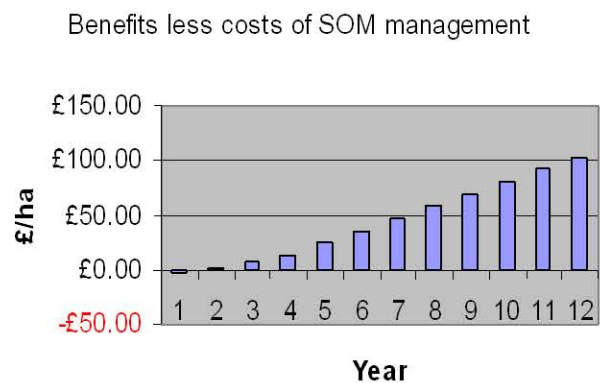


Case study 19

Mixed arable, beef and sheep with short-term rotational grass leys and application of FYM and sewage sludge

- The overall effect on farm profit is positive with an annual net return of £103/hectare on average across 360 hectares of arable area.
- These benefits have been built up over a 12-year period with the largest gains coming from increasing wheat yields, a reduction in fertiliser costs, and cost savings from adoption of non-inversion tillage.





Background

This farmer actively manages organic matter to improve soil structures across the farm and over a period of 12 years has gained yield and cost advantages over otherwise similar neighbouring land. The total farm area is 400 hectares comprised of 200 ha of owned land and 200 ha farmed in partnership with a machinery ring. The principal enterprises include:

- Arable land: 280 ha in total growing winter wheat (120 ha), winter barley (100 ha), millet for domestic bird feed (32 ha), peas (16 ha) and sunflower (12 ha).
- Grassland: 120 ha of grass, of which 40 ha is permanent pasture (due to access, slopes and soils) and 80 ha of 6-month leys in the arable rotation
- Beef herd: 70 head housed indoors over winter and grazed on permanent pastures for the rest of the year.
- Sheep: 550 ewes and lambs winter grazed on the short-term rotational grass leys, brought indoors for lambing and grazed on the permanent pastures in summer.

The farm is in a stable rotation of: winter wheat or winter barley / 6-month, short-term grass ley for over-winter sheep grazing / spring beans, millet, peas, or sunflower.

Improved soil structure enabled the move from inversion to non-inversion cultivation in 2004. The aim was to reduce overall establishment costs and to maintain moisture levels in the seedbed during the cultivation period. The machinery ring was established at this time to optimise and spread the investment costs of the new cultivator.

Soils are described as light to medium. Part of the farm is in a Nitrate Vulnerable Zone, and this determines the application rate of sewage sludge.

Soil organic matter management

The farmer believes that min till helps maintain good soil structure, and in addition organic matter levels are managed with the following measures:

- Application of bio-solids has been consistent for the past 15 years across the whole farm, aside from steep land (approximately 10% of the farm). Delivery and spreading is free from a local sewage works. The application rate provides 170 kilograms of N per hectare.
- FYM applied at 30 tonnes/ha on 10 ha per year and targeted on the lighter land to improve structure.

- 80 ha of rotational grass leys are cultivated in each year. This grass sustains sheep grazing over winter, therefore contains all muck deposited on the hoof. There is no additional cost to cultivating the grass in spring as the non-inversion cultivator is used.
- Pea, sunflower and millet residues are incorporated.

What difference has organic matter management made?

Benefits:

In comparison to immediate neighbours' fields, the farmer observed improved crop performance, i.e. improved seedbed, earlier establishment, and more resistance to drought. Specific benefits include:

- Average yield increase of winter wheat from 7.75 t/ha in 1991 to 9.0 t/ha in 2002.
- With the consistent application of biosolids there has been a reduction in inorganic N fertiliser from 180 kg/ha to 110 kg/ha, savings of £31/ha.
- Improved soil structure enabled the move from inversion to non-inversion cultivation in 2004, which across the whole farm and has led to savings of £45/ha (£113/ha to £68/ha).

Costs:

- FYM application cost to 10 ha/year equals £30/ha.
- Grass spraying off – we take into account the cost of spraying off grass in the spring, since this would not be incurred where grass is ploughed in rather than disced (£27/ha herbicide and application costs).

Comment

The overall effect on farm profit is positive; with an annual net return of £103/ha.

- These benefits have been built up over a 12-year period with the largest gains coming from increasing wheat yields, a reduction in fertiliser costs and cost savings from adoption of non-inversion tillage.
- Benefits from this management are greater than costs from year 2 onwards

Taking into account the gradual build up of yield benefits, the estimated internal rate of return to investing in this change in practice is 179% over 20 years.