

## Divergent mice line for homogeneity and robustness

### Brief description

The MOSEVAR research group has successfully developed a divergent selection experiment for birth weight variability in mice for more than 30 generations. Birth weight uniformity has proven to be beneficial because it improves animal welfare by increasing animal survival. The mouse is used as an animal model and this type of selection for uniformity is already being applied in livestock species. The technology used is framed within the framework of research in Health Sciences and Engineering and Sciences and directly applies in the field of Animal Production. Statistical-genetic models are used to model the residual variance of the data, in this case birth weight, to predict its genetic component and select individuals for it. The selection has resulted in a homogeneous and uniform line for birth weight (robust) and an opposite one.

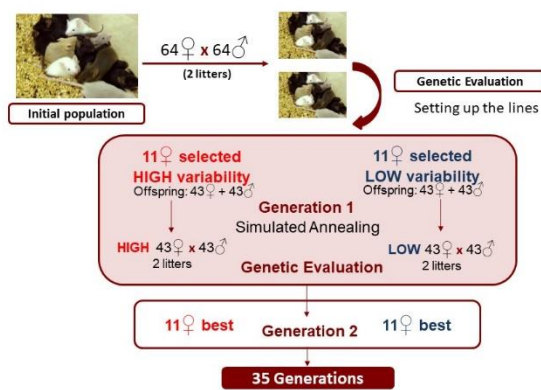


Figure 1. Experimental design.

### How does it work?

By developing a novel divergent selection experiment to modify, genetically and using complex statistical models, the birth weight environmental variability, it was found that individuals in the low variability line were more robust, i.e. less susceptible to environmental challenges, which was reflected in higher embryo and neonatal survival, larger litter sizes, survival at all stages of life and reproductive longevity. Similarly, by selection, another heterogeneous and opposite line was obtained.

The genetic selection to decrease environmental variability is one of main targets of selection and fits with EU research objectives because it is directly related with animal welfare and feed efficiency. Also, the animal welfare has become important in recent years in research and livestock production. It is currently regulated by European (2010/63/EU) and Spanish (RD 53/2013) regulations.

### What problem does it solve?

The homogeneity of relevant traits in research has been related to robustness, which also improves functional traits while maintaining high production potential. Selection for homogeneity produces animals that are more robust and resistant to environmental challenges, thereby improving animal welfare.

The mouse is a good animal model for mammals because it has a short generation interval, high litter size and small size, which allows the population to be kept in the same environment, reducing the noise provided by non-genetic effects. The possibility of selection to modify environmental variability through the statistical models used.



## **What future products will it develop?**

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There is currently a significant demand for homogeneous and robust populations and their heterogeneous opposite, in order to carry out any kind of research that requires knowing the possible responses of two populations.

## **Competitive advantages compared to other research**

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To facilitate research and the application of any treatment to the scientific community, it is vital to consider the population of application, which could be very robust or very vulnerable. In this case, having both subpopulations available is essential. Mice is an excellent animal model for research due to its breeding, maintenance and handling advantages. Within the field of animal production, it is the suitable model for rabbit and pig studies as well as biomedical research.

The technology developed is in line with the objectives of the Horizon Europe Programme 2021-2027.

## **Where has it been developed?**

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The MOSEVAR research group belongs to the Department of Animal Production of the Faculty of Veterinary Medicine of the UCM. The main objective of this research group is to apply conservation and breeding tools to improve the genetic variability and the genetic response for traits of interest in an animal population.

## **And furthermore...**

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The team has the collaboration of researchers specialized in different aspects and animals: alpaca, Pure Arab horse, dairy cattle breeding, developing genetic variability conservation tools and selection for uniformity of production traits in pigs.

## **Researcher in charge**

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