

Nuffield Scholarship 2022 – How to produce the best milk?

During my Nuffield Scholarship I have had the opportunity to analyze the research question: ‘*How to produce the best milk?*’. As a dairy farmer, advisor and project leader I have had a lot of experiences with the dairy sector and governments during my working life. I found out that there are many opinions about how to produce the best milk, of which some are not based on facts, but mainly on emotions. Due to the Nuffield trip to New-Zealand, Kenya and Chile and the contacts with other Nuffield Scholars I refreshed my ideas about this topic. I have expressed those new ideas on the social media platform LinkedIn in a series of articles with the hashtag #90dagenmelk. Hereby, I will give a summary about the articles.

Species of animals

The choice for a certain mammal at the farm, already decides for a big part of the best way how to produce and use the milk that you will produce. Overall, the best way to keep animals is in the most natural way possible, taking animal behavior and their needs into account. Cow- and buffalo milk is mainly used for consumption, horse milk is often used for cosmetics (cream and soaps) and (some parts of) rabbit milk is used as a medicine. Pig’s milk has been produced to draw media attention and plant-based milk is produced to replace animal milk, though it needs additives such as calcium and vitamin B12 to be able to do so. There are some ethical questions about using animals for production. However, the demand for milk is increasing, as it is an important source of vitamins, minerals, sugars, fats and proteins for human health. Furthermore, dairy (components) in cosmetics, medicines or for cultural traditions, means that milk has several functions that are beneficial to human beings.



Animal feed

An important factor influencing the quality of milk is the diet that the animal consumes. Monogastrics and ruminants digest feed in a different way. Ruminants can use grasses and convert those to milk, though the quality of the grasses and legumes influences the quality of the milk as well. An increasing number of byproducts are used as animal feed: especially leftovers from the human food industry. For example in the poultry sector, breads that are not sold from the bakery are collected and processed into chicken feed. Therefore, animal production systems can have a beneficial influence on closing nutrient cycles, by using these leftovers and ‘upgrading’ them to animal products. However, the leftovers from the animals, mainly the manure, is not widely used for ‘upgrading’ and cannot always be used on-farm as well. Many initiatives have started to use the manure, with arable farmers using it as a fertilizer, biodigesters that produce energy and heat from it, manure-stripping and using parts of the manure as replacement for chemical fertilizers, biobased materials and potting soil. The quality of the manure is mainly depending on the feed the animals receive, which depends on several technical, economical and social factors. Furthermore, the feed composition of animals has great influence on political themes, such as nitrogen leakage to water and air, greenhouse gas emissions, biodiversity and animal welfare. It means that nowadays in the Western world the way the milk is produced is just as important, and maybe even more important, as the quality of the milk is. The way the milk is produced should contribute in a positive way to political goals at this moment, and it will be even more in the future as the Farm2Fork strategy is implemented in the European Union.

Soil and manure

One of the most important factors a dairy farmer can influence is soil health, soil life and soil structure at the farm. By choosing for certain farming systems, such as regenerative agriculture, agroforestry, food forests, or by choosing for rotations with soil improving crops, or even by checking weeds and what signal they give about soil health, a farmer can take measures to improve the soil quality. Increasingly, knowledge is generated and research is done about soil health impacting human health. Agricultural practices are key in improving both. Different researches come to the conclusion that: *“As the human health is affected by several factors that should be in balance with each other, the same principles should be used for soil, plant and animal health. Interactions between soil, plant, animal and human are very complex and will challenge us for many years to improve agricultural practices.”*

Economy

Analyzing the economic aspects of dairy farming, one thing is clear: the management and passion of the farmer has to be the most important. Whatever strategy is chosen for the farm, expansion, low cost, mechanization or milk production, without the full commitment of the farmer and his family and co-workers, it will not succeed and will not generate enough profit. At this moment, several subsidies are initiated by governments to encourage farmers to make a transition to a more sustainable agriculture. The new Common Agricultural Policy (CAP) is including eco-schemes that give farmers some extra support if they apply more sustainable measures. Furthermore, farmers receive ‘rewards’ if they can prove that they are more sustainable based on records of their farm.



