

# TYSON FOODS INC. HILLSHIRE BRANDS



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## COMPANY PROFILE

Originally established in 1935, Tyson Foods Inc. is a multi-national protein-focused food company that employs 122,000 employees in more than 300 facilities worldwide. Within Tyson's Prepared Foods division is Tyson Hillshire Brands, a turkey processing facility located in Storm Lake, Iowa. The Storm Lake operations include processing of live turkeys and fabrication of carcasses into bulk quantities of white and dark meat cuts, along with pre-blended sausage mixtures. The facility operates two eight-hour production shifts and one sanitation shift five days a week. More than 700 team members work at the Storm Lake facility with the resources to process 36,000 turkeys daily.

## PROJECT BACKGROUND

At Tyson Storm Lake, water is used in nearly every stage of poultry processing for scalding, defeathering, carcass washing, carcass chilling, offal removal, product movement, and sanitation. The focus of this project was to explore water reuse opportunities from process and wastewater pretreatment areas of the plant, and evaluate pollution prevention methodologies that will reduce overall water consumption. Traditional water conservation practices, including spray nozzle size reductions in the evisceration department, were also investigated.

## INCENTIVES TO CHANGE

Tyson Foods Inc. strives to follow sustainable practices to align with their commitment to "Reduce our environmental impact as we feed the world." In reflection of this commitment, Tyson has set a corporate goal to reduce their water use intensity 12 percent by 2020 compared to 2015 baselines. To assist in meeting this corporate goal, the Storm Lake location has set a facility goal to reduce annual water consumption 4 percent during fiscal year 2019. Reducing water consumption decreases chemical use and wastewater processing required and saves on the energy required for heating, cooling, and pumping water.

## RESULTS

**Evisceration Wash Cabinet Reuse System:** During evisceration, various wash cabinets are used to rinse turkey carcasses. Currently, all these washes utilize potable water, though water conditioned to this level is not required. An industrial water reuse system for this process area would greatly reduce overall water consumption. Such a system would collect process water from the largest wash cabinet at the end of the evisceration process, recondition the water with a series of filters and antimicrobial chemistry, and then supply

the reconditioned water to three upstream wash processes. An analysis of the potential economic and environmental savings associated with three vendor proposals submitted to Tyson to complete this project has been conducted. Additionally, water sampling out of the large wash cabinet has been completed to determine baseline water quality. To implement, a specific proposal must be selected and funding will need to be approved.



**Evisceration Spraying System Modifications:** Using an ultrasonic transit time flow meter, the intern quantified water flow rates at different pieces of equipment to identify opportunities in the evisceration process to reduce water usage. Alternative spraying systems for three wash processes were investigated to reduce overall water consumption and maintain an effective level of cleaning. New nozzles purchased for one wash cabinet alone will reduce overall capacity by 12 gallons per minute while maintaining the same spray coverage, resulting in an annual reduction of nearly 3 million gallons of water. Since the water at this wash is heated, it will also reduce natural gas usage by 6,180 therms. In the two other washes the use of new low-flow showerheads and a restrictor orifice plate will save an additional 259,000 gallons annually. Nozzles and showerheads have been purchased but must undergo testing with the Food Safety and Quality Assurance (FSQA) department prior to implementation.

**Wastewater Effluent Truck Wash System:** In the live receiving and offal departments, water is used to wash trucks after birds are unloaded, for general sanitation purposes, and in three rotary screens used to prevent large solids from entering the wastewater system. Pretreated effluent from the facility's wastewater pretreatment plant could be used in the truck wash system in place of fresh potable water. To be used for the truck wash system, effluent must be heated to 140°F at 500 psi. Reuse of pretreated wastewater effluent could reduce overall water consumption but would require additional natural gas for heating.

A multi-boiler and heat exchanger system to heat and pressurize the effluent was quoted but is not currently feasible. Additional calculations determined that with the addition of a 5,000-gallon hot water storage tank, the facility's current boiler system could accommodate the heating load required. The wastewater effluent was also tested to determine additional filtration and chemical treatment needs. To advance this project, further analysis of equipment and water treatment needs and costs should be completed.



**Chiller Water Reuse:** At the Storm Lake facility, four large immersion chillers containing water mixed with an antimicrobial agent are used to decrease the temperature of poultry products after the evisceration process. Chilling is an essential step in primary processing because it extends the shelf life of fresh meat and poultry by preventing or slowing down microbial growth. The smallest of these chillers has a volume of 33,060 gallons and is refilled daily, whereas the other three are filled only once a week. It is recommended that the smallest chiller's water also be held for a week at a time, which will greatly reduce fresh water usage. A thorough microbiological analysis of the chiller water will be required prior to implementation to confirm safe holding limits for the chiller water.

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
Evisceration Wash Cabinet Reuse System	\$228,379	25,920,000 gallons 21,392 therms	Recommended
Evisceration Spraying System Modifications	\$30,194	3,223,200 gallons 6,180 therms	In Progress
Wastewater Effluent Truck Wash System	\$48,556	17,940,000 gallons	Further Analysis Needed
Chiller Water Reuse	\$55,475	6,612,000 gallons	Recommended

