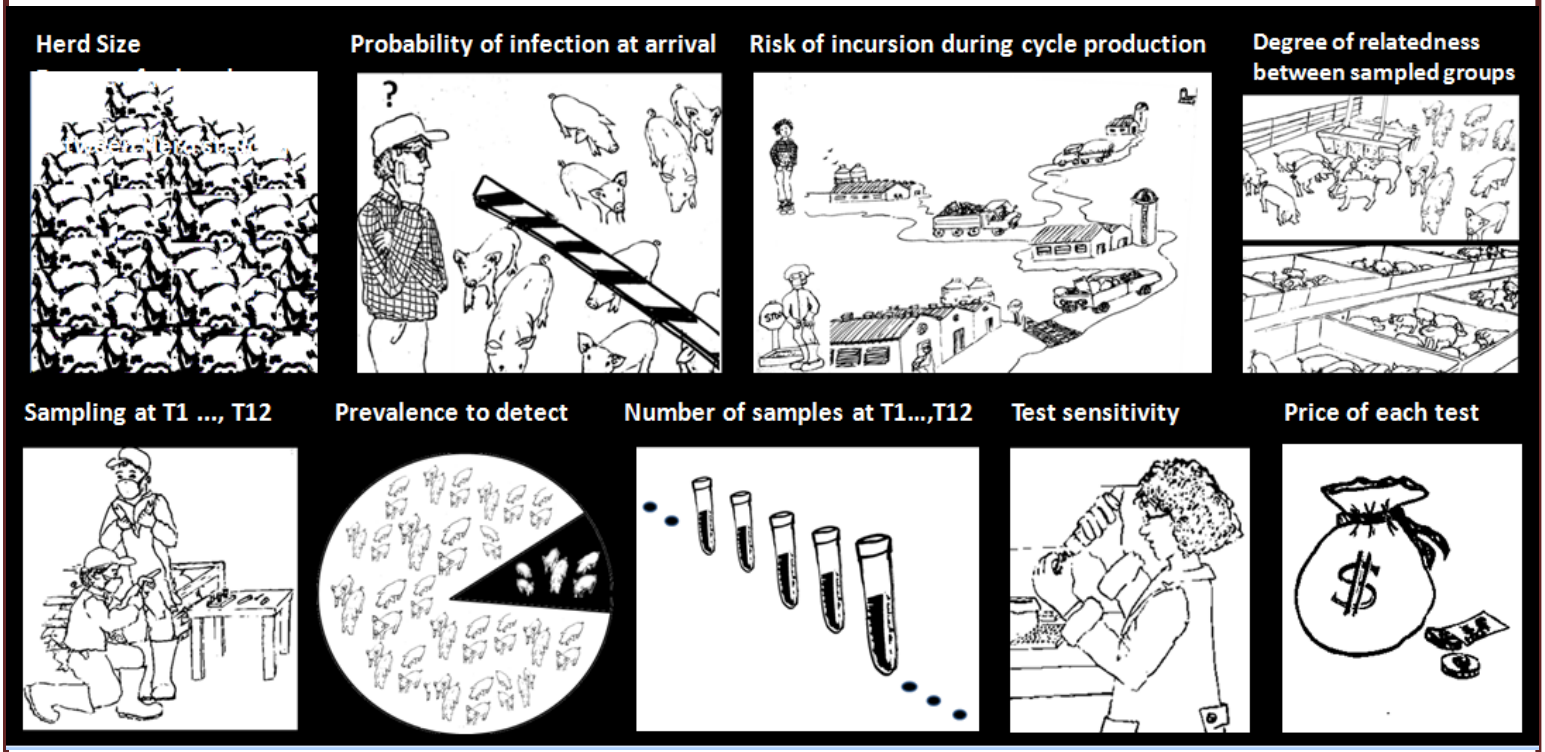
‘OPTISAMPLE’

WITH APPLICATION TO PORCINE RESPIRATORY REPRODUCTIVE SYNDROME AS WORKING EXAMPLE

The **user** includes as **input** values:



Optisample’ provides as **output** values:

- the **total number of samples tested**
- the **cost of testing**
- the **maximum number that could be infected**
- the **probability of being free after each sampling** and **overall all period** given that all the tests result negative.

The model **simulates two situations** for each farm:

I. Where the group sampled is representative of the herd and is always the **same group**

II. Where the **sampled groups vary** over time

ASSESSING SCENARIOS using OPTISAMPLE'

We simulate and compare sampling schemes for three hypothetical swine farms to identify the most efficient strategy in order to demonstrate freedom of PRRSv.

