

Assessment of mammary gland elasticity profiles in dairy cows using once-daily milking

Clémentine Charton

Advisors : J. Guinard-Flament, H. Larroque

INRA – Agrocampus Ouest UMR PEGASE

INRA – INPT ENSAT – INPT ENVT UMR GenPhySE

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Cows must adapt to a changing context for the system to survive

Economics



Technics



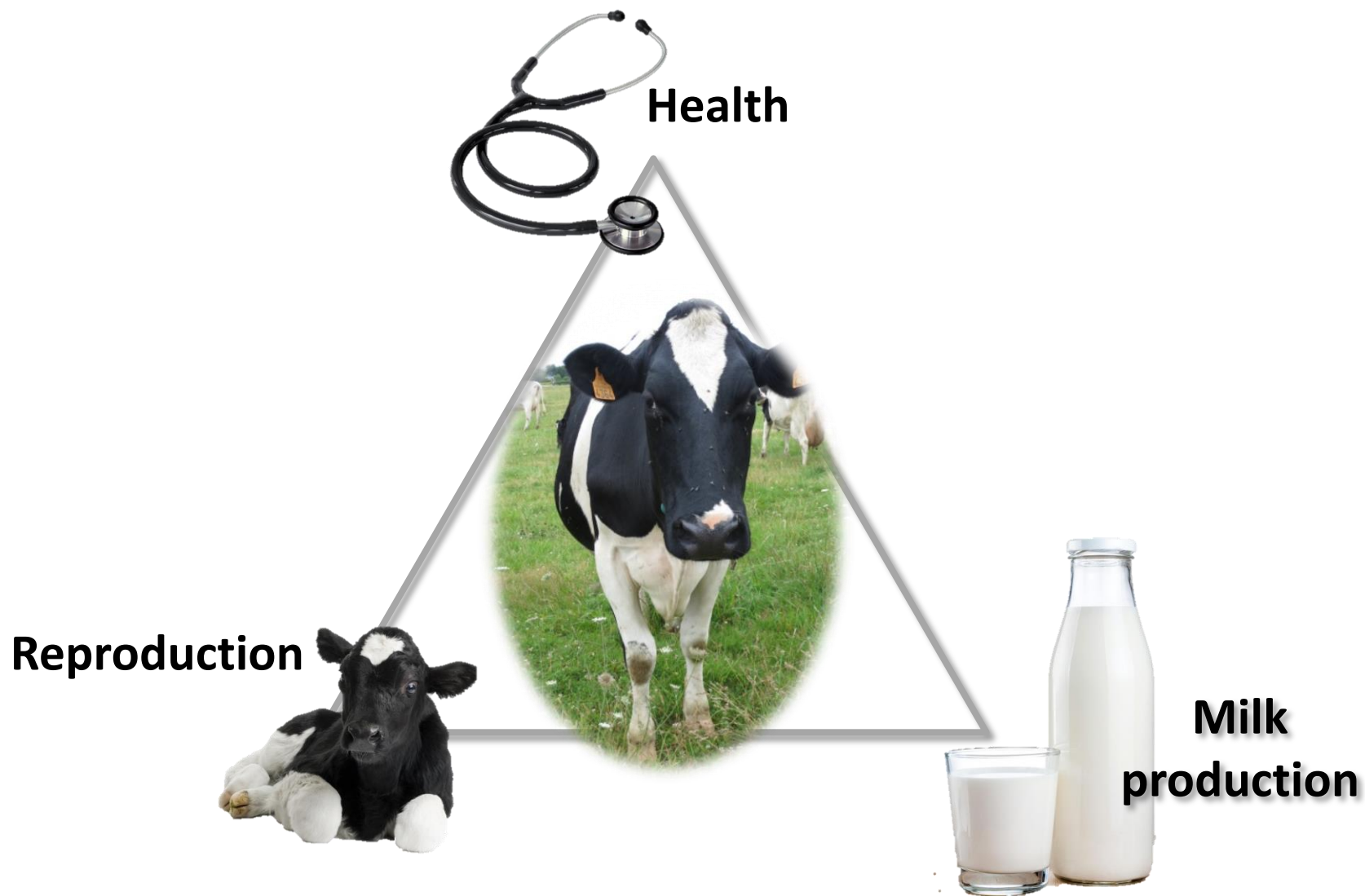
Sociology



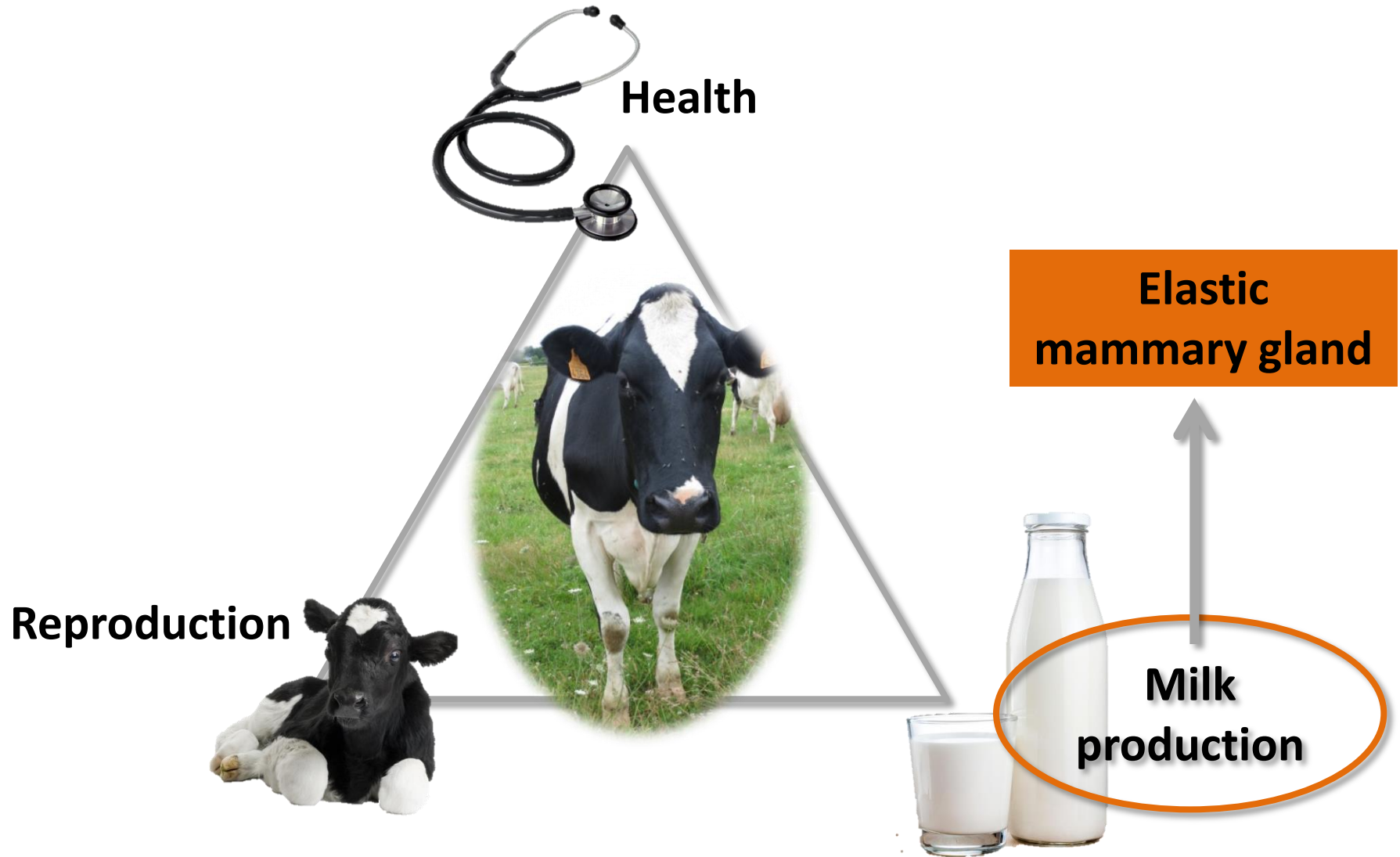
Environment



What is an adaptable cow ?

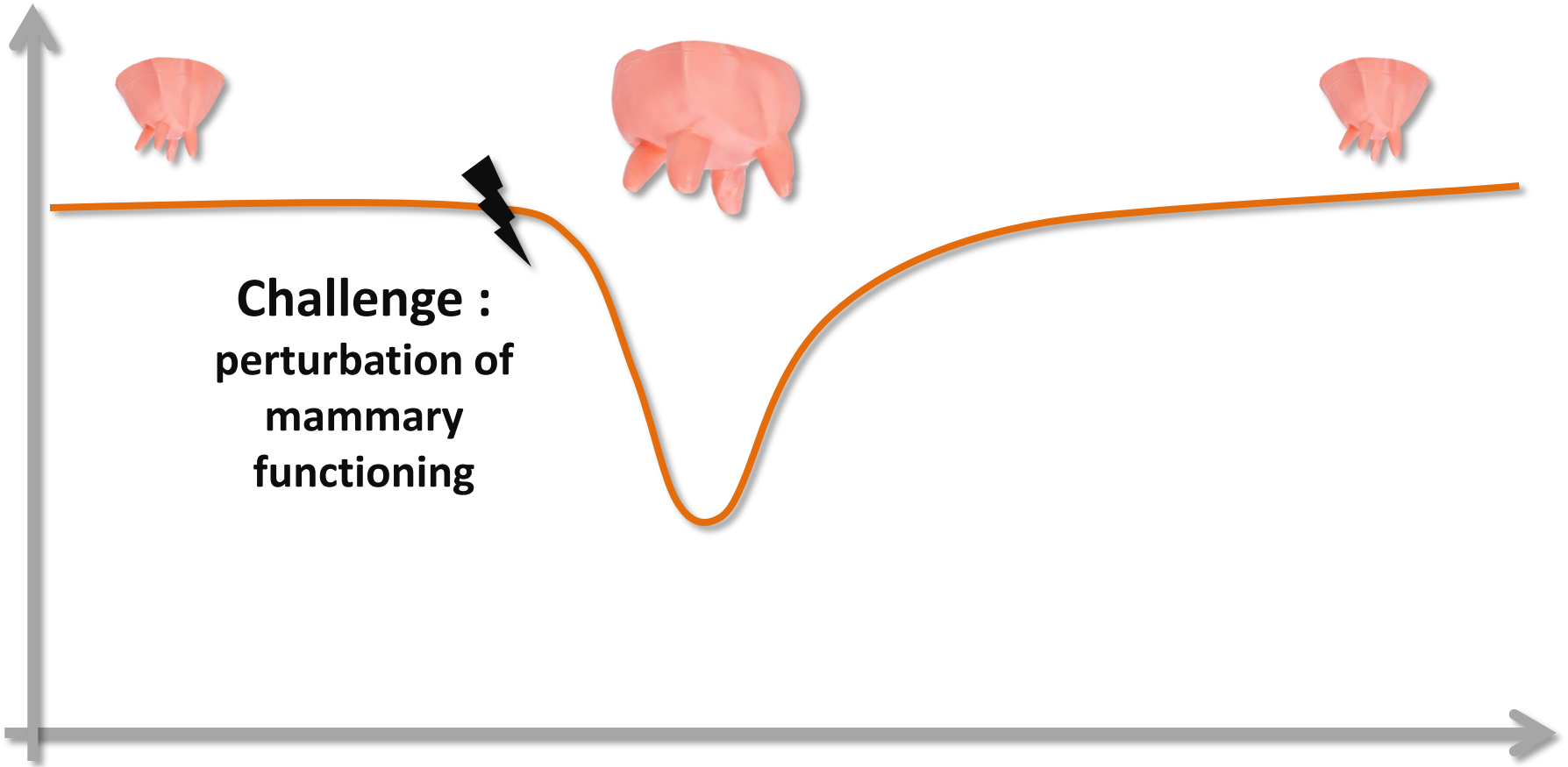


What is an adaptable cow ?



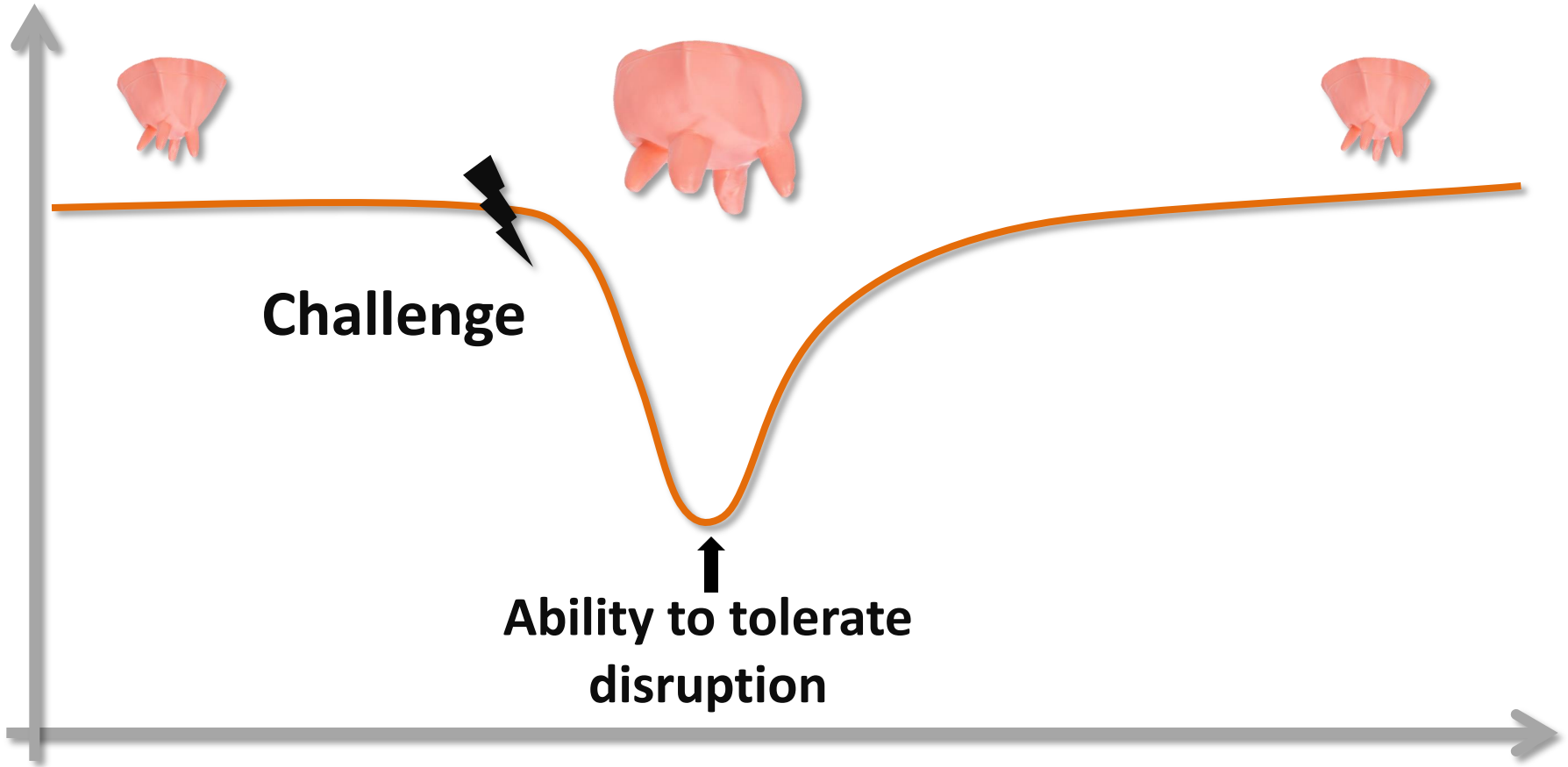
Adaptable cows = cows whose mammary glands are elastic

Elasticity ?