Photocredits: stevepb of Pixabay

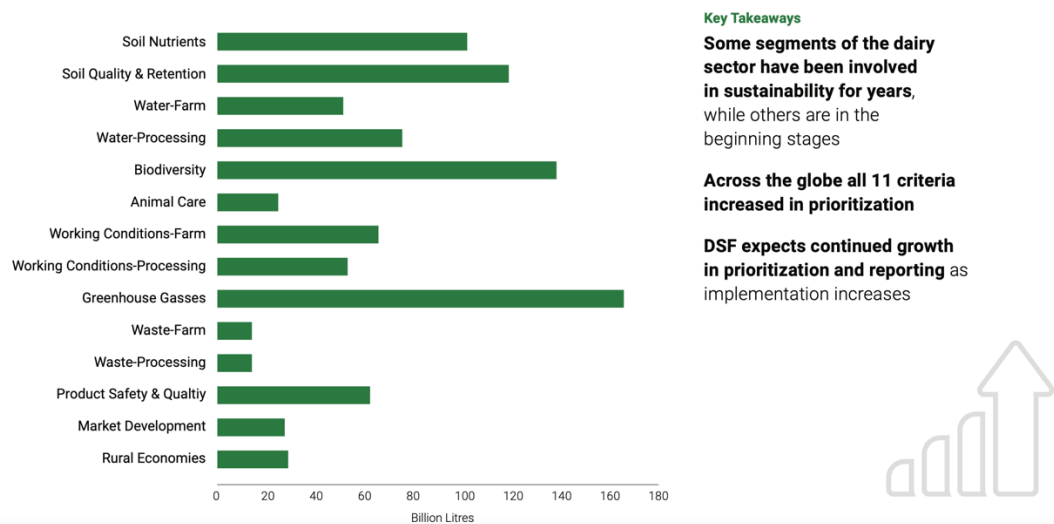
Unfortunately, these rewards and subsidies are not sufficient to generate a decent farm income. In the future it will be necessary for farmers to choose the most sustainable practices that fit their farm strategy. They will have to increase the profit they receive for their dairy products, their measures for the environment and lower the costs at the farm if it is possible. As the difference in profits between dairy farms is as much as a Ferrari (€100.000) a year, still some options are available to improve farm management economically for a large group of dairy farmers.

Sustainability

Often people use the words ‘sustainable dairy farming’, though the thought of ‘sustainable dairy farming’ is different for every person. In The Netherlands you can see the evidence in the supermarkets: we have created labels for ‘Net Zero’, Caring Dairy, Better Animal Welfare, On the way to PlanetProof, and so on for dairy products. Government policies show this difference in opinion of sustainability as well: the eco-schemes of the Common Agricultural Policy (CAP), renting conditions for government land, but also manure and climate policies are all considering different things to be sustainable. Farmers who are mentioned as ‘forerunners’ in the agricultural sector show high diversity: big-size mechanized and specialized farmers with low carbon footprints are applauded just as much as small-sized agroforestry dairy farmers with limited sales. To centralize the information about sustainable dairy farming worldwide, there is an international dairy program that collects information and has created a Dairy Sustainability Framework (DSF). This gives farmers and the dairy industry and customers more insight in what goals need to be achieved worldwide. In The Netherlands, government, research and the dairy industry jointly work on a way to ‘translate’ (inter)national goals into comprehensive farm goals. By formulating ‘Critical Prestation Indicators’ (KPI

in Dutch) that the farmers can influence with their farm management and positively affect the government goals, this system can help to improve farm practices. It tries to integrate all the goals, mainly on ecological issues, so measures that will reduce greenhouse gas emissions and reduce nitrogen emission as well, will show good results on both these indicators.

Growth in DSF Member Prioritisation of Criteria by Milk Volume (Billion Litres) 2018 vs 2017



Social aspects

Talking about ‘sustainable dairy farming’ people often forget the social aspects of it. A farmer can add a lot of value by not only producing food, but also by using the farm for other activities. There is a big demand for organizations that take care of people (e.g. elderly or addicts), provide childcare, recreational activities and guard natural areas for example. Farmers can offer extra services for the community by developing one or more of these activities professionally. However, the earnings from these activities should be reasonable, as it demands a lot from farmers to deliver high quality food, and at the same time take care of the environment and have social activities at the farm as well, all in a professional way. Important is that the social activities have added value for the farmer and the farm itself, so both of them benefit.

International aspects

The demand for milk and dairy products is increasing worldwide¹. Asia produces almost double the amount of milk compared to Europe. The Middle East and Asia are still importing dairy products, that are mainly produced in Western-Europe and New Zealand. The dairy sector in these countries is working on more sustainable milk production taking the Sustainable Development Goals (SDG’s) into account. Worldwide they are leading in sustainable milk production. However, this is not enough. The dairy farmers in Europe and New Zealand have to take into account what the society demands from them, mainly in their own surroundings. Farmers in Kenya have a lot of experiences with that: companies producing food and roses often have social programs for communities providing education, health care, water and food for the people in their surroundings. In that way the communities and political leaders accept and support them and see the benefits of the farms that are often mainly exporting goods. To pay for these costs the goods need to have added value: either in quality, price or availability at the right moment. Farmers in Kenya and in Chile are very innovative in adding value to their products, so they can use the higher margin to invest in social activities. In return, the people surrounding the farms are often working at the farms and the farm can produce their goods for a long-term period, benefiting not only communities, but also investors.

