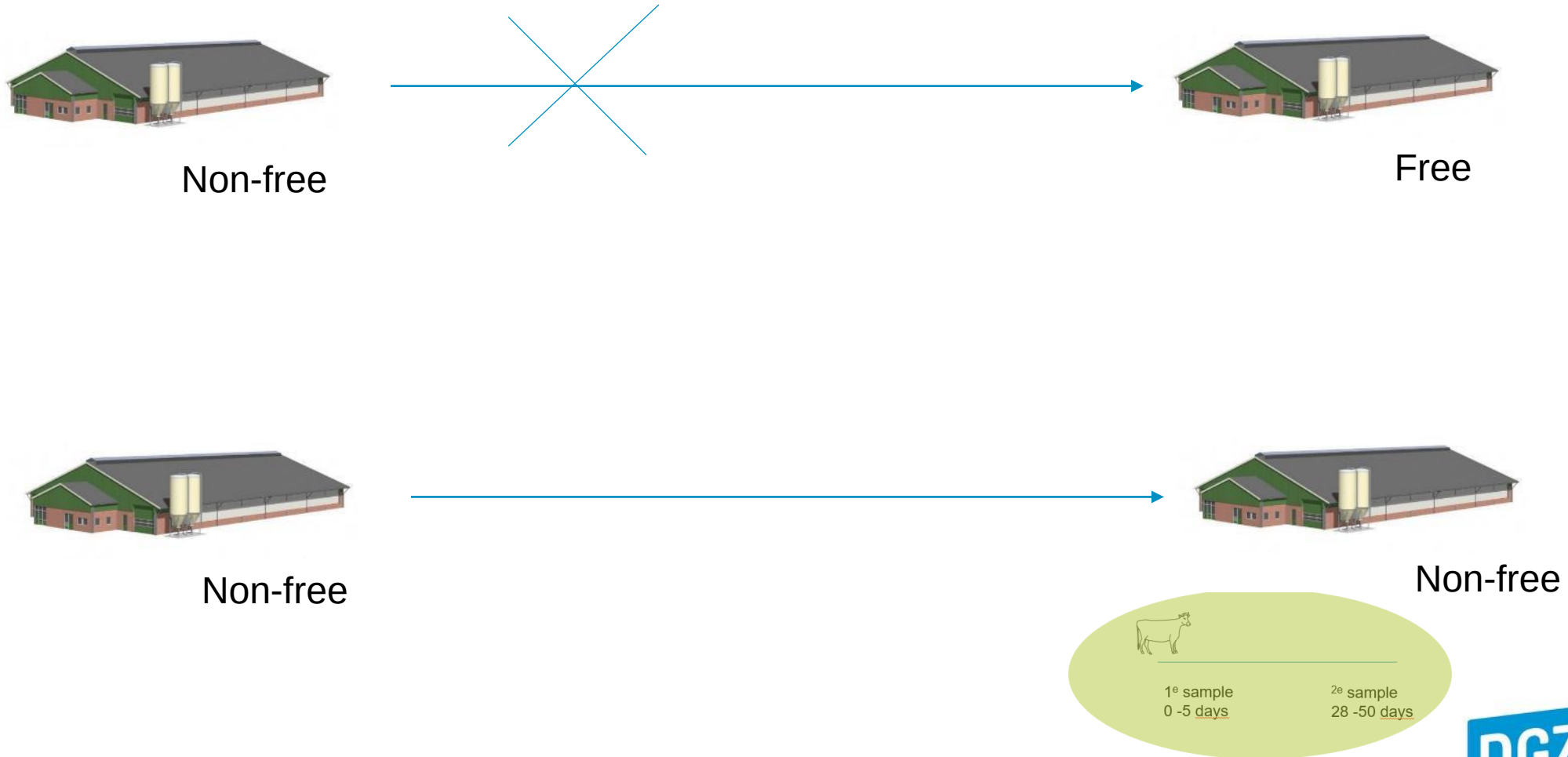
Phase 2 (2018): canalisation of gE POS animals



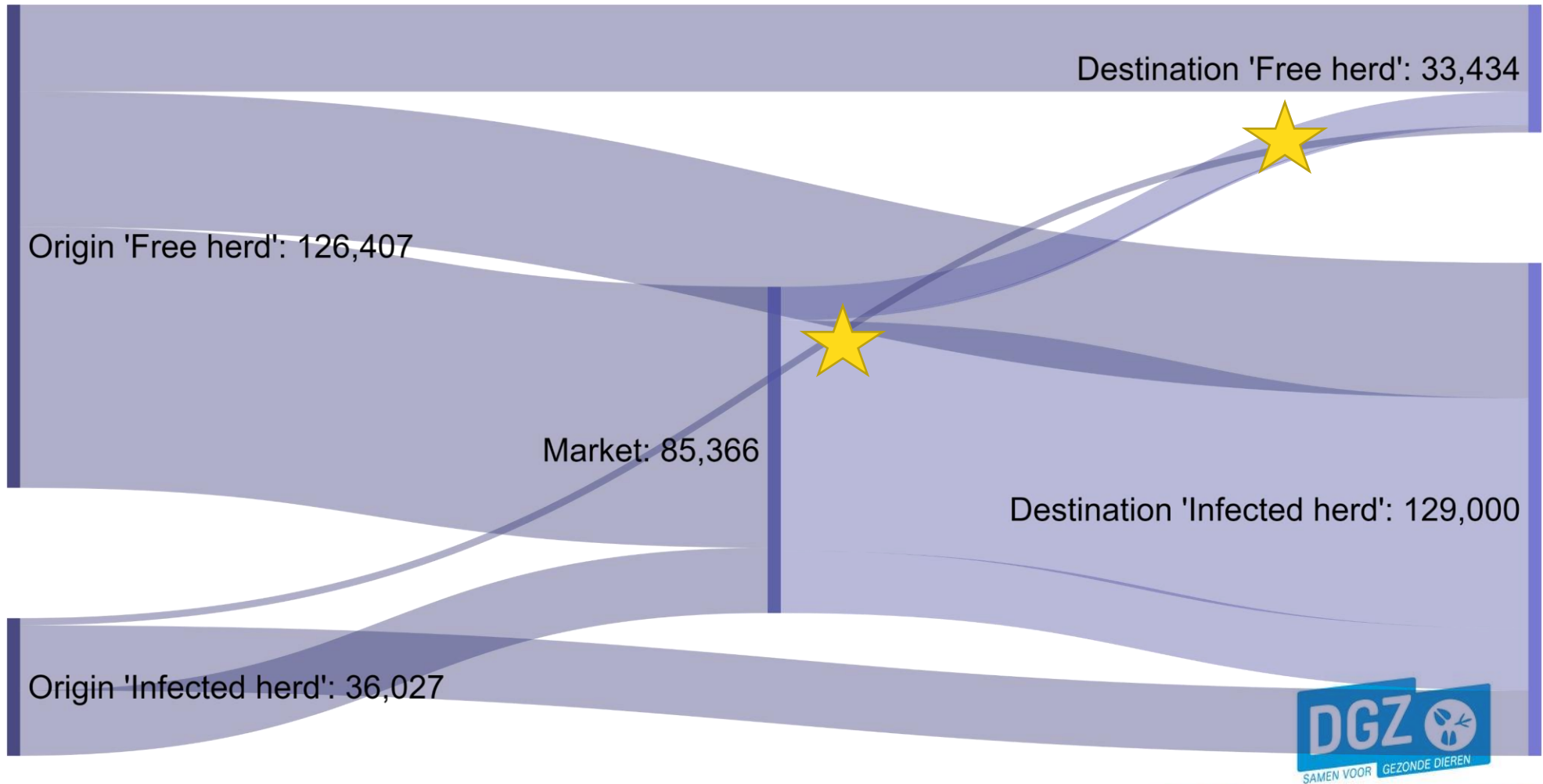
Phase 2 (2018)



