INTERNATIONAL DAIRY FEDERATION - GERMAN NATIONAL COMMITTEE

NEWSLETTER

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FOCUS ON THE DEVELOPMENT OF A QUANTIFICATION MODEL

Pierre Gerber
Livestock Policy Officer, FAO

Greenhouse gas emissions from animal food chains - development of a quantification model using the Life Cycle Analysis approach

Greenhouse gases (GHG) are emitted at various steps of animal food chains. These emissions arise from feed production (via chemical fertilizers, soil organic matter losses in pastures and feed crops, land use change and transport), animal production (enteric fermentation and manure management), and as a result of the processing and transportation (fossil fuel consumption) of animal products.

The FAO is creating, in partnership with the IDF a standardized quantification model to calculate all greenhouse gas (GHG) emissions of animal food chains. The model is set to assist the dairy industry in its on-going efforts and initiatives towards sustainability in the dairy production chain.

Why is it important to develop a quantification model?

Quantification provides insight into the relative importance of emission sources along the complete production chain for the different livestock production systems of the world. Life Cycle Analysis is a powerful tool to systematically assess the complete production chain, but also to allocate the emissions to the different products and processes of the sector and identify the most efficient mitigation options.

This FAO project runs in parallel with an on-going IDF priority project on development of a standard methodology for carbon footprint for dairy products to up-date an existing IDF / UNEP Guide on Life Cycle Assessment towards Sustainability in the Dairy Chain (2005). FAO is actively involved with the IDF project group.

How did you carry out your study?

The LCA methodology guides the project. Firstly, we defined a system boundary (from feed production to retailers), and the second step was to develop a simulation model based on the IPCC guidelines and our knowledge of livestock production systems. In this model, all emissions are estimated and attributed to “functional units”, that are kilograms of milk, meat or proteins, but also other products and services from livestock such as manure and draught power. With this model we can also disaggregate emissions by animal species, main farming systems and regions.

The biggest challenges are probably the allocation of emissions (e.g. between beef and milk in dual-purpose systems) and data collection, due to the essential parameters of livestock production systems not being well documented. In this situation, collaborating with other organisations can be very useful.

Why is this subject a priority for the FAO?

The consumption of milk and meat will increase in the coming decades and improving food security is the basic mandate of FAO. At the same time, natural resources, such as climate, need to be preserved; sustainable agriculture and livestock production is a logical solution to this dual demand.

MILK: THE NEW SPORTS DRINK?

IDF World Dairy Summit
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Milk as sports recovery drink

Milk is a nutrient dense foodstuff containing water, carbohydrate, protein, electrolytes and other components that may be beneficial to individuals participating in sport and exercise. In recent years a number of studies have been undertaken to investigate whether there are any benefits in consuming milk as a sports recovery drink.

Milk and Hydration

During exercise, sweat loss often exceeds fluid intake and so during regular exercise, any fluid deficit that is incurred during one session can potentially compromise the next exercise session if adequate fluid replacement does not occur. While it is relatively easy to ensure that sweat losses are replaced when exercising infrequently, when training twice in a day, effective restoration of fluid balance may need special attention. Given the tendency for individuals to fail to match losses during exercise and the relative importance of ensuring the restoration of whole-body fluid balance before the start of a subsequent bout of exercise, post-exercise re-hydration has been extensively investigated over the past 15 years.

Milk is a potential candidate for an effective post-exercise re-hydration solution due to its naturally high electrolyte content and the presence of carbohydrate in a concentration similar to many commercially available sports drinks.

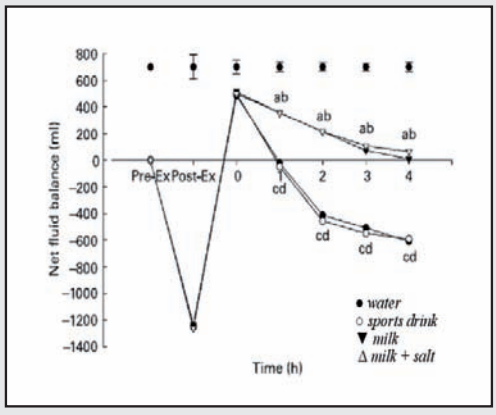
Recent study results

An investigation into the effectiveness of low-fat milk at restoring whole-body net fluid balance following mild exercise-induced dehydration was carried out. The response to milk ingestion was compared to water, a commercially available sports drink and milk with additional salt.

After losing 1·8±0·1% of their body mass during intermittent exercise, eleven subjects consumed a drink volume equivalent to 150% of their sweat loss. Urine excretion over the recovery period did not change during the milk trials whereas there was a marked increase in output between one and two hours after drinking water and the sports drink. Subjects remained in net positive fluid balance throughout the recovery period after drinking the milk drinks but returned to net negative fluid balance after just one hour of consuming the other drinks.

