RobustMilk

An EU-wide programme to improve robustness of dairy cows and to make their milk healthier for humans.

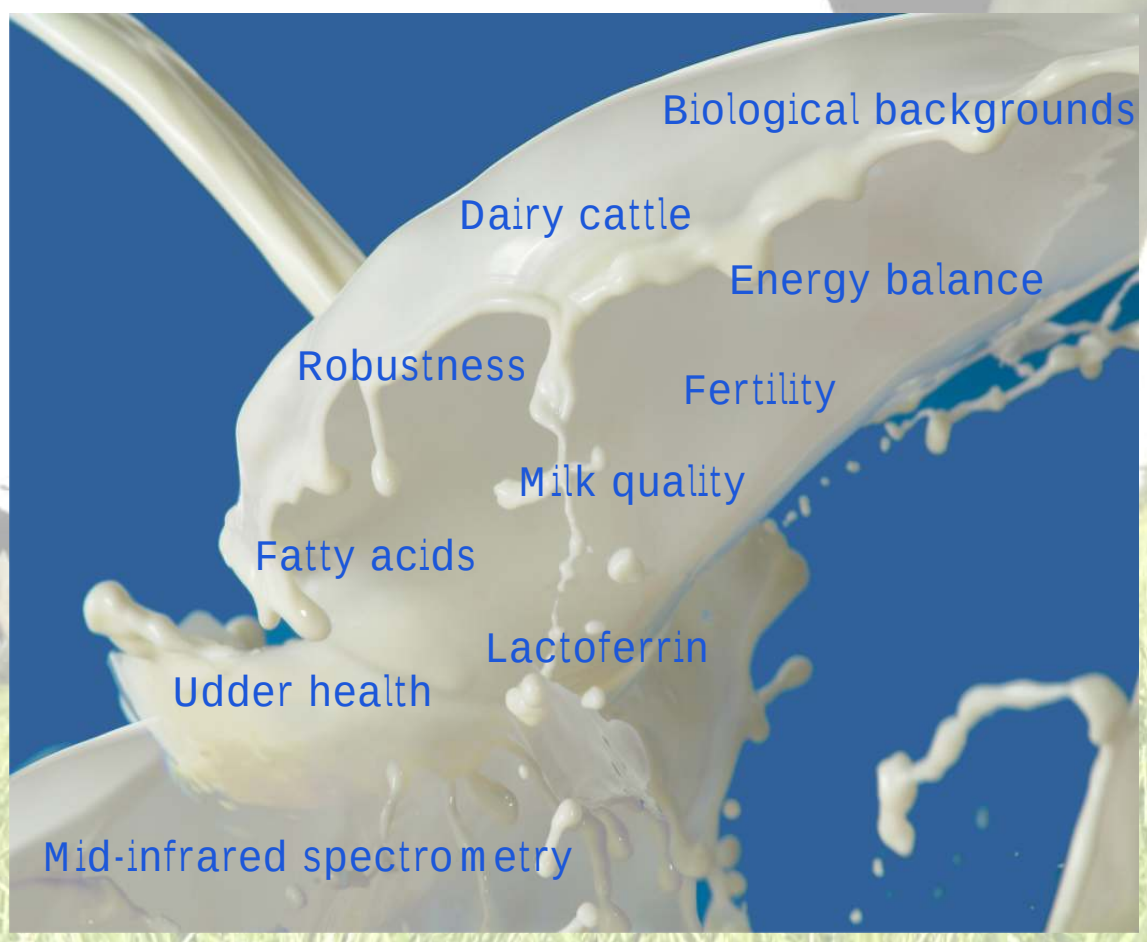
Background

Dairy cattle have been selected primarily on production for over 20 years in many EU countries. This has been mostly as a result of importation of genetic material from North America followed by within-country selection policies specific to each country's local circumstances. In the majority of countries, selection has favoured milk or protein yield whilst in a few countries the focus has been more balanced for improved milk production without compromising health and fertility. Focussed selection for milk production has resulted in impressive improvement in milk production but has also resulted in dairy cows that lose lots of body energy reserves and are in varying degrees of negative energy balance for some parts of the lactation. Consequently, dairy cows are considered less 'robust' than they previously have been.

More recently, as a result of a general public interest in milk production practices and the environment, selection pressure in many (if not most) countries has shifted more towards non-production traits. These non-production traits are mostly those associated with cow health but increasingly, human health is of interest.

What is ROBUSTMILK?

ROBUSTMILK is a project that has been constructed through the EU Framework 7 Programme to join together six organisations within EU that are actively working in dairy cattle breeding and have strong links with the dairy industry. It is called Innovative and Practical Breeding Tools for Improved Dairy Products from More Robust Dairy Cattle abbreviated to ROBUSTMILK for ease of use (and speed).



Who is involved?

There are six organisations involved and all have a strong background in dairy cattle breeding. They are all well known in their own countries and have strong reputation for ensuring that research and innovation is disseminated to industry.