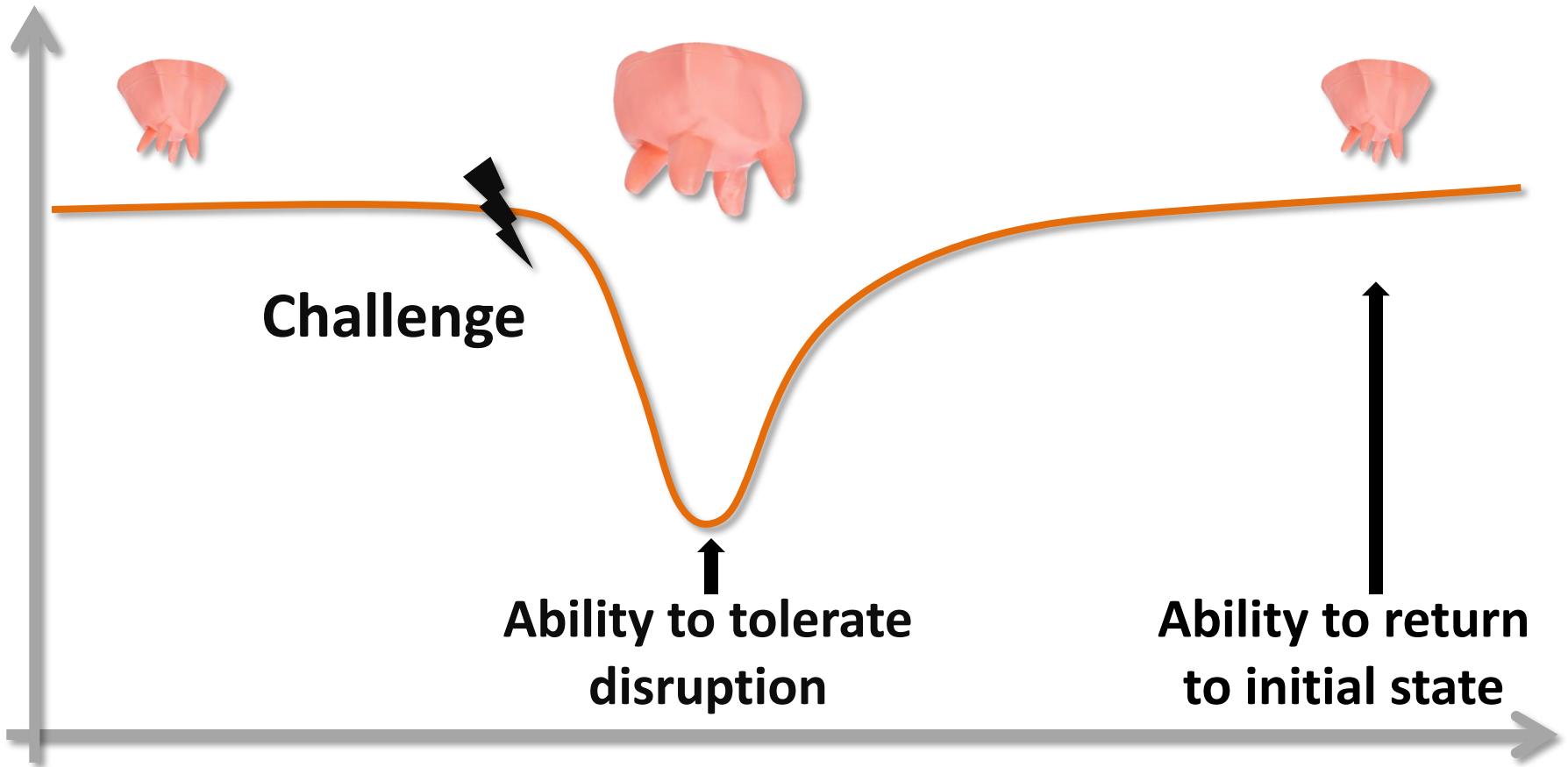
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Elasticity ?

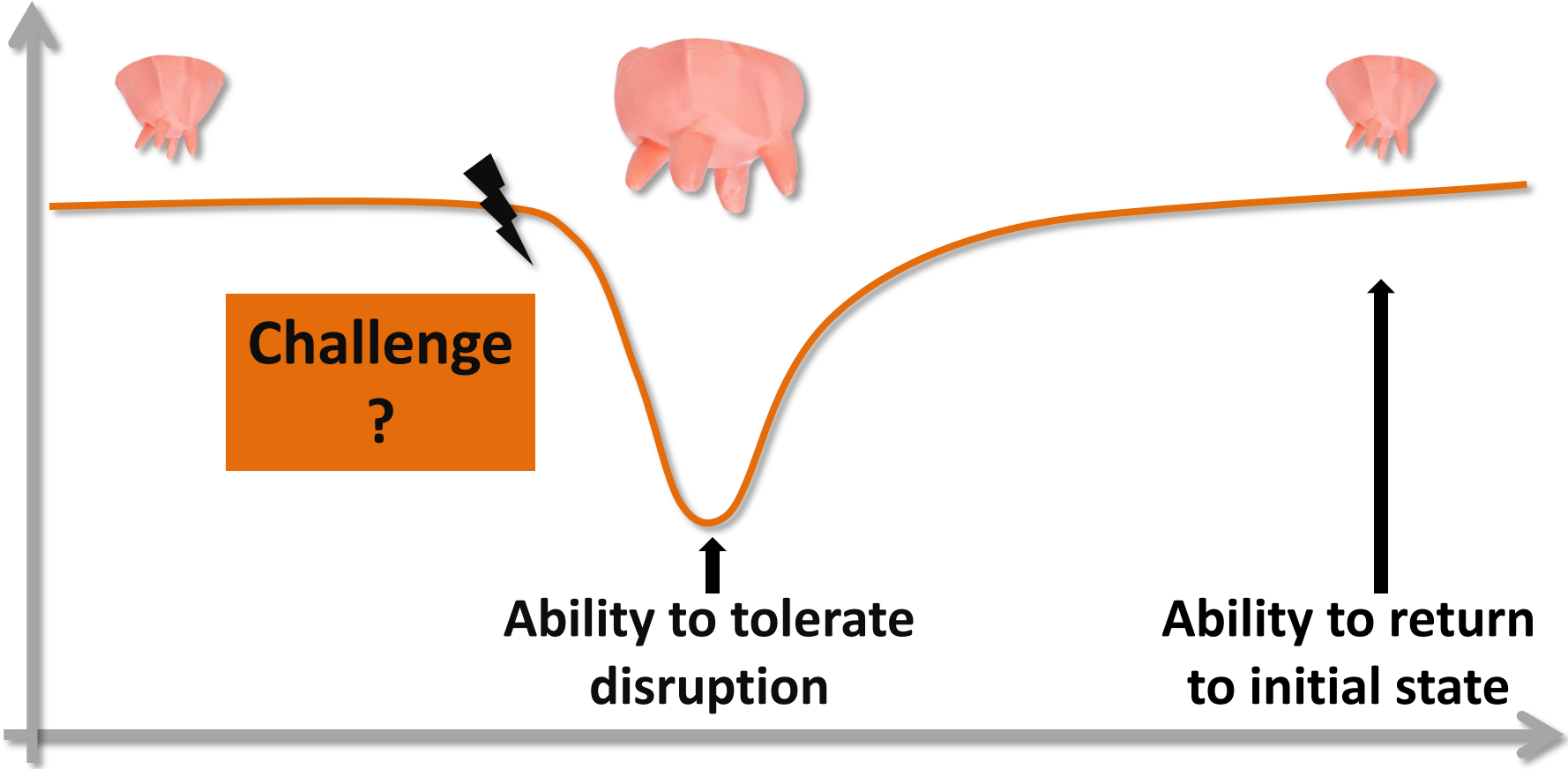


Adaptable cows = cows whose mammary glands are elastic

Elasticity ?



Need to find a challenge to assess mammary gland elasticity



Once-daily milking, a suitable challenge to assess mammary elasticity ?

**Once-daily milking (ODM)
= 1 milking / day instead of 2 (TDM)**

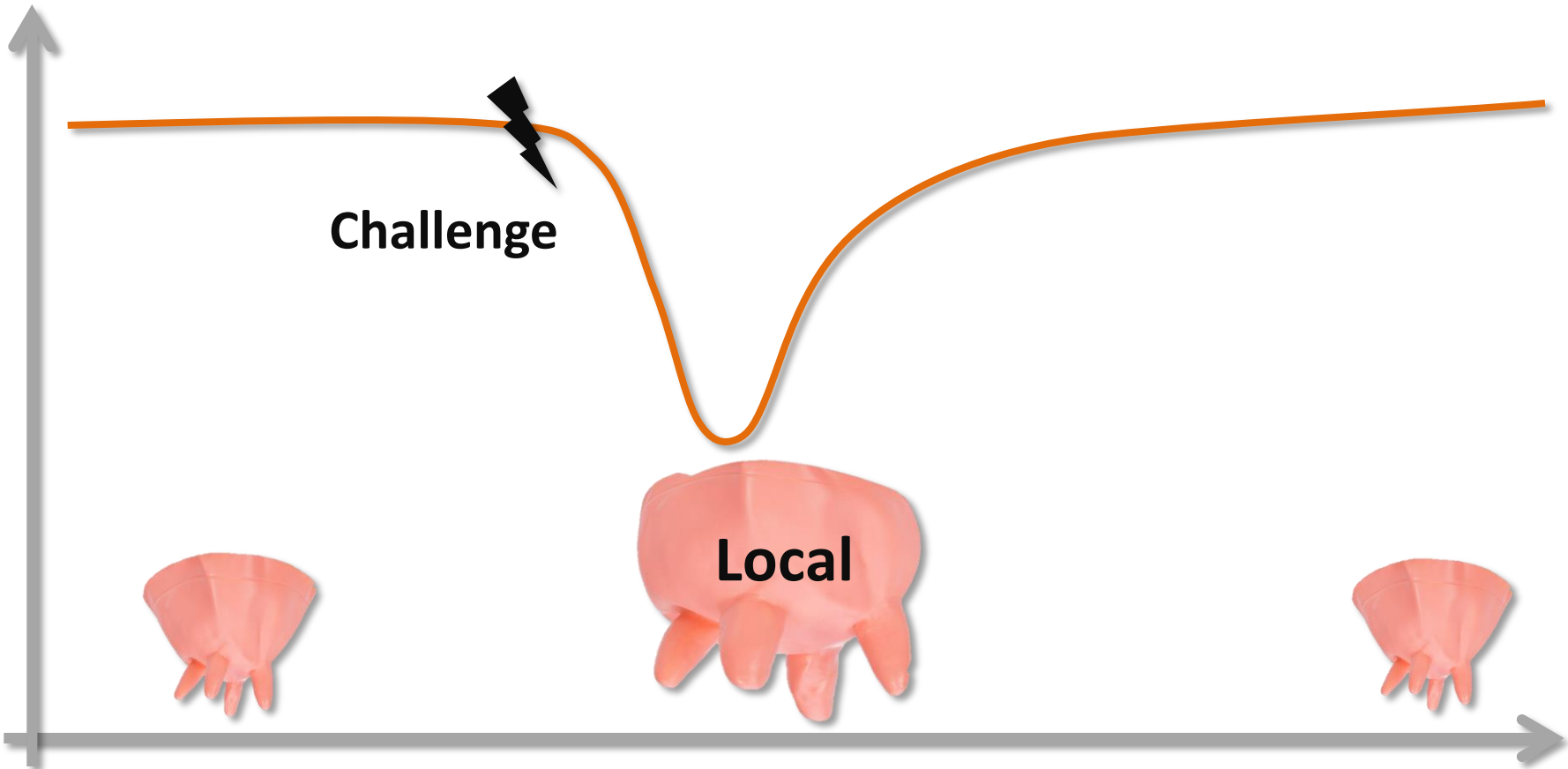
↘ 20 to 30 % milk yield



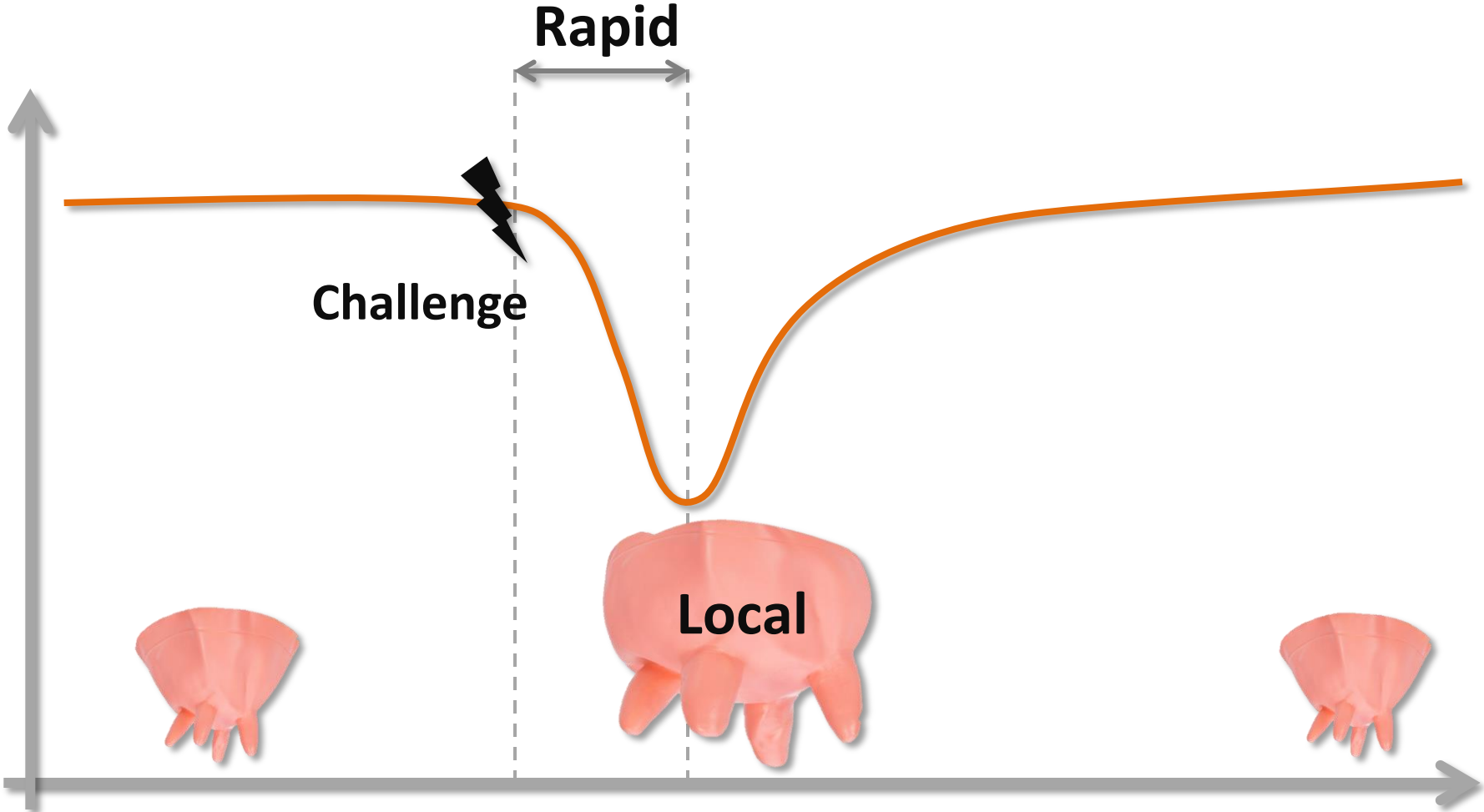
Changes in milk composition



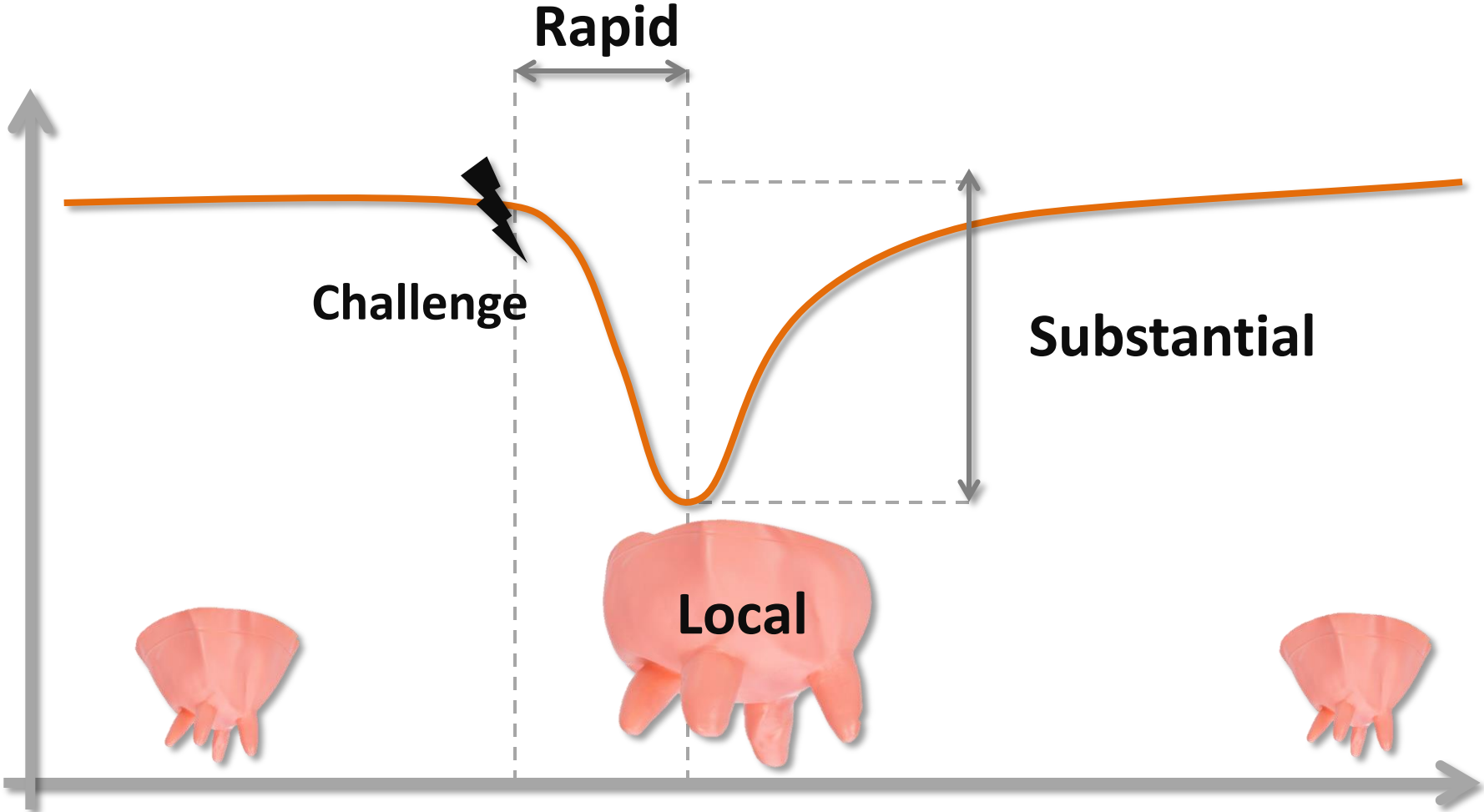
Once-daily milking, a suitable challenge to assess mammary elasticity ?



