

Case study:

Glenrath Farms

Glenrath Farms are among the largest free range egg producers in the world. They have been tree planting around their housing units since 2004.

In 2012 they purchased Kirklawhill Farm to expand production. They built new housing for 64,000 hens and created woodland areas that will provide the opportunity to study behaviour using different planting designs.

Tree planting was undertaken in March 2014 to provide shelter and screening, and to address ammonia emissions and runoff.

The range areas have been divided by secure fencing with different woodland planting designs either side of the fence. One area has been planted to give 46% tree cover, whilst the other has around 20% tree cover.

Tree species include oak, alder, beech, birch, willow, hazel, rowan, sycamore and Scots pine planted in tree shelters at 3m

spacing. The planting areas have been stock fenced to allow sheep grazing on the remainder of the range.

Coming years will provide the opportunity to study the hens' behaviour as well as monitor production and compare any differences under the two selected tree planting models.

"Encouraging good ranging behaviour is important not just for the welfare of the hens, but also for production. We believe that tree planting on our ranges helps us to meet the consumer demand for high quality free range eggs, while also increasing the efficiency of production."

Karen Campbell
Operations Director, Glenrath Farms



Free advice and support

The Woodland Trust offers free advice and support for tree and hedgerow planting on your farm. Our advisors can help identify the best trees for your farm, together with suitable grant support where available.

Call **01476 452356** for a free visit or look on our web site at woodlandtrust.org.uk/plant-trees

The Woodland Trust has produced a technical guide to planting and designing tree planting for your free range poultry business. "Tree Planting for Free Range Poultry" is available online at woodlandtrust.org.uk/farming

"Trees have an important role in improving the welfare of hens in free range egg production and meeting the expectations of both retailers and consumers. This publication provides positive evidence of the benefits which thoughtful use of tree cover can bring to UK producers. We are delighted to be able to support the Woodland Trust in getting the message out to producers and encouraging positive action."

Robert Gooch Director of Policy, British Free Range Egg Producers Association



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The role of trees in free range poultry farming



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Today's consumers increasingly expect that egg production will meet high standards of animal welfare, will result in a safe and nutritious product and respect the natural environment. This trend is reflected in the UK market, particularly retail, where free range eggs represent around 50% of all egg sales.

From the farmer's perspective, integrating trees into free range poultry farming encourages ranging and other natural behaviours in their flocks. This leads to improvements in animal health and welfare, as well as improvements in production – both in the quality and quantity of eggs. As free range eggs command a premium price, this practice can lead to a boost in the farmer's income.

Trees also play a practical role in mitigating the environmental impacts of poultry production on the farm.

This booklet explores the range of benefits trees can bring to all aspects of poultry farming.

Animal health and welfare

There are clear links between good animal welfare and improved production. Disease, morbidity and mortality all lead to loss of production, which can be addressed through improvements in welfare¹.

The Farm Animal Welfare Council characterises welfare by reference to five freedoms:

- Freedom from hunger and thirst – access to fresh water and a diet to maintain health and vigour
- Freedom from discomfort – an appropriate environment including shelter and a comfortable resting area
- Freedom from pain, injury or disease – prevention or rapid diagnosis and treatment
- Freedom to express normal behaviour – sufficient space, facilities and company of the animal's own kind
- Freedom from fear and distress – conditions and treatment which avoid mental suffering

The domestic chicken is a subspecies of the red junglefowl, whose natural habitat is woody scrub². Trees on free range poultry farms improve animal welfare, as wooded environments replicate some of the conditions that encourage natural behaviours linked to the chicken's ancestry, including foraging, scratching and dust bathing.



WTPU/Paul Glendell

Improved ranging behaviour

Studies of typical free range farms show that often only a minority of birds make full use of their range. This may be as low as 10% of hens, with around 70% of these staying within 17m of the house^{3,4,5}. Two key factors preventing ranging may be a fear of predation due to shortage of cover, and a lack of shelter from weather extremes⁶.

Well-designed tree planting encourages better use of the range by providing cover, shelter and shade. To be effective, tree cover should be available close to the housing – hens are reluctant to cross open ground.

Encourage ranging with tree planting

For more information on tree planting, see the 'Tree Planting for Free Range Poultry' guide: woodlandtrust.org.uk/farming



Injurious feather pecking

Research suggests that providing tree cover can lead to a reduction in Injurious Feather Pecking (IFP) – a serious economic and welfare concern for uncaged flocks. Birds subject to IFP suffer pain. Reduced feather cover can also increase energy demand and food use, lowering egg production and quality.