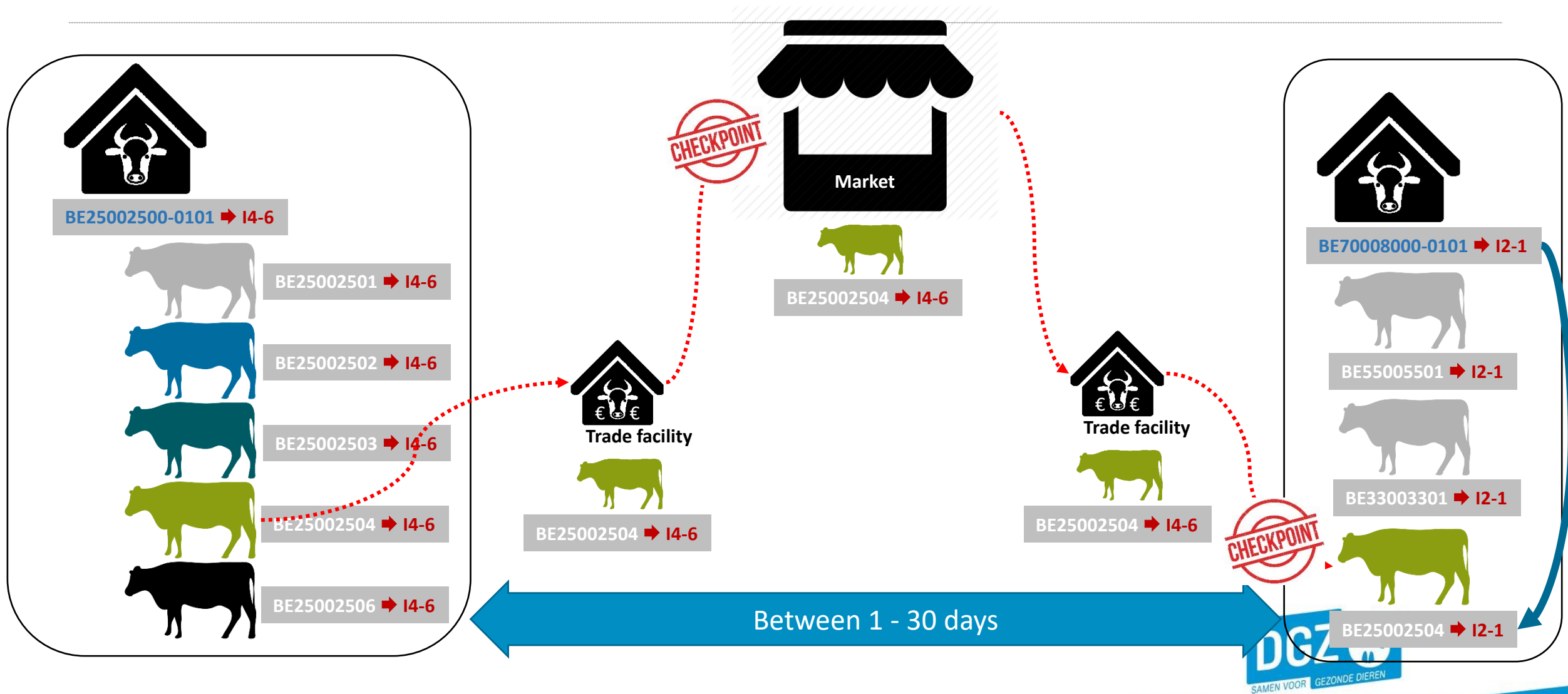
Phase 3 (2019) change in trading patterns



Trade pattern 2018 (destination herd in Northern Belgium)



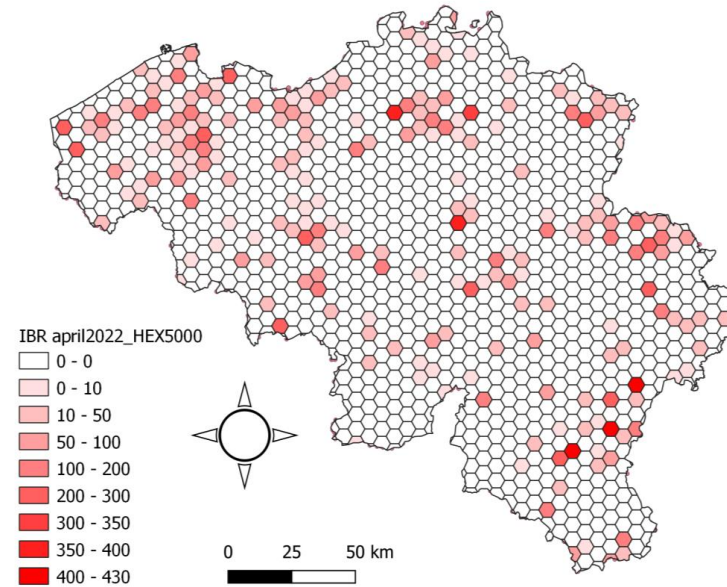
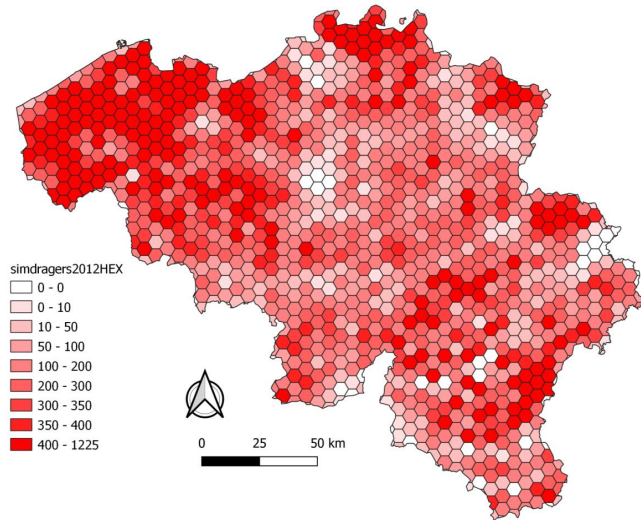
Cattle in transit (actual situation)



Why movement restrictions are of increasing importance in achieving the IBR-free status (BoHV-1) in Belgium?



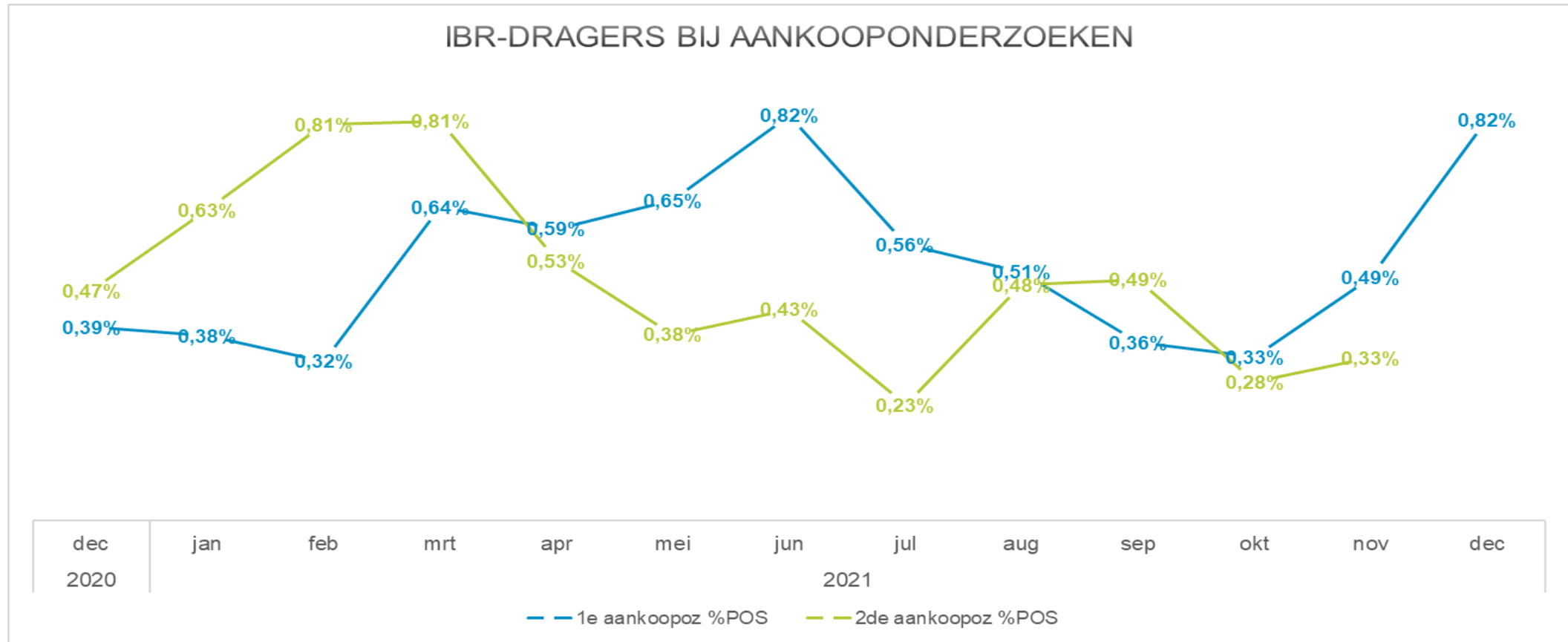
Is the risk of introduction through purchase diminished after 10 years of control?



