

NutriMeat Incorporated Luzon, Philippines

“NutriMeat Incorporated” is a fictitious name for the Philippine company on which this case study is based. The facility description and data have been modified in order to protect the identity of the company and to make the case study more suitable for classroom learning.

1. COMPANY AND FACILITY BACKGROUND

NutriMeat Incorporated is an integrated small animal meat supply operation, including breeding, raising, slaughtering, and feed milling operations. Its diverse customers include large processors, hotel, restaurants, institutions, leading supermarkets, neighborhood meat shops and public markets.

NutriMeat sells live small animals to other slaughterhouses. It also slaughters between 300 to 700 small animals a day, depending on demand. The meat is minimally processed into basic meat products that are sold directly to customers and other processors.

The small animals are supplied by the company’s own farms and by independent small animal raisers with which the company has entered into contract arrangements. Contracted truckers are hired to haul the live small animals to the slaughterhouse from the company’s farms and from contract growers, located in nearby provinces.

The facility employs 44 regular employees and about 50 contract workers depending on production requirements. It boasts state-of-the-art equipment, producing meats with standards at par with those of the European Union and the U.S. Department of Agriculture. The facility has received awards and commendations for cleanliness.

2. WASTE GENERATION & ENVIRONMENTAL MANAGEMENT AT NUTRIMEAT

- NutriMeat’s operations produce waste at several stages.
- Some small animals are found dead upon delivery to the facility by contract truckers; others are found dead in pens prior to slaughter.
- Manure accumulates in the delivery trucks and the pens used for housing animals prior to slaughter or live sale.
- The small animal slaughtering line results in large amounts of waste blood, entrails, hair, and hooves.
- Finished products occasionally are rejected due to defects or other reasons.
- The onsite incinerator that historically has been used to burn small animal carcasses and slaughtering waste produced black smoke and incinerator ash. The incinerator was not in compliance with environmental regulations.
- The facility uses great amounts of water for cleaning manure and other animal wastes from the production area, the trucks used to ship the small animals to the facility, and the pens used to house the small animals prior to slaughter or live sale. This contaminated water historically has been handled via an onsite wastewater treatment

plant, which was not consistently in compliance with environmental regulations, i.e., the final effluent water exiting wastewater treatment, which was emitted to a nearby canal, was not clean enough.

In order to resolve the environmental management issues described above, NutriMeat has carried considered and carried out a number of cleaner production and other activities. A summary list is given below, and two of the projects are described in more detail in the following sections.

- Monitor the small animals found “dead on arrival “ (DOA) in each truckload of pigs, and develop a system to reward/penalize drivers based on the number of DOAs, to encourage drivers to monitor truck transport conditions more carefully. This project was implemented and is described in more detail in the following sections.
- Give the DOAs to a local fish farm for use as fish food, in order to reduce the number of carcasses going to the onsite incinerator. This project was implemented and is described in further detail in the following sections.
- Work with farmers to reduce DOAs by ensuring that the pigs are in better condition before being loaded into the trucks for delivery to NutriMeat. This project was also implemented, but is not described in further detail.
- Refuse to accept DOAs from drivers. NutriMeat rejected this option, as the drivers would have to dispose of the DOAs, and would not be likely to do so in as sound a manner as NutriMeat.
- Replace the on-site incinerator with a new and better one, to reduce the generation of black smoke and come into compliance with environmental regulations. NutriMeat is upgrading its incinerator. However, as noted in this section, the company implemented many measures to reduce the amount of solid waste going to the incinerator, greatly reducing the cost of the upgrade.
- Sweep the delivery trucks and housing pens with brooms before washing them down with water. Pens and trucks that were formerly cleaned by water spraying are now swept first. This has reduced the water consumption from the pen and truck spraying activity by about 100 m³ per day. In addition, it has reduced the amount of wastewater generated.
- Install water meters around the production areas to increase workers’ awareness of water use. The company installed water consumption meters at various points in the facility in 1998 to track water use. Meters were installed in the production area, entrails cleaning area, crate washing area, pen area, etc. This project has raised the workers’ awareness regarding water use, and consequently led to reduced use of water. Process areas that consume a lot of water, like the entrails cleaning area, have also come to an agreement with the facility manager with regard to an acceptable level of water use.
- Divert rainwater from the roofs into canals leading to a stream instead of into the drains running to the wastewater treatment plant. Rainwater draining from the roof of

the facility used to go to the wastewater treatment plant, at times causing it to overflow. To prevent this, the company built canals to divert the rainwater directly into a nearby stream. The cost of building these diversion canals was more than offset by the savings in reduced wastewater treatment capacity needed.

- Install a new wastewater treatment plant to come into compliance with water pollution regulations. NutriMeat installed this plant as required. However, as noted in this section, the company implemented many measures to reduce the amount of wastewater flowing to the new treatment plant, greatly reducing its cost.

3. CLEANER PRODUCTION PROJECTS TO REDUCE DOA WASTE & COSTS

This section provides more detail on the company's efforts to minimize the number of small animals found dead on arrival (DOA). In 1998, 2224 small animals were dead on arrival (DOA).

DOAs present the facility with several costs. First, each dead animal results in the loss of the purchase value of the animal. Under current arrangements, NutriMeat pays for small animals as they are collected from the farmer for delivery to the facility. Thus, any losses in transport are direct losses to NutriMeat. In 1998, the value of the lost purchase value of DOA small animals totaled just under 9.5 million pesos, as illustrated below.

