

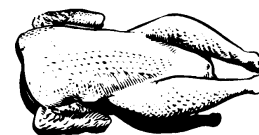


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## PROCESSING TIP . . .

### BACK TO BASICS: REVISITING BLOOD COLLECTION

Technological advances in waste minimization, waste stream analysis and wastewater treatment have focused the environmental efforts of many poultry processing plant personnel on the minutia of pollution prevention. However it is often a good idea to periodically step back from the small details and revisit the basics. One of these pollution prevention basics is blood collection.

The potential impact of blood on poultry processing wastewater streams is significant. Research shows that blood volume in chickens varies with body weight, with smaller birds having a greater percentage of blood versus larger birds. However, once chickens reach about 4.5 lbs of body weight and above, the percent blood in their bodies is about 7.5%. Once a chicken is electrically stunned unconscious during processing and the throat cut is made, research shows that approximately 50% of the blood in the carcass will drain out. This represents about 3-4% of total body weight (Barbut, 2002; Raj, 2004; Sams, 2001). Table 1 shows the potential impact that unrecovered blood has on wastewater based on weight (lbs) and volume (gallons) of blood that is typically bled-out during the slaughter process. The table shows that a 250,000 small-bird/day processing plant must handle 42,200 lbs or about 4,800 gallons of blood a day, while a 250,000 large-bird/day plant must be prepared to recover 70,300 lbs or about 7,900 gallons of blood a day.

**Table 1.** Potential weight (lbs) and volume (gallons) of blood impacting poultry processing wastewater streams based on broiler size.

Bird Size	Body Weight (Lbs)	% Blood	Amount Blood/Bird (Lbs)	No. of Birds Processed Daily	Total Weight of Blood in Birds (Lbs)	Total Bleed-Out Weight @ 50% (Lbs)	Total Bleed-Out Volume @ 8.85 Lbs./Gallon
Small	4.5	7.5	0.3375	250,000	84,375	42,200	4,800
Large	7.5	7.5	0.5625	250,000	140,625	70,300	7,900

With the advent of larger birds and increased line speeds, many poultry processing plants are now losing blood to wastewater drains where it was not previously occurring. On-site inspections of blood collection systems at Georgia poultry processing plants by UGA Extension Poultry Scientists have uncovered new locations of increased blood loss not previously observed. As an example a recent inspection at one Georgia processing plant, where the line speed had increased significantly, revealed 2 points of new blood loss. At 2 separate points where the shackle line made 90 degree turns, faster moving carcasses were swinging out and blood was observed falling outside of the blood collection trough, which had not been observed when the when processing line ran slower. Increased blood loss has also been observed in plants which have recently converted to processing larger birds.

#### PUTTING KNOWLEDGE TO WORK

Key areas identified by UGA Extension Poultry Scientists for periodic inspection of blood collection systems include:

1. The transition point between the automatic killer and blood collection trough,
2. Any bends or turns in the bleed-out shackle line,
3. The transition point(s) between bleed-out troughs and larger blood collection areas,
4. The transition point between the blood collection system and scalding.

Periodic inspection of these areas will reveal critical need points to increase shielding and minimize floor spillage of blood.

Along with increasing the organic load of the wastewater stream, blood can significantly increase the nitrogen load also. Plants with blood collection systems problems will often see a corresponding rise in TKN (total Kjeldahl nitrogen) levels in their wastewater effluent. Since blood is highly soluble in water, the nitrogen load it contributes to the wastewater stream isn't readily removed by physical screening or chemically-enhanced DAF (dissolved air flotation) systems, so effective blood collection is critical.

Another significant impact of reducing the amount of blood entering wastewater is in phosphorus reduction, something that is a daily environmental challenge in the heart of the US poultry industry: North Georgia. Following a recent pollution prevention assessment at a broiler processing plant that included UGA Extension Specialists from the Poultry Science and Biological & Agricultural Engineering Departments inspecting the plant's blood collection system, the plant's Environmental Engineer sent an e-mail containing the following passage:

*"I have great news on the positive results from one of the modifications suggested by your visit. Two months ago we modified the entrance (right after the auto killer) and exit (right before the scalding) of the "bleeding flume". On your visit you pointed out the accumulation of blood spilled on the floor at these two locations due to poor shielding. Well, we did modify it, almost eliminating completely the blood spill in those areas. **These modifications have knocked down the Total Phosphorus entering our WWTP (wastewater treatment plant) about 60%, which resulted on an almost exact reduction of Phosphorus at our effluent discharge.**"*

Quick, periodic visual inspections of the blood collection by processing plant personnel can effectively identify blood collection issues on a timely basis and uncover problems that have a real impact on the wastewater stream. Also, experienced wastewater personnel can often alert the production staff on how well blood collection is going by just observing the color of the wastewater entering the treatment area.

**References:**

- Barbut, S. 2002. Poultry Products Processing. CRC Press, New York, NY.
- Raj, A.B.M. 2004. Stunning and Slaughter of Poultry. Ch. 4 in: Poultry Meat Processing and Quality. G.C. Mead, ed. CRC Press, New York, NY.
- Sams, A.R. 2001. First Processing: Slaughter thru Chilling. Ch. 3 in: Poultry Meat Processing. A.R. Sams, ed. CRC Press, New York, NY.



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