



SEPTEMBER 2010

## COMMERCIAL EGG TIP . . .

### IMPORTANCE OF GRIT REMOVAL FROM SHELL EGG PROCESSING WASTEWATER

Commercial shell egg processing facilities use 1.5 to 3 gallons (5.7 to 11.4 L) of water per case (1 case = 360 eggs) of packaged table eggs, producing a resulting high-strength wastewater stream. Thus, when commercial shell egg processors in Georgia annually produce approximately 7 million cases of table eggs (2.5 billion eggs) (Fig. 1), they also generate approximately 16 million gallons of wastewater requiring treatment. Results of a survey of the U.S. commercial table egg industry in 2005 showed that over 80% of shell egg processing plants treat their own wastewater on-site prior to discharge, typically through land application systems.



*Fig. 1. A portion of the 900,000 eggs daily entering one Georgia shell egg processing plant from layer hen houses. Georgia shell egg processors annually produce more than 7 million cases of table eggs (2.5 billion eggs) and in the process, generate about 16 million gallons of wastewater requiring treatment.*

One essential element of an effectively operating commercial shell egg processing wastewater treatment system is the efficient removal of grit. Grit in wastewater is defined as the heavy, substantially-inorganic particulate solids that have significantly greater specific gravities than the lighter substantially-organic particles in a wastewater stream. When wastewater enters a basin with a low velocity, the heavy grit particles will quickly settle to the bottom, while the lighter particles remain suspended in the water column.

In commercial shell egg processing wastewater streams, grit is predominately pieces of broken egg shell and the particles associated with the debris (e.g., feces and dirt) cleaned from the outside of eggs during washing. The effects of poor grit removal from shell egg processing wastewater are often not immediately apparent, however the negative effects can be substantial.

#### PUTTING KNOWLEDGE TO WORK

### ***Effects of Poor Grit Removal***

Three (3) major negative impacts are associated with poor removal of grit from wastewater treatment systems:

1. Grit will begin to fall out of suspension and collect at any point in a wastewater collection or treatment system where flow velocity is less than 1.5 ft/sec. These low velocity areas can include drains, channels and pipelines. As grit collects in unintended areas, clogs can form, reducing or even stopping wastewater flow. The trapped organic matter in these areas can then rapidly form pockets of anaerobic (i.e., septic) digestion that produce gaseous by-products (e.g., methane and hydrogen sulfide) that can harm both collection and treatment system surfaces, as well as human health.

2. Grit is extremely abrasive and will produce abnormal wear on pumps and treatment system surfaces, significantly reducing the operational life of a wastewater treatment system and its components. The life of a pump impeller can be reduced by as much as 30% due to the abrasive action of grit.

3. Grit will accumulate within the major treatment basins (e.g., waste stabilization ponds), eventually causing a loss in treatment capacity. In addition, since grit quickly settles out of wastewater and to the bottom of basins, the accumulative effect of the grit is often not known until major problems arise in loss of treatment efficiency (i.e., out of sight, out of mind).

### ***What You Can Do!***

To effectively deal with the wastewater grit generated from the conveying, washing and grading of table eggs, commercial egg processors can take action in these 5 areas:

1. Minimize external debris on eggs entering the processing plant,
2. Minimize the occurrence of broken eggs and the time broken eggs remain on the processing line,
3. Minimize egg breakage in washers,
4. Develop plant and equipment sanitation procedures that emphasize dry cleaning methods, and
5. Implement an efficient grit capture and removal system (e.g, screens, grit chambers) that best fits the desired level of operation and maintenance intensity.

If you need more information about removing grit from shell egg processing wastewater see UGA Cooperative Extension Bulletin 1402: *Importance of Grit Removal from Shell Egg Processing Wastewater* (<http://www.caes.uga.edu/Publications>), or contact your county's local University of Georgia Cooperative Extension Agent.

### **References**

- Curtis, P.A., R.E. Carawan, K.E. Anderson and F.T. Jones. 1994. Characterization of wastewater from a shell egg processing plant. Proceedings: 1994 National Poultry Waste Management Symposium, p. 310-316.
- Jones, D.R., and J.K. Northcutt. 2005. A survey of common practices in shell egg processing facilities and water use. *International Journal of Poultry Science* 4(10): 734-736.
- NASS. 2011. Chickens and Eggs: 2010 Summary. Pou 2-4 (11). National Agricultural Statistics Service, U.S. Department of Agriculture, Washington, DC.



Brian Kiepper  
Extension Poultry Scientist

Extension County Coordinator/Agent

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