

# Wastewater Reduction Options for Poultry Processing Plants

*Fact Sheet, Minnesota Technical Assistance Program, University of Minnesota*

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## Reducing BOD, TSS and Water Use

The poultry industry is a large contributor to Minnesota's agricultural economy with sales accounting for about seven percent of Minnesota's farm output. Poultry processing plants contribute large biological oxygen demand (BOD) loads, as well as total suspended solids (TSS) and phosphorus to wastewater.

Most of the wastewater loading in the poultry industry comes from the slaughtering process when the birds are bled, scalded with hot water, rinsed up to three times, gutted, and chilled with water. The need to both maintain high production and meet 1997 zero fecal contamination requirements set by the U.S. Department of Agriculture (USDA) makes using high volumes of water essential.

## Wastewater Reduction Tips

Below are useful tips to keep poultry processing by-products from entering and contaminating the wastewater.

**Measure for Success.** Measure water flow throughout your facility. Flow meters can quickly indicate water overuse. This tool measures wastewater volumes to help you plan your pollution prevention tactics. Some meters on the market use circular chart recorders to measure water use in gallons per minute (gpm) over a 24-hour period. Fluctuations may indicate leaks, wasteful water use or inefficient equipment.

Install meters in high water use areas such as the chiller, scalding, wash cabinets, evaporators and condensers. Monitor overflow areas like the chiller and scalding. The USDA requires a water overflow of one gallon per bird for the chiller and 2 gallons per bird for the scalding. Regulate meters to avoid unnecessary overfilling. Because both the scalding and the chiller are large water users, monitoring the flow rate to avoid inefficient water use is important. **Fix Leaks.** Prevent water loss by finding and repairing all leaks in the facility. Make a checklist of all potential sources of leaks and conduct weekly inspections of equipment such as valves, tanks, hoses and nozzles.

**Break and Shut-Off Time.** Another source of water waste comes from leaving water running during breaks and shutdown times. Develop a water shut down checklist for all areas of the facility. This can help reduce water loss during breaks and shut down periods. Simple steps can be taken to reduce water loss during nonoperating times. Post signs that remind workers to shut off water throughout the facility before plant shut-down time. Hang a reminder sign after the last bird is placed on the production line before break.

Measure water flow rates during nonoperating periods to make sure water has been properly turned off and to discover leaks.

**Nozzles and Spouts.** Installing adjustable pressure/low-volume water nozzles can reduce the amount of water loading in your facility. Equipment such as handwashing spouts in the evisceration room and cleanup hoses can use these nozzles.

The USDA requires that all employees on the evisceration line wash their hands after handling each bird to prevent cross-contamination. Many handwashing spouts run constantly to accommodate both USDA requirements and the rapid pace of the production line. Using lower-volume water spouts can reduce water waste. Also, consider installing foot pedals on the handwashing units. These save water by having the water on only when needed. Install water saving devices such as water regulating valves or narrow pipe fittings in

the handwashing unit pipes to reduce water flow.

**Water Reuse.** Consider reusing some of the water in your facility for melting ice and cleaning. Scalding water can be filtered and reused to melt ice left over from the chillers. This practice eliminates the need for fresh water for melting ice. The same process can be used for reusing water from the evisceration process for some first stage cleanings.

**Keep Organic Materials Out of the Wastewater.** Poultry by-products can be cleaned-up or moved-out without using water. Keeping by-products out of the water stream can reduce BOD and TSS loading in the wastewater.

Consider replacing water troughs with conveyors for moving organs from the evisceration line to the next process area. The USDA has no requirements on the amount of water used to clean the hearts, livers or gizzards.

Collect blood and liquids from the birds using troughs and curbs to direct their flow. Solid by-products, blood and other fluids can also be collected in holding tanks using a vacuum hopper system which does not require the use of water. These by-products can be shipped to rendering plants and converted to animal feed.

Use dry cleanup methods before using water. This can reduce the BOD and TSS loading to the effluent water stream. Some of the most effective dry cleanup methods include scraping fat and grease off conveyor belts; installing strainers along the evisceration line and other areas to keep poultry by-products off the floor; and sweeping, squeegeeing or shoveling materials off the floor before wet cleanup.

**Table Toppers.** Keep your employees informed of the plant's energy and water costs. One option is to post a comparison of the current month's water and sewer bills with that of last year's utility bill for the same month on the tables in the break area or a central location in the facility. Consider mapping out the trends using charts and graphs that show the cost comparisons.

**Non-Phosphorus Cleaners.** Move to low/no phosphorus chemicals for clean-in-place (CIP) systems and other cleaning operations.

## **Jennie-O Foods, Inc.**

*Three Facilities*

*MnTAP Intern Project*

Owned by Hormel Foods and based in Willmar, MN, Jennie-O Foods is the world's largest turkey producer. The company ships food products throughout the United States, as well as 14 foreign countries.

Jennie-O wanted to reduce water use and BOD, TSS and phosphorus loading into the wastewater for two of its plants in Minnesota. MnTAP funded a student intern at Jennie-O Foods to reduce water use and wastewater loading at the Jennie-O Foods plant in Melrose and the Heartland Foods plant in Marshall.

