

# Dutch dairy farmers find own solutions to their environmental problems

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Farmer experimentation and innovation and farmer-researcher platforms for the development of low external input and sustainable agriculture are very successful not only in tropical countries. Also in the Netherlands, there are remarkable initiatives of farmers to develop alternatives to the unsustainable conventional dairy production model. Ten years ago, two environmental associations of dairy farmers, VEL and VANLA in the province Friesland, in the north of the Netherlands, started to experiment with nature and landscape management and integrated agriculture. Now, after several years of successful experimentation with environmentally-sound farming practices, this initiative is being taken up by several hundreds of dairy farmers in different parts of the country.

## Fifty years of dairy development

In the '60s, the average Dutch dairy cow produced 4000 kg milk per year. In 2001, this was about 8500 kg. The average yearly increase of about 100 kg milk per cow was possible due to very successful technology development, enhanced by effective research-extension-farmer interaction, access to credit, and a conducive policy environment. Artificial Insemination and effective breeding policies increased the potential milk yield of dairy animals to levels that our grandfathers did not even dream of. Other important innovations were: the shift from rope-tied to free-roaming stables with sleeping cubicles and a much better ventilation system; disease control through effective vaccination; very high fertiliser application levels which boosted grass yields; mechanisation of fodder production; improved fodder conservation techniques and the introduction of fodder maize. The availability of ample high quality roughage, supplemented with high levels of protein-rich concentrates, made it possible to fully exploit the improved genetic potential of the dairy cows. But also, the low prices of these high quality fertilisers and concentrates were essential in achieving high milk production.

## Increasing environmental problems

The recommended fertiliser application for pastures has gone up to 400 kg nitrogen (N) /ha. Presently, annual grass production on pasture land is 10-12,000 kg dry matter/ha. in 5-6 cuts. The low price and high status of mineral fertilisers made cow manure lose

its importance and was used only as an extra, over and above the recommended fertiliser application. Until recently, the nitrogen present in manure was not even considered in calculations.

These high fertiliser applications increasingly led to serious environmental problems: leaching of nitrates from the topsoil to the groundwater negatively affecting the quality of the drinking water and high levels of ammonia emission from the cows negatively affecting the quality of nature in the surroundings of the farm. In the '80s, the Ministry of Agriculture had to introduce a series of 'restrictive' measures for dairy farmers to meet the environmental targets set by the European Union. Broadcasting manure on pasture land was banned and instead it was made compulsory to inject the manure as slurry into the soil during the growing season.

In the early '90s, a mineral bookkeeping system for dairy farmers was introduced and was tested as a voluntary management tool. Through simple accounting of mineral input and output at farm gate level, nutrient losses within the farming system were made evident. Ideally, inputs (concentrates and fertilisers) balance with the outputs (milk and meat) in terms of nutrients. However, losses of nitrogen occur in the cow and in the soil. This bookkeeping revealed that losses of N/ha in the conventional dairy system had become very high and hence N efficiency very low (<18% at cow level and <30% at soil level). See figure 1.

## Animal health problems and consumer concern

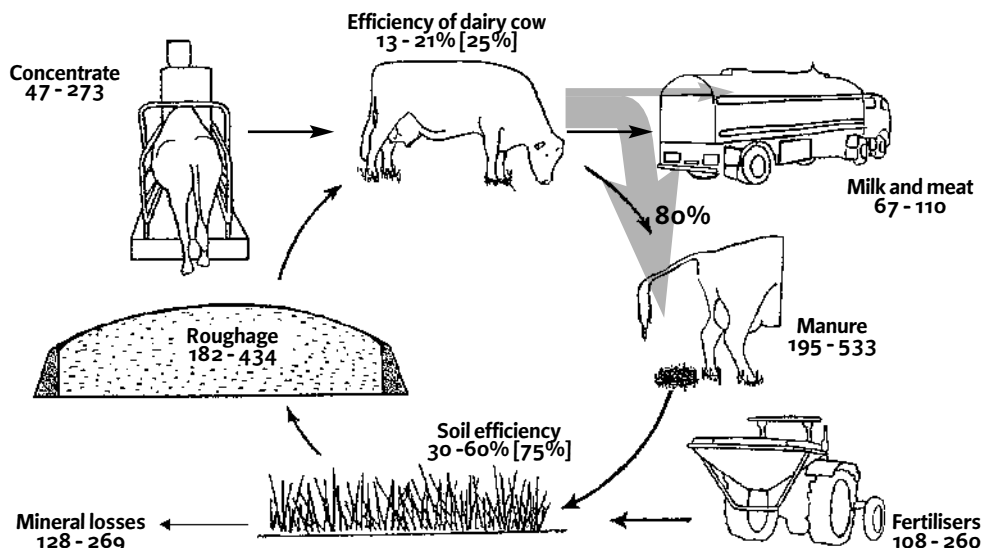
The high-input farming system led not only to environmental pollution but also to animal diseases:

- very high protein levels in the rations causing digestion problems and malfunctioning of the liver;
- high incidence of mastitis;
- animals becoming susceptible to hoof diseases;
- prolonged calving intervals due to fertility problems.

These health problems are increasing veterinary costs and decreasing milk production.

Consumers are showing increased concern with the (perceived) lack of animal welfare related to intensive production, and with human health in relation to cow-diseases like Mad Cow Disease (BSE). They have begun challenging the so-called "license to produce" of farmers. The Foot and Mouth Disease crisis of last year aggravated this feeling and exposed the vulnerability of the modern livestock production systems.