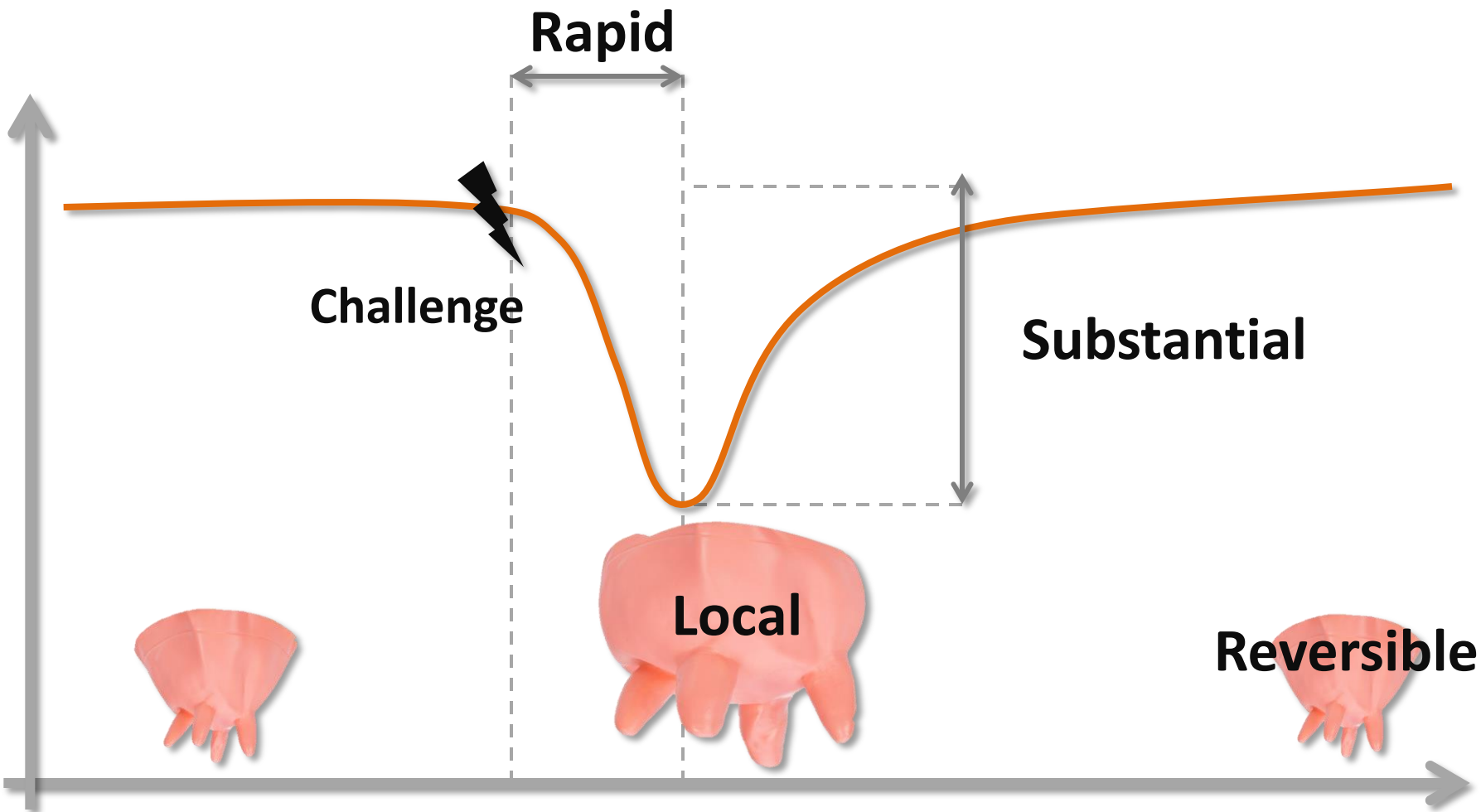
Once-daily milking, a suitable challenge to assess mammary elasticity ?



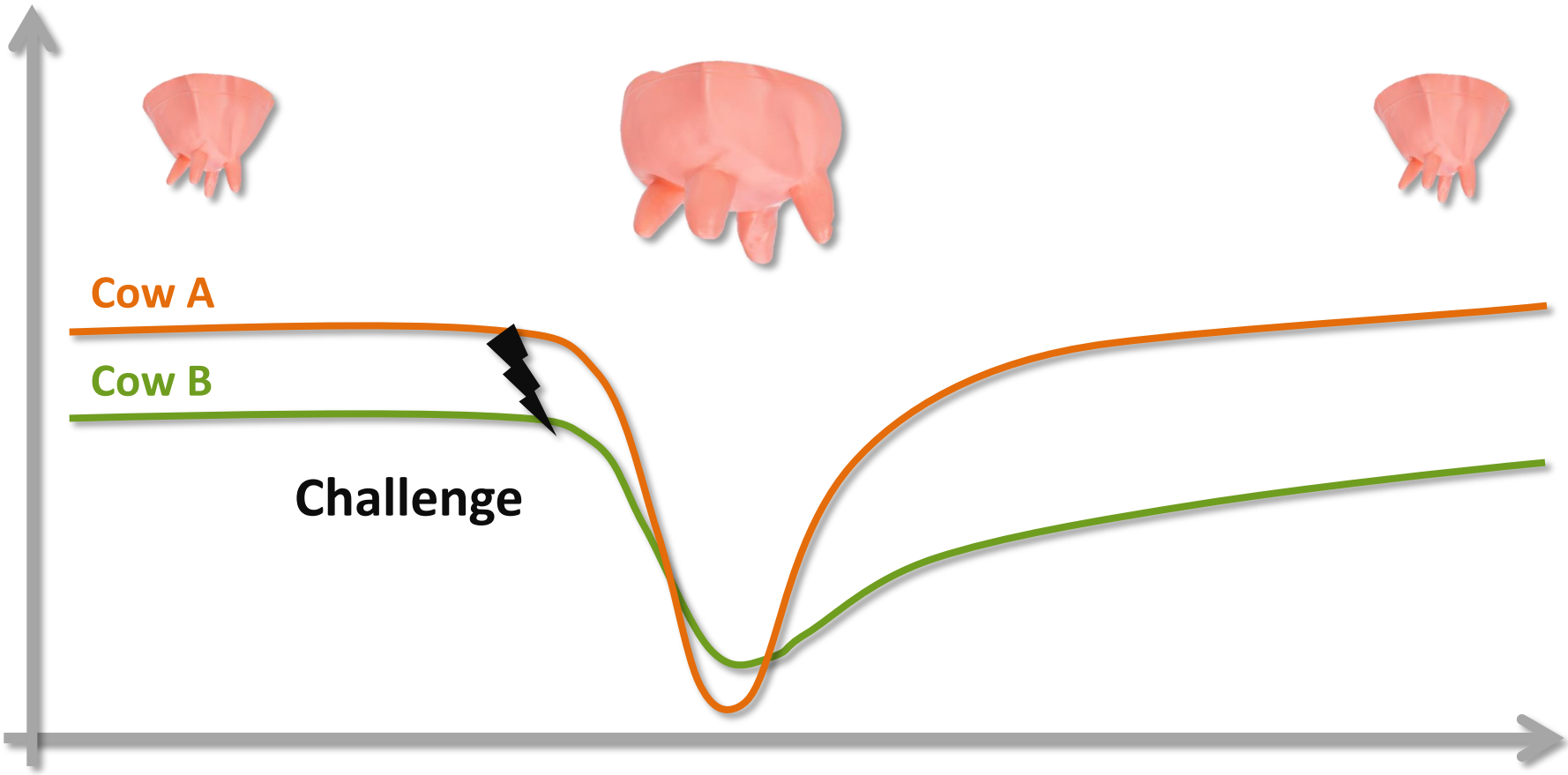
Once-daily milking, a suitable challenge to assess mammary elasticity ?



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Once-daily milking, a suitable challenge to assess mammary elasticity ?



Variability of responses between cows

➔ Discrimination of individuals

Use of 1 day ODM challenge



MÉJUSSEAUME EXPERIMENTAL FARM

5 years



Use of 1 day ODM challenge



MÉJUSSEAUME EXPERIMENTAL FARM

5 years

control wk TDM
(d7 to d1 before ODM)

ODM
(d1)

Post TDM
(d7 to d13 after ODM)

293 Holstein

Use of 1 day ODM challenge



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5 years

control wk TDM
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ODM
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Post TDM
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293 Holstein

Inter and intra
lactation repeated
measures
n=724 challenges

Use of 1 day ODM challenge



MÉJUSSEAUME EXPERIMENTAL FARM

5 years

control wk TDM
(d7 to d1 before ODM)

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293 Holstein

Inter and intra
lactation repeated
measures
n=724 challenges

Wide
variation of
breeding
factors

Could 1 day ODM be used to quantify mammary gland elasticity ?

Elasticity

Tolerate disruption

Return to initial state

Could 1 day ODM be used to quantify mammary gland elasticity ?

Milk loss
(kg/d, %)



Elasticity

Tolerate disruption

Return to initial state

Could 1 day ODM be used to quantify mammary gland elasticity ?

Milk loss
(kg/d, %)

Milk recovery (kg/d)
Milk recovery : loss ratio (%)

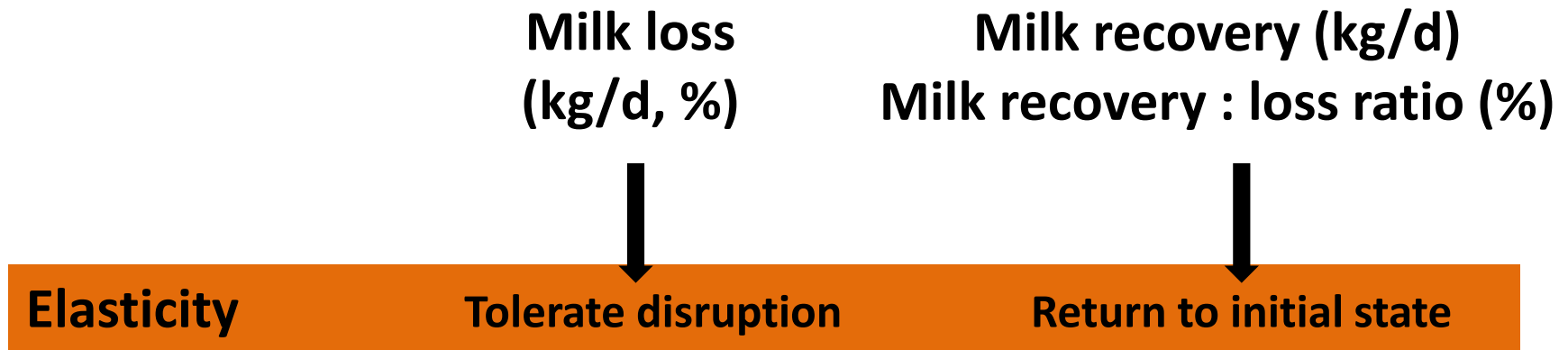


Elasticity

Tolerate disruption

Return to initial state

Could 1 day ODM be used to quantify mammary gland elasticity ?

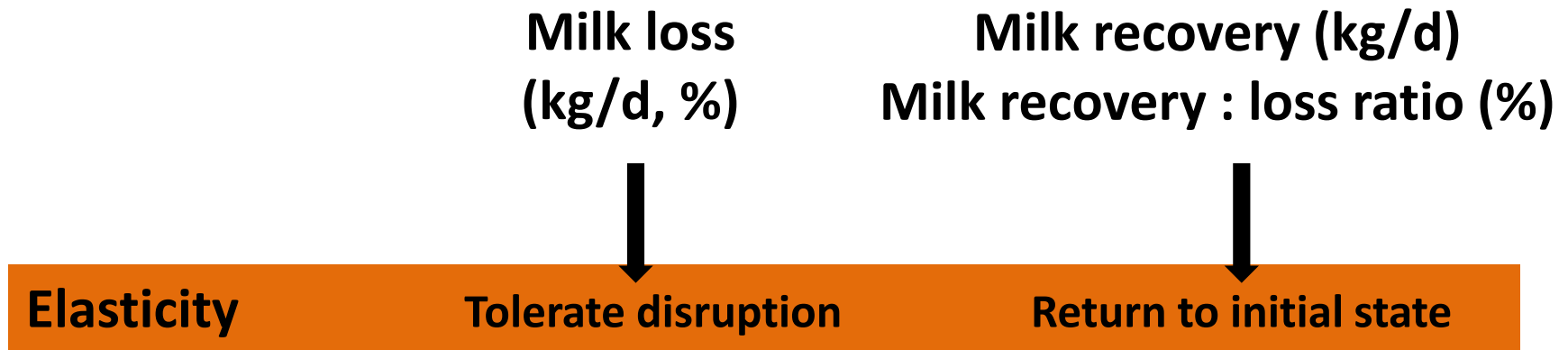


① Response profiles

② Breeding factors

Stage of lactation, parity,
age at first calving ...

Could 1 day ODM be used to quantify mammary gland elasticity ?

