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# Farming for Nature

How does it work and what does it do?

Executive summary of Alterra report 2472

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# Summary

## **Farming for Nature**

Farming for Nature departs from the idea that farmers are the most 'natural' landscape managers. For centuries, farming systems have shaped and managed the landscapes of The Netherlands, including areas that we call 'nature' nowadays, such as heathlands and wet grasslands, and much of the Dutch biodiversity was a result of those systems. Today, farming is seen more as an enemy than as a partner of nature, as a result of intensification enabled by deep drainage, high inputs of feed and chemical fertilizers, pesticides, and the removal of landscape elements for a more efficient layout of parcels. For long, the Netherlands had a strategy of spatial and organizational separation of agriculture and nature, in which their ancient functional relationship was mostly lost. In spite of attempts to halt the deterioration of on-farm biodiversity with schemes for agri-environment management, it decreased severely. Agri-environment measures on most farms are combined with a conventional farm practice. In addition, schemes are also open for participation in areas where for biodiversity little result is to be expected. For landscape quality, however, agri-environment measures can be beneficial even in intensive farming areas.

Farming for Nature proposes alternative farming systems, to be applied in areas of high public value. The nature-oriented farm works with a 'closed nutrient cycle' (no-input), higher water levels and 10% landscape elements and is aimed at (buffer zones around) nature reserves, water catchments and peri-urban areas. The landscape-oriented farm combines 10% landscape elements with conventional farm practices and is meant for transition areas between nature-oriented farms and conventional farming areas where food production is the main goal. According to Farming for Nature, farming systems are to be preferred over add-on measures, because they lead to less conflict in farm management between farming and nature. In addition, agreements and control apply to a limited number of general management decisions, avoiding bureaucracy due to much detail in measures and locations. This creates space for self-governance and entrepreneurship. This report deals primarily with the nature-oriented farming system.

The hypothesis behind Farming for Nature is that farming processes will 'naturally' produce biodiversity as long as the right conditions are created. The nature-oriented farm is extensive and diverse. No input of feed and fertilizer from outside the farm makes manure a scarce resource. For that reason the farmer will steer towards a good quality of the manure and not waste it on edges and wet corners. Rather, he will be happy to harvest biomass from natural landscape elements, which become a source of nutrients in addition to the water system. In this way, Farming for Nature leads to ecological gradients that lack with other concepts, or need to be purposely created.

Nature-oriented farming implies a drastic conversion process, which leads to a considerable decline of the primary production and comes with extra investments. For costs incurred and income foregone the farmer receives a payment from a regional fund. Farming for Nature envisions agreements for 30 years, linked to the land through a servitude contract. In addition to (local) food, the nature-oriented farm delivers public goods such as water storage, biodiversity, attractive landscape for recreation, protection of adjacent nature and education. For that reason several regional governments and private parties contribute financially to the fund from which the farmer receives his payments.

## **Pilot projects**

The concept 'Farming for Nature' was published in 2001 in the Alterra report 'The worst land is the best' (Stortelder et al., 2001). After that, pilot projects were started on a dairy farm in the Biesland Polder, near Delft in the urbanized West of the Netherlands, and on two sheep farms and one farm with suckler cows on the Twickel estate, near Hengelo in the East of the country. The pilot projects concerned experimenting with the nature-oriented way of farming and organising the regional cooperation and funding. The years 2002-2007 were used to make a farm plan, to build regional networks, to achieve commitment for funding, to develop agreements, to go through a state aid procedure with the European Commission, and to set up a scheme for monitoring and evaluation. The

state aid decision was a landmark: without European consent the projects could not start. In 2008 the agreements with the four farmers came into effect. They built new farm buildings for extra storage capacity for feed and for animal-friendly housing, constructed composting facilities and expanded their land, although in varying degree. In the meantime, the landscape was rearranged and the water system was adjusted. As a result of all these dynamics, the conversion process took more time than expected. In 2012 however, the fifth year of the pilot projects, the nutrient cycle was 'closed' on the Twickel farms, and in Biesland the nutrient balance was negative. This means that the envisioned 'impoverishment' of nutrients at farm level is in progress.

This publication reports on the lessons from the pilot projects based on monitoring and evaluation. The development of the farms, the ecology and the social environment were followed from 2008 to 2012 (in Biesland since 2005). In Biesland this was done according to a process of social learning, in which exchange took place between farmers, citizens, volunteers and scientists about and between the various research themes.

### **Process and arrangements**

In both pilot areas, farmers, municipalities, water board, city region, province and state cooperated to work out the organisation and funding of the project. At Twickel in addition the Twickel Foundation was involved (the owner of the estate) and in Biesland the Friends of Biesland citizen group. Various documents were prepared to give shape to the cooperation: political agreements, civil contracts, subsidy agreements, adjusted land lease contracts, a report substantiating the calculations of payments, and so on. Because government payments to farm businesses were involved, a state aid notification had to be done. The decision of 'no objection' arrived, but the permission was, for at least five years, limited to one farm in Biesland and four to ten farms at Twickel. For that reason no other Farming for Nature projects have started yet, in spite of the interest with farmers, local governments and nature organisations.

