PROCESSING TIP . . .

MEASURING WASTEWATER TO DETERMINE PLANT EFFICIENCY

Especially in further processing plants, analyzing the wastewater can be an effective tool to determine the efficiency of the operation. Further processed products are made from chicken meat, oil, flour, salt, polyphosphates and spices. By monitoring the amount of these products that wind up in the wastewater, a further processor can determine lost yield. For example:

- One pound of Biochemical Oxygen Demand (BOD) comes from 1 pound of dry weight organic matter.
- One pound of total kjeldahl nitrogen (TKN) comes from 31 pounds of raw chicken meat.
- One pound of TKN comes from about 50 pounds of 12 percent protein breading/batter flour.

By measuring the BOD and TKN in the wastewater and determining the volume of flow, an approximation of product lost to the wastewater stream can be calculated using the following pounds equation:

\[
\text{Volume of water in gallons} \times \frac{8.34 \times \text{pounds in milligrams BOD per liter (mg/L)}}{1,000,000}
\]

Example Problems:

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\frac{100,000 \text{ gal wastewater} \times 8.34 \times 4,000 \text{ mg/L BOD}}{1,000,000} = 3336 \text{ pounds dry weight organic matter.}
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\frac{100,000 \text{ gal wastewater} \times 8.34 \times 200 \text{ mg/L}}{1,000,000} = 167 \text{ pounds nitrogen; or TKN}
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= 5170 \text{ pounds meat; or}
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\[
= 8350 \text{ pounds breading flour; or some combination of meat and flour.}
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If your plant is using Dissolved Air Flotation technology to reduce the strength of the wastewater, the weight of the skimmings produced each day can be determined. By multiplying the weight of DAF skimmings by percent solids of the DAF skimmings, the amount of dry weight solids lost to the wastewater can be calculated.

Example problem:

A further processor produces 5,000 gallons of DAF skimmings per day that weigh 8 pounds per gallon and contain 20 percent solids.

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\text{5,000 gal x 8 lbs/gal@ 20 percent solids = 8,000 lbs x $2-4/lb = $16,000 - 32,000 lost}
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Wastewater is generally considered an environmental problem, however, wastewater analysis can be used to determine process efficiency, i.e. yield.

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