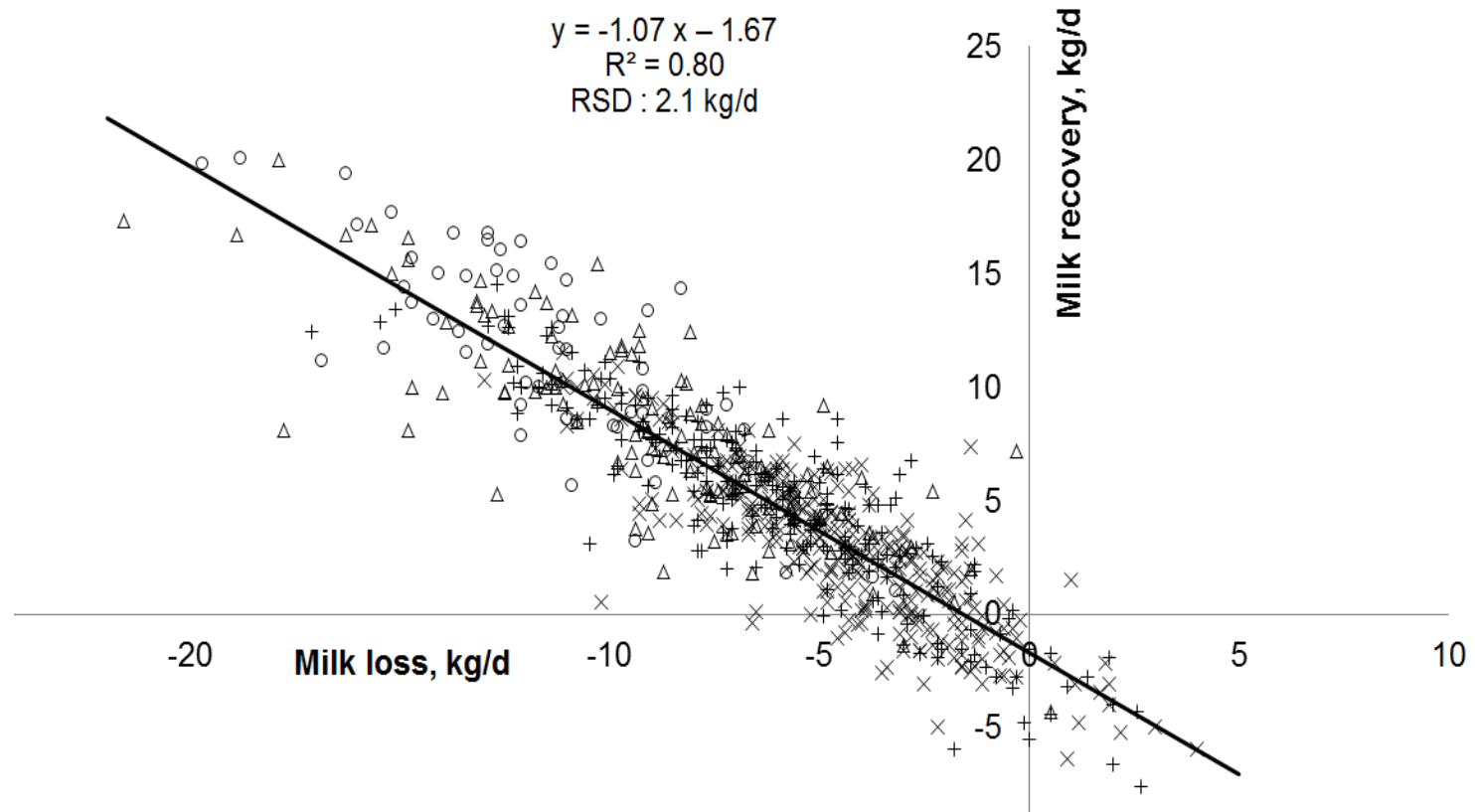


① Response profiles

② Breeding factors

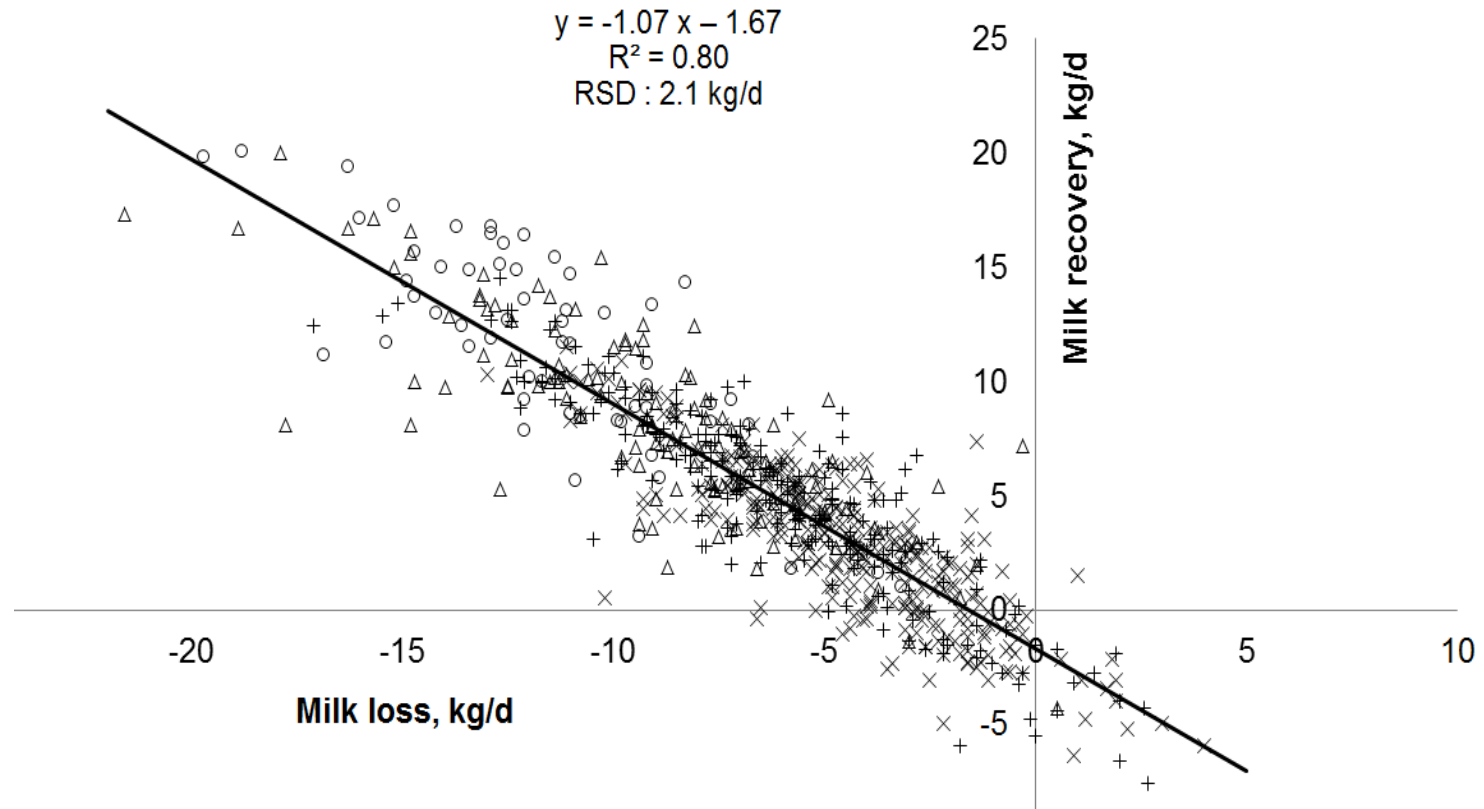
Stage of lactation, parity,
age at first calving ...

ODM generates a wide variability of responses



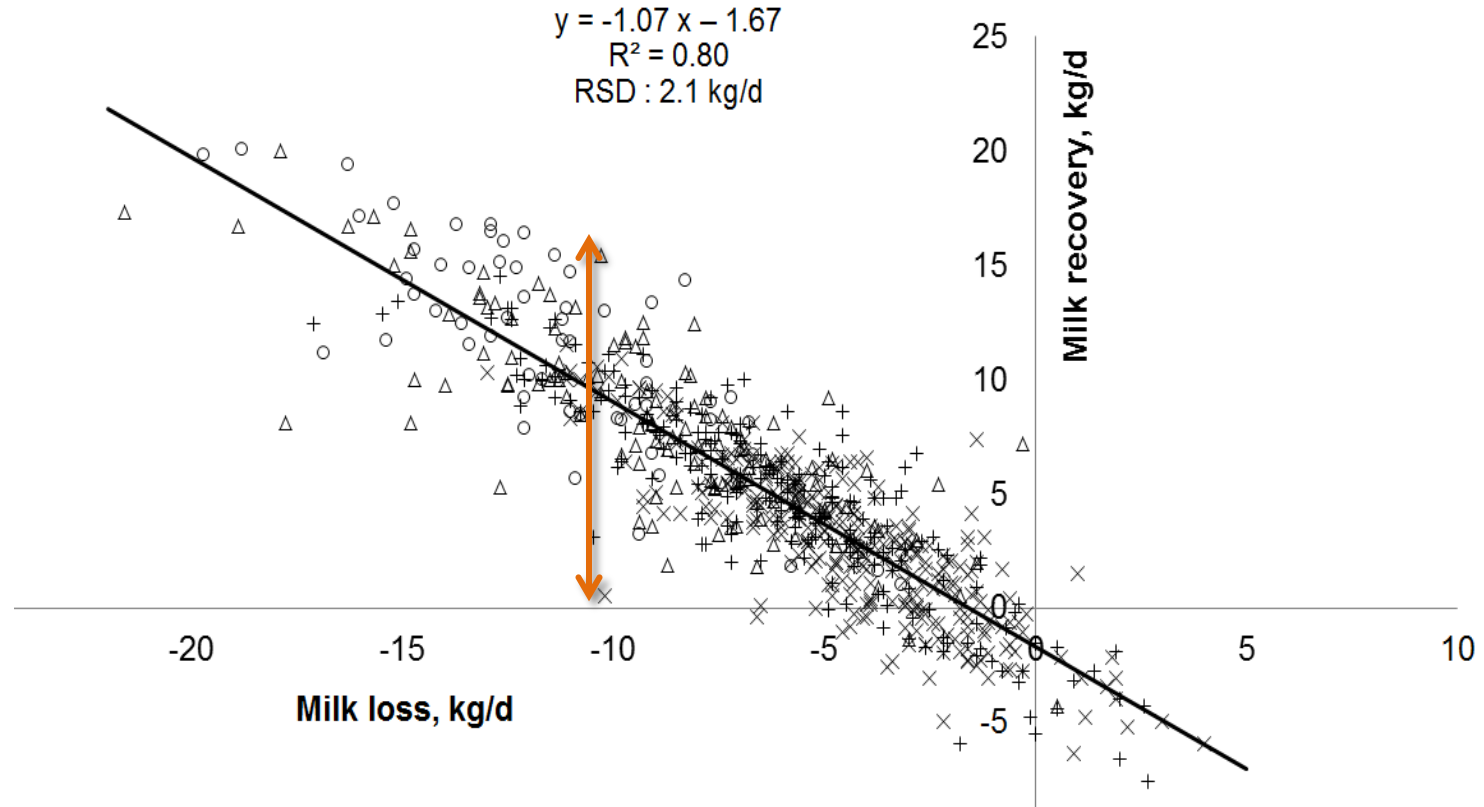
Average milk loss : -6.3 kg/d (-21.3 %)
Average milk recovery : 4.8 kg/d

ODM generates a wide variability of responses



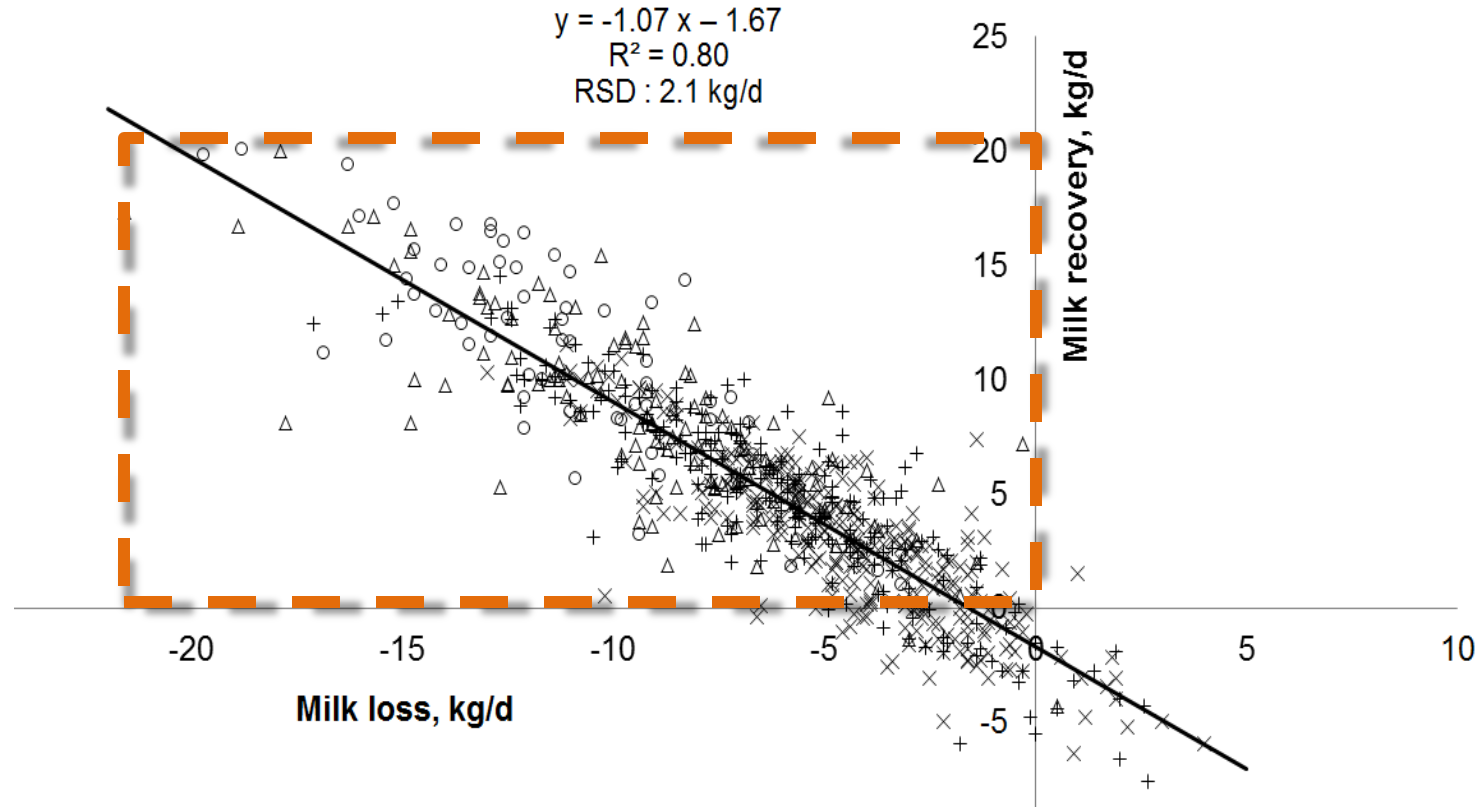
The greater the milk loss, the greater the milk recovery

ODM generates a wide variability of responses



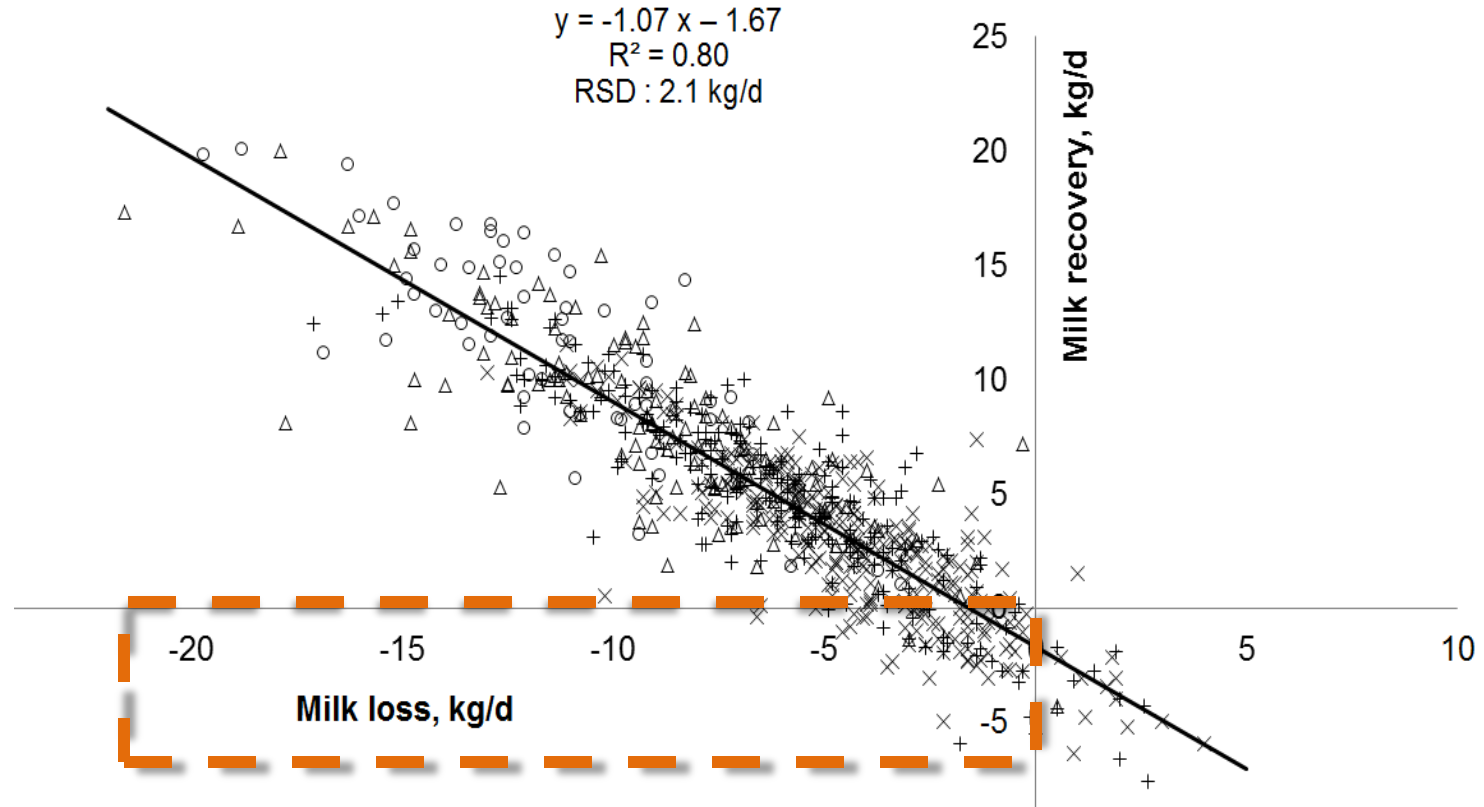
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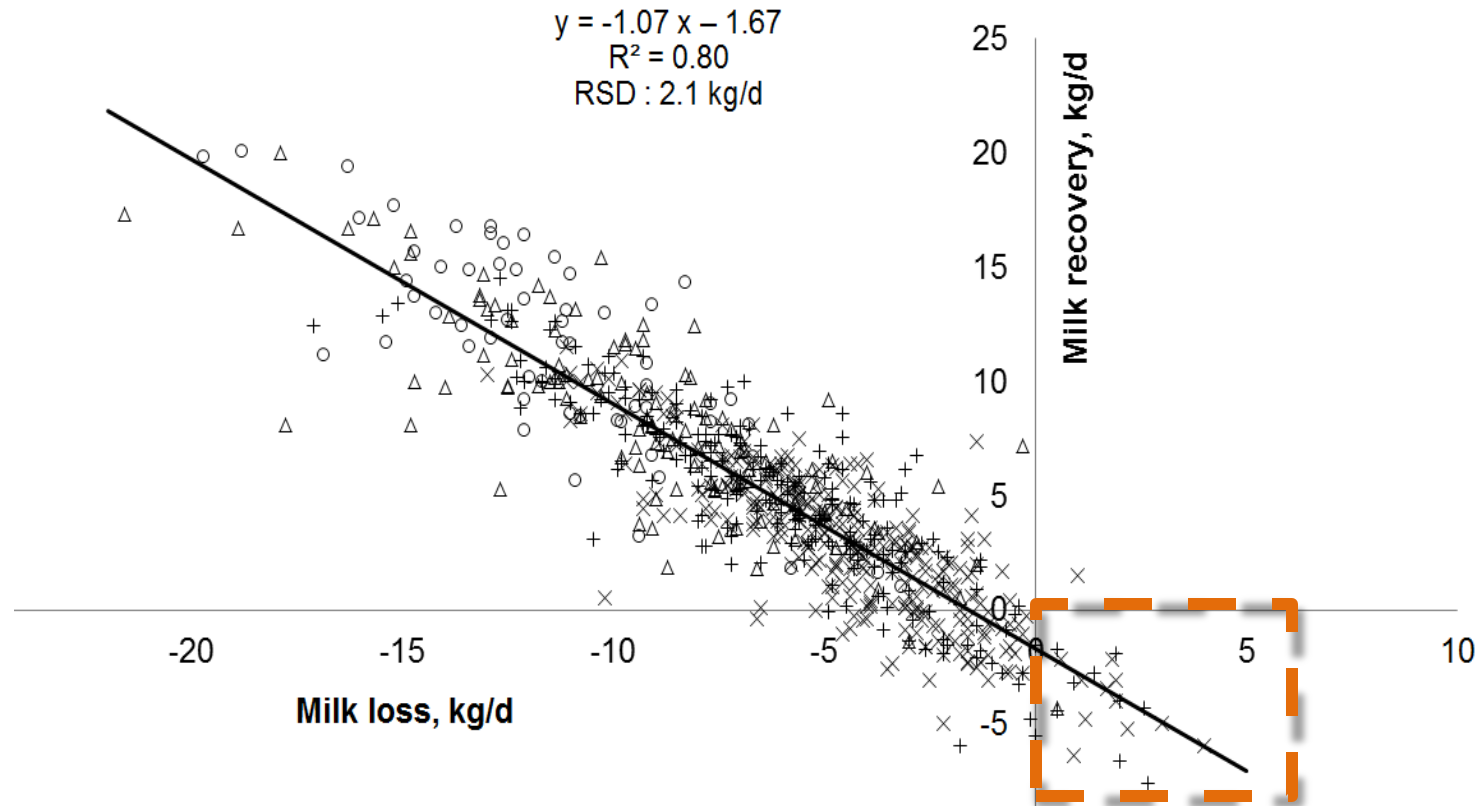
88 % of the cows lost milk during ODM and recovered milk when resuming TDM