FARM A -> Multiplier herd with negative infection status (IV).

- Context of very low incidence of PRRSv (i.e. between 1 and 2 outbreaks every 10 years)
- Without recent introduction of pigs
- Sera tested using a commercial PRRSv antibody ELISA kit.

FARM B -> Multiplier herd with negative infection status (IV).

- Context of medium incidence of PRRSv (i.e. between 1 and 2 outbreaks every 3 years)
- Recent introduction of pigs
- Sera tested using a commercial PRRSv antibody ELISA kit.

FARM C -> Commercial herd with positive stable undergoing elimination status (IV).

- Recent introduction of pigs
- Sera tested by PCR.

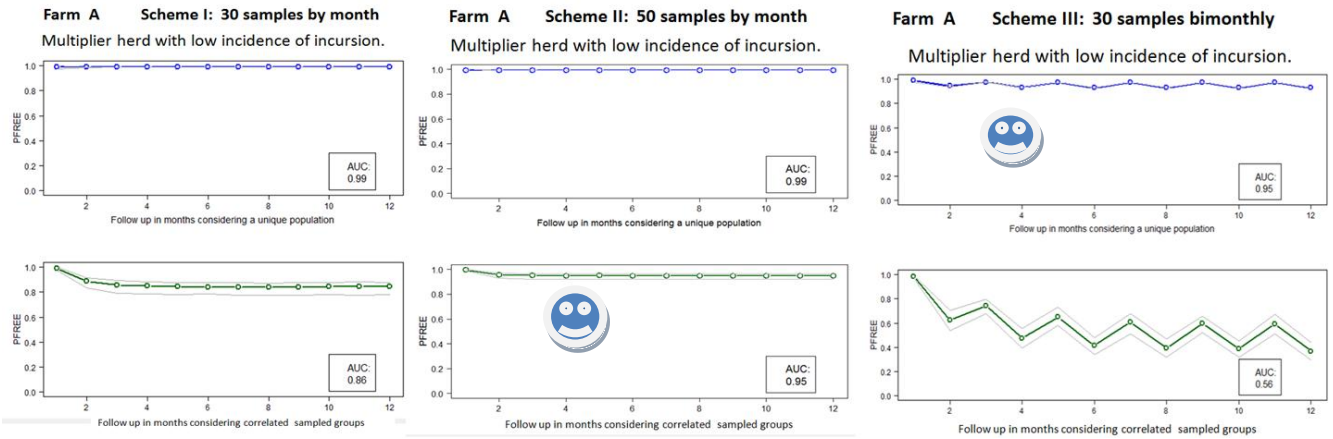
In the event of infection in all farms we expect to detect at least a 5 % of prevalence.

We assume a hypothetical price of 5 dollars for each serological test and 10 dollars for each PCR.

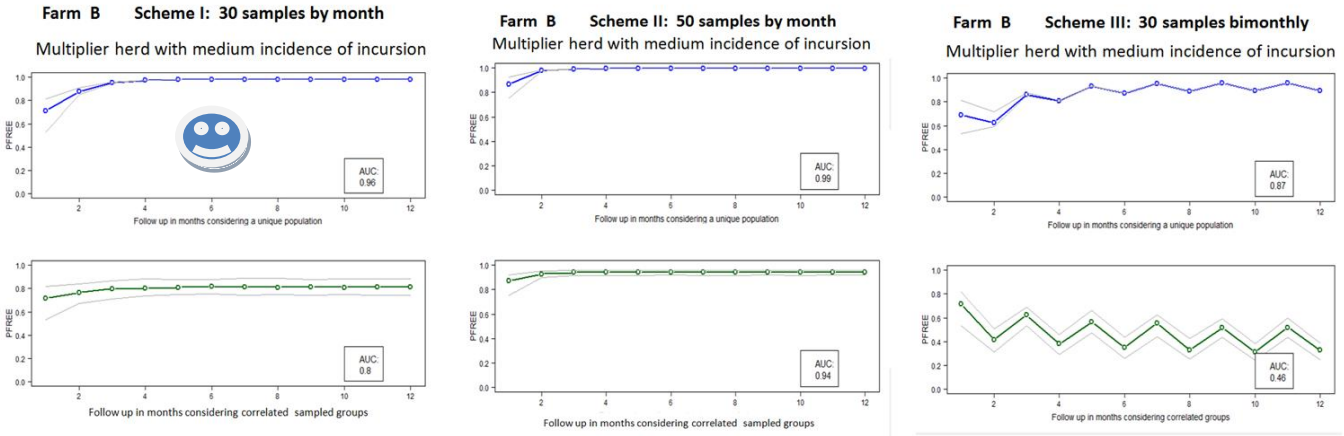
Inputs values of for each scenario proposed with respective sampling schemes to assess