Figure 1: Nitrogen efficiency of Drenthe project farmers expressed in kg N/ha/year [ideal]



## Two environmental associations start the process

Ten years ago, the two environmental farmer associations in Friesland were founded by farmers to regain control over their own future. They argued that by development of integrated agriculture, pollution control by conscious use of agrochemicals and plastics, and the management of nature and the many small-scale natural landscape elements (hedges, bunds, pools, etc.) on and between their farms, they could greatly improve the quality of their environment. These measures, they said, should not necessarily decrease their production and income, while certified quality products, landscape management and income from agro-tourism could provide new opportunities.

The philosophy of these dairy farmers, based on their 'gut feeling' and experience with the production system of their fathers, is that many relationships exist between the various components of the farming system, and that these relationships should be considered in all management decisions. For example, the way they feed their cows affects the quality of the manure. The quality of the manure affects the quality of the soil. The quality and fertility of the soil affects the quality of the pasture and fodder crops and hence the feed, which in turn affects the health of the animals and the quality and quantity of the products. All parts of the system as well as the whole are important! The quality and quantity of the dairy products (milk and meat) are improved by optimising the (biological) quality of all the different aspects (manure, soil, pasture, feed, animals, products) and the quality of the whole system. In conventional dairy production, the concept of system quality was lost because of the focus on the development of a high input - high output system. Through refocusing on quality, the system develops in the direction of a low input - high output system.

The farmers found that by reducing the amount of protein and increasing the amount of crude fibre (roughage) in the feed of their animals, the quality of the manure is much better than the slurry produced by conventional dairy farmers. They argue that this type of manure (with higher C/N ratio and relatively rich in organic N) is more beneficial to soil life and therefore more efficient in production of biomass. Consequently, N emission to the environment will be reduced. Broadcasting manure with these qualities is also less detrimental to the environment.

The approach builds, as much as possible, on farmers' knowledge and ecological regulating mechanisms found in nature. The farmers consider their experiences as added value to the conventional scientific knowledge as they also use practices and methodologies not accepted by conventional agricultural science.

Apart from system quality, the farmers also work on adapted animal breeding, new opportunities to diversify the local rural economy such as agro-tourism, and farmer cooperation to enhance processes of change.

## The PMOV platform – taking it further

In the last 3 years, this initiative has been taken up other farmers and together with some researchers they have founded the PMOV platform to promote 'eco-technological' farming. Presently, the platform constitutes about 120 experimenting dairy farmers, two formal experimental research farms comparing integrated and organic agriculture and the two environmental associations of Frisian dairy farmers.

The network felt strongly that a link should be built with university research for two major reasons. The farmers, who rely on their own observations and incidental measurements, wished to get more insight into what ecological processes actually take place in their farming systems. Secondly, they wanted policy makers to understand their exploratory efforts and promising results, and adapt legislation towards objective-oriented regulations instead of instrumental ones. "Politicians should tell us what they want, but we will decide ourselves how to do it!" Initially, the Ministry of Agriculture was very reluctant to

cooperate. The farmers were perceived as those trying to escape environmental legislation. Only with great difficulty could the farmers negotiate some legal space for their experiments which did not conform to Dutch law for manure application. After several years of good results some recognition for the value of these experiments is emerging, and money from the government has been allocated to facilitate further experimentation by a larger number of farmers also in other parts of the country. Also in 2002, a grant is expected from formal Dairy Research to formulate a joint monitoring project to assess PMOV farm results and compare these with conventional farms. 'Joint' here means that farmers and scientists together design the project. Interest also exists to better understand the dynamics and decision-making logic of experimenting farmers, to make the sharing of their experiences to other interested farmers cost efficient. These farmers do not only perceive themselves as entrepreneurs, but also and often even more so, as 'stewards of complex agroecosystems'. They often feel the need to regain their 'license to produce' within society at large.

## Management guidelines for dairy production

Based on the long years of experience of the farmers and the experiments carried out on the experimental research farms, the platform formulated some new management 'guidelines' for keeping dairy cattle in a more sustainable way:

1. Reduce the percentage of crude protein in the diet (from 18% to around 16 or 15%) and increase the crude fibre content;
2. Try to keep the OEB (Rumen Protein Balance) at zero;
3. Try to increase the C/N ratio of manure from 7 to around 10;
4. Feed concentrates to a maximum of 25 kg per 100 kg of milk;
5. Reduce the fertiliser applications on pasture stepwise with about 30 kg N/ha/year. Try to get it down until it is in balance with the permitted yearly losses (180 kg N/ha/year);
6. Distribute larger portions of the manure applications to the 1<sup>st</sup> and 2<sup>nd</sup> cut. Stop manure and fertiliser applications entirely after mid July.

## Preliminary results

The results of the practical experiences indicate that it is possible to maintain the milk yield with lower costs due to substantial reduction in mineral fertiliser supply and concentrate feeding. The values of nitrate losses into the ground water and ammonia losses into the air were clearly below the set EU-targets. The health status of cattle on many PMOV farms has improved, adding significantly to cost reduction. The biological quality of milk, manure and soils is presently being assessed.

Beside these technical results, the farmers strongly value the benefits from improved social relations and collaboration within the working groups and their communities. As farming now is more in line with their intuition, farmers feel less stressed as well.

The techniques, ideas and experiences of the farmers and the two experimental research farms are shared through farmer-to-farmer meetings, newsletters, seminars and info-markets, lectures and excursions, farmer study-clubs and educational material.

The experiences show that these farmers are well able to resolve their own problems and make their farming systems sustainable to a large extent. Within the norms set by society, farmers should have professional freedom to find their own solutions adapted to local conditions.

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