PROCESSING TIP . . .

DETERMINATION OF YIELD LOSS BY WASTEWATER ANALYSIS

Analysis of wastewater can determine the amount of product lost from either processing, further processing, or cooking plants. To determine yield loss, two types of data must be collected.

- The volume of water discharged over a 24 hour period
- The concentration of organics in that volume of wastewater.

When these types of data are collected the “pounds” formula can be used to calculate the weight of chicken discharged in the wastewater.

\[
\text{Gallons of water discharged} \times 8.34^* \times \frac{\text{concentration of organics in milligrams per liter (mg/L)}}{1,000,000} = \text{pounds of dry weight organics}
\]

*one gallon of water weighs 8.34 pounds

Example problem:

\[
\frac{2,000,000 \text{ gallon per day}}{1,000,000} \times 8.34 \times 2,000 \text{ mg/L} = 33,360 \text{ pounds of BOD}
\]

Biochemical Oxygen Demand (BOD) measures the amount of oxygen required by microbes to digest organic matter to a stable form.

Approximately 1 pound of oxygen (BOD) is required for microbes to digest 1 pound of dry
weight organic matter, therefore using the above example, 33,360 pounds of dry weight chicken was discharged in the wastewater each day. A chicken is about 70% percent water and only 30% organic matter, therefore, approximately 110,000 pounds of live weight is being discharged in the wastewater each day.

\[
\frac{33,360 \text{ lbs dry weight organic matter}}{0.3} = 110,000 \text{ lbs. live weight}
\]

Using this scenario, a plant processing 250,000 birds with an average live weight of 5.5 pounds (1,375,000 pounds) is putting 8 percent of live weight into the wastewater each day.

\[
\frac{110,000 \text{ live weight in wastewater}}{1,375,000 \text{ pounds live weight processed}} = 8.0\%
\]

To discharge into a municipal sewer at 250 mg/L (BOD), approximately 100,000 pounds of this live weight must be removed from the wastewater by converting it into DAF skimmings. DAF skimmings are generally considered a loss product to processors. Improved screening and perhaps air assisted DAF without chemicals can recover some of the product in the primary form that can be mixed with offal. Improved recovery processes that could recover one half of the wastewater organic load would increase profits by about $1,000 per day (50,000 pounds x 2 cents per pound).

William C. Merka
Extension Poultry Scientist

County Extension Coordinator/Agent