



The Oak Tree

Low Carbon Farm

Briefing paper on Soil Carbon Sequestration: a significant tool for absorbing carbon dioxide from the atmosphere, and why UK agricultural policies make this all but impossible for small scale producers to do.

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Soil carbon sequestration offers a genuine and significant tool in the fight against climate change, but is woefully ignored in UK government policy. While techniques for soil carbon sequestration could be put into practice on large scale farms, they are particularly suited to small scale, mixed farms with a large number of workers per unit land area. Such small-scale, skilled employee-dense, mixed farms are severely disadvantaged by the current UK farming and food policy framework.

The Oak Tree Low Carbon Farm demonstrates that, despite the highly unfavourable policy environment, such a venture is just about financially viable on our 4.96 Ha thanks to the dogged determination of all involved. With a favourable policy and regulatory environment such businesses could thrive, offering significant employment opportunities, meaningful social & health benefits, a wide range of environmental benefits (including significant soil carbon sequestration), and a thriving local food economy.

The Oak Tree Low Carbon Farm began as an experiment in how to produce food with the lowest possible greenhouse gas emissions while operating as a viable business. We are still in business in our fifth year, and we have added the goal of sequestering significant quantities of soil carbon using the modern livestock grazing techniques such as “mob grazing”, a refinement of traditional mixed farming methods, which also eliminates the need for energy-intensive chemical fertilisers. Our aim is to become carbon negative while producing significant quantities of food on our land, all while running as a viable business. As a side line benefit, the farm offers wider social and health benefits to its customers.

We are also home to Suffolk's first Community Supported Agriculture (CSA) Scheme. The good-natured community of farm members enjoy both physical and mental health benefits, while the CSA gives the farm a guaranteed market at retail prices, along with lots of volunteer labour. These benefits of the CSA are essential in the face of the regulatory environment we face.

The current agricultural policy framework makes our work extremely difficult in various areas including:

- **CAP subsidies.** We don't get any as we are under 5Ha limit, and environmental stewardship subsidies are too inflexible, and low in value. Please, please either stop subsidising our competitors, or if you really can't do that, give us a simple subsidy system to work with. Other EU states give smaller producers CAP subsidies, so we can't blame Brussels!
- **Hygiene and waste regulations.** These totally inappropriate for mixed farms, particularly small ones. For example small scale outdoor poultry culling and plucking has been shown to be safe by Polyface Farm in the USA, but is illegal in the UK. We simply cannot sell our meat birds dressed. Similarly food waste for animal feed, even legal food waste, is made impossibly bureaucratic due to waste licences and other regulations which are inappropriate to small scale operations where detailed care can be taken.
- **The planning system.** We are under the 5 Ha planning limit applicable to agricultural land, so putting up buildings that we need for our day-to-day work is a near insurmountable obstacle. The overage agreement on our land, which is standard practise when land is sold close to a town, makes the stringent planning rules on smaller holdings under 5 Ha particularly onerous. Small scale holdings close to towns are vital to a thriving local food economy. It is a classic "Catch 22" situation, which I suspect is unintentional, but which causes real problems for small food producers.
- **Land prices:** inheritance tax breaks and CAP subsidies on large land holdings inflate the price of agricultural land so it is all but inaccessible to new entrants to farming.

We are grateful to scientist, author and broadcaster Colin Tudge for providing the following notes on the scientific basis of soil carbon sequestration.

SOIL CARBON AND CLIMATE CHANGE

Brief notes from COLIN TUDGE

Since there is about twice as much carbon in the soil (in form of organic matter) than there is in the atmosphere (mainly as CO₂), any percentage increase in soil carbon is reflected in the atmosphere two-fold. A 10% reduction in atmospheric CO₂ – from 400 ppm to 360 ppm – would hugely reduce the threat of global warming or at least buy time, and could be achieved by a 5% increase in soil carbon. In fact, carbon sequestration in the soil would almost certainly do more to alleviate climate change than other feasible approach – and far more cheaply, and with many extra benefits.

There are four obvious ways of increasing soil carbon.

The first, quite simply, is to add more organic material, either as compost or as "green manure" – fresh plant material that rots in situ. That is, we should be encouraging organic farming and growing worldwide with, perhaps, special emphasis on permaculture, which typically employs great quantities of mulch.

Secondly – a hugely promising approach which has been much under-researched – we should be encouraging "mob grazing" on pasture worldwide. Since well over half of all recognized agricultural land is permanent pasture (basically grassland) the overall contribution would surely be huge

(although as yet there is too little research so far to provide precise statistics). The idea is to move grazing animals – primarily cattle but also sheep – around the pasture in tight groups (generally controlled by electric fencing) so that they overgraze in any one area. Then they are moved on to the next patch – commonly after 24 hours, but sometimes twice a day. After intensive grazing the remaining leaf is too short to sustain the extensive root system below the ground, and a lot of the root dies back. Because the grasses are perennial (very different from short-term leys) the roots are deep and highly mycorrhizal; and roots rich in mycorrhizae rot more slowly than those without. So the organic carbon that the roots contain stays in the ground. Extensive use of grass in situ has sometimes been criticized on the grounds that grazing animals excrete more methane. But evidence so far suggests that the carbon held in the soil in the slowly decaying roots far outweighs what is in the methane (and methane in the atmosphere is short-lived: quickly oxidized).

Thirdly, carbon loss from the soil can be significantly reduced by minimizing cultivation – not primarily (as in the modern vogue for “min-till”) by adding Round-up to eliminate weeds, but again by the methods of permaculture.

Finally, adding biochar is likely to be helpful.

Whatever the method, adding carbon (organic matter) to the soil brings huge additional advantages. Organic-rich soils re-acquire their crumb structure and restore sponginess – dramatically reducing surface run-off and the risk of flood; and holding moisture in times of drought. The deep roots of perennial plants and the increase in earthworms create drainage channels and provide aeration. Crumbly soil warms more quickly than compacted, low-carbon soil and so extends the growing season. The crumb structure also holds nutrients (by adsorption) and beneficial micro-organisms. The high-carbon approach is win-win.

Given all the known and theoretical advantages, it is a matter of huge regret that research into organic farming and into novel grazing regimes has been so under-researched. Public money via the BBSRC is spent on techno-fixes that promise short-term profits (the latest being GMOs) while fundamental exercises in applied biology are mostly left to NGOs or indeed to private farmers to investigate. The passing of the Agricultural and Food Research Council, which did use public money for the public good, is deeply regrettable.

Notes by Colin Tudge, author of So Shall We Reap and Good Food for Everyone Forever; and co-founder of the Campaign for Real Farming (www.campaignforrealfarming.org) and the Oxford Real Farming Conference.