

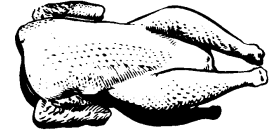


The University of Georgia

**Cooperative Extension Service**

College of Agricultural and Environmental Sciences / Athens, Georgia 30602-4356

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## **PROCESSING TIP . . .**

### **NEW CONCERNS ABOUT CHLORINE ADDITION TO THE CHILLER**

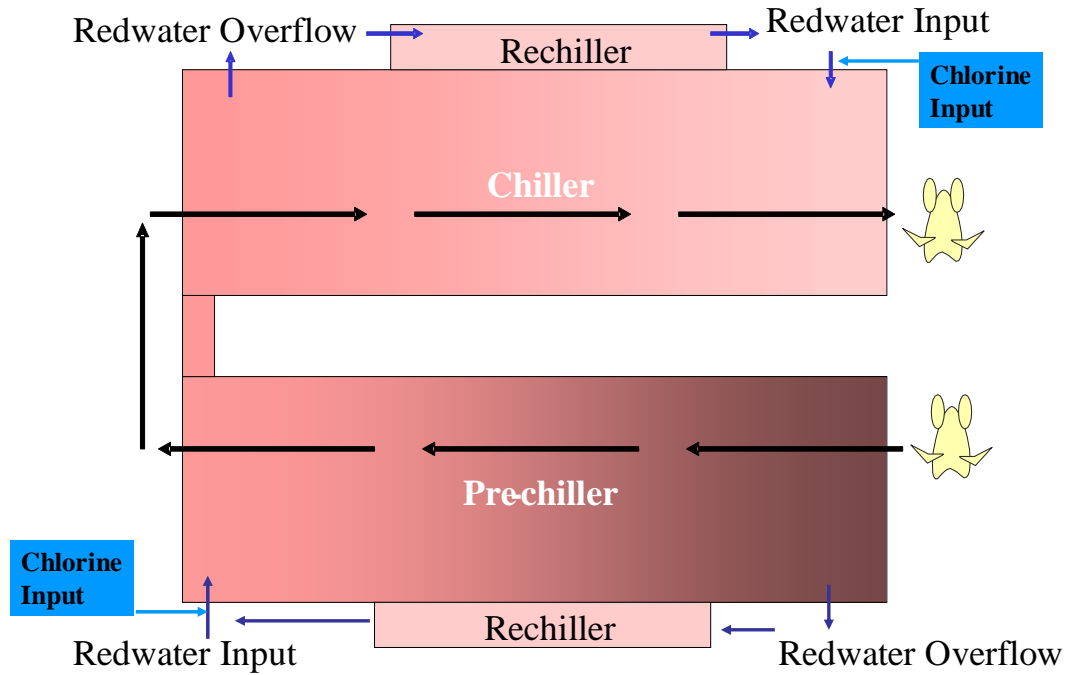
The USDA-Food Safety Inspection Service recently required companies to demonstrate that redwater being pumped back into chillers from the rechiller is “cleaner” or “have less bacteria and turbidity” than water coming out of the chillers in the overflow. This regulation has caused some consternation within the industry. The regulation merely states that the water should be “cleaner”. There are no real requirements listed to define what cleaner means. As a result, companies could reduce the bacteria by 1 colony forming unit or turbidity by a very small amount and be in accordance with the ruling. The problem here is that by adding the chlorine to the redwater system, a major problem becomes evident. Companies generally add chlorine to the redwater system now and monitor the chiller overflow water for free available chlorine (FAC). As long as the FAC is low (a few ppm or below) then the amount going into the water may be increased. Sometimes the input of chlorine is excessive (100 to 150 ppm). The problem is that monitoring the FAC is not an appropriate way to determine chlorine levels. This is because, in the morning, when the organic load is low, the plant may need to add 40 ppm of chlorine to the redwater to achieve a 0.2 ppm FAC level. As the shift wears on and the water becomes loaded with organic material (fat, blood, protein), the amount of chlorine needed to be put into the redwater to achieve a 0.2 ppm FAC level may reach 150 ppm. This is because the organic material binds to the chlorine and renders it ineffective for killing bacteria. Thus, the organic load is determining chlorine input. ***Also, all of the chlorine is being used up immediately by the organic material before it is able to contact the carcasses.*** Moreover, when the plant is reading 0.2 ppm FAC, they are seeing an artifact in the kit. It is likely that the kit is picking up organo-chlorine residuals that do not kill bacteria. ***There is no FAC in the chiller at all. The chlorine demand of an average poultry chiller is 400 ppm!!! Therefore, using FAC as a means of monitoring chlorine is inappropriate.*** Below is a diagram of a common chiller setup.

