

# **The role of water in the life of a chicken**

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It is almost impossible to overemphasize the importance of water to poultry flocks. A chicken is 70 percent water; a loss of only 10 percent of that water will result in the bird's death. And, a single day without water will cause a layer to stop laying.

Water is a major component of blood and plays a major role in transporting to the cells and carrying waste away. It fills almost all space in the cells and between them. It lubricates the joints. Water also is a primary element in two of the most important processes that occur in chickens — digestion and respiration, which is key to thermoregulation.

## **Digestion**

Digestion begins as soon as a bird picks up a bit of feed. Saliva, which is largely water, lubricates the food, helping it pass down the esophagus into the crop. Chickens need sufficient water when they eat to soften the food in the crop. Dry feed can form clumps in the crop, which can press on the bird's carotid artery, causing blood flow to the brain to lessen. This can cause paralysis and possible death.

Susan Watkins, an extension poultry specialist for the Center of Excellence for Poultry Science at the University of Arkansas, says it is equally important to remember that nature designed chickens and turkeys to swallow whole seeds and bugs. Water is needed to soften the feed so that digestion in the stomach is more effective.

Enzymes and acids begin to break down the food as it moves into the proventriculus, the first part of a chicken's stomach. As it breaks down, it then moves into the muscular gizzard (or ventriculus), which some have likened to chicken teeth. Here peristaltic action combined with grit in the gizzard grinds the food even more, turning it into a liquid emulsion.

Most of the absorption of nutrients occurs as this emulsion moves through the small intestine. The small intestine is lined with villi, projections that increase the amount of area available for absorption of nutrients into the blood. Undigested food then moves into the large intestine. The large intestine is much shorter than the small intestine and its primary function is to absorb the remaining water. This is important in helping birds maintain their body water balance. When chickens acquire an organic or inorganic substance that causes them to have diarrhea, the food and water speed through the large intestine too fast for the water resorption to occur. This can cause the birds to dehydrate.

## **Respiration**

Respiration in birds is more than just breathing. It also involves delivering oxygen to cells to allow the chemical breakdown of nutrients that produces energy. A result of that reaction is carbon dioxide, which is carried by the blood stream to the lungs where it is expired as waste when the chicken exhales.

The chicken respiratory system is very important in thermoregulation. Birds have no sweat glands and must rely on other means of losing heat as the temperature rises. At 29.5 degrees C (85 degrees F), birds will begin to pant. This has a cooling effect because panting increases the rate of evaporation. This also will cause the bird to be thirstier and increase its water intake on hot days.

Birds also attempt to increase evaporation by spreading their wings, allowing more air to penetrate the insulating feathers and reach the skin. At this point it is

imperative the flock have unlimited access to fresh water. Without sufficient water, birds will begin to exhibit signs of heat stress. Among those signs are the comb and wattles become shrunken and bluish; the tendons on the back of the legs stand out prominently; and the bird droppings are off color. Heat stress can be life threatening.

## **Water Quality**

Water molecules consist of two atoms of hydrogen and one of oxygen. But, water is a mixture of a variety of substances dissolved or suspended in it. And, those added materials can drastically affect flock performance.

“Unfortunately, as the modern broiler becomes more and more efficient in its growth and feed conversion, it will become less and less tolerant of stressors with a significant stressor being poor water quality. What might have had no impact on birds 15 years ago, could be devastating for the bird of today,” says Watkins.

Ideally, water should be clear, odorless and tasteless for the poultry flock. It should have no bacteria in it. Certain levels of minerals and chemicals appear to have little or no effect on poultry flocks very much. But, when those levels exceed the norms, birds either sicken or stop drinking, or both. Additionally, bacteria in the water can have a serious impact on a flock. If the particular flock is a breeder/parent stock operation, the disease can be passed on to the eggs, resulting in diseased chicks.

Generally, it has been assumed that potable water is of sufficient quality for poultry. However, The Poultry Industry Council of Canada suggests that may not be the case. It points out in its Factsheet #111 2000, “Water Quality for Poultry”: “Water quality is determined by a number of criteria; however, it is difficult to define what constitutes good quality drinking water for poultry since many of the

standards have been derived from those developed for other livestock or humans. In addition, many guidelines have been based on the effects on mortality rather than on performance. Interactions that occur between minerals, as well as the actual quantity of water consumed, also make it difficult to establish an exact toxic level for any one element.”

It is critical that producers have their water tested so they know what their flocks are consuming. Additionally, the testing should not be a one-time event but should be done regularly. Water quality can change over time.

“Qualities to look for include turbidity, taste, odor and color. Turbidity results from materials in suspension, for example, silt, clay, algae or organic matter. Turbid waters are unpalatable and they clog the delivery system. Water should not taste bitter, sweet, salty or sour, since such impressions are usually the effect of salts. Bitter tasting water may be contaminated by iron and manganese sulfates. Iron gives the water a reddish or brownish color; copper tends to turn the water bluish. On the other hand, the water may be clear without being safe. The presence of total dissolved solids is not visible in ‘clear’ water,” according to the Poultry Water Quality Consortium in its “Poultry Water Quality Handbook.”

Water is a basic element of life. Producers who want to optimize their flock performance would be well advised to spend time evaluating the amounts and quality of water provided to their birds.

*Ziggity Systems, Inc. is the only manufacturer 100 percent focused on poultry watering for improved performance. For more information, write Ziggity Systems, Inc. at 101 Industrial Parkway, P.O. Box 1169, Middlebury, Indiana 46540-1169 USA, call +1-574-825-5849, fax +1-574-825-7674, or visit its Web site at [www.ziggity.com](http://www.ziggity.com).*

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