The Twickel project is differently organised than the Biesland project and the contracts have different formulations. In Biesland, South Holland province is the farmer's main partner, supported by an Advisory Council. At Twickel, the province of Overijssel has transferred various tasks to the Farming for Nature Twente Foundation.

In both projects there was tension between the experiment and the institutionalized frames of subsidy schemes, decisions and exemptions. In order to be able to pay the farmers, formal agreements were needed and the development of contracts was part of the project, but the existing legal context was at times insufficiently flexible for the necessary process of trying, learning and adapting.

In both areas the political steering group and the operational project group met regularly. In addition, in both areas a network was set up around monitoring and evaluation. In Biesland this was an extensive network with researchers, nature volunteers, interested citizens and farmers. The network took care of joint data collection, meetings for exchange and the publication of results.

The preparation processes and the development of tailor-made arrangements took a lot of time. A national framework for agreements and payments could make a broader implementation of Farming for Nature more efficient, but the area focus in content and cooperation should be preserved.

### **Landscape adaptation**

Drastic rearrangements have been carried out in both landscapes. Twickel is a small-scale landscape on mainly sandy soils, with small fields, tree hedgerows, forests, creeks and heathlands. On the Loninkwoner farm, the canalised creek Hagmolenbeek was reconstructed: its bed was made narrow and meandering again. As a result the water level has raised considerably. With heavy rainfall the river quickly bursts its banks. Also the valley of the Buitenbeek creek was thoroughly adapted in order to raise the water levels and to store and contain storm water. The wetter circumstances were strived for for the benefit of nearby natural areas. At De Bunte farm new tree hedgerows were planted and a number of ditches was made shallower. At Bokdam farm ditches were made shallower and bushes were planted. Not all rearrangement plans were carried out, because as yet no specific payments are available for landscape elements and not all envisioned lands have been added to the farms.

Biesland is an open meadow landscape on peat and clay soils, with wet circumstances and many kilometres of ditches. Along many ditches, shallow swamp-like shores were made with water quality, biodiversity and water storage in mind. In addition, the water level management was 'reversed': in spring the water levels are now higher than in summer and fall. An arable field was created in the Upper Polder for feed production.

### **Results Farm and Economy**

The no-input rule for feed and manure means a considerable change of the farming system. Because of the lower levels of fertilization, the feed production on the farm is not only reduced in quantity, but also in quality, while shortages cannot be supplemented with purchase of feed. The Biesland farm for that reason steers for diversity. It produces both hay and silage and each batch is wrapped, sampled and labelled separately, in order to tailor the feed provision throughout the season to the needs of dairy cows, young animals and the cows that need to fatten up for slaughtering. De Bunte farm at Twickel is also developing a feed strategy in that direction. With a large amount of low quality grass, compensation with higher quality feed is important. Loninkwoner farm cuts the grass early in the season for that reason and experiments with a mixed crop of barley and field beans. Biesland farm mixes barley or triticale with lucerne and has grass and clover in the crop rotation. Because of the higher water levels in spring and because of the meadow birds, Biesland farm has shifted the season of production from spring to summer. The calves are also born in this period. In this way, Biesland farm combines a nature-oriented and a more production-oriented way of farming in one year, within the limits of Farming for Nature.

Soil fertility is not decreasing yet, but that cannot yet be expected, since the nutrient balances have only recently become negative. The period of conversion took longer than expected. During the rearrangement works in the landscape, much land was bare, and feed needed to be bought as it could not be sufficiently produced on-farm. At the Twickel estate, two of the three farms have not yet reached their envisioned size and at De Bunte the farm buildings are still under construction. As a result, arable land, grassland, number of animals and stock are not yet balanced. On the Biesland farm the limited availability of arable land in the wet and urbanized region became a bottleneck. For that reason the Biesland farm has started to 'export' manure from the farm to compensate for the input of cereals, leading to a negative nutrient balance since 2011. This means that the farm as a whole is extensifying, similar to a situation with a 'closed' nutrient cycle.

Animal health seems not necessarily to suffer from the Farming for Nature regime, although the development of a farming system with a new balance apparently takes time. Availability and quality of feed are important keys on the side of prevention, which are especially vulnerable on a nature-oriented farm. On the Biesland farm there have been problems with coccidiosis, a high number of body cells in the milk and molybdenum in the feed. All that is currently under control. At Loninkwoner and De Bunte, lamb survival has been rather low for a few years. The suckler cows at Bokdam do not have health problems that are worth mentioning.

