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Regional Activity Centre
for Cleaner Production



Ministry of the Environment
Spain



Government of Catalonia
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Pollution prevention case studies

Reduction on the whey generation

Company background

MISR. COMPANY FOR MILK AND FOOD is one of the largest public firms in the dairy sector in Egypt. It processes 8,250 tons of raw milk per year to produce 1,250 tons/year of soft cheese and 850 tons/year of hard cheese in addition to other dairy products.

Industrial sector Food industry. Production of dairy products.

Environmental considerations

The plant produces significant amounts of two types of whey with different characteristics:

- Permeated whey obtained from ultrafiltration for preparation of soft cheeses (1.5 tons of whey/ton of soft cheese).
- Sweet whey from the preparation of aged cheeses (5.0 tons of whey/ton of hard cheese produced). Whey incorporated into the wastewater considerably raises the degree of pollution. The firm dumps 183,000 m³/year into the municipal sewage system without pre-treatment with a BOD₅ of 2,300 ppm and a COD of 4,050 ppm.

Background

In addition to the environmental problems caused, the dumping of whey leads to not taking advantage of a source of carbohydrates, high-quality proteins and minerals.

In Egypt, sugar cane and sugar beet molasses have been used for many years as a liquid feed for ruminants. For this reason, the opportunity to use whey as a new high-quality liquid feed at low cost awoke interest in the livestock sector near the plant.

In order to demonstrate to the farmers the viability of this alternative, a pilot study was carried out with 30 sheep during eight weeks substituting the liquid (water) in the usual diet with various combinations of permeated whey, molasses and urea.

The results show that the relation kilo of liquid feed/kilo of weight gained by the live animal is more efficient when the whey is 100 per cent (7.51) compared to molasses at 100 per cent (9.16) or combination of molasses, whey and urea (9.66).

Summary of actions

Based on the results of the study, it was estimated that the real value of the whey was 18.49 Å/ton but it was sold to the farmers for only 0.26 Å/ton to make it more attractive.

A training programme for workers was carried out, which explained the control procedures and the handling of the whey, cleaning activities, maintenance records and measurements for monitoring the whey and the reaction of the animals.

A practical system for distributing the whey was established with an installation of pipes, pumps and tanks for collecting the whey up to the loading into lorries for distribution. The whey is off loaded at the farms directly at the places where the water for the cows is supplied.

The firm also acquired portable metres for measuring pH and thermometers in order to monitor continuously the whey at key points.

Balances

By eliminating or reducing waste whey in the plant, pollution of wastewater was significantly reduced: 415 tons fewer of BOD5, 522 tons fewer of COD, 58 tons fewer of suspended solids, 218 tons fewer of dissolved solids and 62 tons fewer of oils and fats. The volume of waste was also reduced by 5,970 m³/year.

The cost of treating wastewater has been reduced by about 25 per cent.

The costs associated with feeding with whey were primarily separation at the source and operation of the storage and distribution system from the plant to the farm.

The economic benefits come from reduction of the costs of treatment of wastewater and the sale of whey. For the farm, there are significant savings in the direct costs of feeding cattle and an increase in productivity.

Cash flow summary during the first year of feeding 412 cows with whey

CASH FLOW	PLANT €/year	FARM €/year
Transportation of whey and construction of storage	(13,164)	-
Probes and monitoring equipment	(1,122)	(1,122)
Distribution costs	(1,320)	-
Investment in treatment plant	26,407	-
Sale of 6,000 m ³ of whey at 0.26 €/ton	1,584	(1,584)
100% of savings in water consumption (40 kilos/head/day)	-	1,584
75 per cent of savings in hay and grain (2 kilos/head/day)	-	36,521
Net savings	13,385	35,399
Payback period (months)	<10	<1

(The amounts in parenthesis indicate an increase in cost)

Savings achieved during the first year result mainly from savings on the investment in treatment plant. During the second and third years, the net savings for the plant were 10,563 and 22,447 Å respectively, increasing the sales price of the whey to 1.98 and 3.96 Å/ton.

Conclusions

Thanks to this action, the firm MISR. COMPANY FOR MILK AND FOOD was able to reduce the degree of pollution of its wastewater and obtain significant savings, especially in relation to the investment in treatment of wastewater. In addition, this reduction made it possible for the firm to comply with Law 93 on dumping of industrial wastewater.

NOTE: This case study only seeks to illustrate a pollution prevention example and should not be taken as a general recommendation.



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