

## Case study 3

# Straw incorporation, use of pig manures to benefit arable soils

- Overall effect on farm profits is positive across 200 hectares of cropped land.
- Annual lower net value after 16 years (including slurry and FYM application costs) is £19/ha.
- Annual upper net value after 16 years (excluding slurry and FYM application costs) is £68/ha.





### Background

This mixed arable and pig farm grows cereals, oilseed rape and beans on 200 hectares. Both the rotation and plough-based cultivation have been fairly constant for the past 20 years. The soils are described as medium to heavy, all under drained with clay tiles. The farm's indoor pig unit provides FYM and slurry, which are used on the arable land.

The rotation is: 1st wheat / 2nd wheat / oilseed rape / wheat / beans or peas / barley

The cultivation regime is:

- Plough and press
- Power harrow x 2 (up to 3 on heavier soils)
- Drill
- Roll x 2
- Subsoil 1 year in 4

Blackgrass has been an increasing problem since stubble burning ended. Vining peas were introduced to help control it, along with ploughing before all crops.

### Soil organic matter management

SOM amendments:

- All crop residues (except barley, which is baled off for pigs) are incorporated.
- Pig FYM is spread before the oilseed rape.
- Pig slurry is applied via a ring main across all of the arable land

### What difference has organic matter management made?

Benefits:

- A local crop consultant has advised the farmer that the inputs of pig manures provide a yield benefit of approximately 1.25 tonnes/ha on the 1st wheat, compared with wheats grown locally on the same soils without addition of organic manures.
- The reduction in inorganic fertiliser where pig manures are applied and straw is incorporated is worth £18.90/ha.
- There is virtually no crop deficiency in micro-nutrients (especially sulphur) where pig manures have been applied, saving on additional inorganic fertiliser costs to address this locally frequent problem.

Costs:

- Although an infrequent problem, there is an increase in the occurrence of lodging on higher organic matter areas and a need for additional growth regulator on wheat after a wet winter.
- Loss of potential income from selling straw (the "opportunity cost"), although this farm is not located in a high straw-value area.
- Manure handling and application costs are based on contractor charges for FYM spreading and operation and capital depreciation costs for the slurry ring main. These can be treated as waste management costs for the pig business and so estimates of impact on profits including and excluding these costs are presented below.

### Comment

The overall effect on farm profits (net farm income) is positive:

- Annual lower net value after 16 years (including slurry and FYM application costs) is £19/ha.
- Annual upper net value after 16 years (excluding slurry and FYM application costs) is £68/ha.

The crop consultant managing the arable enterprise thought that it had taken 16 years for the full benefits of managing organic matter to be realised, with around half the benefits being seen in six years.

If the arable business has to pay the full costs of handling and spreading FYM and slurry, the net gains from soil organic matter management are rather small and costs outweigh benefits for much of the first decade.

The situation is completely different if the costs of disposing of FYM and slurry are attributed to the pig enterprise. In this case, benefits from soil organic matter management always exceed costs with net benefits reaching nearly £70/ha/year after 16 years.

If the costs of FYM and slurry handling and application are shared between the pig and arable enterprises, benefits exceed costs from year 5 onwards and the estimated internal rate of return is 23% – making this management an attractive investment.