IMPACCT CASE STUDY No. 11

Integrated Management oPtions for Agricultural Climate Change miTigation

The Cotti Farm, Parma, Italy

This case study is based on a 118 ha farm that lies in the hilly zones of Northern Italy. The main farm activity is milk production for Parmigiano-Reggiano cheese. However, forage crops and tomatoes for canning are also grown. The climate is hot in summer with cool and humid winters.

The farm is located within the alluvial fan of the Parma river, at the foot of the Appennine mountains at the southern border of the Po Valley. The farm is in a nitrate sensitive zone and the main soil type is an Udic Haplustepts, gravelly, not calcareous, neutral pH and with good levels of organic matter and nutrients. There is a shallow groundwater table at a depth of 10 m below the surface level.

The Cotti Farm, Photo: CRPA, Italy

The farm complies with the regional Integrated products code that was developed as part of the Regional Plan for Rural Development 2007-2013. It is also a member of the "Fattorie porte aperte" (Open door farms) initiative of the Emilia_Romagna Region.

The fert-irrigation on Lucerne, Photo: CRPA

The farm has 46 ha of lucerne, 15 ha of ryegrass, 11 ha of permanent meadows, 9 ha of barley and a little durum wheat and millet. 30 ha of land are used for growing tomatoes for canning. There are two main rotations in use: (1) 4-5 years of lucerne/1 year tomato/1 year winter cereals and (2) 4-5 years of lucerne/1 year tomato/1 year ryegrass. The Italian millet may be sown as a secondary crop.

The cropping system is mainly based on lucerne that is cut four times a year. The forage is dried in the field, collected in balloons that are stored in a naturally aerated barn.

The farm has an average of 90-95 dairy cows plus replacements. The cattle are not grazed but stabled all year round.

The farm has modified its farming practices considerably in the last few years in order to reduce its impact on the environment and on climate change. These are summarised below.

- Since 2005 the farm has used a reduced tillage system to improve soil fertility and reduce erosion. The soil is now ploughed to a depth of 20-25 cm compared to 40 cm previously which reduces fuel consumption. Manure is incorporated into the soil on a regular basis to increase soil organic matter. This is expected to increase soil carbon sequestration. There are signs that these new practices have improved soil structure and reduced soil erosion.

- Nutrient management plans have been produced using a nutrient balancing technique to ensure that fertiliser use is optimised. More slurry is now produced rather than FYM. Slurry has a higher mineral N availability and so better as a mineral fertiliser replacement. Rapid soil incorporation techniques are used. This maximises the N contained within the slurry available to the crop and reduces emissions of nitrous oxide and ammonia. The adoption of these activities and other best practice has improved the farms nitrogen balance.
- Buildings and machinery have been updated to reduce energy consumption. For example, in 2007 the old milking parlour was completely rebuilt and new milking machinery installed. This has increased performance and reduced labour intensity, energy (5-10%) and water consumption. Dirty water from the parlour is re-used to clean the barns. A new cow barn has also been built.
- Other farm practices have also been changed to save water. For example water meters have been installed to monitor for leakages.

The new dairy parlour, Photo: CRPA

- The irrigation system has changed from water guns to fert-irrigation applied with spray irrigation equipment. This has improved the supply of water to the crops and reduced the consumption of both water and energy.

Flushing the milking parlour with dirty water, Photo: CRPA

- The milk produced for the cheese must meet strict quality standards and requires a good-quality forage. Since 2005 the cows have been fed on dry forage all year round rather than fresh green forage. The new diet has meant that the amount of concentrate has been reduced with the positive effect of a lower N content in the manure and so lower N_2O emissions can be expected. The feed efficiency has been increased and there should be lower enteric methane emissions.
- FYM produced on the farm is collected and composted in heaps. Liquid slurry is collected separately and stored under cover. This is expected to reduce methane and ammonia emissions.
- All other farm wastes are sorted and recycled where ever possible.
- There are plans to install a 15 kW photovoltaic plant on the roof of the new barn during 2010. The energy from this will directly replace fossil fuel energy and is expected to supply 27000 kWh/year. Energy produced will be purchased by the national electric company at 0.45 €/kWh and so provide income for the farm as well as saving energy costs and greenhouse gas emissions. However, this project will incur a significant financial outlay of around €67,500.

Tomatoes for canning, Photo: CRPA

Original case study content collated by CRPA, Italy