ODM generates a wide variability of responses



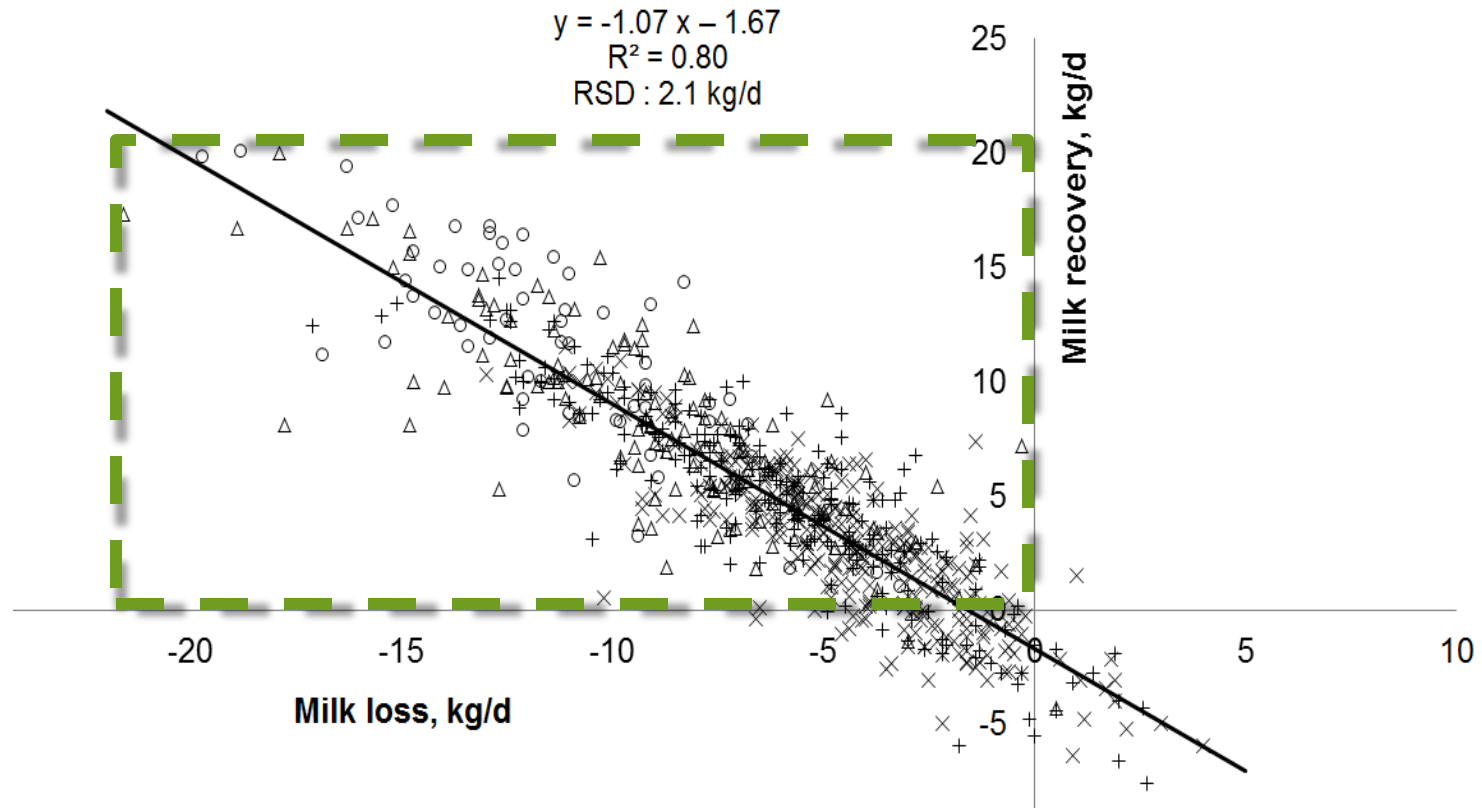
11 % of the cows lost milk during ODM and continued to lose milk when resuming TDM

ODM generates a wide variability of responses



3 % of the cows gained milk when switched to ODM but lost milk when resuming TDM

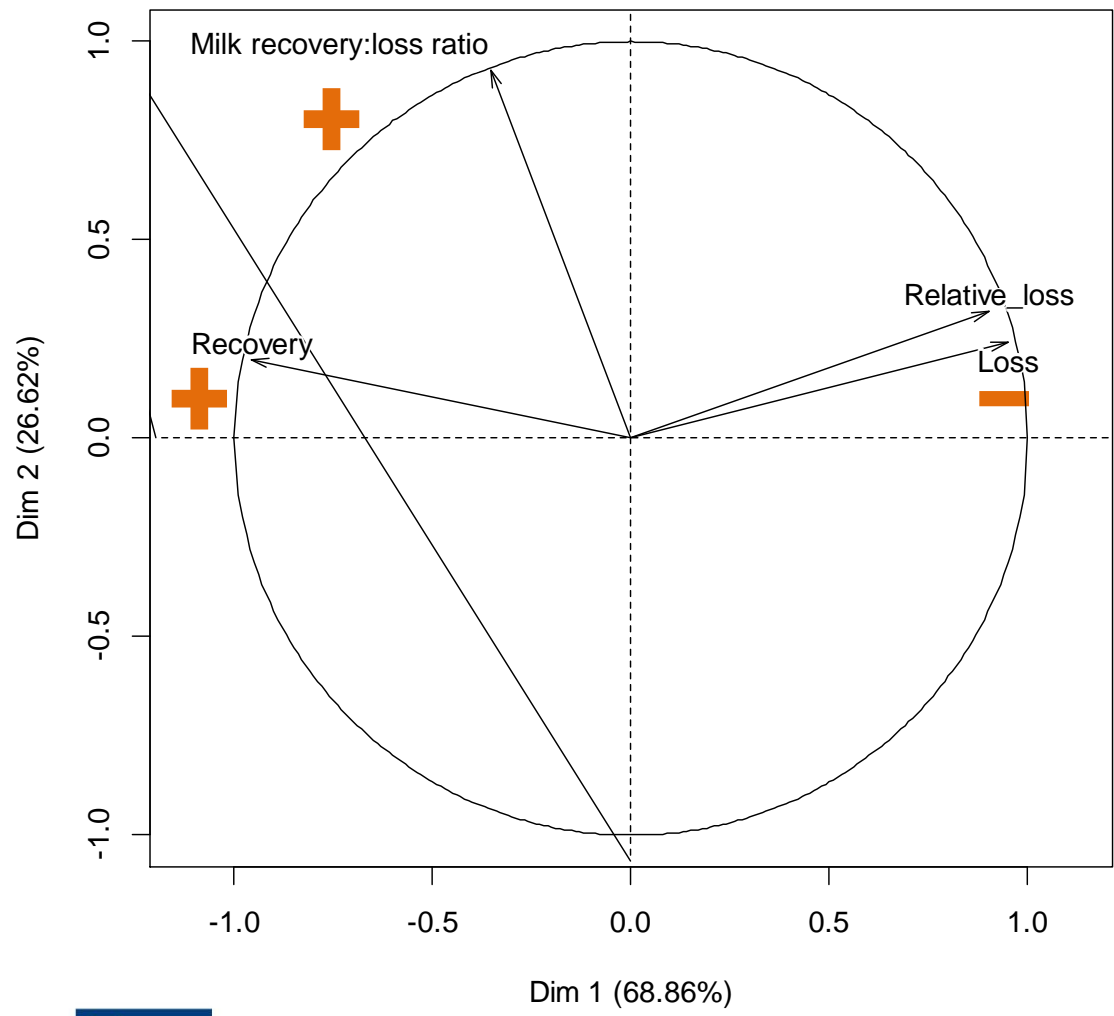
ODM generates a wide variability of responses



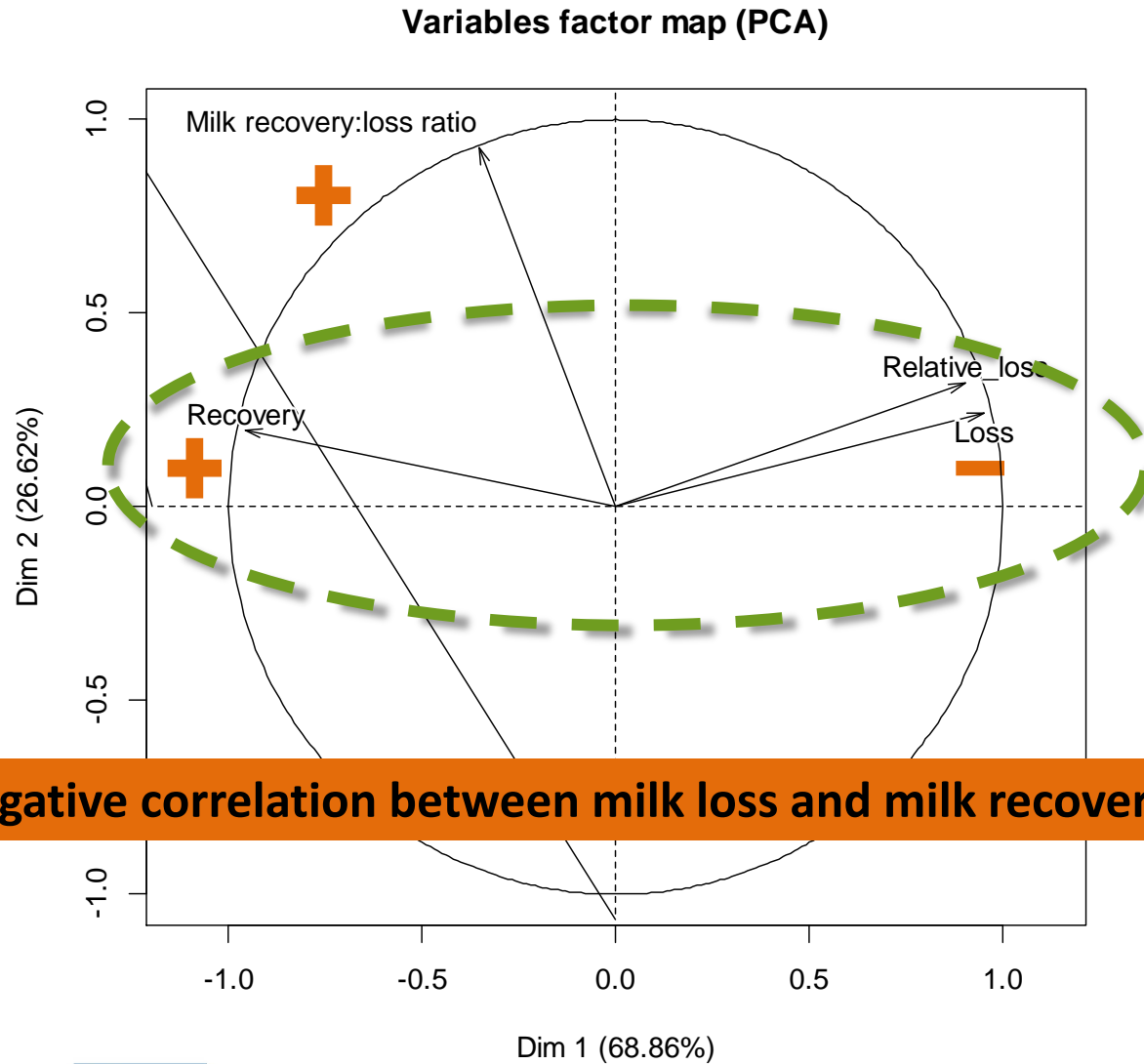
Calculation of milk recovery : loss ratio → PCA and HCPC

PCA results

Variables factor map (PCA)



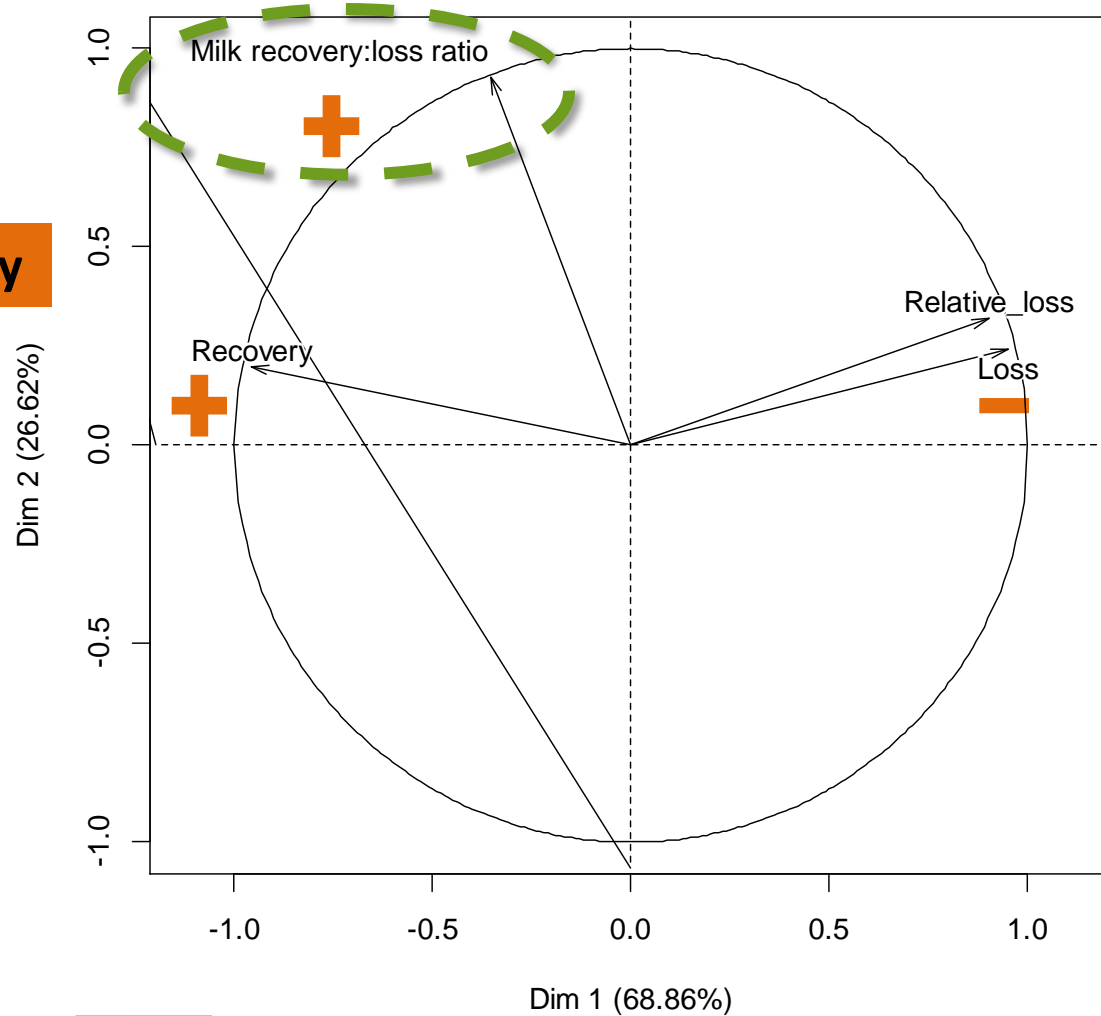
The greater the milk loss, the greater the milk recovery