Year	P(gE+)	freq (number of cattle trade)	P(risk purchase year)	P (risk purchase month)
2012	12,00%	254.935	30.592	2.549
2022	0,67%	215.343	1.443	120

We actually **see more risk**, even with current movement restrictions in place

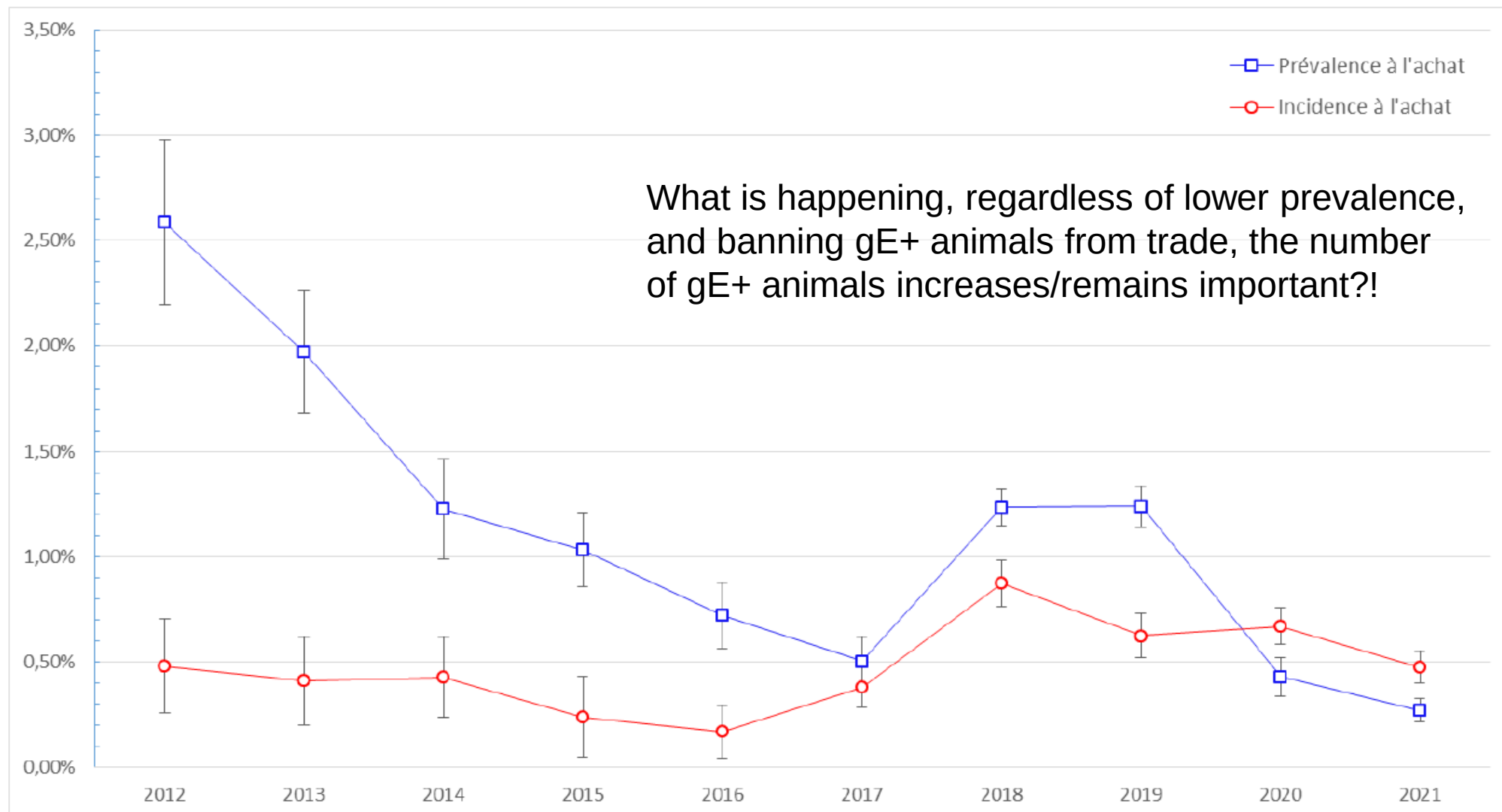
Importance of second blood sampling (28-50 days after purchase) – N-Belgium !!!



About 0,8% - 1-8% of traded animals (becomes) IBR-latent carrier!