The results of the study indicated that milk is an effective post-exercise re-hydration drink and can certainly be considered for use after exercise by everyone except those individuals who have lactose intolerance.

Dr. Susan M Shirreffs
School of Sport, Exercise & Health Sciences, Loughborough University



SUSTAINABILITY AND ENVIRONMENT CONFERENCE HIGHLIGHTS

Sustainable dairy production – Reduction of emissions to air

By Rainer Bertsch, Technical Dairy Expert, Regierungspräsidium Tübingen

How important is reducing emissions to air in attaining a **more sustainable dairy industry?**

Things are in conjunction meaning an increase in energy consumption causes higher emissions to air. The global task is to reduce climate relevant gases to the atmosphere and to achieve the Kyoto goals. The dairy industry is part of this process and I believe IDF, being a very important transformer of knowledge in the dairy family worldwide, can play a role in the drive to reduce emissions.

What is the main source of these emissions to air?

The exhaust fumes from the energy supply is the main source of emissions to air. Every dairy needs a boiler house for the production of thermal energy, e.g. pasteurizing, cleaning, drying and other processes. The highest utilization is the application of steam. The different sources of combustion in the boiler houses are responsible for emissions.

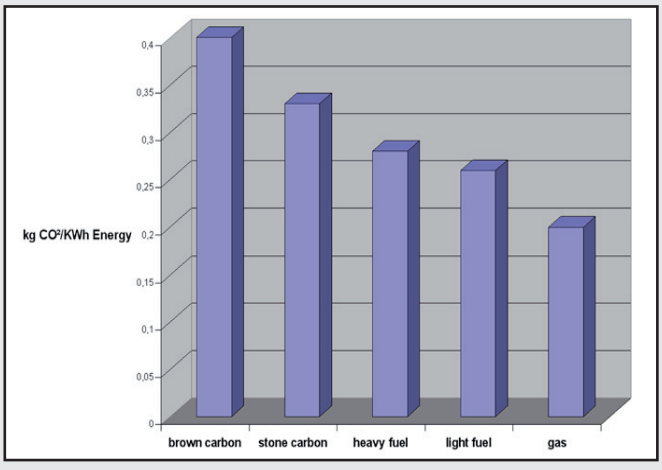
The energy intensive dairy processing plants are, therefore, more concerned with milk and whey powder plants.

Can you list the methods/actions that you recommend be **taken in order to reduce the level of emissions to air?**

Two very general but important recommendations are to reduce the energy consumption overall (there are a lot of existing proposals in detail) and to produce the required energy in the boiler house with a higher efficiency.

How can new methods be developed in order to increase **profit without degrading air quality?**

The optimisation of dairy processes is a permanent process and the steps are small. I believe that energy saving is as important as looking for new energy sources such as renewable energies.



Source: VDM-Guidelines on Best Available Technologies in Dairy Industry

IDF expands its commitment to sustainability and sustainable growth of the dairy sector by providing a dedicated website on environmental matters. It aims at sharing best practices, promoting environmentally focused initiatives and improving overall performance of the dairy sector.

For more details visit our website at

www.dairy-sustainability-initiative.org

SUSTAINABILITY AND ENVIRONMENT CONFERENCE HIGHLIGHTS

Sustainable dairy production – Wastewater treatment at farm and processing level

*By **Jim Barnett**, Environment Strategy and Development Manager, Fonterra Cooperative Group*

The primary aim of wastewater treatment is to reduce organic matter, nitrogen and phosphorus discharges to the environment. This is done by either biological treatment or land application of waste at both the farm and processing level.

How does wastewater treatment both at farm and processing level differ from one another?

The biological processes that are used vary at the farm and processing levels. At the farm level processes tend to be simpler and therefore pond type systems are used, while advanced activated sludge systems are used more by the processing sector. Anaerobic systems are increasingly gaining favour, especially at the farm level where the process is not affected by nitrates and fats. However, there are examples of anaerobic systems in use within the processing sector.

What is the importance of effective wastewater treatment at farm and processing level?

Effective wastewater treatment is essential if adverse effects on the environment are to be avoided. These adverse effects include contaminated rivers, possible eutrophication and groundwater being contaminated with unsafe levels of materials such as nitrates. The closer we move towards greater sustainability the more important effective wastewater treatment becomes.

Would a more effective process of wastewater treatment contribute to an increased sustainability in dairy production?

In general a more effective process of wastewater treatment will usually lead to increased sustainability. When considering sustainability, however, it is important to consider both economic and environmental aspects of the process. If a treatment is more effective but cannot be performed economically then it is not sustainable.

