

# Developing an Agro-forestry System for Production of a Commercial Organic Chicken Flock Focusing on Profits on a 'Triple Bottom Line'

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**Abstract - In most modern free-range poultry systems birds do not fully utilise the range provided. Knowledge of the ancestral history of the domestic chicken, combined with research observations suggests benefits of agro-forestry systems for chickens. A commercial organic poultry agro-forestry system was developed for Sheepdrove Organic Farm, Berkshire, UK, affording the benefits of an agro-forestry system, whilst retaining commercial viability. Five avenues of highly diverse parallel hedges incorporating tree, shrub and herb species were planted. Ongoing monitoring of the system was put in place to evaluate its development. The programme consists of monitoring: 1) biodiversity 2) soil nutrient status and respiration 3) behaviour and welfare of the poultry.**

**Conventionally profits tend to be viewed purely in terms of economic gain. However in an organic farming system more emphasis is placed on the intrinsic and sustainable qualities it has. Organic farming adopts a holistic approach to profit, viewing it in environmental, social and economic terms. The profits afforded by the agro-forestry system are discussed.<sup>1</sup>**

## INTRODUCTION

Modern poultry (*Gallus gallus domesticus*) were domesticated from the Red Jungle Fowl (*Gallus gallus*), which still exists in its wild form in Asia. The red jungle fowl inhabits woodland and forest clearings, making use of the shelter this environment provides for covered foraging. In modern free-range poultry systems, it has been noticed that birds do not fully utilise the range provided. Dawkins *et al.* (2003) found that many birds never leave the house and a maximum of only 15% of birds in the flock were observed on the range at any one time. They hypothesise this may be as a result of the type of range available to the birds not being their preferred habitat. Other research concurred that this may be the case, as providing range structures and forms of cover can enhance range use, (Lubac and Mirabito, 2001). Agro-forestry systems are defined as '...a system of land use in which a range of different approaches to integrating trees, crops, and animals are used to the mutual benefit of all components.' (<http://www.answers.com/agroforestry&r=67>, assessed 20/02/06). Knowledge of the ancestral history of the domestic chicken, combined with research observations suggests benefits of use of

agro-forestry systems for chickens. These include allowing the chickens to express aspects of their innate behaviour, the provision of cover and shelter, which may encourage ranging. It provides foraging opportunities for the chickens, which could result in nutritional and medicinal benefits, as well as enriching the landscape and encouraging biodiversity.

## CASE STUDY FOR THE DEVELOPMENT OF AN AGRO-FORESTRY SYSTEM

A commercial organic poultry agro-forestry system was developed for Sheepdrove Organic Farm, Berkshire, UK. This development was undertaken to afford the benefits of an agro-forestry system to the table bird production system, whilst retaining commercial viability. Prior to development the Sheepdrove system consisted of, mobile sheds on an open range. The range was not fully utilised with ranging localised to the areas immediately outside the sheds. A variety of changes were made to the system in order to provide an agro-forestry environment for the chickens. Five avenues of highly diverse parallel hedges incorporating tree, shrub and herb species were planted at 50m apart. This would allow for management practices such as house movement and rotational cropping to take place. The remaining range area was covered with a grass/clover ley (figure 1a and b).

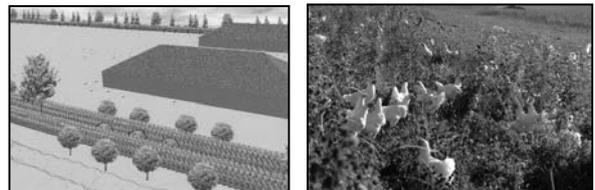


Figure 1a) Agro-forestry layout, b) birds in herbal strip

Tree species used in the agro-forestry system were planted for a variety of purposes. Ash, Beech and Hornbeam for timber, Field Maple, Alder, White Beam and Scots Pine for shelter and, Cherry, Wild Pear, and Apple for food and community and social interest. Herb species were also planted for different purposes. For nutritional benefits Quinoa, Kale and Wild Strawberry, for anti-inflammatory effects, Plantains, Comfrey, and Marigolds. Other plants were also used for their antibacterial, calmativ and anthelmintic effects. The plants chosen and the density of planting were selected and carried out on the basis of soil type and climate.