¹ FAO. 2022. *Dairy Market Review: Emerging trends and outlook 2022*. Rome

Farm visits

During my Nuffield Scholarship, I visited many different other Nuffield farmers. They all have one thing in common: they are often excellent in their farm strategy and reach high levels in their business. They know what their customers expect and make (bold) choices to be in the top-level. Often customers and local people admire them for that. Oranjehoen is one of the Dutch farms who has done this and knows how to communicate about their strengths. New Zealand, where a lot of milk is produced and exported, there is a growing concern amongst politicians and civil society about environmental effects of this production. Emission of greenhouse gasses and water quality are important issues. Farmers take the lead in local groups to work on these issues themselves. Environmental issues are less important in Chile: high margins, high production and high added value are more important in farming, though they can be combined, for example by organic produce. The farms we visited are large farms that work together with local farmers and local people who often work at the farm. Because of Chile's long vertical position, the high educated farmers can start or scale up a farm choosing the right climate for the goods they want to produce. Investors see the benefits of investing in farms in Chile and the government is supportive. The investors are also interested in farms in Kenya, though there needs to be a very good balance between profits and social aspects in this country, as we mentioned before.

Managing Director of the farm Kakuzi in Kenya, Mr Christopher Flowers, mentioned this as we visited his farm as a Nuffield group: *"Growing plants, Growing people"*. It means he not only wants to produce food and flowers at his farm, but also helps people grow to be a better version of themselves. Sustainability is important at this farm in the broadest way possible.

Conclusion

To produce the best milk it is increasingly important HOW the milk is produced. The production process and farm management are very important to achieve international goals on environmental, social and economical themes. The following things are most important for farmers:

- Focus on the **added value** you want to realize with your milk: is it used for consumption, medicines, cosmetics or health? The Chilean companies I visited are very strong in doing this: for example Garcia Fruits is mainly focused on producing the best quality cherries for Chinese New Year. The prices are extremely high in China around that time and Chile is one of the few countries that has good quality cherries at that moment.
- Be aware about the **challenges** for the coming years (climate, biodiversity, water- and air quality, animal health and welfare) and know what you can do about that as a dairy farmer. For example in New Zealand the farmers already know for some time that water quality has to improve: it led to legislation that prohibits cattle from drinking from the waterways as it can spoil the water with nitrogen. One of the dairy farms we visited has joined efforts with other farms and started to analyze the water quality on several spots on their property. They found out that sediment caused a big part of the nitrogen pollution of the water, not the cattle. This helps to prevent unpractical legislation.
- Try to **optimize the production process** for milk on all aspects (feed, soil, manure, economy) to contribute to the environmental and social challenges. This doesn't need to be disadvantageous for the farm economy: every year millions of imported nitrogen is lost in the Dutch agricultural sector. Making sure nutrient cycles are more closed at the farm can increase the profit and benefit the environment.
- Add extra value to your farm by starting **extra social activities**, such as childcare, restoring nature and recreation, and make sure you get decently paid for that. Civil farm Oosterwold is working on that: they are not only producing milk, but also offer workspace for other small entrepreneurs and are starting up a cooperative supermarket that works with local farmers.

Every farmer will make their own choices, depending on their farm situation, (social) environment and personal interests. That diversity in farm management will add value to the production of milk and to landscaping the surroundings. As a camel farm we are unique in The Netherlands, but not in Saudi-Arabia, where everybody in the countryside has some camels. That is why people from all over Europe come to visit our farm for camel dairy and tourism. From the start of our farm, we have been extending our activities and the production of milk. During the Nuffield Scholarship I learned that we should make strategic choices in how to succeed our milk production. We want to add value with our camel milk to human health, show how we contribute to the environmental and social challenges, optimize the production process and analyze which touristic activities at the farm are really of added value. Especially at this moment, with few employees and a strong demand for workers everywhere, it is important to make choices. We will try to have the most positive impact we can for the people around us and ourselves.

