

## Introducing trees in dairy and poultry farms. Experiences dairy and poultry farmers' networks in The Netherlands.

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### Author's Background

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### Summary

*In the Netherlands networks of goat, cow and poultry farmers started to grow trees in their fields and outdoor runs. This was done for different reasons: animal welfare (shelter); production of fodder, biomass, litter or fruits; spread of minerals from manure; increase of biodiversity; keep away water birds, which can transmit influenza virus to domestic poultry. In this abstract we present the project activities and the first experiences from the farmers. Plantations of mainly willows were planted on cow and goat farms. The farmers inform themselves about mechanical harvesting and storing methods. The first experiences with branches and twigs as fodder are positive. It depends on how much fodder trees can be harvested per hectare, whether such plantations are profitable in an economic sense, because land is expensive in the Netherlands. On poultry farms fruit trees, willow plantations and miscanthus were planted in the free range area. The poultry farmers are content with the effects of their plantations on the chickens. However, especially miscanthus needs much labour for weed control, which mainly has to be done manually. Also on the poultry farms the balance between costs and benefits has to be investigated in the next coming years.*

### Background

We try to optimize dairy and poultry systems by introducing trees. Trees provide shelter, feed, carbon sequestration, take up minerals, increase biodiversity and also biomass, litter and fruit can be harvested. These so-called 'silvopastoral systems' are applied traditionally already long times in 'low input systems' in for example Africa and in Mediterranean countries. However, trees introduced in more intense livestock production systems in north western Europe is rather new. In this paper we present experiences from organic dairy and poultry farmers in the Netherlands with trees.

### Main Chapter

#### Experiences with fodder trees on dairy farms

The aims of the goat and cow farms in the network 'Fodder Trees' are getting information about the nutritional value of several tree species (and willow clones) and with mechanization of the harvest. Moreover, the use of tree products for biomass in wood stoves and litter in stables are investigated. With such applications we try to get the most of the combination of trees and animal husbandry, which makes its application more sustainable also in an economic sense.

Plantations were realized on 4 dairy farms (Apr 2011 - Febr 2013): willows; a combination of willows, alder, hazelnut and robinia; a combination of willows and ash; a wooded bank which consists of 13 tree species. The plantations on these farms have been harvested already at least twice and although first year harvests did not reach the full potential, we could measure already things as dry mass production in relation to different plantation schemes and different periods between the different harvests (once per 2 years or several times per growing season). If grass or maize is grown, then it is possible to harvest up to 10 tons of dry mass per hectare per year. Since land is expensive in The Netherlands, a new crop like trees need to give somehow benefits: food, litter, biomass or combinations of these.

After the first plantations were realized, the excursions and meetings focused on mechanical harvesting, storage and method of feeding. We have investigated harvesting while dividing leaves from branches, shredding branches including leaves and mowing 6-weeks young branches including leaves. The goats liked to eat leaves and twigs. In a small scale feeding experiment it seemed that goats eat more and longer of the shredded compared to intact branches plus leaves. Other behavioural observations showed that goats preferred willow above roughages, but there was no preference between willow and concentrate. Goats preferred leaves and young parts of twigs, then bark and older twigs (van Meir, 2012). We investigated silage making as a storing method for harvested branches plus leaves and fed them in February.

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The willow silage had good quality and the goats ate it very enthusiastically. We exchange experiences with growing, harvesting, storage and feeding trees with the Rotterdam Zoo, who also have plantations with fodder trees. See picture 1 for the harvest demonstration. Moreover, in order to get additional information on digestibility, observations on young dairy goats in a nature area have started.



**Fig 1. Goat farmers visit harvest demonstration in a willow plantation by the Rotterdam Zoo**

#### **Experiences with trees in poultry free range areas**

The aims of the poultry farms in network 'Trees for Chickens' and 'Happy healthy chickens under the willows' are providing natural shelter, increase animal welfare, increase the area used by the animals, spread minerals, increase biodiversity, discourage water birds to use the free range area because they are risk species for avian influenza virus and grow a harvestable product such as biomass for wood stoves, litter for bedding in stables or fruit. In 'Trees for Chickens' and 'Happy healthy chickens under the willows' only recently (early 2013) four farms planted fruit trees, four farms willows and three farms miscanthus.

Totally about 4 hectares of fruit trees were planted on 4 farms, 'by hand' and the density (3-10 meters between the trees) was much lower than in a commercial orchard (1 meter between the trees). By doing so the financial investment was lower than in a commercial orchard as well. The chickens didn't damage the trees. During the dry spring and summer irrigation was necessary. The first fruit harvest is expected in 2014. The farmers want to make juice and sell this from farm shops and shops with 'regional products'. The farmers were trained in how to take care of fruit trees and the strategies for selling the fruits.

Totally 4 farms planted totally 2.25 ha willows in a part of their free range area (see figure 2). The willows were planted with a planting machine in a density of 15,000 trees per hectare, which is the 'commercial density'. The young plants had to be protected from the chickens during the first months. Mechanical weed management was necessary several times. Model calculations show that in case of selling all the harvested chips, only after 12 years the first financial benefits appear. A willow plantation can exist at least 20 years. If the farmers can use the chips as biomass on their own farm, for example for heating, then the benefits start earlier.



**Fig 2. Willow stripes interspersed with grass stripes on a poultry farm**

Totally 3 farms planted totally 3.5 ha miscanthus in a part of their free range area. The miscanthus was planted with a planting machine in a density of 13,000 plants per hectare. Protection against the chickens was necessary during the first months. Weed control was necessary several times till September. The farm with 0.8 ha spend about 50 hours of labour in 2013 for planting, control and weeding. A second crop was sown, in order to suppress the weed and to decrease the amount of labour for weeding. However, the second crop also suppressed the growth of the miscanthus, so the miscanthus failed on this farm. The farms with 1.1 ha and 1.6 ha miscanthus each spend about 150 hours on planting, control and mainly weeding in 2013. The miscanthus on these 2 farms survived. None of the farms had enough miscanthus to harvest it already. It is expected that in 2014 again per farm > 100 hours of labour are needed for weeding. The first harvests are expected in 2015, which probably will be for use as litter in stables or sold as cow feed.



**Fig 3. Miscanthus on a poultry farm**

The poultry farmers with the plantations of fruit, willows and miscanthus all report that the chickens use much more area of the range. They walk up to 300 meters now, while it was much less when the outdoor area consisted of grass.

### **Core messages and conclusions**

Dutch dairy and poultry farmers investigate whether tree plantations can become a serious 'crop' on their farm. Because there is not so much experience yet, it is advisable to look across the borders not only between countries but also

between sectors (forestry, poultry, dairy). Our experiences with the farmers networks is that, while using a participative approach (involvement of the end users already from the beginning) and establish the plantations directly on commercial farms, only plantations are established that are promising in both a practical and economic sense. On dairy farms optimal schedules for harvest and storing leaves and branches for fodder are still under investigation. The economic aspects are not sure yet. The poultry farmers are content with the effects of their plantations on the chickens. However, especially miscanthus needs much labour for weed control, which mainly has to be done manually. The economic balance between investment, labour and benefits of the harvested products must be investigated after the first harvests in 2014 (fruits and willows) and 2015 (miscanthus).

[www.voederbomen.nl](http://www.voederbomen.nl)

[www.bomenvoorbuitenkippen.nl](http://www.bomenvoorbuitenkippen.nl)

[www.kiplekkeronderdewilgen.nl](http://www.kiplekkeronderdewilgen.nl)

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