Achats - troupeaux indemnes

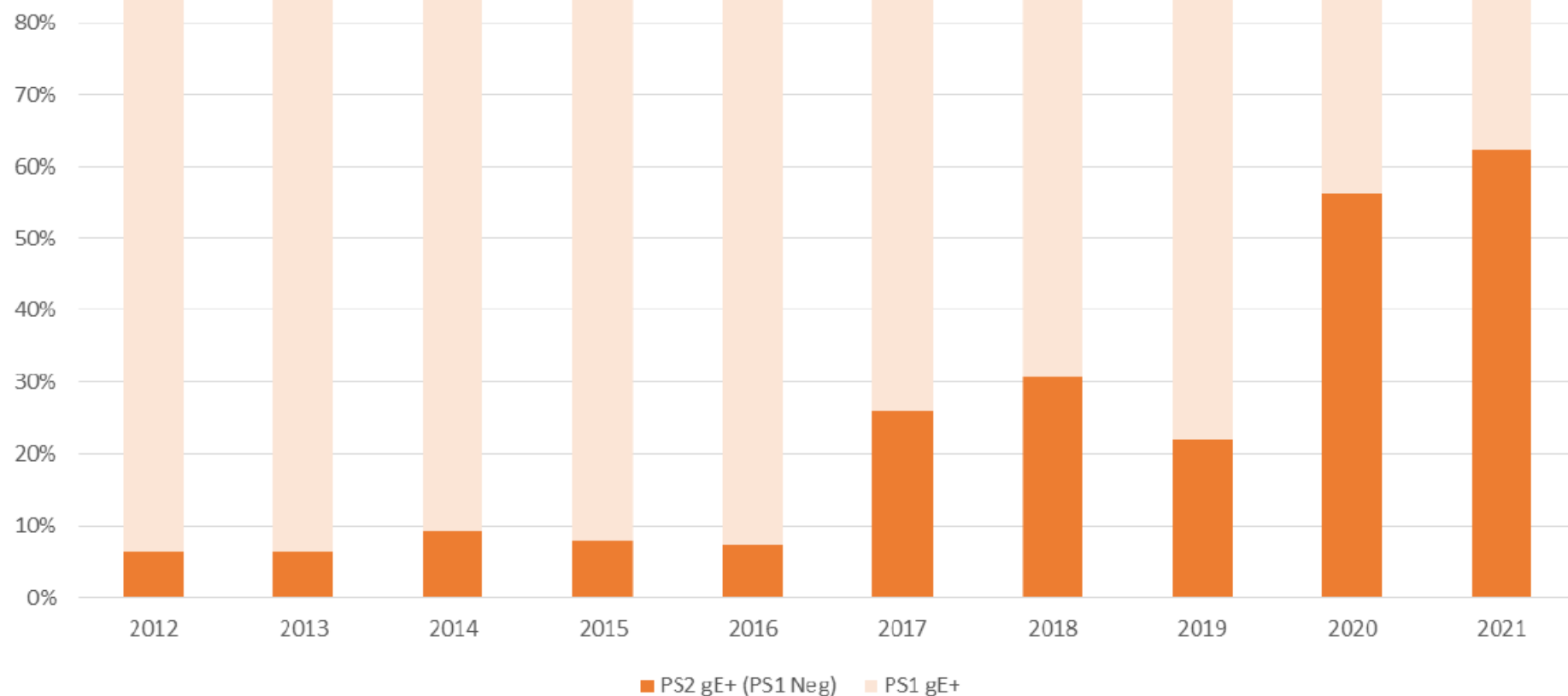
Prévalence & incidence IBR gE



Proportion d'achats détectés positifs PS₁ vs PS₂

	Nbre	%
Achats 2021	62 089	
Achats 2021 sans PS ₂	1 874	3,02 %

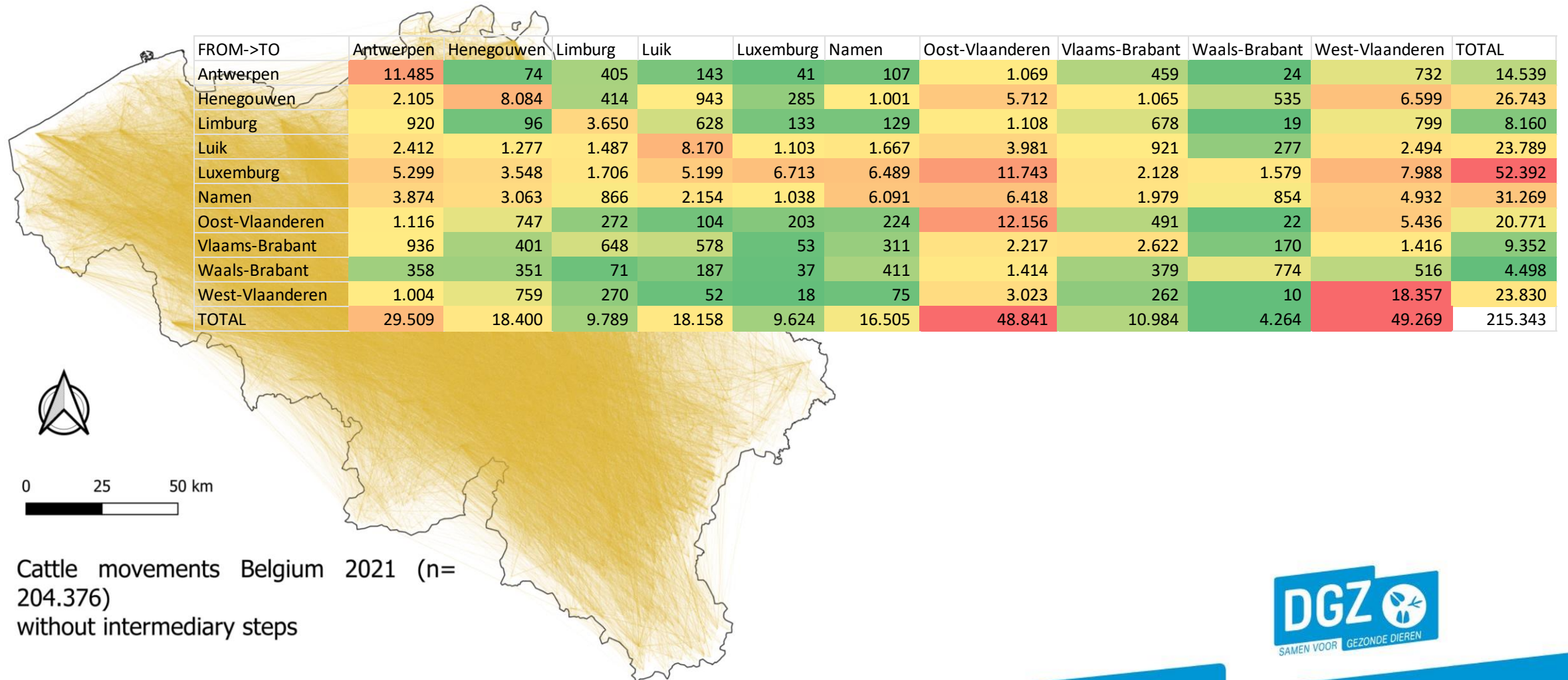
Increase of detection of seroconversion 28-50 days after purchase !



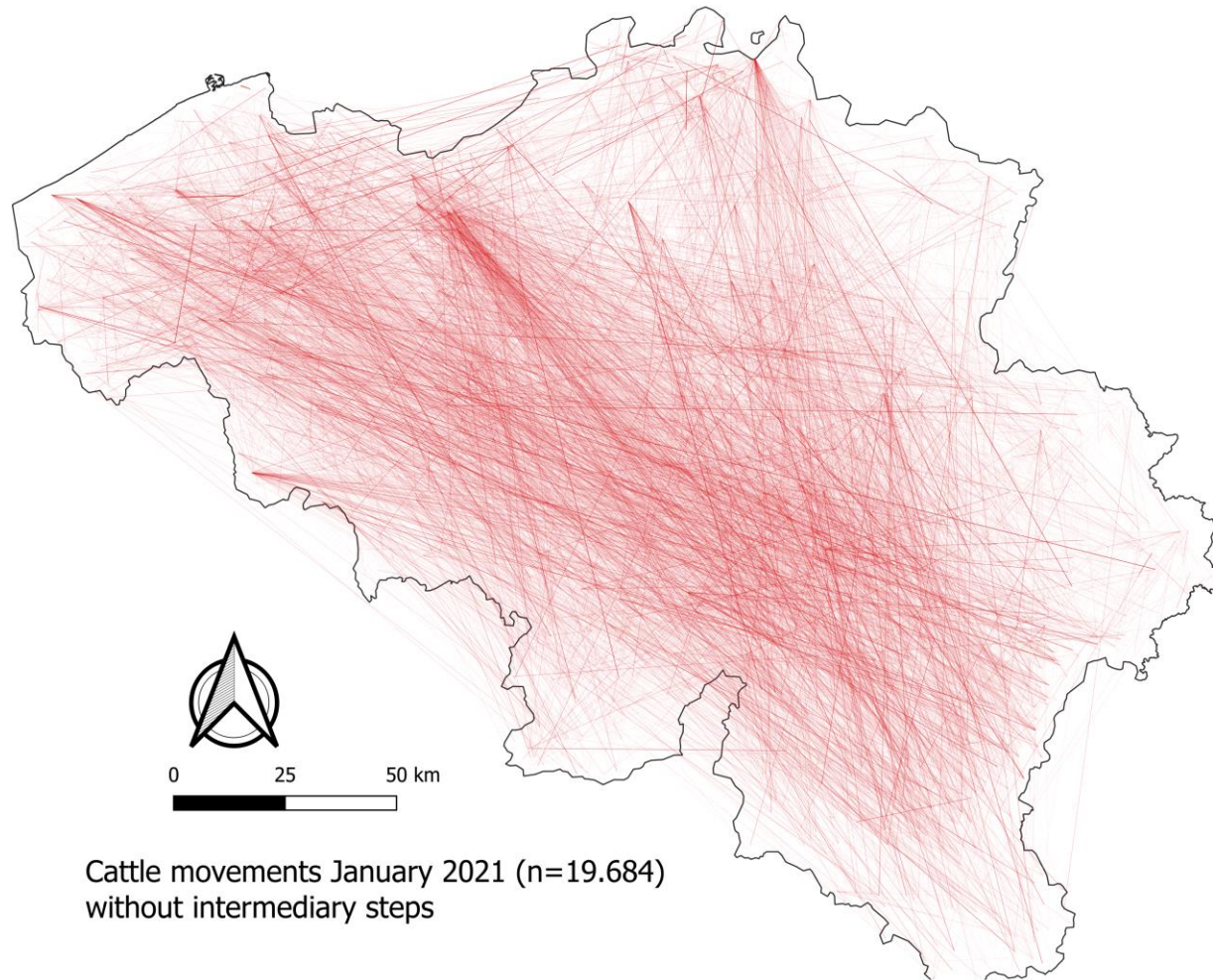


Cattle trade in Belgium 2021

Cattle movements within Belgium in 2021 (excluding imports)

