

Case study 2

Straw incorporation since burning ban improves soil condition

- Annual net value was £27/hectare after 7 years across this 1,000-hectare arable farm.
- Benefits were apparent at 5 years. However, full benefits arose 7-10 years after consistent straw return.
- 56% internal rate of return on soil organic matter investment – far greater than most other investments.





Background

The farm business has been arable since 1960 with a fairly constant rotation and tillage regime on 1,000 hectares of tenanted and contract-farmed land. Drainage was installed in 1980, and stubbles were burned until 1992. Cultivation is to 23 centimeters with 10 cm discing for oilseed rape. Soils are all heavy clays over chalky till. Heavy machinery is fitted with wide tyres to minimise compaction.

The crops grown on the farm are wheat (1st and 2nd), barley, oilseed rape and peas. The farm business also has a small breeding turkey enterprise.

Soil organic matter management

Since the straw-burning ban, all straws have been chopped and incorporated into the soil. The farmer's comment on the impact of straw incorporation was: 'This soil can eat as much straw as we can incorporate.' The farmer considers that organic matter levels have built up very slow, but when a certain level is reached the benefit becomes highly noticeable on all farm cultivation activities. From the beginning of straw incorporation in 1993, the benefits became observable and of clear value from 1998 and continued to improve to a stable level in 2003.

Soil organic amendments:

- All wheat straw is incorporated. All other crop residues, except from barley (used for turkeys), are incorporated.
- Turkey manure with a very high straw content and only 3-4% nitrogen is applied on 12 ha/year.

What difference has organic matter management made?

The benefits identified by the farmer after 5 years were as follows:

- Fuel consumption for cultivation operations was reduced 20-30% compared with prior to the straw-burning ban.
- The time taken for cultivation operations was reduced by 10%. Where straw has not been incorporated for a year (e.g. after barley) the tractors work in a gear lower for more power to maintain the same productivity.
- The biggest benefit is in small areas where land tends to be compacted and waterlogged. Yield mapping has shown local wheat gains of up to 4 t/ha in these patches. On average across the farm, the yield loss in very wet and very dry years is around 10% lower since straws have been consistently incorporated.

- There has been some saving in fertiliser rates, although we do not value this as nutrient planning has improved across the farm.

Costs:

- Main cost is the loss of potential income from selling the straw. A local contractor was offering £6/tonne, equivalent to approximately £20/ha. This probably overstates the cost as the contractor was thought likely to cause some soil damage through compaction.

Comment

The overall effect on farm profit (net farm income) is positive.

The net value is £27/ha yearly after 7 years.

These benefits do take some years to build up in this type of soil, with gains apparent after 5 years but the full benefits taking 7-10 years to realise.

However, the costs of straw incorporation are relatively low in this area and so even though the benefits are not huge in absolute terms, it made good sense to invest in this option.

This farm managed to achieve an estimated internal rate of return of 56% on its investment in soil organic matter management, far more than the annual return on most investments.