Negative correlation between milk loss and milk recovery

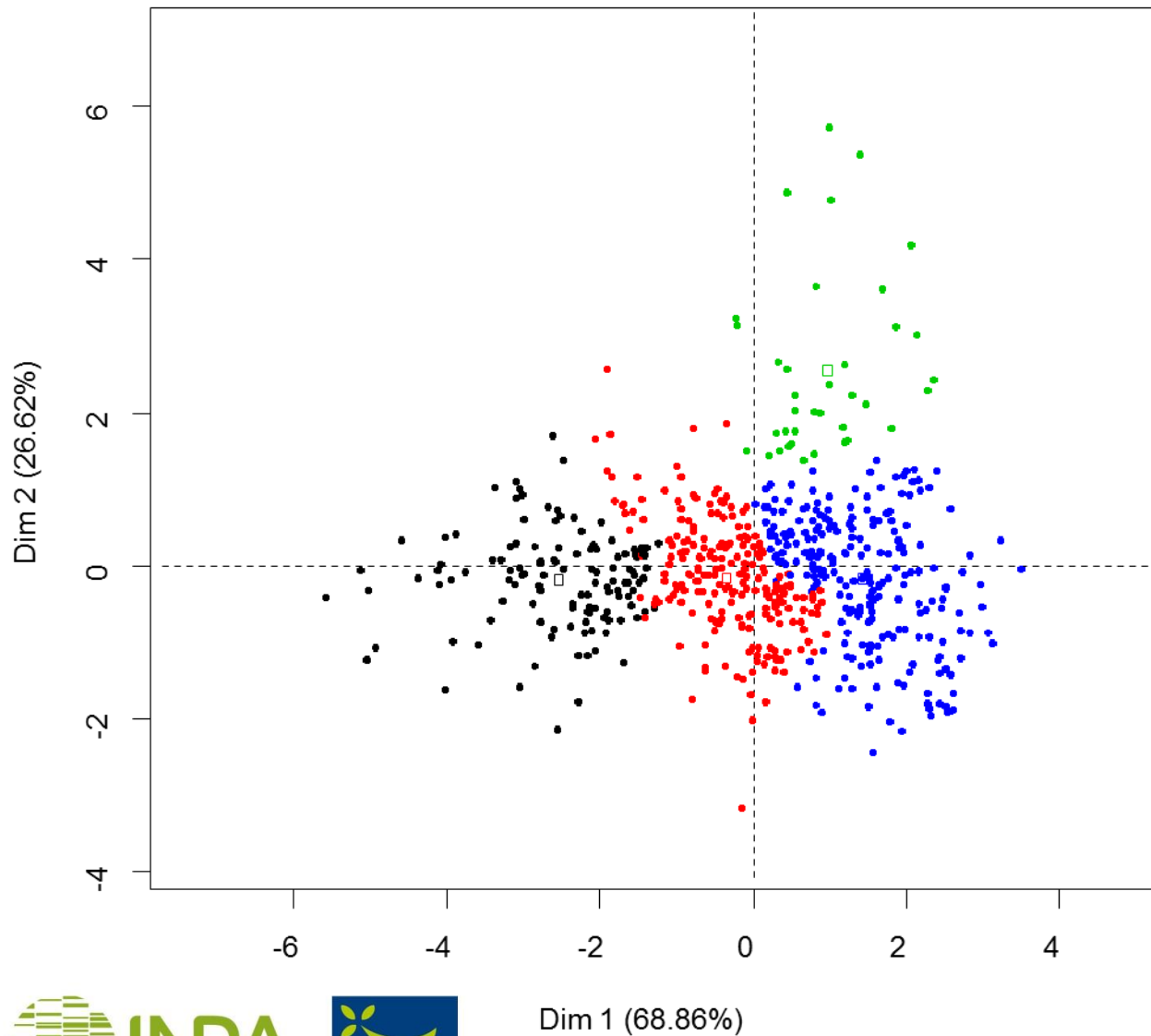
Milk loss and milk recovery : loss ratio may be independant

Variables factor map (PCA)

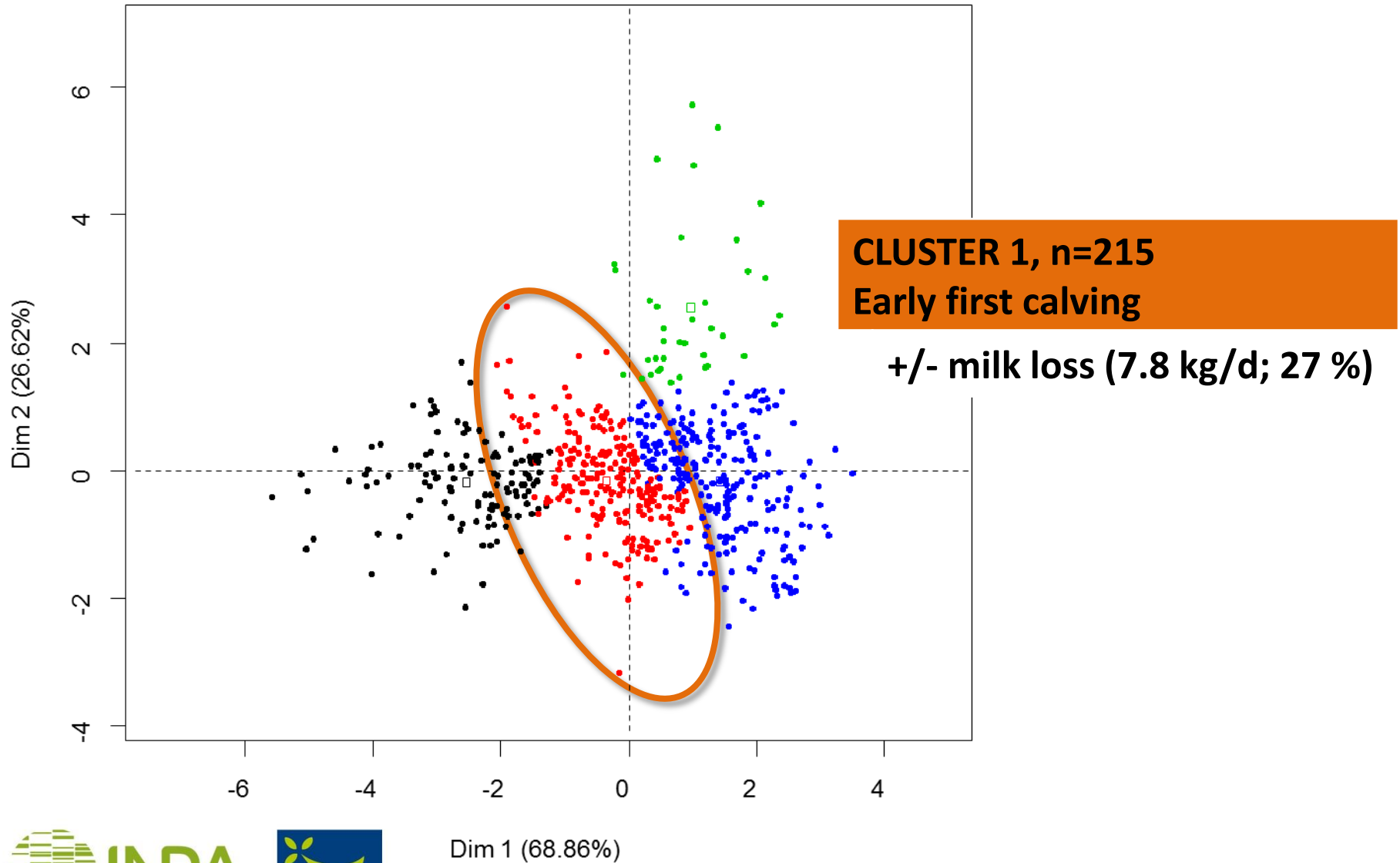


Orthogonality

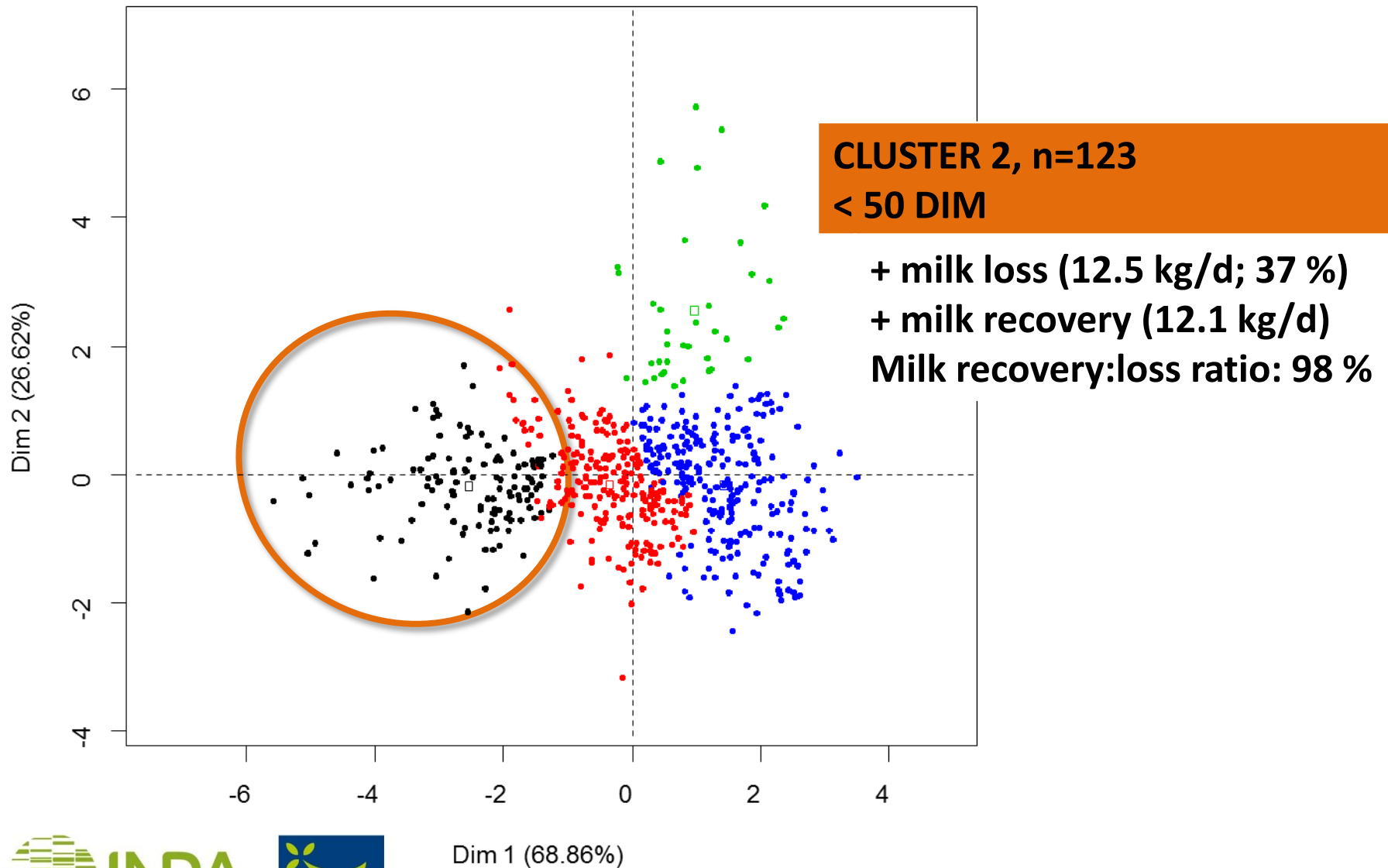
ODM generates different response profiles



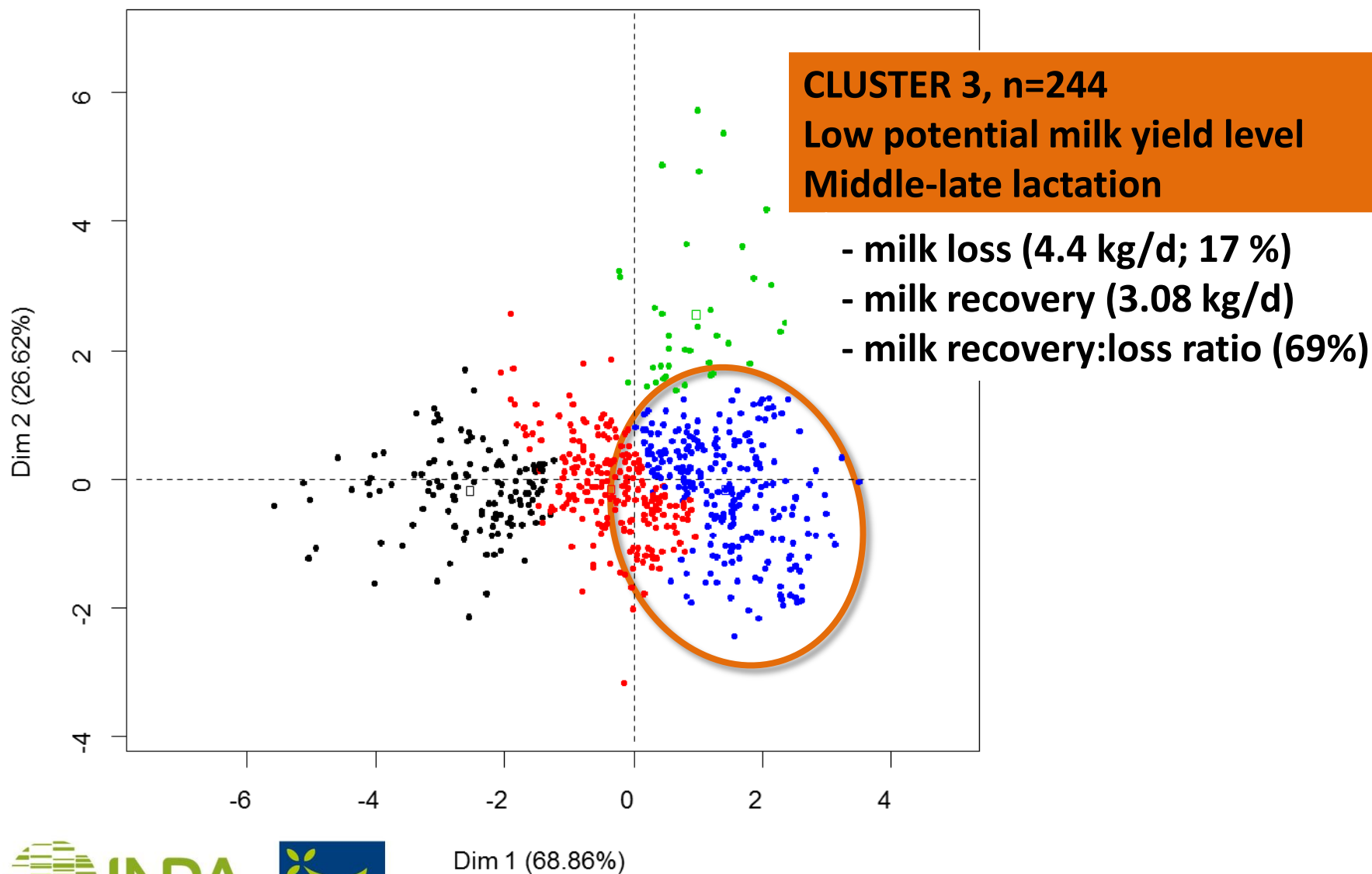
Cows with first calving at 24 months were only characterized by showing an average loss