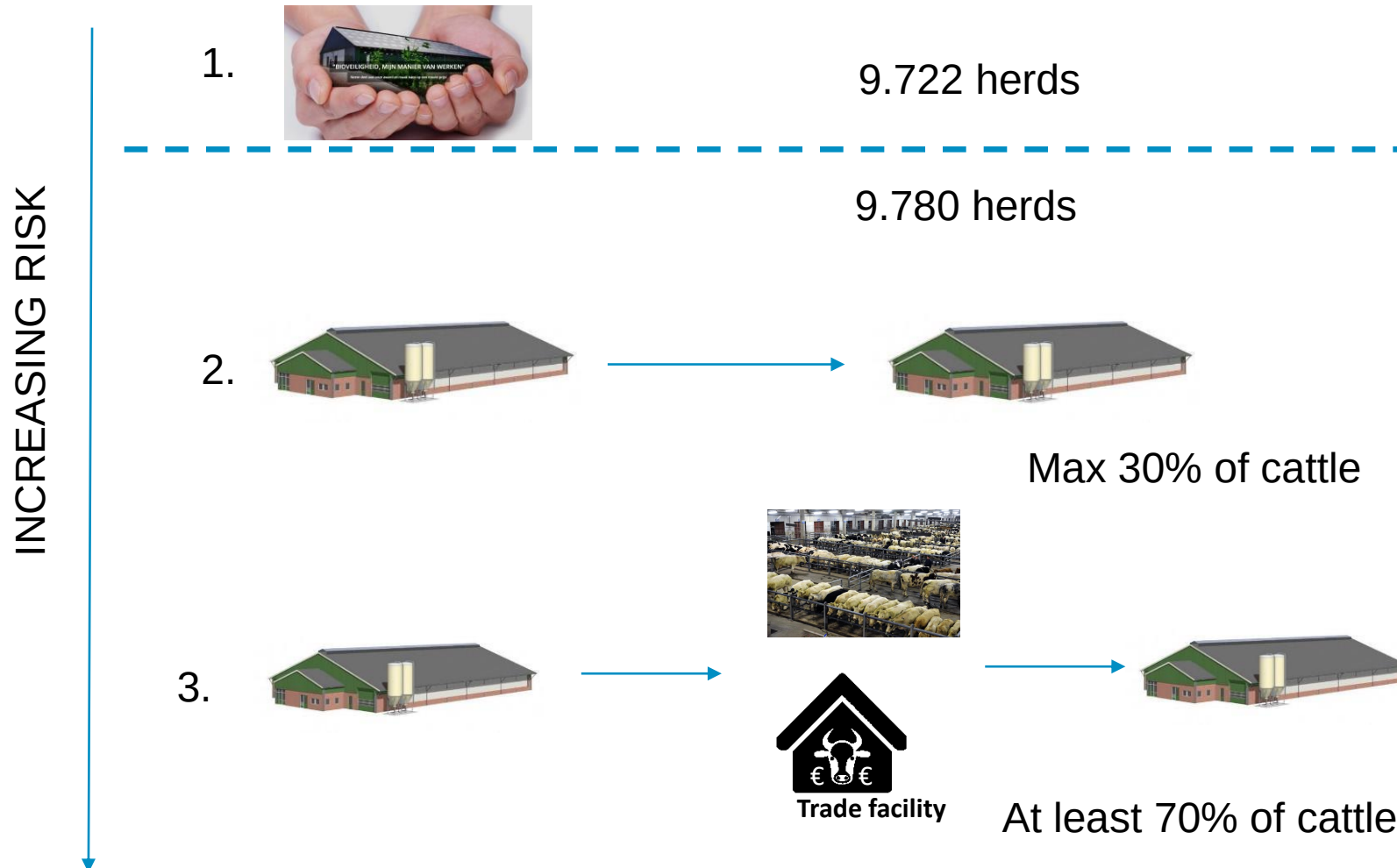


Cattle movements within Belgium in January 2021 (excluding imports)



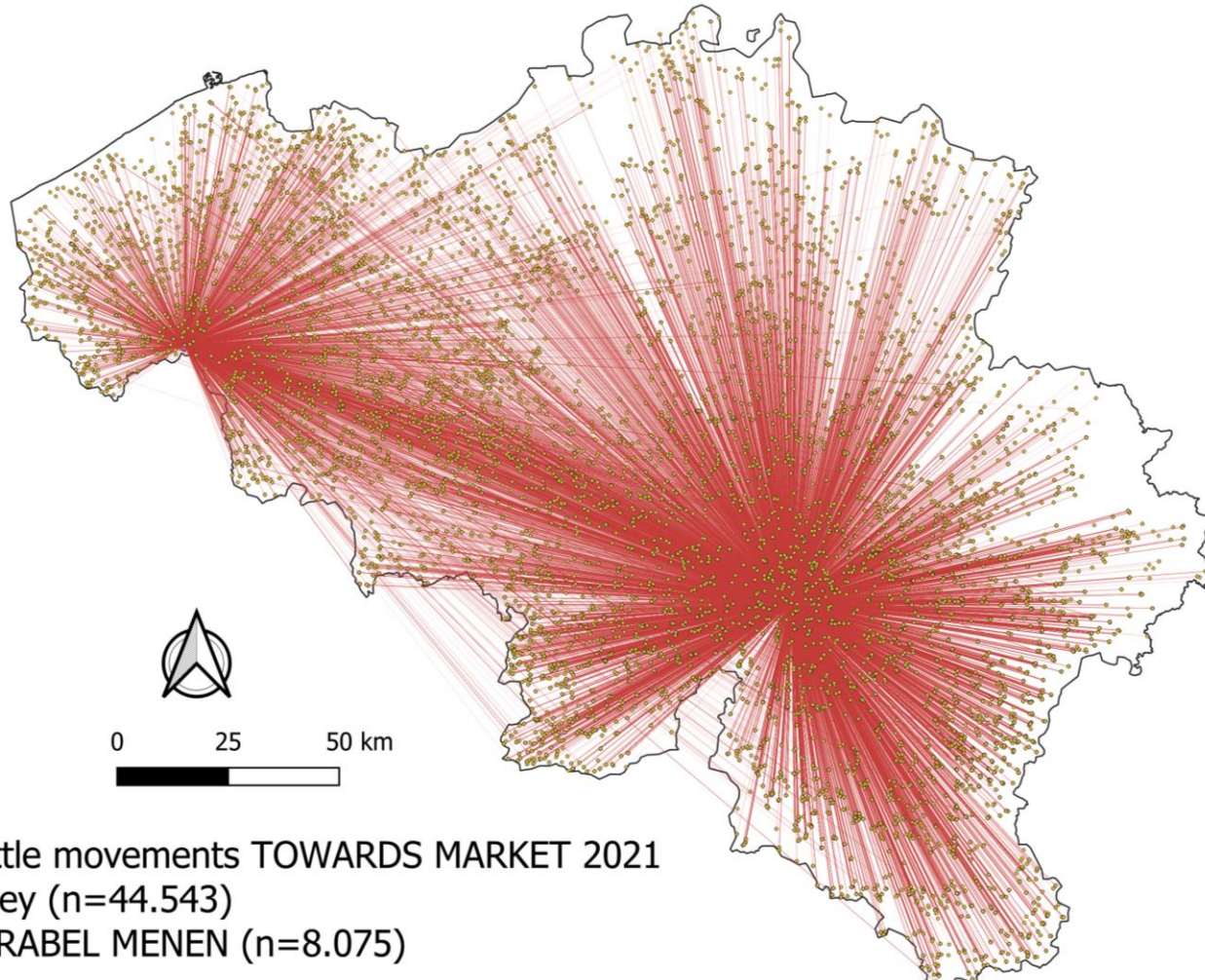
Cattle movements January 2021 (n=19.684)
without intermediary steps

