

Case study 28

Minimum tillage with imported poultry litter and rotational fallow

- The overall effect on farm profit (net farm income) is positive, with a net value of £91/hectare yearly after 10 years of minimum tillage, which applied to 650 hectares of cropped land on this farm.
- More than half of the economic benefits came through savings in cultivation costs and easier preparation of a seedbed. Another quarter came from savings in fertiliser costs. Benefits to soil condition have developed gradually over the period. In recent years soils have been in a good stable condition.





Background

This estate farm of 2,225 hectares is managed for cereals, potatoes and shooting. Crops are grown on 650 ha including potatoes 1 year in 7. Some cattle are housed in a let barn, providing a small amount of FYM, and chicken litter is brought in. Minimum tillage was introduced 10 years ago. The decision to change from conventional ploughing to minimum tillage was cost driven. However, the farmer felt that continuing with inversion tillage would have depleted soil organic matter while the current system maintains stable organic matter levels. Potatoes are irrigated on schedule by overhead gun.

Soils are Bromyard series loams, varying in clay content and heaviness across the holding. On the heaviest fields, they tend not to grow potatoes. These fields frequently require discing twice. Subsoiling is required periodically, done in response to compaction testing and when conditions are suitable. Where potatoes are grown, fields are ploughed before and after.

The rotation for arable fields is: potatoes / winter wheat / oilseed rape / winter wheat / set aside or fallow (2-3 years). Previously beans were included in the rotation. In the future there is likely to be more grass.

Soil organic matter management

The farmer believes that if the land had continued to be ploughed conventionally, soil organic matter levels would have declined.

Soil organic matter management:

- Chicken broiler litter is added to all land to the maximum level permitted under Nitrate Vulnerable Zone regulations, which can vary depending on the N content of the manures.
- Oilseed rape straw is incorporated. Cereal straws are baled
- The current minimum tillage system of light shallow discing then drilling maintains soil organic matter at a stable level.
- The fallow period – formerly set-aside, more likely grass in the future – adds organic matter when ploughed in.

What difference has organic matter management made?

Benefits:

- Minimum tillage has gradually improved soil structure and workability. In the first years after stopping annual ploughing, most fields had to be discing twice. However, now the majority of the land is only discing once.
- Addition of poultry litter has allowed N applications to be reduced by 15%.
- There are reduced slug problems as soil is firmer, so slug pellets are only used as needed, except on potatoes, which have routine applications. Overall there is a 90% reduction in slug pellet use compared with that previously used when ploughing for all crops.
- The frequency of waterlogging has declined. Rainfall tends to infiltrate better.
- Fuel consumption for cultivation has decreased by 30%.
- Seed rate has declined by 30% over 10 years.
- Better root structure is gradually being achieved, which the farmer believes contributes to yield increases over the past 10 years. This is not valued in our economic analysis because contributors to yield increase are complex.
- Populations of worms have significantly increased, not valued in this analysis.

Costs:

- There was an investment in a new drill, discs, and a press cultivator, whilst plough equipment was retained for the potatoes. We include this as an additional cost.
- Increased potash and phosphate indices in some fields, which requires more testing. We value increased time and soil testing costs.
- There are more grass weeds, but this is controlled satisfactorily with more targeted use of herbicides, e.g. on headlands, so there is no additional financial cost.

Comment

The overall effect on farm profit (net farm income) is positive with a net value of £91/ha/year after 10 years.

The benefits have built up gradually during the 10 years since the combinable crops have been grown under a minimum-tillage system.