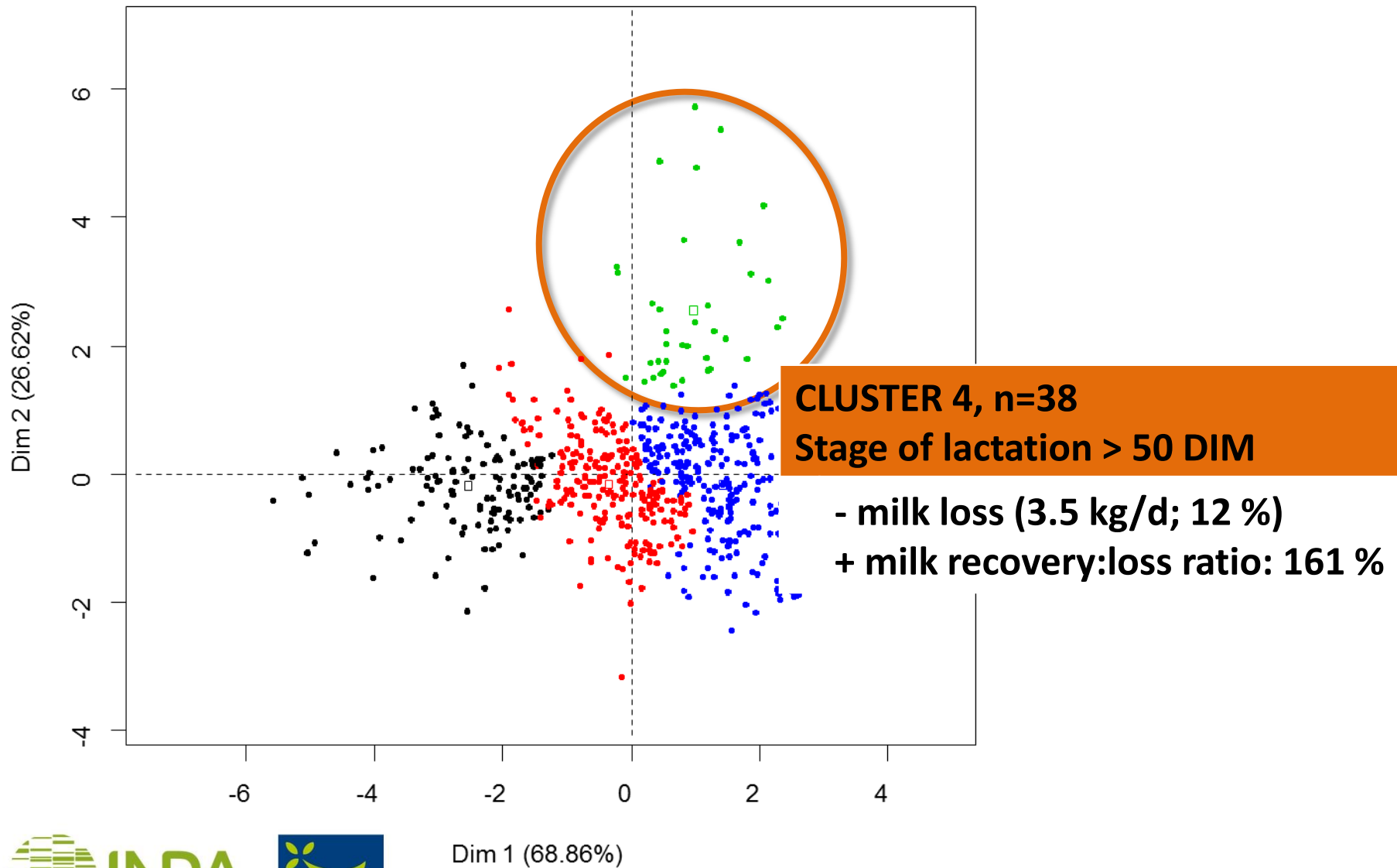
Early lactation cows lost more milk but recovered completely



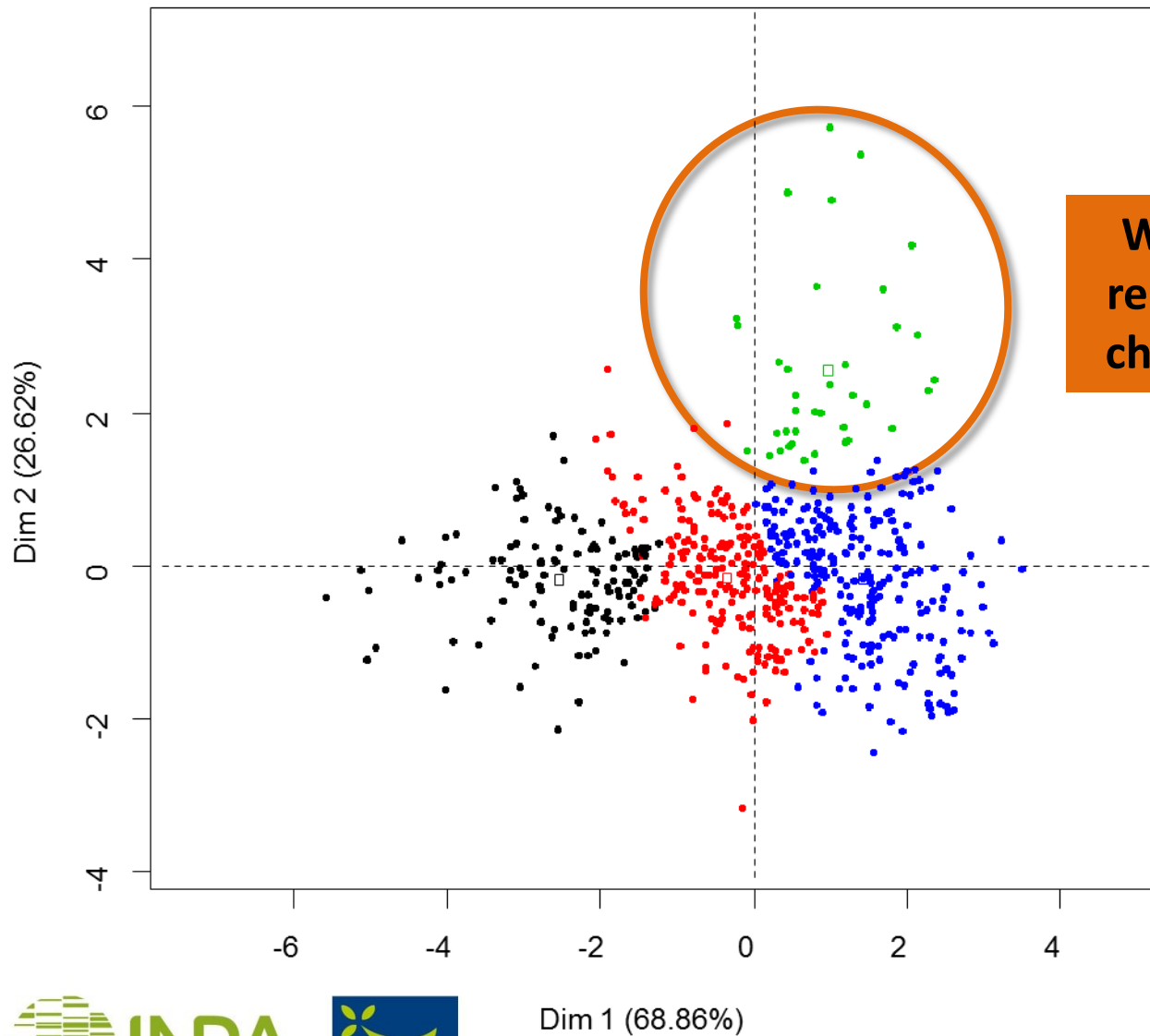
Cows with a low potential milk yield level with a stage of lactation > 180 DIM lost less and recovered less



Cows with a stage of lactation > 50 DIM combined a limited milk loss and a great recovery

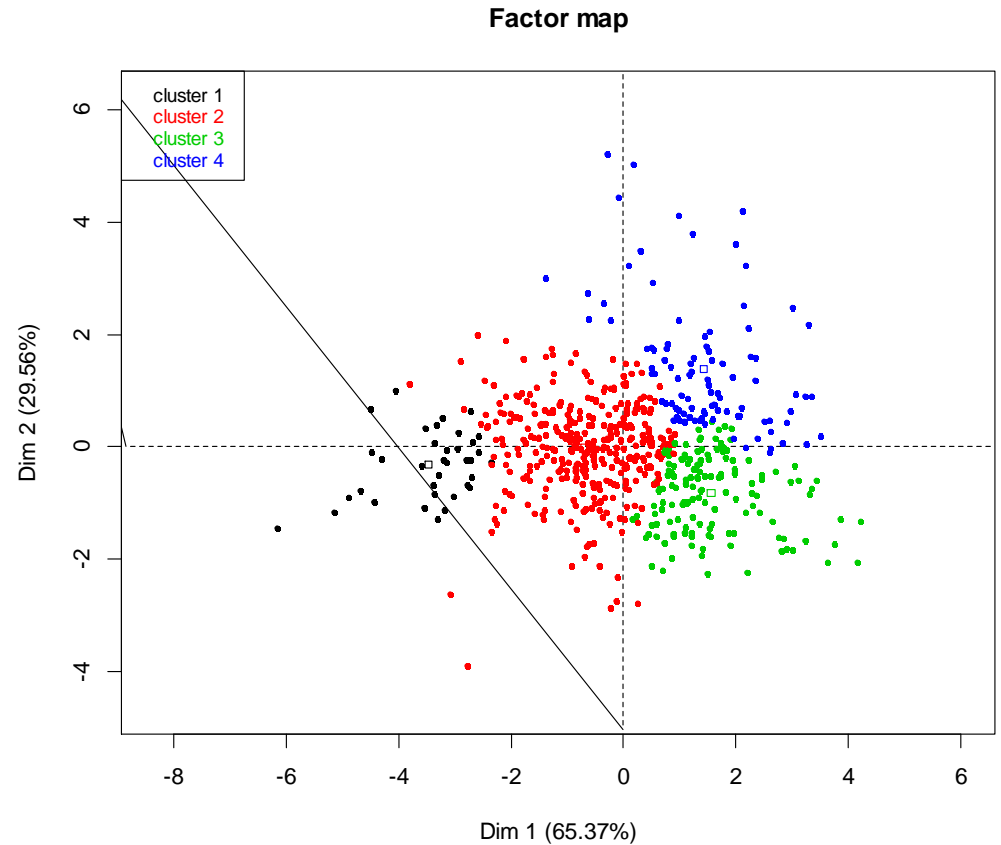
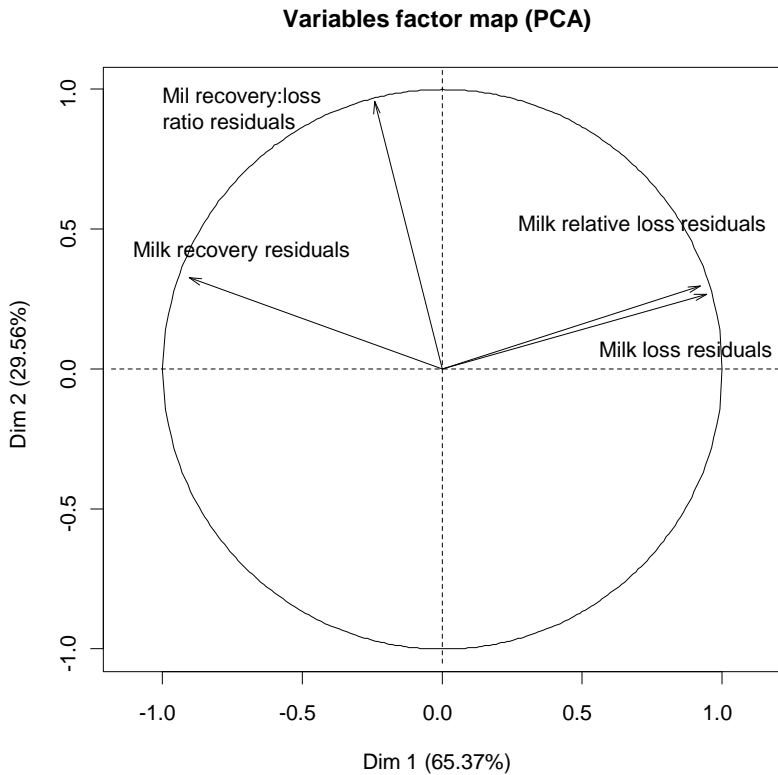


Cows with a stage of lactation > 50 DIM combined a limited milk loss and a great recovery

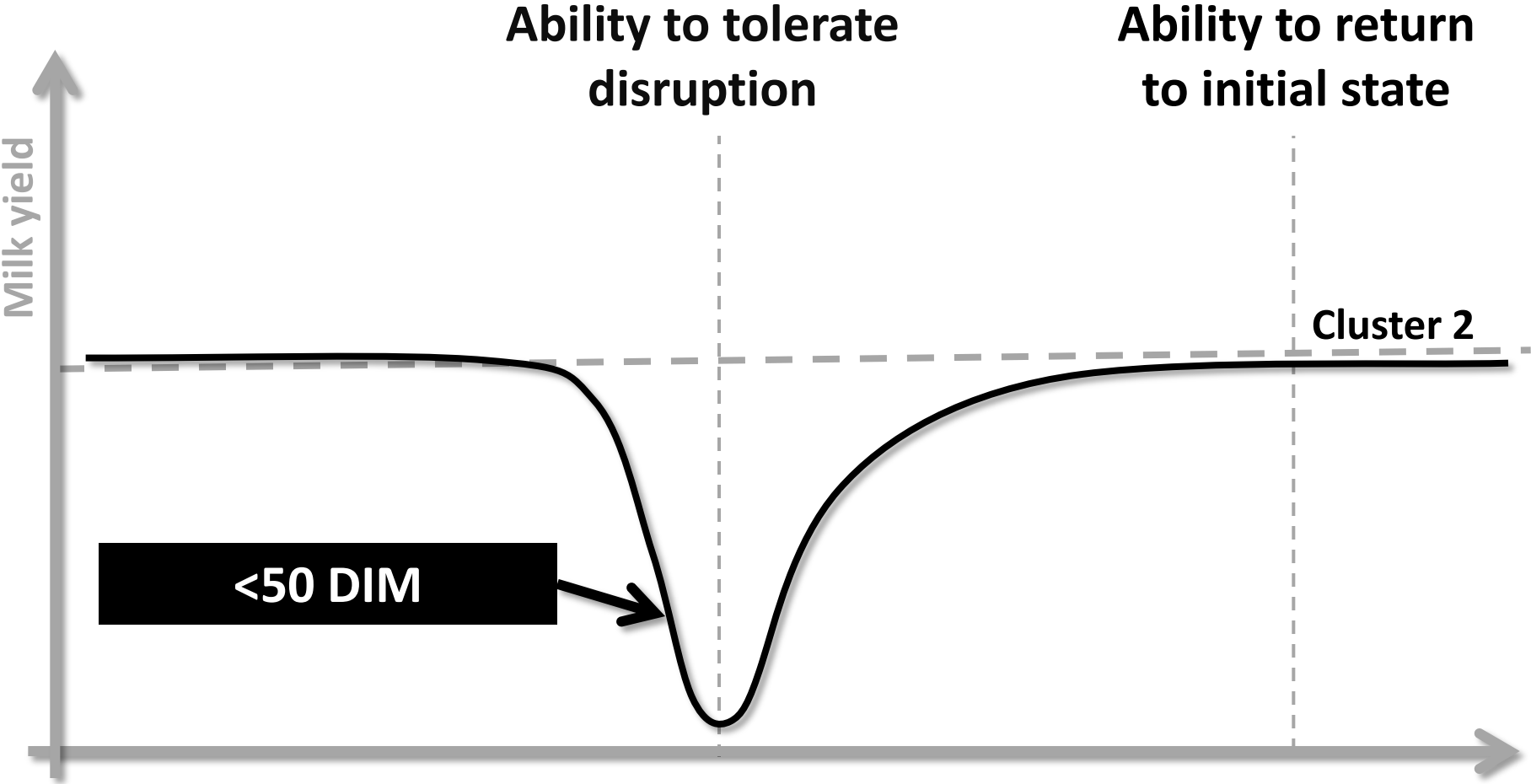


Wasn't found to be repeatable from one challenge to another

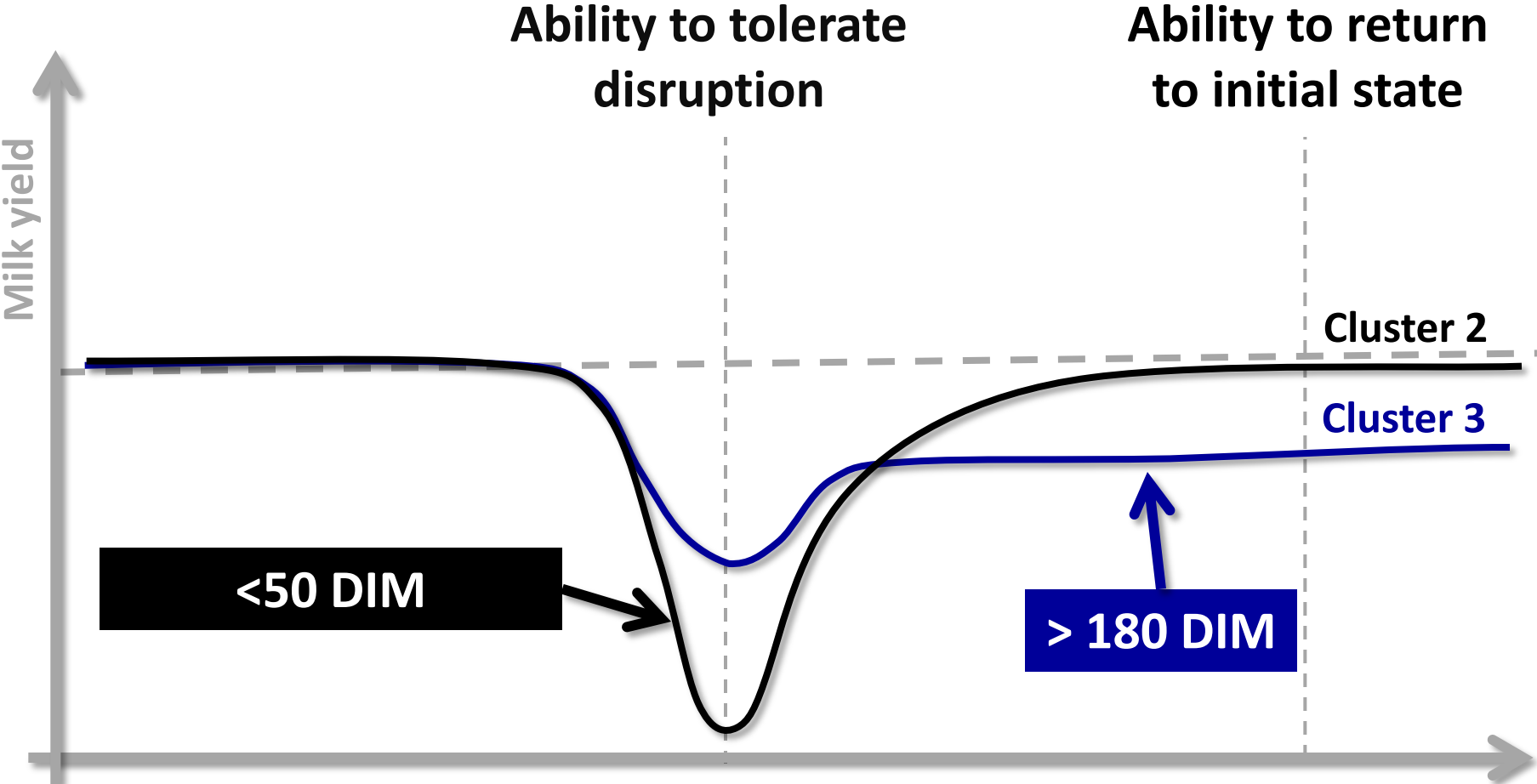
The same profiles were observed for milk yield losses and recoveries corrected for the breeding factors



