IMPACCT CASE STUDY No. 12

Integrated Management oPtions for Agricultural Climate Change miTigation

Sartori & Bianchi Pig Farm, Montechiarugolo, Parma, Italy

This case study is based on a large 270 ha pig farm situated at Montechiarugolo in the middle of Northern Italy. Montechiarugolo is in the Province of Parma in the Italian region Emilia-Romagna, located about 80 km northwest of Bologna and about 13 km southeast of Parma.

The farm has a capacity for 800 sows plus replacements and piglets and 3200 growing and fattening pigs. It is a closed cycle pig farm producing fatteners with a final weight of around 160kg. The farm also incorporates a feed production plant and a small tomato production unit (34 ha).

The climate is typical of the Po Valley with hot summers and cool humid winters. The farm soils are a silt loam, sub-acid with good levels of organic matter and nutrients. 80% of the farm is located in a Nitrate Vulnerable Zone, close to the river Enza.

Montechiarugolo

The crops grown are mainly for feed. This includes 136 ha of maize, 50 ha of wheat, 28 ha of sugarbeet, 9 ha of barley and 14 ha of permanent meadow.


Biogas digestors, Photo: CRPA

In 1993 a biogas plant was built, created by adapting the tanks used for slurry storage. The slurry reaches a shaft from which a pump sends it to a rotating screen. The liquid part is divided into two identical flows by a hydraulic separator, and then conveyed to two parallel digestor tanks of the same size. Both digestion tanks are heated by means of a steel pipe coil installed near the bottom, in which hot water from the cogeneration plant circulates. The biogas is sent to a co-generator that can supply about 50 kW of electric power and 120 kW of thermal power. All the electric energy production is bought by ENEL (Italian national electrical agency) at 0.28 €/kWh. The plant is currently undergoing an upgrade.

The capital costs of the plant were €90,000 but the farm recoups €29,000 from selling electricity. The energy generated is a direct replacement for electricity generated from fossil fuels.

Many other farm practices have been modified in recent years to reduce environmental impacts, particularly those associated with climate change effects. These include:

- Farm nutrient budgeting is used to formulate crop nutrition plans. This has led to a reduction in the use of mineral fertilisers and, thus, greenhouse gas emissions. Other benefits include a reduction in N losses through leaching and surface runoff.

- The irrigation system in the maize fields has been changed from waterguns to fert-irrigation with drip pipelines used to distribute the liquid fraction of the digested pig slurry with irrigation water. This has ensured a more efficient use of water and improved the supply of water to the crops. Less energy is now used for distribution reducing greenhouse gas emissions. Other environmental benefits have been noted including a 90% reduction in ammonia emissions compared with the previous practice of land spreading the slurry. N uptake by the maize is higher with the water/slurry mix compared with the untreatd slurry. Anaerobically digested slurry has increased N available to the crop in comparison to undigested slurry.

The irrigation drip lines between the maize rows, Photo: CRPA

The overall costs of irrigation is estimated to be reduced by 15%. However labour required for operation and maintenance has increased and there is also a need for careful rodent control.

The fully slatted floor with Vacuum system, Photo: CRPA

- The diet of pigs in the growing-fattening phase has been modified over the last eight years. The farmer now uses a multiphase feeding system (3 different feed compositions) rather than a single feed that was previously used. This has seen a reduction in manure-N, less deposition and less N_2O emissions. Less ammonia emissions from manure has also been noted.
- The farm built its own feed production plant in 1990 which has reduced energy used for feed transport.
- Between 2001 and 2005 the slurry collection and storage system was modified in most of the pig houses. The old system used a fully slatted floor with a deep pit underneath for a prolonged storage of the slurry. This was substituted with a frequent slurry removal system (vacuum system). Consequently, the mechanical ventilation of the house could be substituted by natural ventilation saving energy and reducing greenhouse gases. Frequent removal of slurry for digestion has reduced methane and ammonia emissions.
- The slurry from the pig houses goes to the biogas plant.

Pig houses, Photo: CRPA

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