Lost Purchase Value Of DOAs in 1998	
Average small animal carcass weight	84.15 kg
Production cost per kg	P50
Average cost per small animal	P4,207
Shipping cost per small animal	P40
Value per delivered small animal	P4,247
Number of small animals DOA in 1998	2,224
Value of small animals DOA in 1998	P9,446,110

Second, DOAs are disposed of by onsite incineration, which is costly. For example, the cost of incinerator fuel alone was just under 0.9 million pesos in 1998, as show below.

Incinerator Fuel Costs Due to DOAs in 1998	
Average small animal carcass weight	84.15 kg
Cost of fuel to incinerate to incinerate 1 kg of carcass	P4.60
Fuel cost to incinerate one small animal	P387.09
Number of small animals DOA in 1998	2,224
Incinerator Fuel Cost for DOAs in 1998	P860,888

Finally, DOA small animals result in the loss of profits that would otherwise be earned from the sale of products. Thus, preventing DOAs is a high priority for the facility.

The facility has undertaken two related projects: one to reduce the number of DOAs delivered in the first place by improving trucking conditions; the other to reduce disposal costs for the DOAs that do occur by sending DOA carcasses to a catfish farm for use as fish feed. We discuss each project in turn. The simplified flow diagram at the end of this case study gives an overview of the flow of DOAs and other solid wastes into the incinerator and to the catfish farm.

3.1 Reducing DOAs Due to Trucking Stress

Most DOAs result from stress, trauma, and injuries to the animals during transport, as well as from health of the animal at loading. The truck driver has some control over the number of DOAs, i.e., care can be taken in loading, to avoid sudden starts and stops, to transport during cooler hours (e.g., at night), and to avoid overcrowding the truck.

NutriMeat decided to apply pressure on the truck drivers to reduce DOAs. In August 1998 the company began monitoring the number of DOAs per trucker on a daily basis and began posting the results on the company's bulletin board. Trucks at the top the DOA list are labeled "killer trucks". The facility managers hope that this project will compel the hauling truckers to drive carefully to protect the animals during transport.

3.1.1 Profitability Assessment of the DOA Reduction Project

This project has not been in place long enough to gauge the effect on the number of DOAs. In addition, any reduction trend due to this project was overwhelmed due to an epidemic that weakened and killed a number of small animals in the last quarter of 1998.

Note, however, that the value of a single delivered small animal is more than P4,200. The one-time cost of setting up this project was estimated as P458, for supplies such as markers for use on a surplus whiteboard. The ongoing operating costs are estimated as P464 per month for supplies and labor, or almost P5,600 per year.

Thus this project more than pays for itself if it prevents even two DOAs per year. This conservative estimate does not even include the savings that would result from avoiding incineration of those DOAs. Given the magnitude of the potential savings for reducing DOAs, the company intends to continue this project, as well as strengthen it, by awarding the truckers with the least number of DOAs with more hauling contracts. Those who consistently top the DOA list will be suspended.

3.2 Reducing DOA Disposal Costs

Once an animal has died, it must be disposed of quickly. Historically, NutriMeat has disposed of DOAs in an incinerator operated on the site. This incinerator recently required replacing. In part to minimize the loading on the incinerator - and thereby reduce the capacity necessary for the new incinerator - facility management looked for opportunities to reduce the amount of material entering the incinerator. The most significant project for reducing incinerator load was to work with a local hito (catfish) farm to use DOAs as feed for their operations.

The hito farm collects the DOA carcasses directly from NutriMeat for no charge. In the period between the program start in April, 1998 and the end of the year, over 128,000 kilograms of small animal carcasses were sent to the hito farm rather than to the incinerator. In the period May to December, 92 percent of all DOA carcasses were sent to the hito farm. This project resulted in significant savings to NutriMeat Incorporated, as discussed below.

3.2.1 Profitability Assessment of the Hito Farm Project

The only annual operating costs associated with implementation of this project are additional administrative costs associated with the hito farm. Officials at NutriMeat felt that these costs, as well as any one-time costs to initiate the program were negligible and not worth quantifying.

However, this project resulted in significant annual savings for the facility, in the area of reduced incinerator fuel requirements, reduced incinerator labor requirements, and reduced cost for replacing the incinerator with a new one to achieve regulatory compliance.

Reduced Capital Cost for a New Incinerator

In the absence of this diversion of the DOA carcasses to the hito farm, officials at NutriMeat Incorporated estimated the cost for a new incinerator would be P1,500,000. However, the diversion of DOAs to the hito farm significantly reduced the size requirement of the new incinerator and thus reduced the cost of the incinerator upgrade to P380,000 - a savings of P1,120,000.

Reduced Incinerator Fuel

By avoiding the incineration of over 128,000 kg of small animal carcasses, NutriMeat, Inc. saved almost 600,000 pesos in 1998, as shown below. If we extrapolate for a full year the May to December rate of 92 percent of carcasses diverted to the hito farm, the annualized savings would be almost P800,000.

**Incinerator Fuel Costs
Due to DOAs in 1998**

Average small animal carcass weight	84.15 kg
Cost of fuel to incinerate 1 kg of carcass	<u>P4.60</u>
Fuel cost to incinerate one small animal	P387.09
Number of small animals diverted to hito farm in 1998	1,528
Incinerator Fuel Savings in 1998	P591,688
Estimated Annualized Savings	P794,255

In addition to DOAs, the hito project has also eliminated the incineration of other 17,412 kilograms of discarded small animal waste, such as animals rejected in butchering or product returned by customers. The resulted in an additional fuel savings of P80,050.

Other Reduced Costs

In addition to the savings described above, the hito project reduced labor requirements for the incinerator from two employees to one employee, a savings of P190 per day, or P54,720 per year. The reduced incineration also reduces the generation of ash from the incinerator, although

there are currently no cost savings associated with these reductions, as incinerator ash is stored on site.