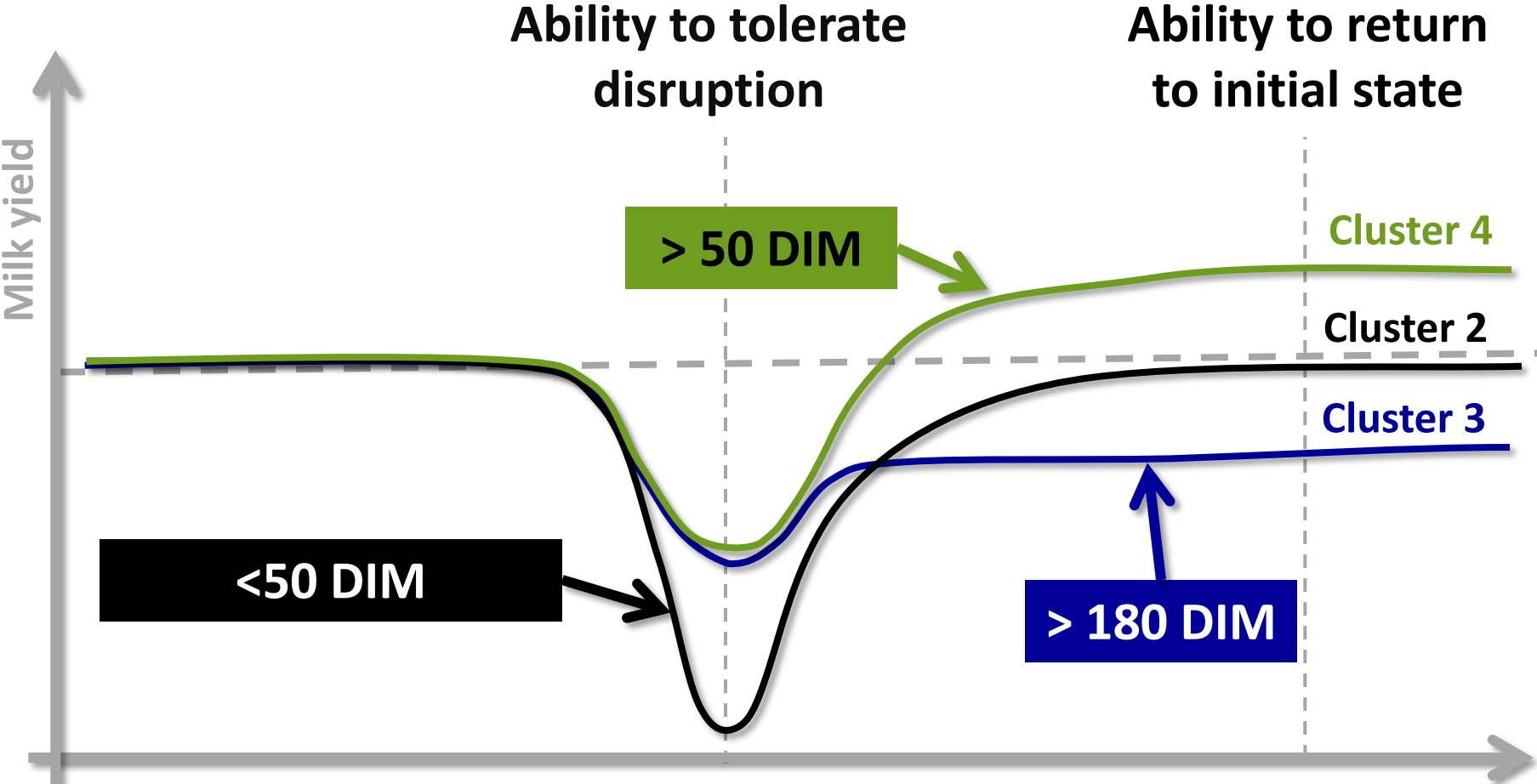
Mammary elasticity profiles can be assessed by using an ODM challenge



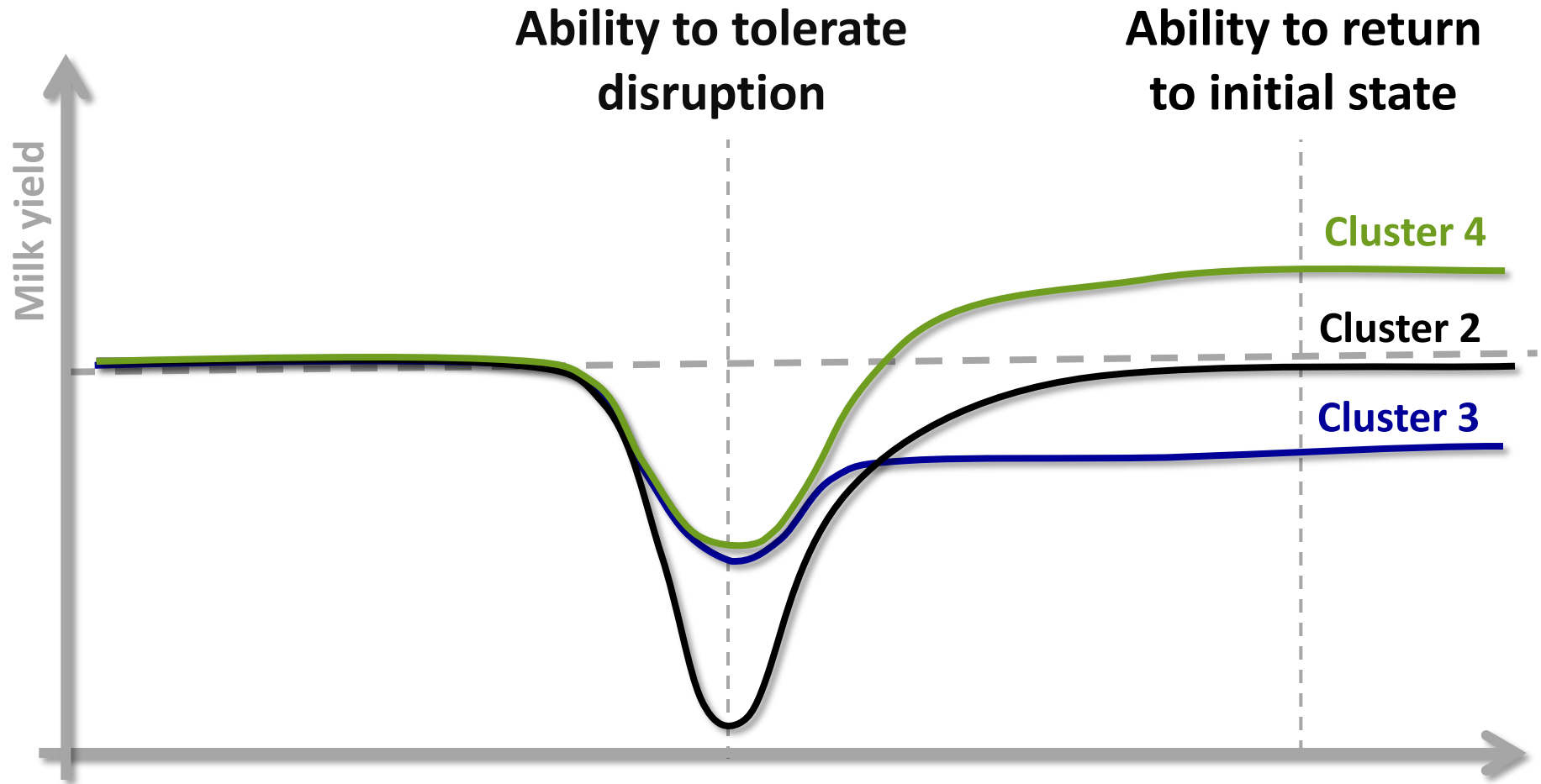
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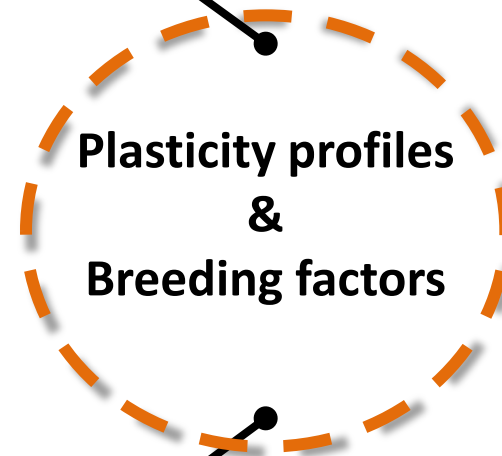
Same profiles observed when correcting for breeding factors

Once-daily milking, a relevant challenge to assess mammary elasticity



Phenotypes

What I presented



Prediction of
mammary
elasticity



Evaluation of
genetic determinism

Selection of
adaptable
cows

Once-daily milking, a relevant challenge to assess mammary elasticity



Phenotypes

Extension to phenotypes study

Plasticity profiles & Breeding factors

Prediction of mammary elasticity



Evaluation of genetic determinism

Selection of adaptable cows

Once-daily milking, a relevant challenge to assess mammary elasticity



Phenotypes

Extension on longer ODM & stage of lactation constant and genetic determinism

Plasticity profiles & Breeding factors

Prediction of mammary elasticity



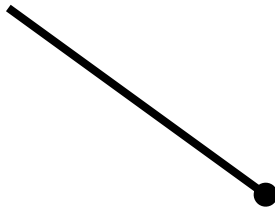
Evaluation of genetic determinism

Selection of adaptable cows

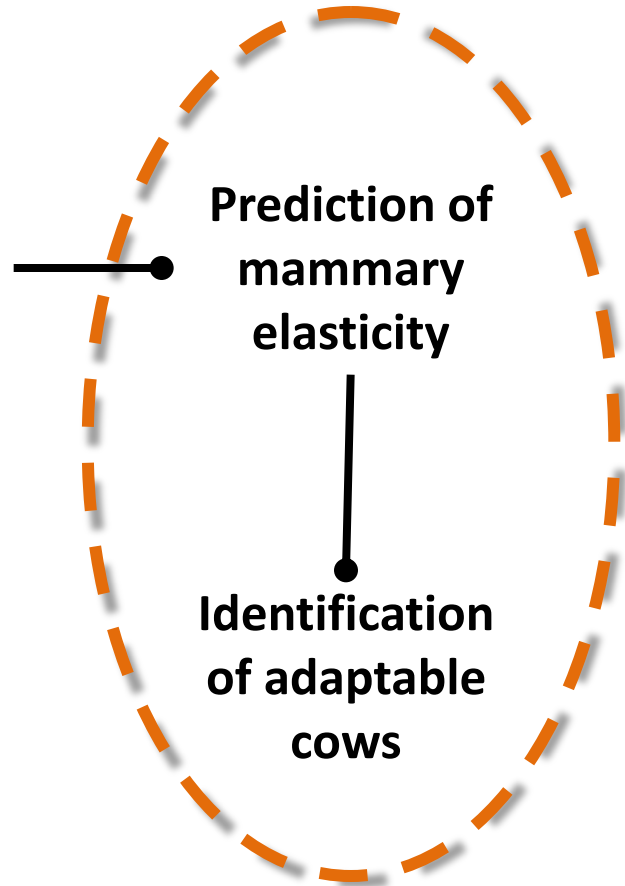
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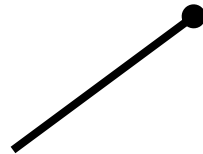
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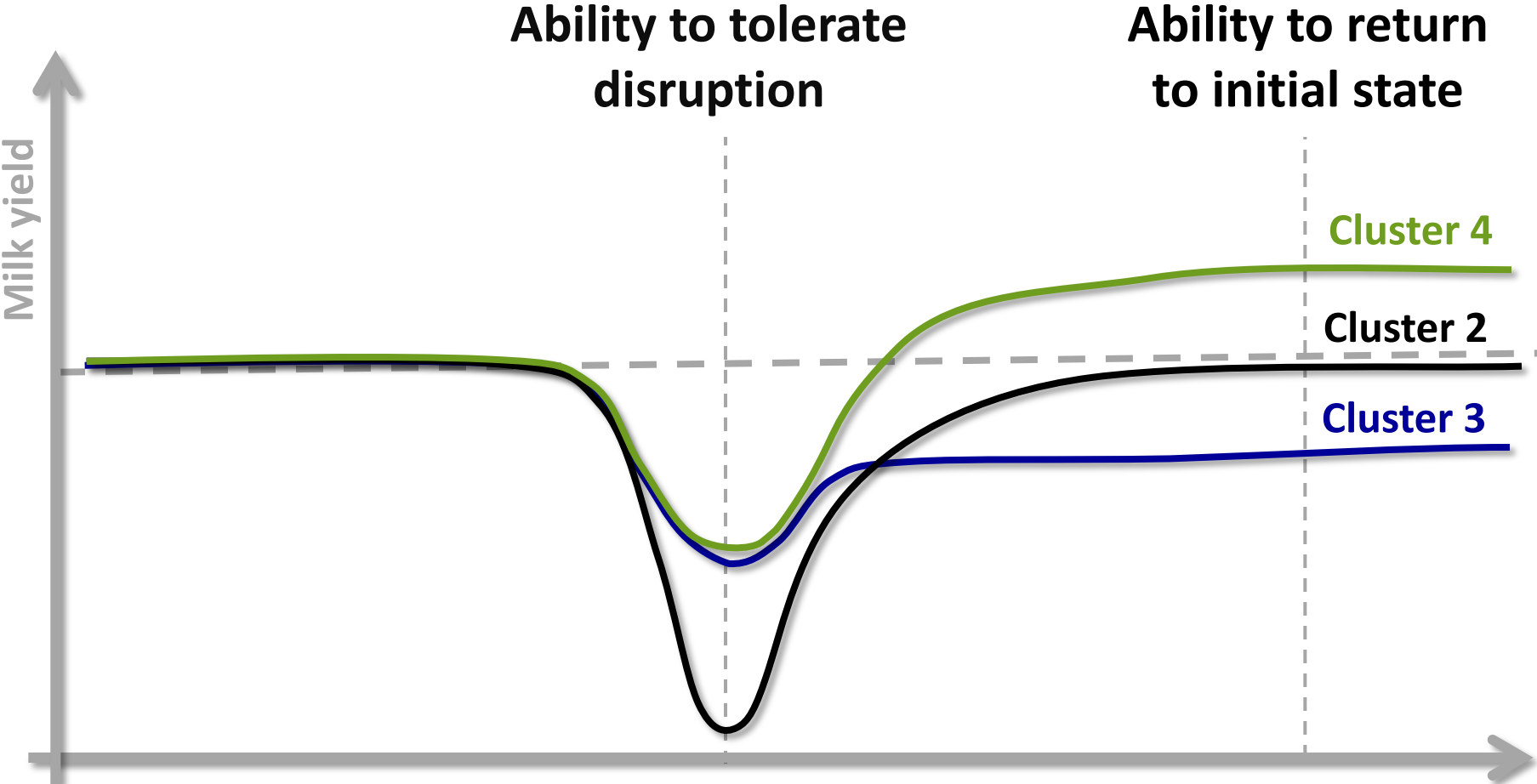
Plasticity profiles
&
Breeding factors



Evaluation of
genetic determinism



Mammary elasticity profiles can be assessed by using an ODM challenge



Any questions ?