It is in the interest of the dairy industry to improve environment performance and sustainability and thus I believe there are measures that must be taken, such as:

- Implementation of anaerobic treatment to recover methane
- Reuse of water to reduce the industry water footprint
- Implementation of enhanced biological phosphorus removal

Would it be economically beneficial for the dairy industry to implement such measures?

Methane recovery, if performed on an appropriate scale, is economic in that it reduces energy requirements and in the future will accrue carbon credits. Similarly water reuse will reduce water abstraction, treatment costs and in a water short world it will become more economic.

Other applications need to be compared on merit and assessed against the cost of not undertaking the treatment required. Adverse costs may relate to environmental clean up, loss of credibility, loss of production opportunity etc.

Potential role of animal breeding in reducing environmental impact of dairy systems

*By **Eileen Wall**, Research Scientist, Scottish Agricultural College, Edinburgh*

Can you explain how the process of genetic improvement in livestock can potentially reduce the environmental impact of dairy systems?

Reducing the wastage in dairy systems will prove beneficial in reducing the environmental impact. There are three ways in which dairy cattle breeding can affect this:

- Breeding for improved efficiency of the dairy cow (e.g., selection for feed conversion efficiency)
- Breeding for improved efficiency of the dairy system (e.g., breeding for improved fertility and/or longevity)
- Breeding directed to reduced greenhouse gas emissions (e.g., selecting high or low emitting animals)

How does this technology improve performance?

Selection for improved efficiency in general will improve the performance of the dairy system in that it can potentially increase the profitability.

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ANIMAL FEEDING AND BREEDING CONFERENCE HIGHLIGHTS

In what way can the role of genetic improvement become a **tool to decrease emissions?**

The first two examples of selection are activities that the dairy industry are undertaking, to lesser or greater extent, and then valuing it in terms of improved animal and economic performance, which needs to be continued and consequently promoted. However, work on fully understanding the environmental co-benefits and harnessing genetic improvement to tackle some of the environmental challenges livestock keepers play is not as well developed. The dairy industry worldwide is encouraged to develop this area in order to ensure sustainability on a more long-term basis where they may suffer under environmental as well as economic challenges.

How will this discovery affect the dairy industry?

I believe that work in this area will help the dairy industry be proactive rather than reactive to the challenges that the environmental impact of livestock systems will bring in the future.

How cost-effective is the process, for the dairy industry in **particular?**

Some of the tools and selection goals have historically shown to be cost-effective and were the reason for pursuing them in the first place. Readjustment of some of the 'old tools' will help farmers address this. However, some of the newer developments in this area, such as direct selection for reduced emissions and utilising genomic information, are less developed and need further work and support.

The effect of genetic improvement on emissions from dairy and other livestock systems

By Dr. Huw Jones, Genesis Faraday

The process of genetic improvement is based around three main steps:

- Measuring and recording animals for specific characteristics of interest (such as milk yield for dairy cattle);
- Calculating estimates of genetic merit for these characteristics for each animal;
- Selecting the highest merit animals as the parents of the next generation.

What is the main conclusion from your research?

In dairy cattle the focus has traditionally been on achieving genetic improvement in characteristics such as milk yield and composition, which effect production efficiency. However, as production efficiency improved we would also have expected at least some reduction in overall emissions.

Using the UK as an example, we were able to show that the genetic improvement that has been achieved over the last 20 years in dairy cattle has resulted in reductions in emissions per unit of milk production. We were also able to predict that similar or even higher levels of annual reductions could be achieved by continued genetic improvement of dairy cows.

Can you explain why there was a reduction in emissions **through the process of genetic improvement?**

For dairy cattle systems there are three main sources of greenhouse gas emissions; emissions from the cow itself through belching of methane, through production of the cow feed and from the manure the cow produces. Through genetic improvement the amount of milk each cow can produce has been increased and thus to produce the same amount of milk we now need fewer cows.

How will these results help the dairy industry to tackle the **green challenge?**

The first benefit of this work is that we now have evidence that dairy producers can, and have been able to for a number of years reduce emissions per unit of milk produced through genetic improvement. The work has also shown that genetic improvement is a tool that has great potential to reduce emissions even further.

The benefits to date have been achieved by focusing on characteristics related to production efficiency. We could increase the reductions in emissions by increasing the rate of genetic improvement in these same characteristics, and by focusing on other characteristics that affect overall production efficiency such as measures related to cow health. In the future it may also be possible to directly select for reductions emissions.