Every farm takes different risks concerning purchase: size & frequency matters



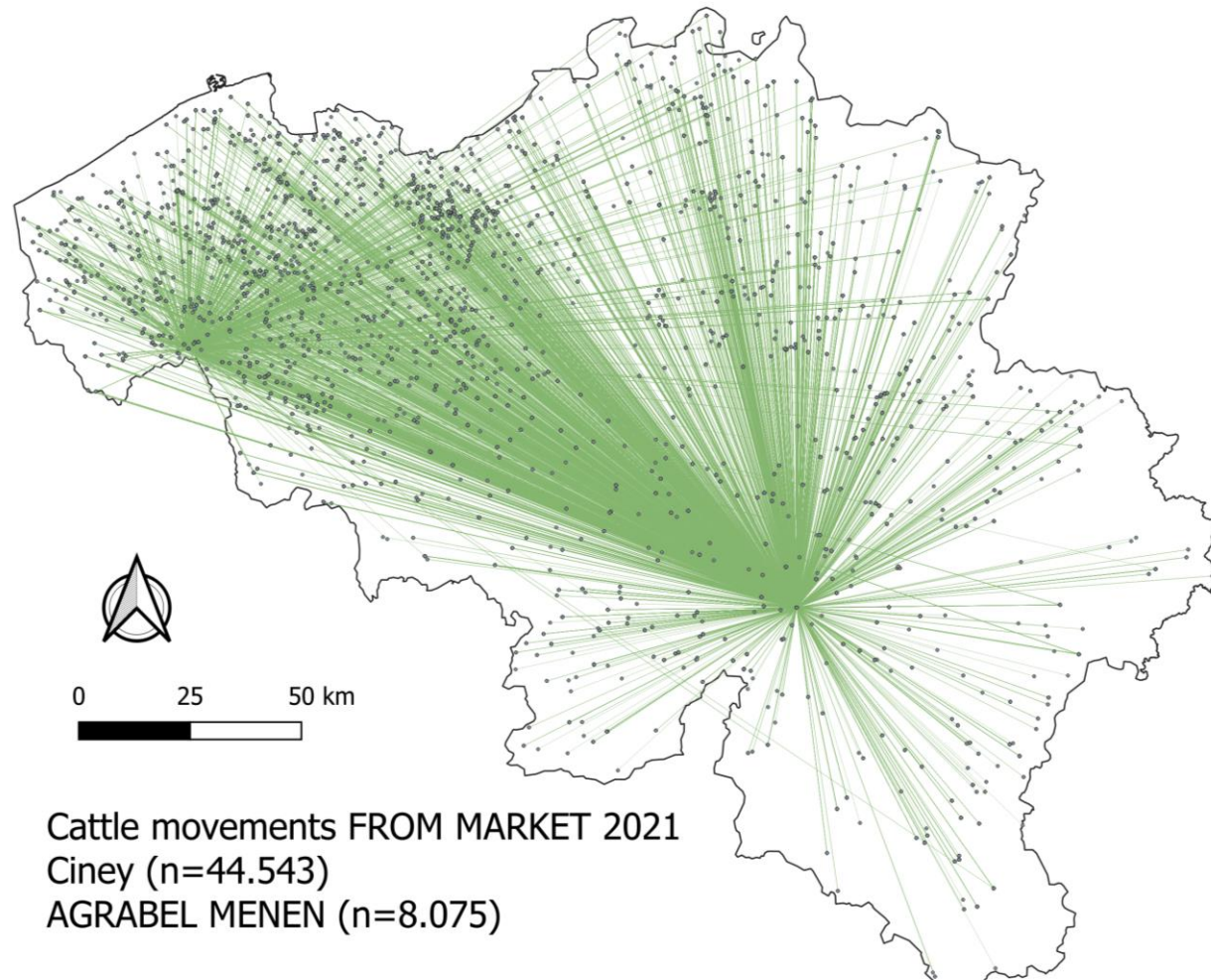
Category	Herds	Number of traded cattle
No purchases during 2021	9.722	0
With purchases during 2021	9.780	156.464
-1	3.312	3.312
- 2-3	2.349	5.491
- 4-10	1.900	11.778
- 11-20	851	12.470
- 21 - 50	745	23.287
- 51 – 100	299	21.159
- 101-1600	324	78.967
Movement to specific fattening facility	317	58.948

Cattle movements towards the two most important markets in 2021



>700 other trading facilities!

Cattle movement from the two most important markets in 2021



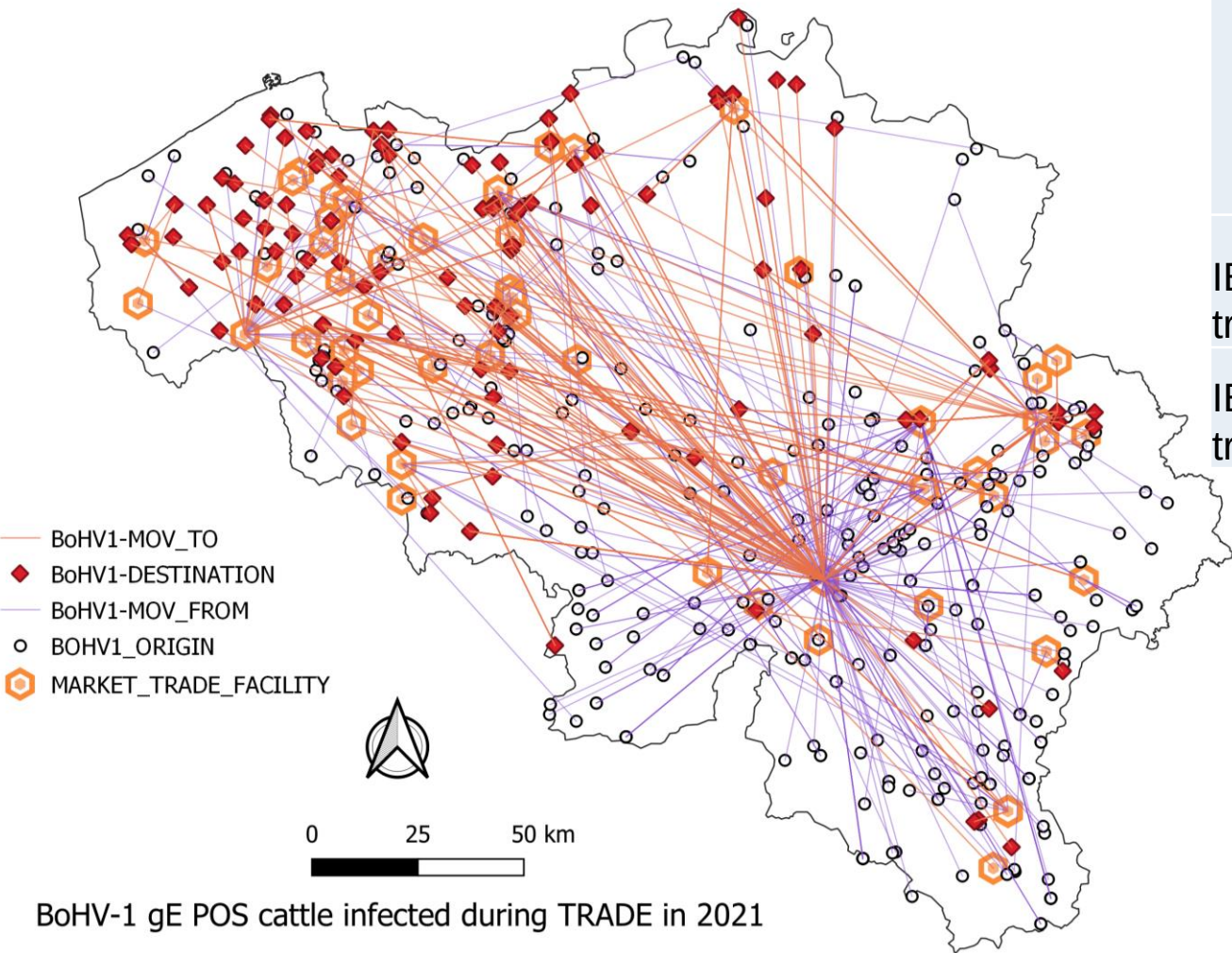
>700 other trading facilities!



What is actually happening in cattle trade and BoHV-1?

