



A clear solution for farmers

CATCHMENT SENSITIVE FARMING

Catchment Sensitive Farming

Farm Business Benefits Case Study 11

Cover Crops at Littlethorpe Farm, Rudston

Cover and catch crops enable John Gatenby to maximise profitability, minimise fertiliser costs and improve soil structure by:

- Ensuring that there is green cover all year round across light chalky soils prone to wind erosion
- Retaining nutrients within the plant used as a catch or cover crop so that they can be made available to the next crop following establishment
- Providing an additional source of income within the rotation where a catch crop such as temporary grassland can be 'sold' as grass keep
- Increasing organic matter in the soil profile when the plants are incorporated prior to the establishment of the next crop



Farm Business Benefits Case Study 11: Cover Crops at Littlethorpe Farm, Rudston

John Gatenby farms at Littlethorpe Farm, Rudston near Bridlington. The farm extends to 600 acres (243 ha) of which over half is under arable cultivation. Farming on very light chalk soils has meant that John has needed to focus on increasing the organic matter content within the profile in order that crops would not suffer during periods of drought.

The Farm

Littlethorpe has been in the family for over 100 years as John's great grandfather moved to the farm in 1903. John took the farm over in 1978 after graduating from Wye College and quickly recognised that he would have to adopt a different approach to soil management if yields were to be maintained during drier years.

The principal risk at Littlethorpe is soil windblow. In the early 1950's when John's father took over the farm, three crops of sugar beet were sown and then lost as a result of windblow in one season before one crop was harvested successfully.

John decided to revert back to a mixed farming system and now finishes up to 600 head of cattle on the farm alongside the arable enterprise. The cattle are housed throughout the winter and then most are turned out for some of the time in the summer before returning to the buildings to be finished prior to slaughter.

The farm is located within the Gypsy Race catchment, a spring-fed chalk stream that is actually dry for most of the year. This is largely because the groundwater table in the area lies almost 7 metres below ground level and so it takes until January and February when groundwater has been sufficiently replenished before it begins to run again.

The Gypsy Race

Part of the secret to the farm's success has been the borehole that was sunk on the farm in the 1960s and this has allowed John to irrigate throughout the summer months. Added to this are the six hundred cattle that John finishes on the farm which provide the farmyard manure and slurry which is applied to the land. This slurry and manure has not only substantially increased organic matter within the soil but it has also provided a significant proportion of the nutrients required by the crops.

Cropping

John has experimented with different rotations over the years in order to find the best combination of crops to suit the farm and the market place. Over half of the farm (350 acres/ 141 ha) is down to arable crops including cereals grown exclusively for seed production, oil seed rape and contract potato growing. The remainder of the farm is down to temporary and permanent grassland and forage maize. John's approach is to ensure that there is a crop growing on the land for the greatest proportion of time in order to maximise profitability and to reduce the risk of windblow or soil wash. He has adopted a six year rotation (see table 1) that ensures that there is some form of green cover throughout the year.

Winter wheat and barley are grown for seed production and therefore it is essential that grain quality and the cleanness of the crop are maintained throughout. The rotation at Littlethorpe not only maximises nutrient and organic matter retention but it also minimises the need for the application of pesticides and herbicides to the cereal crop. This saves time and money but also enables John to meet the strict protocols imposed by the seed houses.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
WB2						H Sow G	Grass (G)					
Grass (G)/Sheep (S)		G,S,muck	Potatoes (P) or Oil Seed Rape (OSR)						H (P/OSR)			
Winter Barley									Winter Barley			
Winter Wheat							H		Winter Wheat			
Mustard			Potatoes or OSR						H	Mustard		
Winter Barley (forage)									Winter Barley (forage)			
Rye (forage)						Mustard		Rye (forage)				
Rye silage			Maize							H		

H - Harvest

Potatoes are grown on contract and therefore the price that John receives is dictated by the cost to the grower of generating the crop and the yield. Irrigation using the water from the borehole coupled with the friable soil and inherent fertility has meant that Littlethorpe is a very attractive prospect to potato growers. John's rotation also means that the risk of fungal and other diseases affecting the crop is minimised.

Cover and Catch Crops

Cover crops can be defined as 'plants that are grown to improve and structure and nutrient content of the soil'. They can be a cheap addition to inorganic fertilisers and can also complement animal manures. They are usually incorporated into the soil before any crop is produced as they are principally grown for their leafy material.

