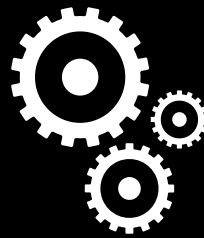


TYSON FRESH MEATS, INC.



FAYE ASSMANN
CHEMICAL ENGINEERING
IOWA STATE UNIVERSITY



COMPANY PROFILE

Tyson Foods was founded in 1935 and has grown into a multi-national corporation with \$37 billion in net sales in 2016. There are 12 beef and pork harvest plants and the Tyson plant in Storm Lake, Iowa, is one of nine pork processing facilities and employs 1,850 people.

PROJECT BACKGROUND

Pork processing requires significant amounts of water for production, sanitation, and maintenance of the plant. After it is used in the plant, water is sent to Tyson's wastewater facility where it is treated before being released back into the environment. The goal of the intern's project at the Storm Lake plant was to reduce the overall water usage by 1 percent from the previous fiscal year's usage. The intern conducted an economic and environmental analysis of water use at the plant and made recommendations to conserve water and reduce operating costs.

INCENTIVES TO CHANGE

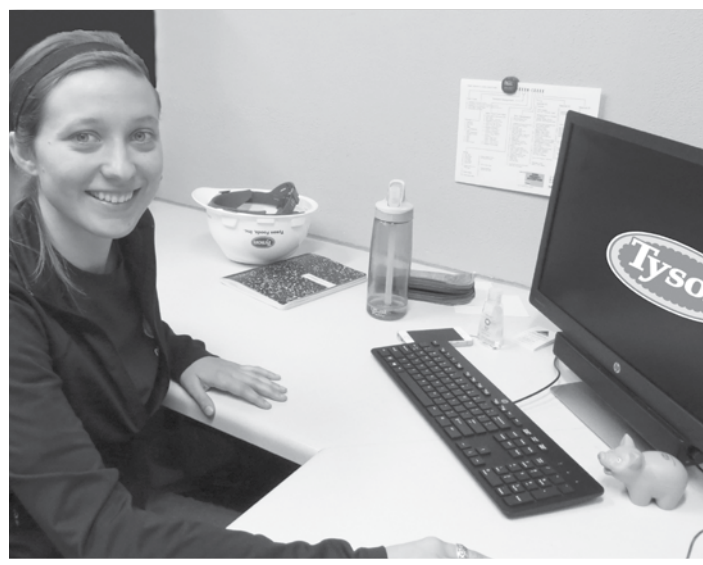
One of Tyson's core values is, "to serve as stewards of the animals, land, and environment entrusted to them." Since 2006, Tyson has published an annual sustainability report with one of its focuses on improvement in water usage. Without compromising the wholesomeness and safety of their food products, the company has set a goal to reduce the water used to make each pound of product by 12 percent by the end of 2020. To contribute to the company-wide goal, Storm Lake partnered with the 2017 Pollution Prevention Intern Program.

RESULTS

Knee-Activated Water System: Current production of the chitterlings, or pork intestines, involves a large amount of water used while they are disentangled and washed before getting prepped for packaging. The employees who unravel the product use 140°F water from hoses that run continuously during production to rinse their gloved hands after handling each one. On average, the employees rinse their hands two times a minute. By installing a knee-activated water system for this step, water can conveniently be turned on and

off and would only be running when the employees needed to rinse off their gloves. With this system in place, the water demand for the chitterlings hoses could be reduced by more than 18 million gallons of water and 152,000 therms annually.

Sanitation Shift Water Reduction: During the night shift, the sanitation crew comes to the plant and works to remove the meat and scraps from the production floors that accumulate during the day and sanitize the equipment before production begins again. The sanitation shift utilizes 140°F water from hoses for the first step to knock meat/scraps off belts, equipment, and machines to the floor. After using a cleaning detergent on all the equipment, the workers use hoses again to rinse off the soap. The nozzles on the hoses are



continuously flowing and currently don't provide a way to easily turn the water supply on and off. Periodically throughout the night, employees experience downtime to readjust their hoses or ladders or go on break. Installing ball valves next to the nozzles so water can be momentarily turned off and on during these downtimes could reduce water usage during night shift by approximately 2 percent, or 1,658,560 gallons, and save more than 13,000 therms annually.

Water and Chemical Reduction During Breaks: During production, water flows continuously to numerous pieces of equipment to keep machine blades cool, clear blades of particle dust, and to rinse gloved hands and finished product before packaging. Depending on the task, the sprayers will also perform an antimicrobial spray in addition to water spray. The water and chemicals for this process flow continuously during production hours, including employee breaks that represent 135 minutes each day. Next to each piece of equipment is a ball valve and lever that allows for simple manual water supply control. Turning off this water supply during breaks could cut back on 21 gallons of antimicrobial chemical and reduce water usage by more than 2.7 million gallons of water annually.

Reduce Sink Water Use: On the harvest floor, the ambient temperature of the room can get very hot due to numerous pieces of heat-emitting equipment. The water pipes that feed the floor's hand washing sinks and water fountain faucets are indirectly heated and the water comes out warm. To combat the warm water, faucets are left running continuously so that cooler water can flow instantly. The drinking water is only used intermittently during a production shift. Additionally, the intern's analysis revealed the time delay to get cooler water from the faucets was usually less than five seconds. Turning on the water only as needed could save a significant amount of water and associated costs.

Water Conservation Training: Ongoing training is recommended for all Tyson employees to educate and encourage water-conserving behavior. Including specific information about water usage and conservation opportunities would help employees understand the impact and value of their efforts. Also, establishing a system for employees to report leaks or broken equipment on the production floor would enable these situations to be addressed quickly and reduce inefficient water use and potential downtime. Finally, recognizing behaviors that reduce water use could help engage employees in meeting the plant's water reduction goals.



PROJECT	ANNUAL COST SAVINGS	ANNUAL ENVIRONMENTAL RESULTS	STATUS
KNEE-ACTIVATED WATER SYSTEM	\$155,095	18,233,940 gallons 152,103 therms	RECOMMENDED
SANITATION SHIFT WATER REDUCTION	\$14,107	1,658,560 gallons 13,835 therms	RECOMMENDED
WATER AND CHEMICAL REDUCTION DURING BREAKS	\$16,980	2,786,626 gallons 21 gallons of chemical	RECOMMENDED
REDUCE SINK WATER USE	\$6,651	1,108,462 gallons	RECOMMENDED