2021

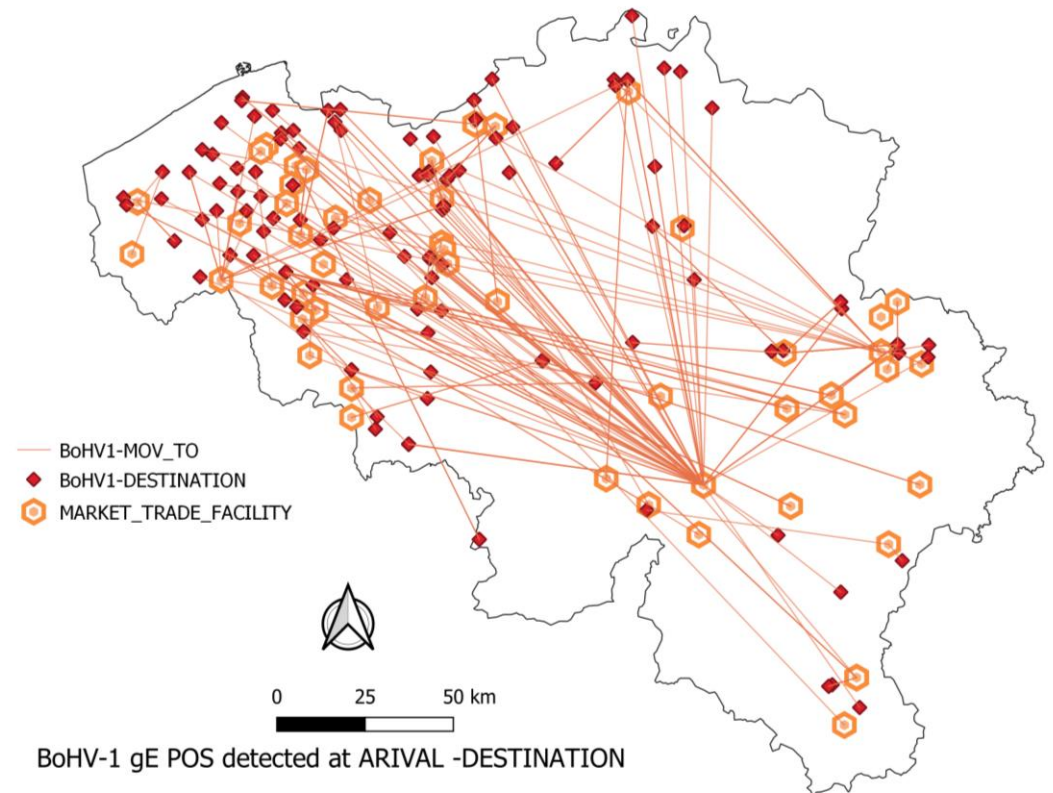
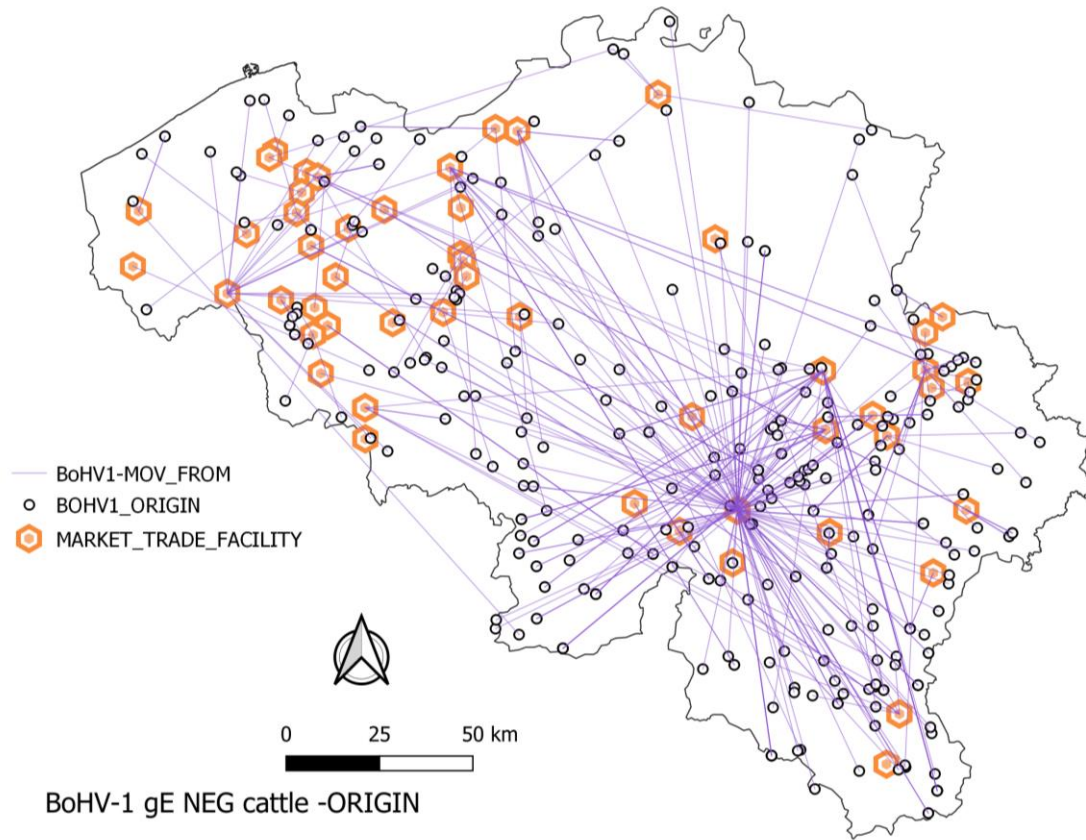
BoHV-1 gE+ cattle “created” during trade in 2021 (n= 875)



	Not direct	Direct	Trading facility	Market
IBR gE+ during transit	545	232	2	96
IBR gE+ before transit	329	755		

‘In theory’ animals originating from free herds may not be mingled during trade
Mixing of susceptible & infected cattle
>70% of traded cattle passes in trading facilities & cattle markets

BoHV-1 gE+ cattle “created” during trade in 2021 (n= 875) (2)



Some reasons why movement restrictions are (more) important?

1. Only from 2019 every traded animals is (theoretically) tested twice to account for viral circulation during trade, hence we are better able to detect viral circulation during trade
2. The type of animals and the trade patterns related to IBR have drastically changed making restrictions feasible
 1. The remaining infected herds are the once buying-in 80% of cattle
 2. Trading structure has not altered a lot (yet) –
 3. Median transport duration 5 days
 4. Still lot of indirect trade
3. Increase of number of gE positive animals during program coming into trade (e.g. 2017-2018 – 2021) with canalisation, and pressure of removal of economical valuable cattle
4. Higher number of susceptible cattle present in trade changes due to less vaccinated animals present
5. A limited number of gE + animals mixed with a lot of susceptible animals is a recipe for disaster, also in later stages



	2012	2013	2014	2015	2016	2017	2018
% Certified free herds	25,0%	27,0%	30,1%	35,5%	52,5%	67,2%	86,2%

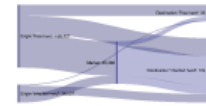
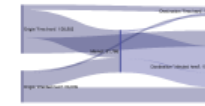
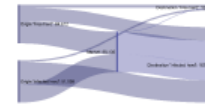
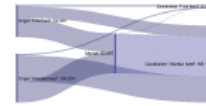
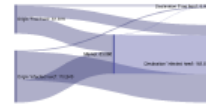
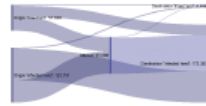
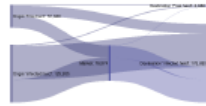
Phase I

Phase II
screening

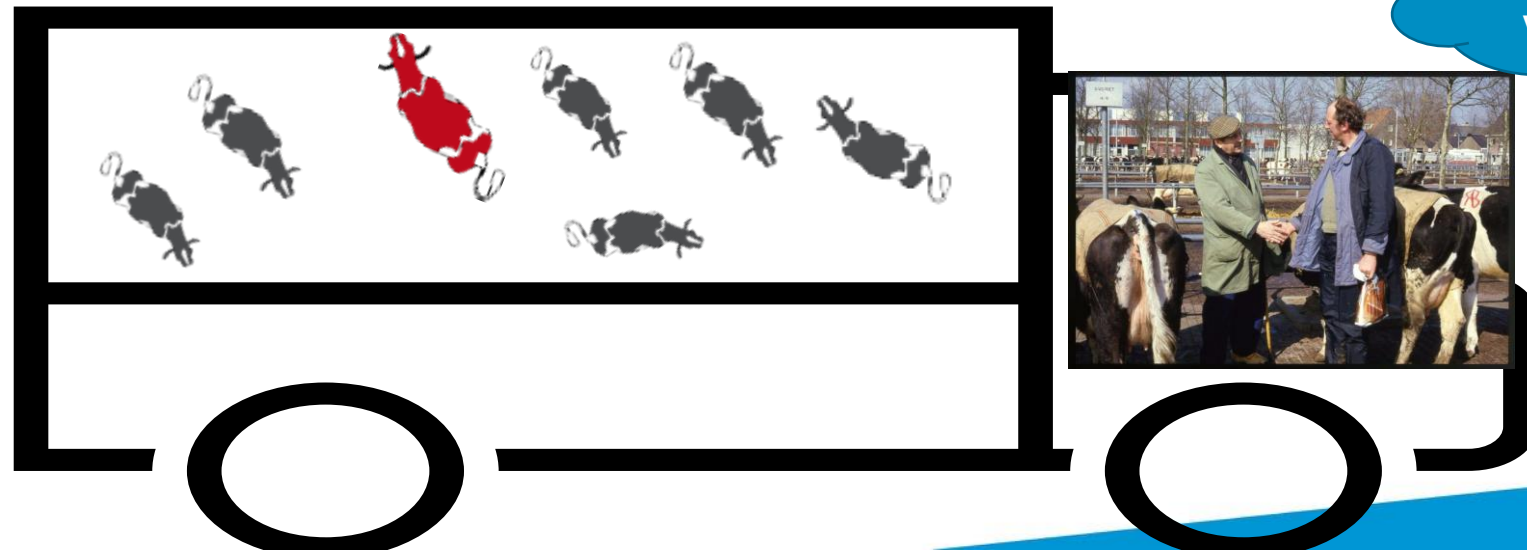
Canalisation of
BoHV-1 infected
animals for
slaughter.