PROMISING NEW RESEARCH RESULTS

Steps to implement Animal Breeding for Improved Nutritional Quality of Bovine Milk

By Nicolas Gengler, Research Associate of the National Fund for Scientific Research, Brussels, Belgium and Lecturer at Gembloux Agricultural University, Belgium

Animal improvement is always directed towards a given selection objective and these have been changing in dairy cattle over the last forty years. More recently, interest in milk quality traits has been increasing and the general object of our research was to contribute to the development of the steps needed to implement animal breeding for improved nutritional quality.

Key results showed that FA could be recorded on a large-scale basis and research on genetic parameters and correlations between FA and other economically important traits was successful and will continue in the future.

The next challenge in the field of nutritional quality is to conduct research and move definitively towards breeding values (genetic merit) for individual animals. Moreover, the fact that new traits can be measured will also change principles in the dairy industry regarding milk pricing and other important issues.

Finally there are many more lessons yet to be learned from milk composition than just its nutritional quality, with milk compositions reflecting many animal and animal management related parameters such as health, nutrition and potentially environmental footprints.

With dairy calcium against overweight in children

By Dorothy Teegarden, PhD; Professor, Department of Foods and Nutrition, Purdue University

There is substantial literature to suggest there is a relationship between a higher intake of dairy products and improved body weight or composition, however we do not fully understand yet how it works and why it doesn't seem to have an effect all the time.

Calcium is present in the food supply both as an individual nutrient, with the primary source for many populations being dairy products. There is clear evidence that calcium intake leads to increased fecal fatty acids in humans and animals, which reduces the amount of fat absorbed. How much calcium intake will lead to a significant effect on weight, however, is controversial.

We do not know if achievable intakes of calcium will have a significant effect on weight through lower absorption of fat, though it remains a possibility. We also do not know if there is any compensatory mechanism (such as satiation) for the reduced absorption of fatty acids with higher calcium intake that will prevent the reduced fatty acids from impacting overall body weight.

Most populations do not consume nearly enough calcium to have an impact.

On the other hand, only a few calcium supplement intervention trials have shown an impact on body weight, and most of these were during weight loss trials. Dairy product intake may have a greater impact than calcium alone. Not all weight loss trials with calcium or dairy products show enhancement of weight loss, which suggests there may be other factors such as something else in our diets, environment or genetics that, alongside the consumption of dairy products, promotes the greater weight loss (or less gain).

If there is an effect of calcium it is small, however small differences in energy balance over a long period of time may well have a very significant impact on the incidence of obesity.

A higher intake of dairy may have a significant effect on obesity over the long term.

If we can identify a nutritional factor which enhances or allows dairy products to significantly impact body composition, the dairy industry may be able to enhance this component in milk and consequently have an even greater impact on obesity than is already proposed.

ALSO IN THE NEWS

2009 IDF Award goes to Prof. Dr. Walther H. Heeschen (DE)

Christian Robert presenting the medal to Prof. Dr. Walther H. Heeschen.

The 2009 IDF Award was presented to Prof. Dr. Walther H. Heeschen last night at the IDF World Dairy Summit Gala Dinner. IDF wished to pay tribute to his extensive contribution to dairy research and extensive participation in various IDF groups and activities.

This year's IDF award winner was selected based on his extensive commitment to the dairy industry and the contribution that he has made to IDF, among many other organisations. Prof. Dr. Heeschen has held many posts and played a role in various scientific groups and successful documents.

Prof. Dr. Heeschen has been actively involved in the work of the International Dairy Federation with initiation and participation in a number of documents, monographs and standards. Moreover he was chairman or member of several groups of experts and still acts for both IDF and the German Federal Government within Codex Alimentarius.

Throughout his career he has published more than 450 papers in German and English and gave around the same number of lectures in over 50 countries worldwide. His contribution to food and milk hygiene research is outstanding and he currently remains the Scientific Editor of the journals Milchwissenschaft (Milk Science International) and Food & Hygiene.

Despite Prof. Dr. Heeschen's retirement in 1996, he continued to teach food hygiene, milk hygiene and food legislation at the Universities of Kiel and Berlin until 2002 and remains a scientific consultant and advisor in the areas of food hygiene/safety and applied food legislation. In addition, he remained a scientific advisor to Federal Ministries (health, consumer protection and agriculture) on topics such as BSE, residues and contaminants, development of hygienic standards and Codex Matters among others.

NZ WDS 2010 in the spotlight

Christian Robert and Andy Williams presenting two of the winners with their prize.

The winners are:

Dr. David Homer (GB) - Mrs. Dilek Emil (TR)

Mr. Massimo Forino (IT) - Mrs. Afroditi-Nectaria Vamvakaki (GR)

Updated information

www.wds2009.com

Farmers Dinner Highlights

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