Benefits of Cover crops:

- They help to prevent nutrients being leached through the soil profile because they are taken up and retained by the plant and then when the nutrients are needed for the next crop, they are incorporated into the soil or alternatively used as a surface mulch
- They improve soil structure by improving aeration and water retention
- The roots of the cover crop can help to bind the soil, thus reducing windblow or water erosion
- They can help to control weeds which are typically opportunist so if cover crops reduce the amount of bare ground, there will be less chance of weeds colonising. If they do establish, their vigour is usually reduced because the cover crop is competing with them for light, air, water and nutrients

The use of cover crops at Littlethorpe Farm has helped to address problems of windblow as well as improving soil structure and increasing organic matter on the light, erodible soils. John uses a mustard cover crop for one winter in six, which is not harvested but instead is simply incorporated to increase soil organic matter. The mustard is drilled directly onto stubbles in August following the harvest of the winter wheat crop and rolled in.

"I use a very low seed rate of about 3kg/ha which is significantly below the rate recommended by the seed merchant. But I find that this is sufficient to get the level of cover that I need and it provides ample plant matter to incorporate back into the soils in March prior to the establishment of rape or potatoes," John explains.



Cover Crop of mustard establishing on stubble

John also uses a mustard cover crop again in his rotation for just two months during the summer after winter barley has been harvested whole crop for silage and but before forage rye is sown as a catch crop in September. This ensures that the nutrients are not lost over this period but are instead available to the rye crop in the autumn.

John also uses a number of different catch crops. These differ from cover crops because they are utilised rather than simply being returned to the soil profile. They still fulfil a number of the functions of cover crops as they reduce the risk of erosion and the root matter and a small amount of surface vegetation can be incorporated into the soil.

A catch crop of Italian ryegrass is sown down for one winter in six and this is grazed by sheep. It is then ploughed up in March prior to the establishment of potatoes. Rye is also grown as a catch crop and it is sown in September and then harvested for silage in April.

"We choose to grow rye before the Italian ryegrass because it grows at lower temperatures and therefore is ideal as an autumn sown whole crop cereal. It only needs 30 units of nitrogen to get it to the stage where the flag leaf ligule is just visible and at this point it will be three foot tall. We then harvest it as whole crop silage and feed it to the housed cattle," John explains.

Soils

The Strutt report (1970) highlighted that 'some soils are now suffering from dangerously low organic matter levels and could not be expected to sustain the farming systems which have been imposed on them'. Since then, the situation has deteriorated further and John is conscious that his soils are more prone than most to the serious problems that arise in the absence of organic matter.

"The answer to making soils more workable is to increase the organic matter but this is a long term project. We have adopted a rotational system and are now reaping the benefits."

The combination of cover and catch crops coupled with the large quantities of manure and slurry from the cattle has contributed to the huge improvement in soil structure across the farm.

"We don't have to beat our soils into submission. The combination of friable soils, smaller tractors and larger tyres makes our job easy and it represents a significant saving in diesel too," comments John.

John has also experimented with different ideas in order to counteract the problem of the heavy machinery used during potato harvesting compacting soils around the edge of the fields.

"I now establish a 16 metre headland around the edge of all the fields where the potatoes are grown. Previously, we found that the potatoes harvested from the edges of the field were always the poorest quality and then the following year, the soils at the edges of the field were so compacted that we could never grow a decent crop," he explains.

The grass headlands act as buffer strips reducing the risk of diffuse pollution which is heightened because soils are irrigated.

"The contract potato growers also like what we do because it means that all the potatoes that are harvested are of the highest quality, rather than accepting a poor crop at the edges of the field."

John has also experienced a relative saving on fertiliser bills as a result of the practices employed. Although additional nitrogen has to be added to some crops, phosphate and potassium levels hold up well meaning that he does not incur the costs of buying more expensive compound fertilisers. He does have to monitor trace element levels due to the high pH of the soils.

"Although the approach we have adopted has served to improve water and nutrient retention dramatically, the availability of several trace elements are often low, especially copper and manganese so we are constantly looking at ways to ensure that these elements are available to the plant in sufficient amounts."

Potatoes at Littlethorpe

Benefits

Combining a mixed farming system with the use of cover and catch crops has delivered substantial benefits to Littlethorpe Farm:

- Improved soil structure leading to improved water and nutrient retention properties and an increase in friability and therefore ease of cultivation
- Reduced fertiliser bill because more of the nutrients needed for the crops within the rotation are either provided by organic manure or from the plant matter from the cover or catch crop
- Reduced incidence of disease as a consequence of implementing the six year rotation and choosing break and catch crops carefully
- Reduced diesel costs because smaller tractors can be used and fewer passes are required at cultivation to achieve the desired tilth prior to seeding
- Less weed problems therefore lower crop protection bills because the use of cover and catch crops limits the opportunities for weed colonisation and the six year rotation reduces the likelihood of weeds such as black grass persisting in the seedbank.

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