

# A Decade of Conservation Agriculture

## Farm Walk at Thurlby Grange Farm, Bourne, Lincolnshire

Brian Sims, April 2014

### Introduction

On Saturday 29 March 2014 some 25 TAA members and followers met at Tony Reynolds' farm where no-till has been the regime since 2003 (Figure 1).



Figure 1. Participants on the Thurlby Grange Farms walk

In addition to the farm visit, on this occasion there was also a presentation on conservation agriculture (CA) from Bill Crabtree a wheat farmer (amongst other things) from Perth, Western Australia. No-till Bill's accumulated wisdom on CA in Australia can be accessed at: [www.no-till.com.au](http://www.no-till.com.au); and his presentation is available at: <http://www.slideshare.net/IIEDslides/bill-crabtree-amir-uk-28th-march-2014>.

Tony Reynolds offered an informative insight into the thought processes of a CA convert during his pre farm walk presentation:

### Thurlby Grange farms

Thurlby Grange Farms comprise three farms totalling 1250 ha. Most of the land is under wheat, oilseed rape (OSR), field beans, oats, linseed and canary grass for seed, and there is on-going experimentation with cover crops including vetch, phacelia, crimson clover and mustard. Cover crops are drilled with spring wheat and have the dual role of adding N (in the case of legumes) and soil conditioning. Vetch can be kept throughout the winter and is harvested with a haulm mower for animal feed. Also included is an important 100 hectares of pasture for 150 beef cattle, and a 16,000 bird free-range egg production enterprise.

**No-till farming:** Tony is emphatic that merely reducing soil tillage rather than eliminating it does more harm than good. Soil pores are sealed by the the finer soil particles in the disturbed stratum and consequently water infiltration is reduced, root growth is restricted and yields suffer. Tony considers that, as he retains all stubble, he encounters zero wind erosion of his fen soils (Figure 2).



Figure 2. No-till wheat drilled directly into the previous crop stubble

However, he goes further and speculates that he achieves a net gain of soil as his plough- and harrow-using neighbours still facilitate the spring soil blow, some of which lands, and is trapped, on Tony's farm.

**Crop production:** All crops are direct sown. The early months of 2014 have been the wettest on record and for this reason the Weaving no-till drill is favoured as it performs particularly well in wet conditions (Figures 3 and 4). It is encouraging to see UK manufacturers once again entering the no-till seed drill market after having been world leaders in the 1970s ([www.weavingmachinery.net](http://www.weavingmachinery.net)).



**Figures 3 & 4. Weaving Big Disc zero-till seed hopper with pneumatic fan; on the right the planting line with disc openers for seed. The drill costs around £50,000**

When sowing into the previous crop's stubble, the RTK (Real Time Kinematic) global navigation satellite system now available on the farms means that the second crop (e.g. beans) can be sown precisely between the wheat stubble rows. The system can also be used to relay drill cover crops between the lines of the growing main crop.

OSR is broadcast directly, together with slug pellets if needed, by the Autocast which comprises a seed hopper attached behind the combine header; a fan and a manifold distribute seed to spreading plates and a land wheel meters the seed. The combine used on the farm has a Shelbourne Reynolds stripper header (Figure 5) which leaves stubble standing in the field by just stripping the grain from the plant. This speeds up combining and leaves an ideal environment for the subsequent crop (and for trapping incoming wind-blown soil).



**Figure 5 Shelbourne Reynolds Combine and 'stripper head'**

**Crop establishment costs:** Tony made a broad-brush estimate that CA crop production costs are around £30/ha compared with £266/ha for conventionally tilled crops. Some of this saving is due to lower fuel bills as diesel consumption has fallen from 92 litres/ha to 42 litres/ha simply by adopting no-till.

**Crop yields:** It is to be expected that soils damaged by conventional tillage will need time to heal and re-establish their natural structure of aggregates, pores and channels; and this has been Tony's experience. Yields in year one after adopting CA were not noticeably lower, however years two to five may show a dip until pre-switch levels were re-achieved in year 6. From then on yields continued to rise before stabilising in year eight at a level higher than year zero. Tony continues to investigate why this yield dip in years 2 to 5 occurs on some soils but not others.

Earthworms are crucial to the soil rehabilitation process and their numbers quickly rise under a no-till and residue-retention regime (Figure 6). Tony has made some measurements and he found 47 earthworms in one sample of his no-till soil, whereas his neighbour, on the other side of the fence and with the same soil but ploughed each cropping season, had only one worm in the same volume of soil. The average worm count on the farm is between 80 and 90 under an area of 1m<sup>2</sup>, the aim is to achieve 140-150/m<sup>2</sup>.



Figure 6. *Lumbricus terrestris* spp. *Rattlesnakensis*

During the soil recuperation process, and beyond, soil carbon levels have continued to rise. The soil organic carbon (SOC) level in 2003 was a low 2.1 percent, this rose to 4.6 percent in 2007 and is now 6.3 percent. SOC means soil fertility and so levels of P and K application have fallen by 80 percent and N by 50 percent over the same period.

**Poultry enterprise:** The poultry enterprise has 16,000 Hy-line UK hens, which are free range but have access to shelter for feeding and egg laying (Figure 7). The hens are kept for 13 months and their manure provides a large part of the P and K fertilizer needs of the farm.

**Blackgrass control:** Blackgrass (*Alopecurus myosuroides*) is one of the most notorious pests of arable farms in the UK. Tony explained how a no-till regime can reduce its incidence. Eighty percent of blackgrass seeds die in the soil in year one and so, if there is no soil inversion, the mortality rate in year two will be eighty percent of the remaining twenty percent. No-till in conjunction with judicious application of Atlantis (iodosulfuron+mesosulfuron) at 0.4kg/ha has controlled blackgrass on the farm. GPS mapping is used throughout the farms for soil fertility and crop yields. It is also useful for mapping patches of troublesome weeds so that they can be dealt with selectively, rather than over-dosing areas with no weed problems.



Figure 7. Hy-line UK hens

So thanks Tony for reducing GHG emissions, for sequestering carbon in the soil, for eliminating soil erosion, for giving wildlife a better habitat and, as you put it, doing your bit to save the planet.