The intern began by documenting the improvements made earlier at West Central Turkeys, Inc., a Jennie-O facility located in Pelican Rapids.

## **West Central Turkeys**

*Model for Success*

*Success Story*

West Central Turkeys, Inc. is a slaughter and processing plant. West Central produces processed turkey products such as turkey bacon and turkey roasts. It employs about 720 people. West Central has implemented

many effective pollution prevention tactics that served as models for other facilities.

West Central developed a utility task force to help the plant reduce its use of energy and water. One goal was to involve all employees in lowering the utility costs. Employees in each department were assigned to help reduce monthly energy use. To reduce water use and effluent water loading, the task force started meeting weekly to review the volumes and cost of wastewater loading. They looked for inefficient water use and leaks, and installed meters to track water use. By monitoring cleanup water use alone, West Central was able to reduce its water use by 23,000 gallons a day.

The West Central staff started using water volume reduction tools such as narrower pipe fittings, low-volume spray nozzles, and foot pedals on hand washers in the evisceration line. They also started reusing water from evisceration for first stage washings of the turkey transfer trucks. This helped reduce the need for fresh water.

The most effective waste load reduction practice was keeping by-products out of the water stream. Employees started using dry cleanup methods to remove by-products before wet cleanup. Keeping by-products off the floor greatly reduced BOD and TSS loading into the effluent water stream.

## **Melrose Jennie-O Foods**

### *Reducing Wastewater Loading*

#### *Success Story*

The Melrose Jennie-O Foods plant is the largest turkey slaughtering plant in Minnesota. The facility is a whole bird packing plant that employs about 900 people and bags turkeys under 200 different name brands.

In addition to reducing its water use, the Melrose plant wanted to decrease the amount of water discharge. The MnTAP intern started addressing water loss by documenting leaks throughout the facility. He estimated that the plant wasted 876,500 gallons of water per year, costing approximately \$2,638 annually. By eliminating leaks, the Melrose plant reduced wasted water and improved the efficiency of the water-using equipment. To make sure that all leaks were continuously addressed, the intern made a weekly checklist for leaks throughout the plant.

The Melrose facility also started using adjustable pressure/lower-volume hose nozzles on the evisceration line and for cleanup hoses. This flow reduction strategy has an estimated savings of more than \$25,000 and more than eight million gallons a year. As another means of saving water, the plant also installed aerated nozzles, which mix air with the water, on all handwashing spouts on the evisceration line. The intern estimated savings of more than \$10,000 and more than three million gallons of water per year.

The intern looked at water use during company break times and estimated that the Melrose facility could save more than eight million gallons of water a year by turning off the water. Employees posted signs in the high water use areas reminding workers to shut off the water before breaks and shutdown time.

Melrose also decreased the rate of the water going into the prechiller. The intern noted that the plant exceeded the USDA required one gallon overflow per bird by 0.63 gallons. He brought down the average overflow to 1.2 gallons per bird. This reduction has a projected annual savings of more than seven million gallons of water.

The plant's salvage station was one source of water waste. This water station continuously pumped chlorine into the water stream to rinse and disinfect partially damaged birds that are cut up and salvaged. Water runs constantly to maintain a dilute amount of chlorine in the water. The intern incorporated an idea from Heartland Foods Company which involved installing a flow switch and surge pump to regulate the amount of chlorine in the water flow. With this system in place at Melrose, the chlorine pump runs only when the water at the product salvage station is running, reducing the amount of water and chlorine waste. Melrose estimates

a yearly savings of more than one million gallons of water from this change.

**Results.** By implementing the intern's suggestions, the Melrose plant estimates a savings of about 31 million gallons of water with an annual savings of \$93,700.

## **Heartland Foods Company, Inc.**

### *Reducing Water Use*

#### *Success Story*

Heartland Foods Company slaughters, de-bones, and packages turkeys. Its main product is the whole bird. The plant employs approximately 500 people. Like Melrose, Heartland Foods' main product is whole birds. A large volume of water is needed for daily production.

Heartland was interested in reducing its water use to help bring down utility costs and reduce the load on its pretreatment water system. The MnTAP intern also made suggestions that led to significant changes in this facility.

Heartland expanded on the intern's ideas and installed five water flow meters along with a computer system to measure and track water flow. This helped them identify areas where they can reduce water use.

They installed a tank to recycle water for melting ice or cleaning. The tank is used to collect relatively clean water for reuse. Heartland estimates that it will quickly recoup the cost to install the tank by lowering water and sewer costs. The plant would also benefit from reducing its flow into Heartland's water pretreatment system.

The intern also borrowed an idea from West Central and Melrose to post reminders to shut off the water throughout the facility. This simple solution also helped reduce their water waste.

**Results.** With these changes, Heartland Foods reduced its water use from about nine gallons per bird to about six gallons per bird. They also estimate savings of more than 14 million gallons and \$43,000 annually.

### **More Information**

MnTAP has a variety of technical assistance services available to help Minnesota companies reduce and manage their industrial waste. If you would like MnTAP assistance call 612/624-1300 or 800/247-0015 from greater Minnesota.

*The intern project was conducted in 1999 by MnTAP intern Nick Zewers, a chemical engineering sophomore at the University of Minnesota.*

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