These organisations are

1. Animal Sciences Group (The Netherlands)
2. Teagasc Moorepark (Ireland)
3. Gembloux Agricultural University (Belgium)
4. Swedish University of Agricultural Sciences (Sweden)
5. Wageningen University (The Netherlands)
6. Scottish Agricultural College (Scotland, UK)

What will ROBUSTMILK do?

The objective of ROBUSTMILK is to develop new useful and practical technologies to allow dairy farmers and the dairy industry to refocus their selection decisions to include additional traits such as milk quality and dairy cow robustness. It is of utmost importance that farmers can evaluate the consequences of selection for these novel and additional traits within their own milk production systems. Likewise, it is important that the inclusion of traits such as milk quality does not compromise health, fertility or "robustness" of the cow. We seek the win-win situation where dairy cow milk is healthy for humans and is also healthy for the cow.

The overall objective will be achieved by having five integrated workpackages each having their own objective:

1) The creation of a common database across country partners that includes unique and scarcely recorded phenotypic measurements for traits underlying robustness and milk quality. These traits include measures such as feed intake, regular body condition scoring and detailed health and fertility recordings. These databases are held at each of the research partners involved and the first thing to do is to create a framework that enables bringing that data together to make it useable by this and future projects.

This project is financially supported by the European Commission under the Seventh Research Framework Programme.
The content is the sole responsibility of the publishers, and does not necessarily represent the views of the Commission or its services.

ROBUSTMILK

2) To develop measurement tools for robustness (energy balance) and milk quality (lactoferrin and fatty acid composition) using mid-infrared spectrometry. As part of routine milk analysis, a spectrum is produced that can be used to predict how much of each of the various types of fatty acids is present in milk. Preliminary analysis indicates that equations developed using the spectra can be used to predict milk fatty acid content; the objective of this task is to strengthen these calibration equations and evaluate whether they can be used to also predict dairy cow robustness.

3) A robust cow maintains good milk quality (e.g. low level of somatic cell count, SCC) over a wide range of environments and also throughout her life. In this workpackage we will develop statistical tools to select for both types of robustness, with special emphasis on SCC. Increased SCC is an indicator of both compromised udder health and lowered milk quality – therefore decreasing SCC is an example of a win-win situation.

4) To develop genomic tools for selection for robustness and milk quality traits. The merged data from all of the partners will be accompanied by DNA from each of the animals so that new genotyping technologies can be used to identify which genomes are associated with 'good' milk and which with 'bad' and similarly can be used to differentiate between genes for high or low "robustness". Once identified, these markers can then be included in breeding values thereby providing more power to the farmers when making selection decisions.

5) Integrate and disseminate knowledge on the consequences of selection practices on robustness and milk quality. ROBUSTMILK has the potential to enhance the competitiveness of European agriculture through the production of higher quality dairy products and more sustainable dairy production systems. ROBUSTMILK will contribute significantly towards the Knowledge Based Bio Economy objective of the EU, through a greater understanding of factors contributing to genetic variation and exploiting this variation in a sustainable manner in genetic improvement programmes. Research findings will be updated regularly at the ROBUSTMILK website (http://www.robustmilk.eu/)

What will be produced?

Primarily, knowledge will be generated but of course when this knowledge is applied, through the strong links between this research group and industry, the ultimate beneficiaries will be EU consumers. For example, once we know the genetic profile of cows that have improved robustness and produce more healthy milk, then we can include this in selection programmes, farmers can choose better bulls and society will benefit from healthier food being produced by better cows. These cows will require less treatment for disease, will live longer and consequently dairy production will have less impact on the environment.

How will it benefit farmers and society?

Ultimately, when the research on milk quality is applied in a systematic manner within the food chain, healthier milk can be placed on supermarket shelves. At the same time we will know how to do this without compromising the health of the cow and so cows (and farmers) will benefit. Indeed, irrespective of the human health aspects of milk, this project will lead to cows that are more 'robust' which translates into cows that can produce large amounts of milk economically for the farmer, that can remain healthy in so doing and can live a long time without the need for veterinary intervention or drug usage. This benefits both farmers and society but above all, benefits cows and the environment, because cows that live a long time have an overall lower impact on the environment.

When will it produce results?

The project started in April 2008 and will run for 4 years. Animals are currently being selected for DNA analysis and the first results are expected late in 2009. Once peer reviewed and disseminated to the respective industrial partners it is expected that decisions based on knowledge from this project will begin early in 2010. As always in dairy cattle breeding, results take a long time to percolate through the system to lead to change. However, genetic improvement is permanent (once you have it you have it for always), it is cumulative (all improvements are on top of previous improvements) and it is cost effective because all that is required for the farmer is to choose a different bull based on the knowledge that this project will produce.

Take home messages

1. Cows can be improved by selection to be more efficient, more healthy and live longer
2. Cows can be selected to produce milk that is more healthy for humans
3. The objective of this project is to attempt to achieve both of the points above simultaneously in an effective and efficient manner

www.robustmilk.eu

ANIMAL SCIENCES GROUP
WAGENINGEN UR

gembloux
faculté universitaire
des sciences agronomiques

Supporting the
land-based industries
for over a century
SAC

WAGENINGEN UNIVERSITY
WAGENINGEN UR

SLU

eagasc