INPUTS	Farm A	Farm B	Farm C
Demographical and epidemiological context			
Herd Size	3000	3000	3000
Probability of infection at the arrival	0% - 10%	50% - 80%	80% - 100%
Risk of infection between consecutive samples	0% - 0.08%	3% - 10%	3% - 10%
Sampling strategy			
Prevalence to detect*	5%	5%	5%
SCHEME I	30 by month	30 by month	30 by month
SCHEME II	50 by month	50 by month	60 at T1 +30 by month
SCHEME III	30 bimonthly	30 bimonthly	60 at T1 +30 bimonthly
Test sensitivity	97% - 99%	97% - 99%	97% - 99%
Degree of relatedness between groups	0.5 - 0.8	0.5 - 0.8	0.5 - 0.8
Price of each test	5	5	10

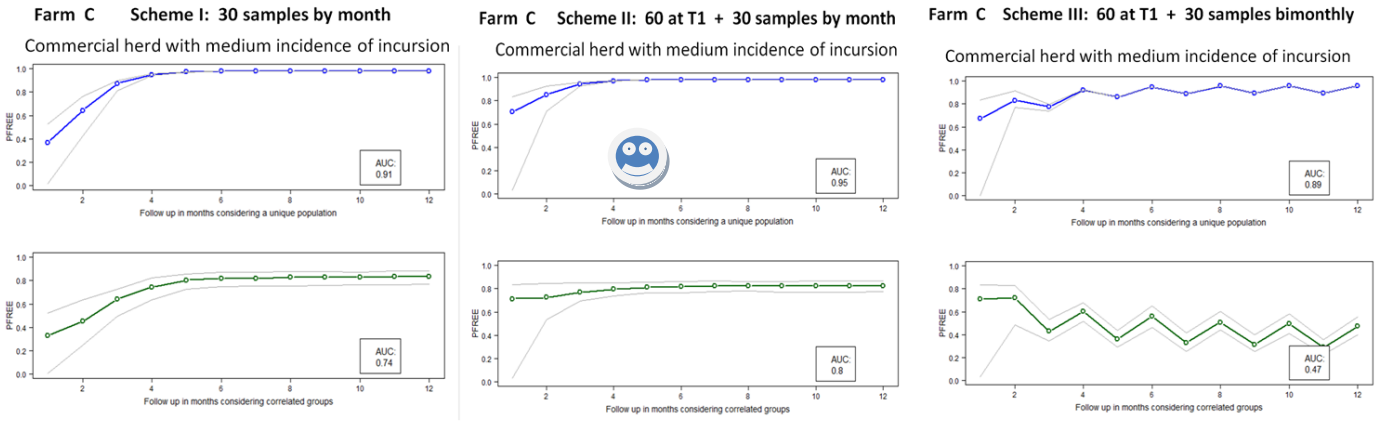
OUTPUTS of 'OPTISAMPLE'



Farm A: A multiplier herd withlow risk of infection at the arrival and between consecutive samplings



Farm B: A multiplier herd with unknown risk of infection at the arrival and medium risk between consecutive samplings



Farm C: A commercial positive stable herd undergoing elimination with a medium risk between consecutive samplings

Optimum strategy: good level of confidence (at least 95%) and lower cost

Summarized outputs for the scenarios proposed

FARMS	Farm A			Farm B			Fam C		
SCHEME	I	II	III	I	II	III	I	II	III
OUTPUTS									
Pr of being free testing the same group	0.99	1	0.95	0.95	0.99	0.87	0.91	0.95	0.89
Pr of being free testing different groups	0.84	0.95	0.58	0.80	0.94	0.46	0.74	0.80	0.47
Cost of testing	1800	3000	900	1800	3000	900	3600	3900	2400

'Optisample' illustrates the importance of assessing both epidemiological context and process of sampling selection to demonstrate freedom of disease. This approach can be easily extended to other systems of surveillance for different animal diseases.

'Optisample' has been built as an open web application accessible to veterinarians, producers and other users interested.