

Case study 9

Straw incorporation after burning ban benefits arable soils

- The net benefit from incorporating crop residues has built up to an annual value of £32/hectare, which applied to all of the arable area on this 75-hectare farm.
- For years 1-4 costs exceeded benefits, but from year 5 benefits were significantly greater than costs – a return of 24% on this investment.
- The local price of straw is the key factor determining the net financial benefit.





Background

This 75-hectare farm is part of a larger management group but tends to have similar cropped areas annually comprising oilseed rape, winter wheat, oats, and barley.

The cultivation is: plough and press, followed by one or two passes of a spring-tine cultivator before drilling and rolling.

Soils are described as light to medium.

Soil organic matter management

All crop residues including cereal straws have been incorporated over a 14-year period since the straw-burning ban.

What difference has organic matter management made?

Benefits:

There had been some substitution of inorganic fertiliser, but the main benefits have been through improved soil structure.

- Less slumping and capping.
- A better seedbed, with a lower seed rate and easier cultivation, and more often reduced number of passes.
- A modest increase in wheat yields (0.4 tonnes/ha).
- Less drought stress in the crop during prolonged dry spells. The farmer believes that the improved organic matter levels provide a buffer in drier/drought years (although this value was not quantified as an economic gain).
- The farmer noticed increased earthworm activity over the time crop residues had been continuously incorporated.

Benefits built up over 9 years and then seemed to stabilise.

Costs:

There were some additional costs from incorporating crop residues.

- A loss of revenue that could have been gained from selling straw. This cost greatly outweighed the other costs, since straw values are around £18.50/ha in the swath in this area, averaged across the wheat, oats, and barley.
- A small increase in fuel costs when ploughing-in.
- An increase in the slug burden – requiring greater use of slug pellets.

Comment

Taking all this into account, the net benefit from incorporating crop residues reached an annual value of £32/ha. For the first 4 years costs exceed benefits, but from year 5 onwards benefits are significantly greater than costs, giving an estimated internal rate of return over a 20-year period of 24% on this investment.

The key factor determining the net financial benefit to the farmer is the local price of straw. If the average straw price was £28/ha the net benefit from year 9 would fall to £23/ha, giving a return of 12%. However, if there was no local market for the straw, the increase in the gross margin from incorporation would reach £51/ha by year 9. The economic evaluation also does not include offset against the potential costs associated with straw baling for sale, such as yield losses through soil compaction, compaction remediation costs, or loss of timeliness in cultivations.