Recommendations

To the dairy farmers in The Netherlands I would love to say: *grow animals, grow earth, grow people*. As dairy farmers we are so much more than animal caretakers and dairy producers. We can help animals, soil quality, plants, people and the economy to grow in a sustainable way. Let's strive for a way of producing milk with the most 'positive impact' as possible to ourselves, our farms and our surroundings.

By consciously looking at what you can contribute as a farmer and which factors you can influence yourself, you can increase the amount of positive impact you realize. That is why I developed the 'FarmersPIM'. This is a Positive Impact Method which you can use to add value to everyday practice. It doesn't have a 'good' or 'bad' score: nobody is 'better' than the other. Every day you have a different positive impact. It is a tool to realize how much more we can do as a farmer. Hopefully it will stimulate to 'produce the best milk' at every dairy farm around the world.

During the making of the FarmersPIM I first analyzed which themes are important to governments, industry and society. There are a lot of them:

- Closing (nutrient)cycles and reduce waste
- Climate change, adaptation and mitigation
- Improve water-quality and -management
- Improve soil quality
- Maintain biodiversity
- Improve plant- and animal health
- Improve social and economic conditions of farmers

This can be seen as a threat to the future of farming. However, it is important to see what IS possible. Therefore the FarmersPIM (see below) is a positive way of looking at the challenges. How can you have a positive impact? What can you do about these challenges? How can you balance all these challenges on your farm?

Positive impact

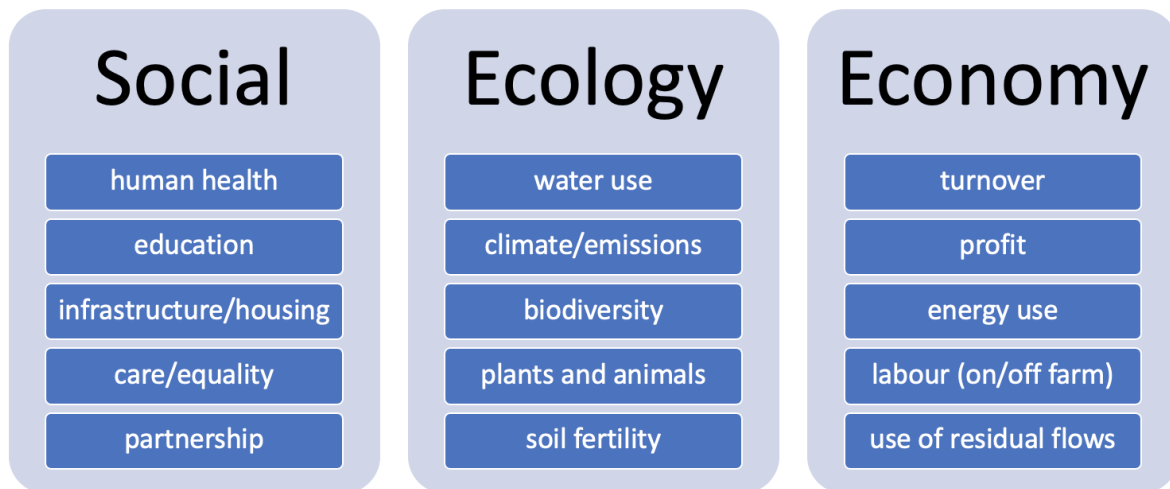


Figure 1: FarmersPIM

Without being aware of it, farmers already work on these themes every day. By being conscious about it, choices can be made that improve the positive impact the farmer already has. In developing a farm further, looking at these themes and making choices about them will strengthen the farm and the farmers. Though some choices will not be positive for each of these themes, for example investing in soil fertility will often lower the profits at this moment, but in the longer term will lead to improved quality of products, higher biodiversity and/or more healthy animals and plants. Using the FarmersPIM can help a farmer to look at their farm in a broader sense and communicate about the added value the farm has on many aspects, not only production of food.

People working with farmers, directly as a farm advisor or indirectly as a policy maker, should be aware about the FarmersPIM as well. If farmers are advised in a more integral way about making sustainable choices, the farm will be more 'future-proof'. An increasing number of advisors are 'multifunctional advisors' not only looking at the production part, but also at the social activities at the farm. If they can even broaden their horizon with the FarmersPIM, they can really make a difference in the way farmers think about their farm and the positive impact they can make. For policy makers, it is important to realize that they are often hired for only a small part of the total farming system, for example for zoonoses. It is expected from them that they know everything about that one issue. However, being aware of the big challenges for farming, it will help them to make legislation and develop subsidies that are improving several themes in an integral way. That means that they can prevent developing legislation that will for example reduce greenhouse gas emissions, but will decrease biodiversity as well.

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