The University of Georgia
Cooperative Extension Service
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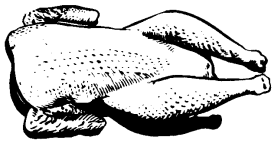
PROCESSING TIP . . .



ENVIRONMENTAL IMPACT OF WATER-FLUME TRANSPORT OF POULTRY PROCESSING BY-PRODUCTS

Water serves many important and essential functions in the processing of poultry into safe and wholesome food products for human consumption. Water is used in the cleaning and sanitation of birds, humans and equipment in a poultry processing plant; as a medium for heat transfer to assist in the cooling of carcasses and in facility HVAC systems; and serves a role as an ingredient in finished products.

In addition, water also serves as the traditional transport medium for moving poultry processing by-products from the production floor to offal recovery areas in the processing plant. Whether it is the tons of feathers generated from automatic picking machines or the hundreds of thousands of visceral packs removed from carcasses during the evisceration process, the vast majority of processing plants rely on water-filled flumes to transport these by-products through the plant each day. In offal recovery areas the by-products are recovered using screens for transport to rendering, while the water (now wastewater) is treated to remove pollutants prior to discharge.

It is logical to assume that the transport of these by-products in clean water produces wastewater that must now undergo treatment and that the longer the by-products are in water the "dirtier" the resulting wastewater stream will be. However, just how significantly by-products impact the poultry processing wastewater stream based on time of contact has not been established, until now. Extension poultry scientists at the University of Georgia conducted an experiment to establish the influence that visceral pack contact time with the wastewater stream has on effluent quality.