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On-going monitoring of the system was put in place to evaluate its development. The programme consists of monitoring: 1) Biodiversity including, plants, birds, moths, butterflies and terrestrial invertebrates. 2) Soil nutrient status and respiration. 3) Behaviour and welfare of the poultry. This information can be used to develop a picture of the different profits provided by the system.

#### PROFIT IN AN ORGANIC AGRO-FORESTRY SYSTEM

Profit is '*an advantage (gain) or benefit*' (Anon, 1994). Conventionally profits tend to be viewed purely in terms of economic gain. However in an organic farming system more emphasis is placed on the intrinsic and sustainable qualities it has. Organic farming adopts a holistic approach to profit, viewing it in environmental, social and economic terms. Difficulties arise, however, in equating these profits in terms recognised in a forum, which places emphasis on economic gain as its sole measure of profit. A good starting point is to define what might be meant by environmental, social and economic profits. Environment is '*...(the physical surroundings, and) conditions effecting growth development and wellbeing of plants, animals and humans*' (Anon, 1994). An environmental profit can therefore be thought of as an advantageous benefit to the physical surroundings of an organism. Some of the environmental profits afforded by an organic poultry agro-forestry system include the increase in biodiversity through the provision of alternative more diverse habitats. In addition improved soil nutrient and respiration status can be achieved through the rotation of poultry and crops. Another benefit, which is harder to directly measure, is the improvements to the landscape, as the system is more aesthetically pleasing.

Social is defined as '*...the relationships ... (within a) community*' (Anon, 1994) and as such social profit could be seen as an advantageous gain or benefit to a community. Social benefits or profits can be particularly difficult to measure. Some of the social profits of an organic poultry agro-forestry system include the opportunity to harvest agro-forestry products including fruits and woodland products. In addition the system can provide an element of social conscience, as it can benefit public perception and consumer relationships with the end product. A direct social impact of the Sheepdrove Organic Farm poultry agro-forestry system is a collaborative project carried out in conjunction with a local school. In addition to the social profits to humans there are also social benefits for the chickens in terms of improvements to animal health and welfare. The natural behaviour of the chickens is encouraged by the presence of cover and more natural surroundings. This encouraged ranging can result in good leg health and welfare particularly as the birds approach their end weight. Monitoring of the chickens within the agro-forestry system has identified a very low incidence of injurious and antagonistic behaviours. The range also provides opportunities for the birds to self medicate by selecting herbs from the strips as well as providing opportunities to forage on invertebrates.

Economic profit can be defined as '*...good return for money laid out*' (Anon, 1994). The agro-forestry system provides an opportunity for a wider variety of economic profits. Firstly the diversification of the system means there are increased economic opportunities through the optimal use of space. As the poultry are integrated with trees this allows for the production of a harvestable crops. The land can also be used for interspecies grazing (chickens, sheep, cattle), as well as for silage cuts. Due to the layout of the system it still allows for poultry production in rotation with arable cropping to capitalise on the nutrient rich ground.

Organic table birds produced in an agro-forestry system fulfil a niche market and can achieve a financial premium increasing the market value of the chicken. There are, however, increased production costs incurred by the system due to increases in feed costs, lower stocking density, a higher ratio of stockmen to birds and a longer growing period. This may result in a lower financial profit margin than in conventional production systems; this will depend on the individual systems. The Sheepdrove Organic Farms poultry agro-forestry system is running as an economically viable enterprise.

Estimated financial values have been made for the environmental profits of organic farming systems. Cobb *et al.* (accessed 20/02/06) estimate that when considering wildlife and improved soil health factors, organic farming brings an additional value of £75-£125 per hectare per year. They also estimate the cost of the burden of conventional farming to the environment at £15-£25 per hectare per year.

#### CONCLUSIONS

There is an intrinsic link between the three different types of profit due to the nature of organic farming systems. The developed organic poultry agro-forestry system can be described in terms of the profit it can deliver. It has been shown to have the potential to deliver not just economic profit but profits on a multi-faceted triple bottom line: environmental, social and economic.

#### ACKNOWLEDGEMENT

We thank Juliet and Peter Kindersley for their enthusiasm and backing of this project and are grateful to the staff at Sheepdrove Organic Farm for their time.

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