# Research and Development Protocol for Agroforestry for Free-range Egg and Poultry Production in the Netherlands

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| **Project name** | AGFORWARD (613520) |
| **Work-package** | 5: Agroforestry for Livestock farmers |
| **Specific group** | Agroforestry for free-range egg and poultry production in the Netherlands |
| **Milestone** | Milestone 22 (5.3) Part of experimental protocol for WP5 |
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| **Approved** | 12 April John E Hermansen |

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# 1 Context

The AGFORWARD research project (January 2014-December 2017), funded by the European Commission, is promoting agroforestry practices in Europe that will advance sustainable rural development. The project has four objectives:

1. to understand the context and extent of agroforestry in Europe,
2. to identify, develop and field-test innovations (through participatory research) to improve the benefits and viability of agroforestry systems in Europe,
3. to evaluate innovative agroforestry designs and practices at a field-, farm- and landscape scale, and
4. to promote the wider adoption of appropriate agroforestry systems in Europe through policy development and dissemination.

This report contributes to the second objective. It contributes to the initial research and development protocol (Milestone 22 (5.3)) for the participative research and development network focused on the use of agroforestry in free-range poultry production systems.

# 2 Background

Integration of trees with crops and/or livestock production (agroforestry) has been identified as a sustainable way to increase the productivity of land and to provide a number of ecosystem services and environmental benefits compared to disaggregated agricultural and woodland systems. When combined with egg production it is expected to improve animal welfare because the trees provide the hens with a more natural and stimuli-rich environment with good possibilities for shadow seeking as well as shelter in order to feel safe in case of predator animals. Since hens originate from jungle fowl they still behave like forest birds. In free range areas with shelter (either, trees other plantations such as miscanthus or artificial), a higher percentage of the hens in a flock are seen ranging than in free range areas without shelter (Bestman & Wagenaar, 2003; Zeltner and Hirt, 2008). The higher the percentage of hens using the free range area, the less feather pecking damage is seen (Bestman and Wagenaar, 2003; Bestman and Wagenaar, 2014, Green et al, 2000). Less feather pecking damage in laying hens can be associated with a higher level of animal welfare.

An increasing number of poultry farms in The Netherlands are providing natural shelter in the free range areas of their hens. This is mostly trees, but also miscanthus (a grass species) is also being used. In recent years, poultry farmers are being more discerning with the choice of trees, including for example: biomass willows and different kinds of fruit trees. Also miscanthus, after harvest, can be used as litter, cattle feed, or a biofuel. In the farmers network project 'Trees for chickens' (www.bomenvoorbuitenkippen.nl), several types of plantations have been tested. They all have benefits and disadvantages, and a synthesis of this and the existing knowledge of 'best practice' is needed to support implementation of agroforestry in free-range egg and poultry production.

# 3 Synthesise existing knowledge of 'best practice'

## 3.1 Objective

The first objective is to identify and communicate 'best practice' in relation to design and manage an agroforestry system for free-range poultry production. Guidelines on integrating trees and/or shrubs in free-range poultry production systems will be produced, e.g. with regards to tree species, costs and benefits, labour and special skills or machinery needed.

### 3.2 Methods

The results and experiences from the farmers network project 'Trees for chickens' (www.bomenvoorbuitenkippen.nl) will be used to summarize several types of plantations: fruit trees in high and low densities, biomass willows and miscanthus. These plantations were planted in the early spring of 2013 (Table 1).

Table 1. Description of the soil, tree, understorey, livestock, and climate characteristics for three study site, originally used in the "Trees for Chicken" project, that will be reported in AGFORWARD

| Site characteristics | | | |
|---|---|---|---|
| | Fruit trees | Biomass willow | Miscanthus |
| Area (ha): | < 1 | 1 | 1.6 |
| Co-ordinates | Renswoude, NL* | Overberg, NL* | Terschuur, NL* |
| Site contact:<br>Site contact email address | Monique Bestman<br>M.Bestman@Louisbolk.nl | | |

* Exact locations cannot be specified for confidentiality reasons.