The complexity of a nature-oriented farm is even higher than that of a conventional farm, because it lacks various ways to correct problems that are available to a conventional farm. The farmer-entrepreneur must learn and invent much and develop his skills. Because of the limited size of the farms, the farmers at Twickel have to get extra income from delivering various services outside the farm (pluriactivity). Farming for Nature should be feasible on a part-time farm, but for the development of new skills it is important to be able to spend enough time on the farm. In addition, a full-time farm would create more space for multifunctional activities that have synergy with the agricultural activities. De Bunte wants to combine farming with extension and training, Bokdam has a small sales point along a public footpath and Loninkwoner considers the development of a local product.

The Biesland farm yields enough income for the three members of the company, who work on the farm full-time. The farm has extended considerably with grassland, including 40 ha in the nature reserve Ackerdijkse Plassen. Farming for Nature has offered the farmers various new opportunities because of the urban environment. The dairy activities have been supplemented with processing and sales of meat, education and care ('assistant farmers'), and more plans are on the roll. For all four farms, the payment of Farming for Nature is essential in the farm economy.

## **Results Ecology and Water**

The period of piloting and monitoring has been too short to expect big changes in the ecosystem. Yet, the first results are promising.

As expected, the shores and edges in Biesland are richer in plant diversity than the fields themselves. The fields are home to few rare species, but are much richer in diversity of grasses and herbs than the almost monoculture of perennial ryegrass in conventional fields. Furthermore, the Biesland fields have a vegetation structure that is highly suitable for meadow birds, as a result of the higher water levels in spring and the use of farmyard manure. The meadow birds seem to maintain their numbers quite well, including the sensitive Blacktailed godwit and Common redshank, and occur in densities that are high in the Dutch context. This is remarkable because the area is not optimally suited for them, because of the high numbers of visitors and the limited openness of the landscape.

The water quality in Biesland has not improved during the monitoring period. This can be explained from the fact that the regional water board has not yet succeeded in constructing a by-pass for removing the polluted water from a nearby glasshouse area, which is until now let in in the Biesland polder. The poor water quality is the main reason why the fish community, which is not badly developed as it is, has not yet improved.

In the Hagmolenbeek creek at Twickel, the fish community has changed dramatically and quickly as a result of the reconstruction. Today, the creek is dominated by species that belong to fast flowing water similar to natural creeks, while before the reconstruction the creek was dominated by fish species of still water. Because the whole creek valley has been reconstructed, the vegetation along the Hagmolenbeek has also become very varied. Here, a gradient has developed from poor grassland to a nutrient-rich inundation field and groundwater dependent species. On other parts of the Loninkwoner farm the vegetation has had little time to adjust to the new management after the rearrangement work and the number of species is limited. The extensivication has started though and some corners receive so little manure that herbs are taking over. As a result of the shallower creeks of Hagmolenbeek and Buitenbeek, in the heathland between the valleys the groundwater has raised considerably. The vegetation of wet heathland is already recovering with species such as Sundew, Beak-sedge and Sphagnum.

The creek Azelerbeek, on the Bokdam farm, already had a fish community of fast flowing water and that is still the case. Bokdam has the most interesting fields in the sense of vegetation and one parcel has an exceptionally high number of plant species. Also De Bunte has a very interesting field. These grasslands already had a high biodiversity at the beginning of the project. In the arable fields of the Twickel farms, typical herbs of arable fields have developed, including the in the Netherlands rare Rye brome at the Bokdam farm. The increase of biodiversity in the arable fields is an obvious result of Farming for Nature.

There could have been more bird diversity if the planned landscape elements had been laid out at the Twickel farms, including the grass edges along the arable fields. However, Barn swallows and House sparrows profit from the open stables, the Grey partridges from the new arable fields, Kingfisher and Grey wagtail from the reconstructed creeks and the birds of the existing landscape elements of the extra food on the extensively managed parcels.

## **Results Society**

More attention was paid to this research theme in Biesland than at Twickel. The Biesland polder is highly appreciated by the many visitors. That was already the case in the beginning of the monitoring period, and the appreciation has even grown a little. People use the area for cycling and walking, both for commuting and for recreation. Especially the quietness and the open space are valued. Between 1,700 and 2,000 people yearly visit the farm – this is excluding the thousands of people visiting the Biesland Open Days. The visitors include many children but also groups of farmers or government officials. The number of members of the Friends of Biesland increased for years in a row but has stabilised around 370. The knowledge about Farming for Nature has not increased with the public in the region during the monitoring period. That is different for the group of civilians and volunteers that

were involved in the monitoring and evaluation. The joint learning process was highly appreciated by them and their insight has increased.

Twickel estate is also visited by many people because of the beautiful landscape. Within that landscape, the three nature-oriented farms do not automatically stand out. Since a few years, more attention is given to informing the public about Farming for Nature, by means of excursions, open days and signposts in the field.

