

4 CLEANER PRODUCTION CASE STUDY

This case originates from a Cleaner Production assessment carried out at a Danish pig abattoir. It describes what the company did and what the assessment achieved. The description below follows the Cleaner Production assessment procedure as described in Chapter 5.

4.1 Phase I: Planning and organisation

Obtain management commitment

The company wanted to reduce water consumption, because the costs of water and disposing of wastewater were too high.

Set up a project team

The management formed a project team, which comprised a foreman, a technical engineer and an external consultant.

Develop environmental policy

The company did not have a formal environmental policy; however, its strategy was to reduce water consumption and pollution without impairing product quality.

Plan the Cleaner Production assessment

The project team decided to focus the Cleaner Production assessment on the pig reception and holding areas. An assessment of the slaughter line had been undertaken previously. The following steps were decided upon:

- inspection of the area;
- measurement of water consumption;
- assessment of the work procedure;
- development of a list of possible improvements.

4.2 Phase II: Pre-assessment

Describe the process

The project team first described the processes that take place in the reception and holding areas. The abattoir processes about 1.1 million pigs per year. The pigs are delivered in trucks, each containing 50–60 pigs. Each truck must be cleaned and disinfected after unloading, according to regulations. The cleaning procedure takes place in a segregated cleaning area. Approximately 75 trucks are cleaned every working day.

Undertake walk-through site inspection

During the site inspection the following points were noted regarding the cleaning of trucks:

- Sawdust is used as bedding in the trucks.
- The driver removes the bedding and manure using water hoses with 10 mm nozzles.
- The waste is washed to drains and very little is collected.
- Afterwards the driver cleans the truck carefully, using cold water.

The site inspection revealed the following problems:

- High consumption of water.
- Running hoses.
- Discharge of manure and sawdust bedding to the sewer, causing high organic loading in the effluent.

Plan assessment phase

The project team decided to continue with the assessment of the reception area, since the pre-assessment had shown a considerable

number of opportunities for Cleaner Production improvements. In reality, the project team did not distinguish between work in the pre-assessment phase and in the assessment phase.

4.3 Phase III: Assessment

Collect data

The team measured water consumption by measuring the time it took to fill a container of known volume. Readings from a water meter supplying water to a larger area were taken to verify the data collected manually.

The following data were collected:

- Water consumption was approximately 17 L per pig or 950 L per truck.
- The water pressure was approximately 12 bar.
- The quantity of solid organic waste generated was not measured, neither was the organic pollution load of the effluent.

Identify Cleaner Production options

The project team discussed ways of reducing water consumption and minimising the organic load of the wastewater. The following options were identified:

- Using water at a pressure higher than 12 bar and using smaller nozzles;
- Removing the bedding with a scraper before washing with water;
- Reducing the amount of sawdust bedding in the trucks;
- Training employees to reduce the losses.

These options were discussed further in the evaluation phase.

4.4 Phase IV: Evaluation and feasibility study

Undertake preliminary evaluation

As the number of options was limited, the project team could quickly assess them. Reducing the amount of bedding would not give significant reductions in water consumption and pollution. It was therefore decided to focus on the other options.

Undertake technical evaluation

During the technical evaluation it was found that it was desirable and feasible to increase the water pressure from 12–18 bar, and at the same time change from the 10 mm nozzles to a trigger-controlled, jet spray gun.

The technical evaluation also showed that the dry collection of bedding and manure (i.e. before washing) would require the construction of a new area where the trucks could park, so that the bedding could be scraped directly into an automatic solid waste removal system. The project team inspected an existing area that was not in use, and found that it would be suitable for this purpose.

Undertake economic evaluation

The team estimated the costs of changing to high-pressure jet sprays and found that it would be feasible since only a minor investment was required. No large investments were required for the dry collection of bedding and manure, so the most important issue was whether it would require more labour to carry out the dry cleaning as well as wet cleaning. A trial showed that the dry cleaning and wet cleaning could be done as quickly as the previous method. The total investment in equipment and installation was estimated to be US\$5000.

Undertake environmental evaluation The project team expected that implementing the options would bring about a 50% reduction in water consumption and a similar reduction in organic load of the effluent.

Select options The project team presented the four options to the manager. It was decided to implement them all and to train the employees and truck drivers in the new procedures.

4.5 Phase V: Implementation and continuation

Prepare an action plan After the meeting with the manager, an implementation plan was drawn up. The plan took into account the time required for training the employees and drivers, without disrupting normal production. Staff responsible for the various options were appointed.

The following options were implemented:

- Bedding and manure were collected dry in a separate area by scraping them into a solid waste storage container. The waste was composted and later applied to land as fertiliser.
- Hoses were equipped with trigger-controlled spray guns and the water pressure was increased to 18 bar. Each gun delivered approximately 60 L of water per minute.
- The drivers were instructed in the proper use of the equipment and made aware of the importance of saving water and reducing pollution.

Monitor performance As part of the implementation process, a monitoring program was established to document improvements. The new cleaning operation was evaluated and figures for water consumption and pollution were recorded. The results were as follows:

- Water consumption was reduced to 5.6 L per pig (67% reduction).
- BOD was reduced to 13 g per pig.
- Solid organic waste was reduced to 1.4 kg per pig.
- Man-hours required for the cleaning of trucks remained unchanged.

The savings for the abattoir were nearly 12 L of potable water per pig. Based on a cost of US\$2 per KL, which includes the cost of water and charges for disposal of the wastewater, the annual savings are approximately US\$24,000. The extra costs for pressurising water and transporting the manure and bedding have not been included in this calculation.

4.6 Contacts

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