| Soil characteristics | | | |
|---|---|---|---|
| Soil type | Sandy | Sandy | Sandy |
| Soil depth | | | |
| Soil texture | | | |

| Tree and shrub characteristics | | | |
|---|---|---|---|
| Tree species | Fruit trees | Biomass willow<br>*Salix* spp. | Miscanthus<br>*Miscanthus* spp. |
| Planting date | 2013 | 2013 | 2013 |

| Understorey characteristics | |
|---|---|
| Species | Grass |
| Coverage | Complete |
| Additional details | Grass managed by grazing with poultry |

| Livestock characteristics | |
|---|---|
| Species | Poultry |
| Stocking density | 2500 laying hens/ha |

| Climate data | |
|---|---|
| Mean monthly temperature | 10.1 °C |
| Mean annual precipitation | 833 mm |
| Details of weather station (and data) | Location of weather station: De Bilt, NL<br>Means are calculated from data of period 1981-2010 |

The 'Trees for chickens' network project publishes its results in Dutch in spring of 2015. These results will be translated and edited to make them available to an international publication. Since the AGFORWARD project lasts till the end of 2017, also results and experiences can be included of the different types of plantations after spring 2015. Five steps will be carried out as shown in Table 2.

Table 2. Collection of data, information and experience

| Step | Activity | Time |
|---|---|---|
| Literature review | Results from the project 'Trees for chickens' will be analysed and discussed. | Until May 2016 |
| Interviews | Follow up interviews with producers and consultants will be carried out | Jan-April 2016 |
| WP5 skype meeting | Meeting with partners from ORC and AU | May 2016 |
| WP 5 workshop | Workshop with partners from ORC and AU to compile collected knowledge from Netherlands, UK and Denmark | May 2016 (General Assembly) |
| Publication | Producing report | August 2016 |

# 4 Choice of trees on poultry farms

## 4.1 Objective

We will summarize the results from three different plantations (fruit trees, biomass willows and miscanthus) already in the 'Synthesis of existing knowledge of best practice'. However our objective here is to compare these three different plantations in an easy to read table which makes it easier for farmers to choose a perennial species that fits in their specific farm context.

## 4.2 Methods

A table will be made, based on the results and experiences of 'Trees for chickens'. In this table, the three types of tree planting will be compared in terms of a range of aspects including costs, benefits, advantages, and disadvantages. Examples of advantages related to the specific farm context could be: biomass needed as fuel or miscanthus needed as cattle feed or bedding, cheap labour available on 'care farms', opportunities for direct sale of fruits and fruit juice in a farm shop, or availability of professional fruit farming skills. The analysis will cover any special skills needed (fruit trees), special machinery needed (biomass willows), and the degree of damage by chickens or lots of labour during the initial years (miscanthus). We will use the results and experiences from the network project 'Trees for chickens' and where necessary/possible, do additional measurements and interviews to have the information more up to date than the results of 'Trees for chickens' that will be published in spring 2015.

# 5 Bringing together fruit farmers, tree nurseries and poultry farmers

## 5.1 Objective

Establishment of a free-range area with fruit trees or a tree nursery, especially at a commercial orchard/nursery density, may cost several thousands of euros per hectare. Moreover, fruit farming and tree nursing need special skills. We want to investigate if fruit farmers, tree nurseries and poultry farmers are willing to work together and under which preconditions.

## 5.2 Methods

In another project we hired a fruit farmer/consultant in order to visit farmers with different types of poultry and different types of fruit in the free range area. Some of them had cooperative arrangements with a fruit farmer. We wanted to know how, from a 'fruit perspective' the combination poultry and fruit is evaluated. From the preliminary results we already know that such cooperation is rather new. If such cooperation exists and there are contracts, these contracts are mainly to state that each party is not responsible for any damage to the other parties' property. There doesn't seem to be a stated common aim to optimize the system together.

A meeting will be organized bringing together some poultry farmers, fruit farmers and tree nurseries. The research will cover a discussion of the results of earlier interviews, and to investigate the possibilities and barriers for further cooperation and synergy between these different agricultural activities.

# 6 Acknowledgements

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