The BIG problem

Cattle farmers are facing ever increasing pressures from society making it harder to sustain a living. The consequences of climate change, an increasing demand for meat and milk and the push for affordable, high- quality food are a few examples of the challenges they face.

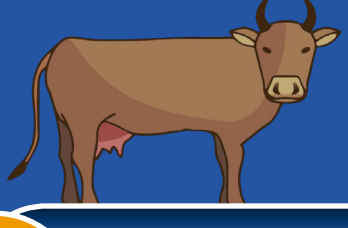
To survive they need to optimize food production whilst improving animal health and welfare and farm in a more sustainable and environmentally friendly way. That means working with the most efficient and resilient animals that best fit the local environment.

GENTORE

Genomic Tools

The issue

- *We need to balance resilience and efficiency in modern animal agriculture and cattle should be able to adapt to different and changing local environments. There are 4 distinct ways genomic tools can provide solutions: **genotype X environment interactions; systematic crossbreeding**; efficiency and resilience traits; and management decisions. GenTORE has tackled the first two to aid diversity-rich breeding.*



GenTORE Solutions

1 GenTORE has developed tools and protocols that allow for the analysis of individual Single Nucleotide Polymorphism (SNP*) effects

** A "SNP" is a variation at a single position in a DNA sequence among individuals.*

2 GenTORE is developing 2 promising multi-breed genomic methods that allow joint evaluation of purebreds, crossbreds, and admixed individuals

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Applications and potential impact

GenTORE methods and models use industry-level data so are easily adapted for industry use. This will lead to more efficient and resilient cattle systems by better:

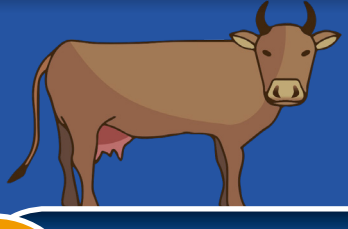
- *Utilization of and selection in crossbreeding systems.*
- *Selection within and across environments.*
- *Management decisions.*

GENTORE

Breeding Strategies for Mitigation

The issue

- *European livestock farming plays an essential role in maintaining a healthy environment but also adds to greenhouse gas (GHG) emissions and is thus part of the climate change challenge.Genetic improvement of livestock is a particularly cost-effective mitigation technology, producing permanent and cumulative changes in performance. Genetic tools reduce emissions by improving productivity and efficiency, reducing wastage, and reducing emissions by direct selection.*



GenTORE Solutions

1. GenTORE aims to encourage the breeding of more efficient cows that improve profit margins and reduce environmental impact, as selection for both production and fitness will mitigate GHGs

2. GenTORE solutions will allow breeders to consider societal views of farming systems like animal welfare, biodiversity, food safety and environment, and understand trade-offs between breeding goals such as economic and environmental

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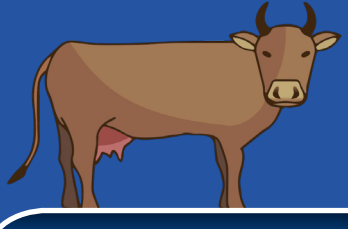
Applications and potential impact

GenTORE tools will allow farmers and breeders to select and breed cattle with improved efficiency and resilience, resulting in reduced environmental impact.

GENTORE Improved phenotyping for R&E

The issue

- *Resilience and efficiency are complex and variable traits and we lack large scale practical references for predicting which young animals will make good cows. Current sensor technologies target mainly dairy cows and individual data focus on monitoring and detecting specific events.*



GenTORE Solutions

1. GenTORE developed a multiple trait random regression model to overcome the variation of efficiency over time using data from lactation in dairy and the growth period in beef

2. GenTORE has developed a scoring system to assess a lifetime resilience score (LRS)

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Applications and potential impact

GenTORE methodologies and results will help breeders to:

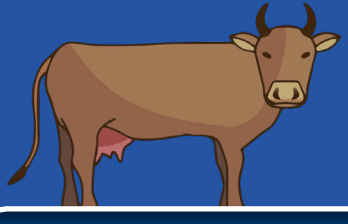
- *Use on-farm information to assess LRS and so rank cows.*
- *Predict LRS early to help identify which cows to keep and breed.*
- *Use LRS to monitor herd level resilience.*
- *Use information from innovative sources (e.g., sensors and drones) to monitor beef cattle health and decide on grazing strategy.*

Tools to tailor cattle to different environments

GENTORE

The issue

- *Identifying which genotype of cattle are best for current and future environments and sufficiently resilient requires finding the best blend of animal resilience and animal efficiency.*



GenTORE Solutions

GenTORE has developed a database combining regional topography with climatic and farm types to aid the forecast of climate change on cattle production systems by region

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Applications and potential impact

This GenTORE database will help to:

- *Assess whether local production environments will challenge animals.*
- *Characterize cattle for resilience and production efficiency.*
- *Rank cattle based on predicted future worth.*
- *Explore predicted consequences of breeding strategies in different environments.*

www.gentore.eu

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