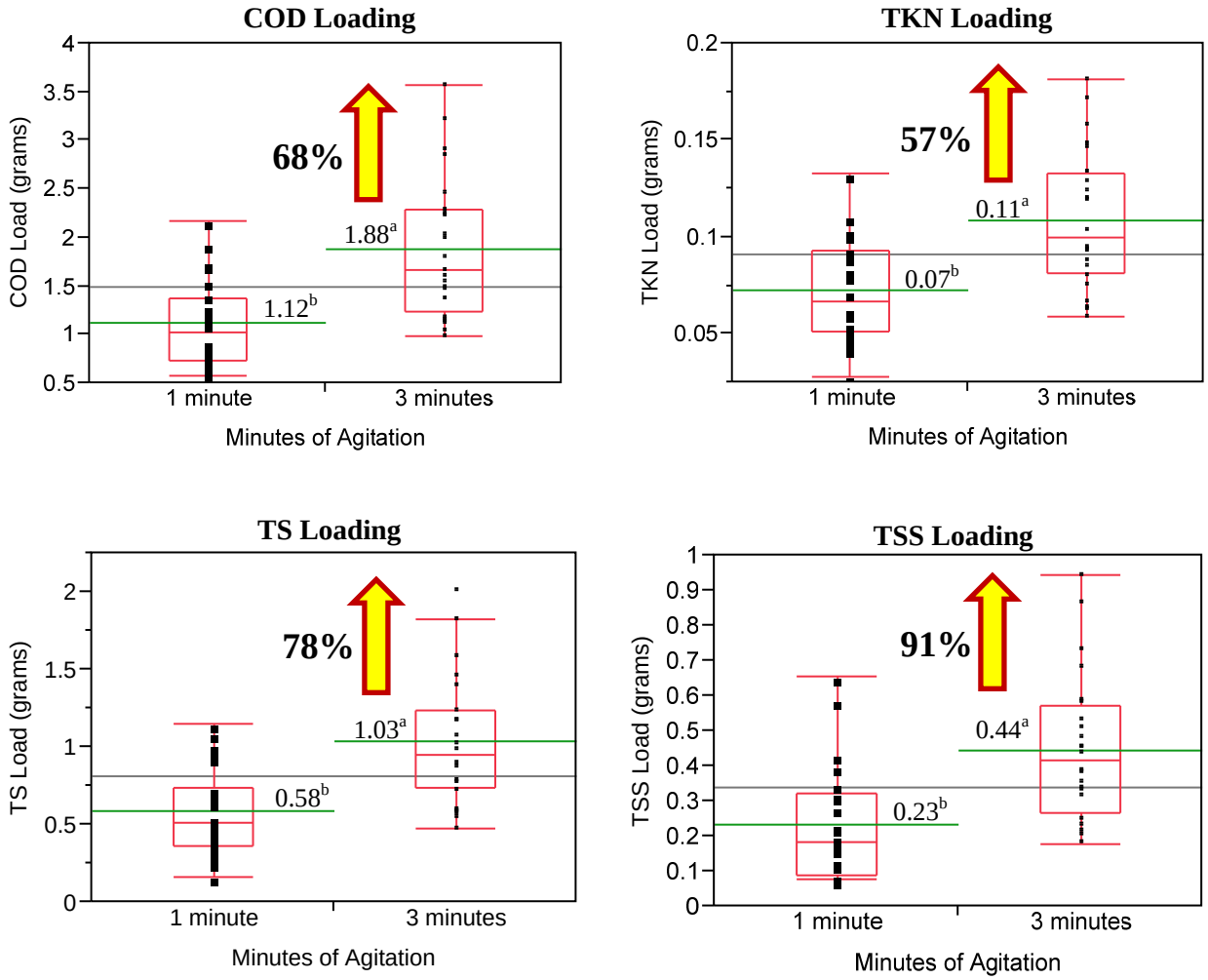
By-Product Experiment

Twenty-four, 8-week old male broilers with an average live weight of 9.0 lbs (4.1 kg) were electrically stunned and exsanguinated at the UGA Poultry Research Farm. Once bled out, each carcass was manually scalded, defeathered and eviscerated. Each visceral pack was weighed (average weight = 0.7 lbs or 0.3 kg, representing ~8% of live weight) and placed in a plastic bag containing 4 L of clean water. Each bag was manually agitated for 1 minute and 2 L of wastewater were then screened from each bag and retained for analysis. Each bag was then manually agitated for 2 additional minutes (3 minutes total) and the remaining 2 L of wastewater were screened and retained for analysis.

All wastewater samples were analyzed for concentration (mg/L) of chemical oxygen demand (COD), total solids (TS), total suspended solids (TSS), and total Kjeldahl nitrogen (TKN). Resulting concentration data (mg/L) were converted to mass loading (grams/carcass) for comparison of wastewater impact at 1 minute (in 4 L of rinse water) versus 3 minutes of agitation (in 2 L of rinse water and initial 1 minute load subtracted from the 3 minute total load).

Results

The 4 figures below show the results of the experiment comparing the impact of visceral packs agitated in water at 1 minute and then an additional 2 minutes. Of the 4 wastewater parameters analyzed, the greatest impact was seen in TSS loading which increased an average of 91% from 0.23g to 0.44 grams/carcass (g/c). Total solids (TS) loading increased 78% from 0.58g/c at 1 minute to 1.03g/c at 3 minutes. Increased agitation time resulted in a 68% increase in the COD load from 1.12g/c to 1.88g/c. Finally, TKN loading increase 57% from 0.07g/c to 0.11g/c.



Economic Impact using COD Example

Using the COD data as an example, economic impact of increased water flume contact can be calculated. Results showed a per carcass bird increase in 0.76g of COD load during the additional 2 minutes of agitation. Using this data, an economic impact based on increased surcharge fees can be calculated. For a typical broiler slaughter plant processing 250,000 birds per day (bpd), 260 processing days per year, and paying $0.30 per lb of COD in surcharges:

(250,000 bpd) (0.76g) = 190,000g/d or 190 kg/d
190 kg/d = 419 lbs/d
(419 lbs/d) ($0.30/lb) = $ 125.70 / day
($ 125.70/d) (260 processing days/year) = **$ 32,682.00/year**

Using these experimental data, an increased viscera contact duration of just 2 minutes would result in increased COD surcharge fees of over $32,000 a year. Thus, any procedural or process train change that would lead to reduced contact time between poultry processing by-products and a plant's wastewater stream could result in a substantial economic savings. A thorough investigation of current poultry processing by-product handling could reveal money-saving changes up to and including investments in dry-handling (e.g., vacuum) systems.

Brian Kiepper
Extension Poultry Scientist

Extension County Coordinator/Agent

"Your local County Extension Agent is a source of more information on this subject."