#### **PUTTING KNOWLEDGE TO WORK**

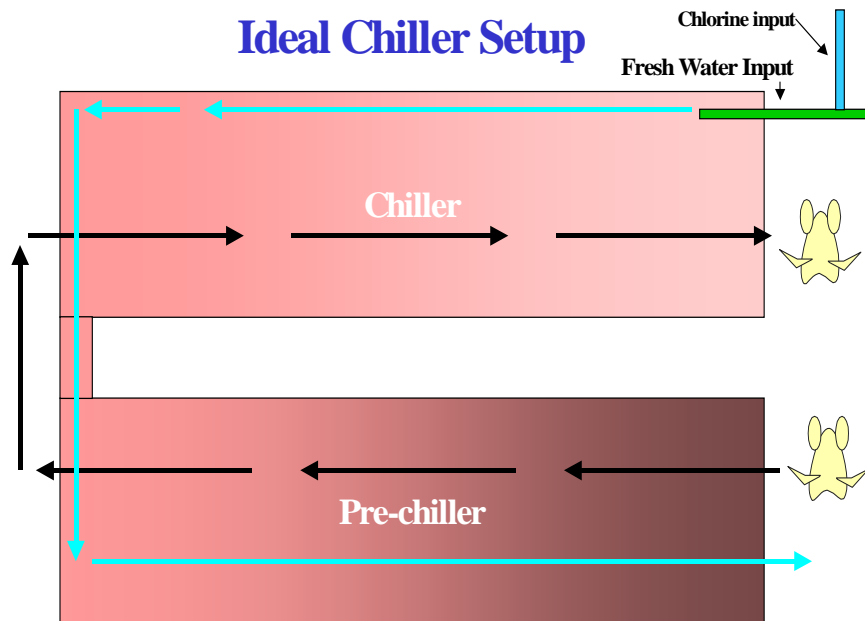
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## Common Chiller Setup



The problem with the chiller setup above is that the chlorine is immediately deactivated upon addition to the redwater. Ideally, the chiller should be setup in such a way that the chlorine is added to the fresh make-up water and both should be added to the very exit end of the chiller as depicted below. This setup allows the chickens to be exposed to very clean, chlorinated water. The chlorine has not been completely used up by the organic material in the redwater.



**pH should be 6.5 to 7.5, chlorine input at 50 ppm**  
**\*Notice the gradient (this should be evident)**

For plants processing big birds, this becomes extremely important. As the FAC is monitored at 0.2 ppm during the day, more and more chlorine is pumped into the redwater recycling system reaching levels of 150 ppm input. Two or three chillers are treated this way, as opposed to just adding the chlorine to the exit end of the last chiller. The chickens are exposed to very high levels of bound chlorine through the two or three chillers. Also, in big bird plants the exposure times in the chillers are often extended to 90 to 150 minutes. While the bound chlorine is not killing bacteria on the chickens because it is not available to do any work, it does, however, bleach the breast fillets. Breast fillets from these plants can be bleached completely white, resembling overscald but instead of appearing as stripes, the entire breast fillet is affected. This oxidation on the breast fillet will cause great problems later on if the breasts are frozen, as this will greatly exacerbate oxidative rancidity and freezer burn. By setting up the chiller as depicted in the second figure, plants may achieve higher bacterial reductions and prevent organoleptic damage to the breast fillets. To meet the requirement for “cleaner” water in the redwater system, plants could add very low levels (25 to 40 ppm) of chlorine to the redwater.

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