The benefits of tree cover in reducing IFP are likely to result from the expression of normal behaviour patterns. Findings from studies support recommendations of at least 5% canopy cover within the range area, ideally close to the sheds and forming a full canopy in places⁷.

Lower parasite load

While free range farming systems are considered to be a welfare improvement on cage systems, they are subject to increased risk of some parasites. Several of the most prevalent poultry parasites rely on soil or soil organisms as part of their life cycle. The risk of parasite spread is greater if the range use is restricted, as this increases faeces density.

Faeces density is greatest around the pop holes and in these areas birds are more likely to ingest nematode eggs and become infected. Tree planting encourages birds to roam more widely throughout their range, reducing faeces density and the risk of infection.



Bigstock

Egg quality

Trees in free range poultry systems lead to better ranging, reduced stress and increased shade. This combination has a positive impact on egg quality, with hens laying fewer seconds and white eggs.

A study of egg seconds across 33 free range flocks with tree cover and 33 without tree cover showed a significant reduction in egg seconds in the treed ranges, particularly towards the end of the laying cycle. Even a small reduction in egg seconds can have a marked economic effect, given that seconds in the UK are worth about a third of class A eggs⁸.

Both stress and exposure to strong sunlight can increase the numbers of pale shelled eggs, leading to downgrading and loss of value. Hormone release in response to stress, particularly to fear and the 'fight or flight' response, can result in reduced shell pigmentation⁹. Production of pale eggs may also be as a result of increased vitamin D3 synthesis by hens resulting from high UV light levels¹⁰. Good tree cover on the range reduces stress and increases shade, which reduces UV exposure.

Case study:

David Brass - CEO, the Lakes Free Range Egg Company

David Brass has been producing free range eggs for 20 years at his family farm in the Lake District. Realising the benefits trees bring to free range poultry farms, he planted his first trees in 1997 to encourage his flocks to roam on the range.

David planted native species that are local to the area including birch, oak, ash, wild cherry and holly as well as fast-growing willow and poplars. Planting cost £2,000 per hectare but the farm achieved payback in just six months and the benefits are outstanding.

Under their woodland canopy, sheltered from predators and the weather, David's hens roam freely. They have good plumage, display lower stress levels and produce high numbers of top quality eggs.

David said:

"The cost benefit of tree planting is one of the best in farming. There is the opportunity to significantly increase income – a poultry farm with 64,000 hens could make an additional £20,000 per year

as a result of improved egg production and quality. This shows trees are not just 'nice to have', they are business assets that lead to increased production and income.

"As well as financial benefits, trees improve the overall quality of my farmland, increase wildlife habitats and provide wood fuel for the biomass boiler that heats our farm."

Over the years, the Lakes Free Range Egg Company has planted 40,000 trees on their land, creating over 15 hectares of woodland. Today, it is one of the largest free range egg packing businesses in the UK, supplying major supermarkets, retailers and restaurants. Just as importantly, the wooded landscape is helping wildlife to thrive and David has seen red squirrels and barn owls re-establish on his farmland.



Ammonia emissions and dust capture

Around 90% of the ammonia emitted in the UK arises from agriculture, mainly from the breakdown of excreted urea from farm livestock or uric acid from poultry¹¹.

When ammonia gas is released into the atmosphere, it is deposited in rainfall on the land. This causes a fertilising effect that damages sensitive habitat such as ancient woodland, heathland and grassland. Increased nitrogen levels on the land also lead to eutrophication of water courses and acidification of land and water.

In poultry farming, concentrations of ammonia are highest close to the poultry units. Emissions are often associated with odour and dust, which can impact on the health of livestock and agricultural workers. Long term exposure to high concentrations is a significant respiratory hazard and may lead to pneumonia. It can also cause skin and eye irritation¹².

How tree planting can help

Creating tree belts downwind from emission sources can intercept ammonia emissions and particulates¹³.



They can also reduce the spread of infectious bronchitis between neighbouring housing¹⁴.

Tree planting to capture ammonia can help to screen the emission sources and buffer sensitive habitats.

For planting near to emission sources, a number of design layouts have been suggested. For poultry housing, as dust and feathers are also drawn out by fans, the trees closest to the housing should be deciduous species as they drop any solid matter when the leaves fall¹⁵. Evergreen species close to housing tend to become matted with debris and this can lead to trees dying.

A number of widths of tree belt have been used – the wider the belt the greater the potential capture. Tree belts as narrow as 10m have been shown to reduce ammonia in emissions by around 53% and dust by 56%. However belts of 15-20m provide a more effective barrier, with layers of shrubs and taller trees. Studies for wider belts suggest ammonia capture of 67%¹⁶.