### **Integration**

The idea behind Farming for Nature is that everything on a farm is connected. It is an interplay between 'culture' and 'nature'. The concept of the nutrient cycle enables the stakeholders to understand and discuss that. Farming for Nature is a way to restore coherence of the landscape and the functional relationship between farming and nature. With two examples we illustrate that it is worthwhile to thoroughly adapt the farming system.

Because of the no-input rule, Marwin Hofstede of Loninkwoner farm is happy with the inundations of the creek. The sediment is 'input' for his farm. He uses the mown vegetation from the swampy shores of the creek as feed and as litter for the stable, which indirectly supplements the stock of manure. Without this positive attitude towards the reconstruction of the creek, this would not have been possible. The biodiversity around the creek would not have increased, the heath field would not have become wet again, and the Sphagnum would not have recuperated.

On the Biesland farm, biomass from natural elements is used as litter in the stables, or composted together with the manure. In this way, nutrients from the ditches are used as fertilizer. The use of farmyard manure and the high water levels cause a slower growth of the grass in spring. This, combined with the high appreciation from society for the meadow birds, resulted in the choice to dedicate the farm to nature in spring, and to focus more on production in summer, when the young chicks can fly and the water level is lowered. The herd is steered towards giving birth in summer because of the availability of grass. The meadow birds profit from this, as well as the biodiversity in the shores of ditches.

Unlike the Twickel farms, the Biesland farm did not succeed in 'closing the nutrient cycle' by lack of arable land for growing grain. For that reason, the farmer in consultation with the regional governments decided to develop a variant, that should lead to extensification of the farm similar to the closed nutrient cycle. With a 'closed nutrient balance' the input of grain must be compensated with output of manure. The adjusted water levels remain, as well as the 10% landscape elements. This new farming system could also be an option elsewhere in the peat areas, to combat subsidence of the soil, to preserve meadow birds and to improve the quality of farmland ditches.

### **Potentials of Farming for Nature for policy**

Farming for Nature is suitable for areas in which large scale, production oriented farming is not feasible. Such areas tend to represent a number of public values, such as landscape amenity, recreation, biodiversity and water protection. Farming systems such as Farming for nature can help to preserve and strengthen those values and to form an economic base under sustainable, multifunctional management of these landscapes. Especially around nature reserves (Nature 2000), in areas with a challenge in water management (WFD) and in peri-urban areas, nature-oriented farms can contribute to these values. Additional consent of the European Commission would be needed because of state aid rules, in order to start more nature-oriented farms in The Netherlands. Elsewhere in Europe, the idea of a modern high-nature value farming system could inspire the management of High Nature Value farmland (HNV). Much rural biodiversity is a result of traditional systems with more intensively managed 'infields' and extensive 'outfields', similar to the traditional Dutch farming systems that inspired Farming for Nature. In many HNV areas in Europe the ageing of farmers and land abandonment are threats to sustainable management. Modern, economically sustainable farming systems are needed to preserve the biodiversity and landscape qualities in these areas.

### **Public expenditures**

Farming for Nature is 'more expensive' than conventional agri-environment management and 'cheaper' than land purchase by the government and management by specialised organisations. A

comparison is not simple, because Farming for Nature is done at other scales than agri-environment management and integrates more public values.

### **The role of research**

It is a complex task to study a social-ecological system. We have tried to do that by working together with many scientific disciplines and stakeholders from the areas. In Biesland this has been done more extensively than at Twickel. We are careful with our conclusions, because the system is too complex for hard statistical evidence for all relations, and because of the relatively short period of monitoring. Repeating the research on the pilot farms with 5 year intervals would be recommendable.

### **General conclusions and recommendations**

Policy, process and arrangements

1. For a broader implementation, a national, EU approved framework is needed
2. Farming systems are an innovative approach for agri-environment
3. Innovation does not only ask for political commitment, but also room for experiment
4. Space for self-governance by farmers means that the government needs to adapt
5. Area funds can facilitate co-financing and long term contracts

Ecology and water

6. Farming for Nature needs time to prove its worth
7. The ecological results are yet modest, but promising
8. Farming for Nature has potential for water and nature management, especially in combination

Farm and economy

9. Enough land and a balance between grassland, arable fields, number of animals and 'outfields' (in the form of nature and landscape elements) are important prerequisites for a nature-oriented farm to succeed
10. The payment is essential. Conversion also deserves support, especially in the case of landscape rearrangement
11. A nature-oriented farm requires special skill

Society

12. A nature-oriented farm is attractive for society and market

Research

13. Joint learning is rewarding
14. In order to be able to evaluate the results of Farming for Nature, repeating the research on the longer term is necessary.

The main report is written in Dutch, but the authors are happy to give more information on request.