

SMITHFIELD FOODS, INC. - DENISON



MICHAEL LAKE
Major: Chemical Engineering
Minor: Chemistry
The University of Iowa



COMPANY PROFILE

Smithfield Foods, Inc. is a global food company and considered the world's largest pork processor and hog producer. Smithfield Foods originated as Smithfield Packing Company in 1936 in Smithfield, Virginia, where the corporate headquarters are still located today. Smithfield employs more than 54,000 people companywide and generates \$15 billion in sales. The Smithfield Foods location in Denison, Iowa, employs more than 1,600 people and produces three main products - ready-to-eat hams, ready-to-cook bacon, and fresh pork.

PROJECT BACKGROUND

The purpose of this project was to assess water usage on Smithfield's harvest floor. Pork processing is a very water intensive industry. Approximately two-thirds of all water used at the Denison facility is used on the harvest floor. The goal of this project was to find ways to reduce or reuse process water in this heavy-use area. Of particular focus for this project were the dehair and evisceration processes. Both areas are among the biggest water users on the harvest floor.

INCENTIVES TO CHANGE

The Denison facility has two water reduction goals. The first goal is a facility-level target to reduce water usage by 2 percent in 2019. Meeting this target will help position the facility to meet a corporate goal of reducing normalized water usage at all Smithfield facilities 10 percent by 2020 from a 2014 baseline. Normalized water usage is defined at Smithfield as gallons of water used per 100 pounds of product. The 2019 intern's work is considered a key contributor to the facility's efforts in meeting these sustainability goals.

RESULTS

Dehair Makeup Water Recycle: The dehair machine uses more water than any other piece of equipment on the harvest floor. Most of the water used for the dehair process is retained and recycled via makeup tanks back to the dehair machine throughout the production day. However, some of the water is lost due to the vigorous vibrations the machine experiences during operation. This lost water flows into a trough before going through a rotary screen and is then sent to wastewater. Recapturing and reusing this lost water back within the dehair machine would create a closed water loop for the system and present numerous benefits.

Closing this water loop would reduce water use by eliminating the need to introduce fresh makeup water to the dehair system. Because the dehair water is heated, reusing the existing water would also reduce the amount of energy needed to keep the water supply at the target temperature. Additionally, the rotary screen would no longer be needed for this process and could be eliminated.

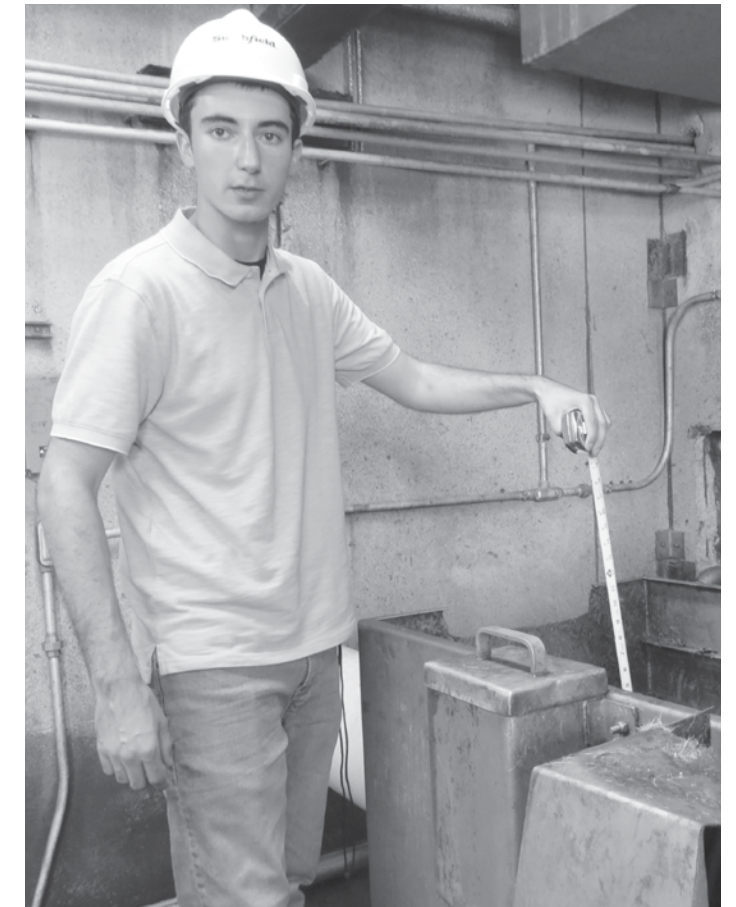
To achieve this recommendation, a sump pump would need to be installed in the initial collection trough to pump the lost dehair water back into the makeup tanks. Plans have been made to set up this water recycle loop. After implementation, testing will be done to ensure the optimum makeup water level in the tank is maintained.



Tray Wash Water Reduction: The tray line is another large water user on the harvest floor. The tray line operates as a conveyor system used to transport eviscerated organs to other production areas. The trays must be washed and sanitized after each pass on the conveyor system so that new evisceration material can be placed on a clean surface and eliminate any risk of cross contamination. The conveyor also uses water to lubricate the rollers and keep the conveyor running properly.

Tests were performed varying the amount of wash water used to clean the trays. Using an ultrasonic flow meter to measure the various flow rates, it was found that the flow of water could be reduced while still maintaining stringent sanitation standards. Once the optimal amount of water flow was determined, an in-line flow meter was installed on the water feed to the wash station. This flow meter has a built in control that will restrict water flow to the specified flow rate and reduce excess water use in this area. The only remaining component of implementation is writing a standard operating procedure and training on-site personnel on the operation of the flow meter.

Shaving Line Water Reuse: The shaving line utilizes water to lubricate the surface of the hog before employees manually shave off any hair remaining after the hog has gone through the mechanical dehair processes. Fresh water was being supplied to the spray bar utilized on this line. The outlet for cooling water used in the nearby singers is located in close proximity to the water source for the shaving. The singer cooling water is non-contact water that represents a great reuse opportunity. Piping has been added to use the singer cooling water to supply the shaving line spray bar. The original valve feeding this process was kept in place and it simply turns on water from a different source to supply water to the spray bar. The costs to implement this project were minimal due to the proximity of the singer water outlet to the shaving line and no changes were needed to employee procedures at the shaving line.



PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
Dehair Makeup Water Recycle	\$32,710	4,161,600 gallons	Recommended
Tray Wash Water Reduction	\$39,252	4,993,920 gallons	Implemented
Shaving Line Water Reuse	\$4,252	541,008 gallons	Implemented