Phase III
Trade
restrictions

Shifting trading
patterns



Estimated vaccination coverage*	80%?						20%?
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Farmers
should
vaccinate?

No, infected animal should
be strictly canalised during
the complete transport
chain!



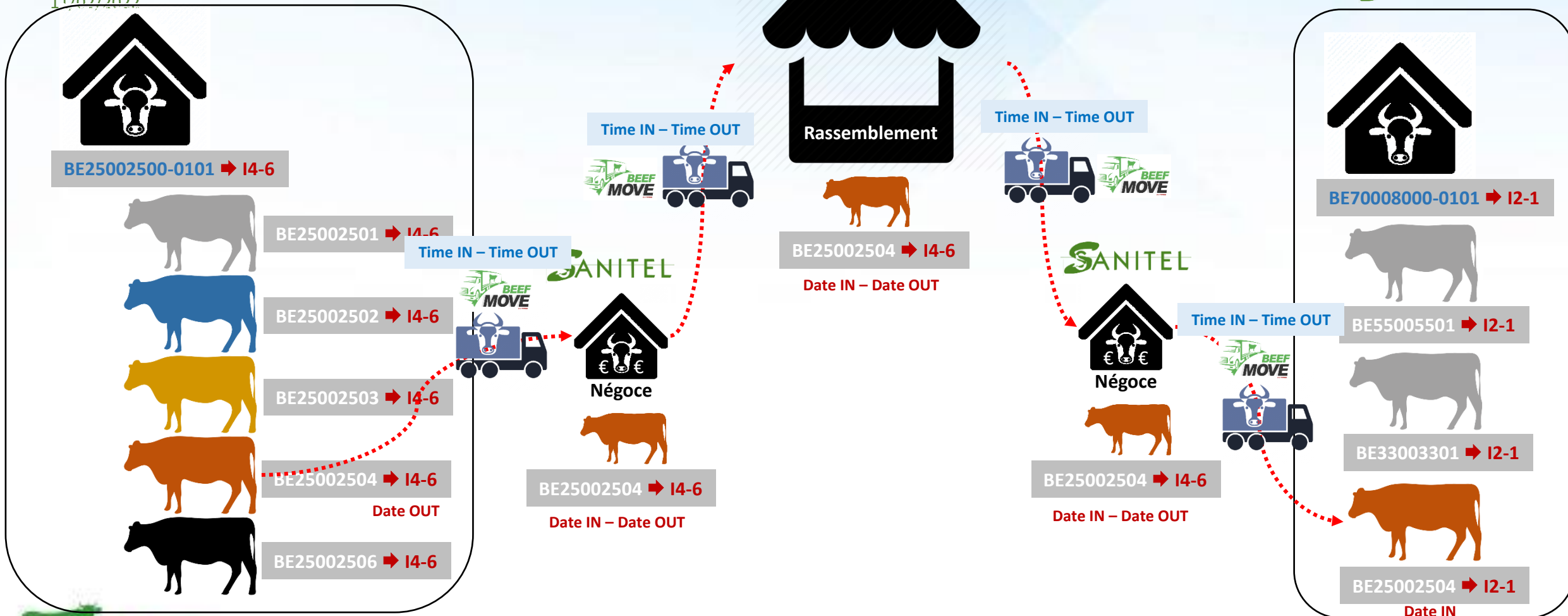
What will be the next challenge, necessary to obtain the BoHV-1 free status?

Help the sector to safely trade “healthy animals” – altering a mind set regarding trade

Bovins en transit ⇒ Beefmove

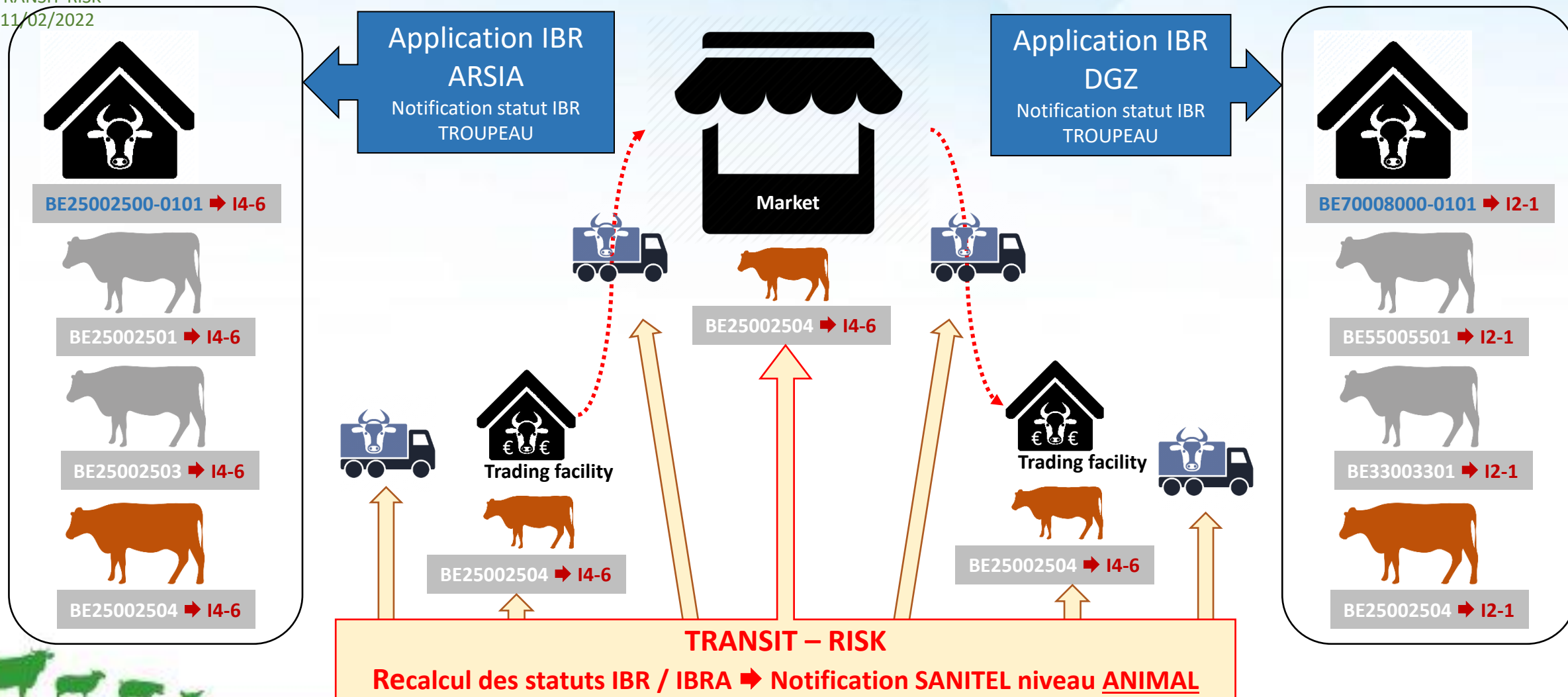
GT ARSIA-DGZ
TRANSIT-RISK
11/02/2022

SANITEL



Coupling traceability and BoHV-1 status together

GT ARSIA-DGZ
TRANSIT-RISK
11/02/2022



The challenge for IBR, a 'trade' disease?

All necessary movement restrictions are in place, but they have to be implemented correctly.

Cattle trade is of economical importance, cooperation with farmers and cattle traders is a necessity.

Using new tools to improve traceability during trade, not only necessary for BoHV-1 control but also for all other infectious disease, and demonstrating the benefits for the industry.

“A cow that has to be traded should be a healthy cow, free of disease”.

Further mind shift for the most important aspect of biosecurity (transmission through direct contact).

Questions?



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