Where sensitive habitats can be identified, such as ancient woodland, rivers, wetlands or areas of species rich grassland, buffering with tree belts provides an effective strategy for capture of ammonia and other pollutants, including those in water runoff and drainage water¹⁷.

Ideally planning for this sort of approach should happen across landscapes so that sensitive habitats on different land ownerships can be protected.

We work with landowners offering advice and support to ensure the best planting layouts to tackle emissions and protect sensitive habitats.



Protecting water quality

Trees help reduce rainwater runoff from poultry farms and reduce the potential for contamination of water courses, as they intercept nutrients and faecal organisms which can enter water sources.

Water infiltration in tree belts is many times greater than the surrounding land, as a result of the action of tree roots and an increase in soil organisms such as worms.

Landscape and energy efficiency

Planting shelter belts using tree species characteristic to your local area helps your development blend into its surroundings. Trees around poultry units and other farm buildings also improve energy efficiency by providing shade in summer and acting as windbreaks during the winter. Eventually, trees thinned from shelter belts can contribute towards wood fuel.

Wildlife benefits

Planting native tree species on your poultry farm has great benefits to local wildlife. Are there other woods or habitats around the farm that could be buffered against the negative impacts of ammonia? Are there streams which might be protected from both aerial and runoff pollution? Could the planting around houses form part of wider farm planting for biodiversity?



References

- 1 Appleby, M. and Hughes, B. 1991. Welfare of laying hens in cages and alternative systems: environmental, physical and behavioural aspects. *World's Poultry Science Journal*. 47(2):109-128.
- 2 Bubier, N. 1998. Movement of flocks of laying hens in and out of the hen house in four free range systems. *British Poultry Science*. 39:5-6.
- 3 Dawkins, M., Cook, P., Whittingham, M., Mansell, K. and Harper, A. 2003. What makes free range broiler chickens range? In situ measurement of habitat preference. *Animal Behaviour*, 66: 151-160.
- 4 Jones, T., Feber, R., Hemery, G., Cook, P., James, K., Lamberth, C. and Dawkins, M. 2007. Welfare and environmental benefits of integrating commercially viable free-range broiler chickens into newly planted woodland: A UK case study. *Agricultural Systems*. 94(2): 177-188.
- 5 Hegelund, L., Sørensen, J., Kjær, J. & Kristensen, I. 2005. Use of the range area in organic egg production systems: effect of climatic factors, flock size, age and artificial cover. *British Poultry Science*. 46:1-8.
- 6 Weeks, C. A. & Nicol, C. J. 2006 In : *World's Poultry Science Journal*. 62 (2), p. 296 – 307.
- 7 Bright, A., Brass, D., Clachan, J., Drake, K. and Joret, A. 2011. Canopy cover is correlated with reduced injurious feather pecking in commercial flocks of free range laying hens. *Animal Welfare*, 20: 329-338.
- 8 Bright, A. and Joret, A.D. (2012) Laying hens go undercover to improve production. *Veterinary Record*. Available at: veterinaryrecord.bmj.com [downloaded 11 July 2014]
- 9 Hsiu-Chou Liu, and Winston Teng-Kuei Chen (2010) Eggshell pigmentation: a review *J. Chin. Soc. Anim. Sci.* 39(2). Pp.75-89.
- 10 Ryan, J. (2007) Strong sun can mean pale shells. *Poultry World*. Volume 23, No. 9. Available at: www.worldpoultry.net/PageFiles/27148/001_boorderij-download-WP6865D01.pdf. [downloaded 24th July 2014]
- 11 DEFRA. *Ammonia in the UK*. London: DEFRA, 2002.
- 12 Atia, . A. *Ammonia Emissions from Confined Feeding Operations (CFOs): Control and Mitigation*. Fact sheet, Alberta Agriculture and Rural Development, 2008.
- 13 Adrigal, et al. "The Potential for Plants to Trap Emissions from Farms with Laying Hens: 2. Ammonia and Dust." *Journal of Applied Poultry Research*, 2008: 298-411.
- 14 *The Poultry Site - Effectiveness of trees against poultry house emissions*. 5 October 2009. www.thepoultrysite.com/articles/1526/effectiveness-of-trees-against-poultry-house-emissions (accessed December 10, 2013).
- 15 Frazer, .L. "Green Screen for Poultry Farms." *Environmental Health Perspectives*. Vol.116 (11), 2008: 477.
- 16 Alberta Agriculture and Rural development [www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex12072](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex12072)
- 17 Dragosits, .U. "The potential for spatial planning at a landscape level to mitigate the effects of atmospheric ammonia deposition." *Environmental Science and Policy* 9, 2006: 626-638.

