

Water Quality and its importance for Poultry

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Water is the most important nutrient for poultry. Poultry birds can survive for a longer time in the absence of any other nutrient but they can't survive without the water for shorter time. The available data suggests that animals and birds can tolerate a loss of about 98 per cent body fat and about 50 per cent of body protein and still survive. But a loss of 20 per cent body water is lethal to the birds. So the drinking water given for poultry birds should be of utmost quality to ensure the optimum production performance of the birds. The water quality should be tested regularly to prevent the diseases and metabolic disorders arising from the water.

Water is the most important nutrient for poultry. Poultry birds can survive for a longer time in the absence of any other nutrient but they can't survive without the water for shorter time. Water is not only a nutrient, it also softens food and it carries it through the body, aids in digestion and absorption and cools the body as it evaporates through the bird's lungs and air sacs. Water helps remove waste, lubricates joints, is a major component of blood and a necessary medium for many chemical reactions that help form

meat and eggs (Winchell-2001). Birds generally drink twice the amount of water as the feed consumed by them on a weight basis. Generally during the periods of extreme heat stress the consumption of water will quadruple. Although the importance of providing the sufficient amount of water or adequate access to it is well accepted, the importance of water quality on performance of birds is often overlooked. Water quality attributes can have direct or indirect effect on the performance of the birds. High levels of microbial load, minerals or other pollutants in drinking water of the poultry can have the detrimental effects on normal physiological process resulting in inferior performance of the birds. A safe water supply is always essential for the healthy birds because contaminated water not only affects the growth, reproduction and physiological process of the birds but also affects the safety of the animal products thereby affecting the human health. Water quality can be determined by a number of criteria. The following are the most important factors that influence water quality.

TEMPERATURE

Temperature of the waterway

is significant because it affects the amount of dissolved oxygen in the water. The amount of oxygen that will dissolve in water increases as temperature decreases. Water at 0°C will hold up to 14.6 mg of oxygen per litre, while at 30°C it will hold up to 7.6 mg/L.

COLOUR, TASTE AND ODOUR

Drinking water for poultry should be clear, tasteless, odourless and colourless. As a general observation, a reddish brown colour may indicate the presence of iron, while the blue colour indicates the presence of copper. Hydrogen sulphide is indicated by the rotten egg odour. Hydrogen sulphide may also combine with iron to form black water (Iron sulphide) that may also implicate the presence of sulphate-reducing bacteria. Taste can be affected by the presence of salts and a bitter taste is usually associated with the presence of ferrous and manganese sulphates.

PH

The acidity or alkalinity of the water is measured by PH. A pH of 7 indicates that the water is neutral, a pH less than 7 indicates acidity, and a pH greater than 7 indicates alkalinity. Low pH water can be

unpalatable, corrosive to equipment, and may have a negative impact on performance. High pH water is also unacceptable since it reflects high levels of calcium and magnesium, which can clog watering systems. Poultry accept water on the acid side better than they accept water on the alkaline side. Because generally birds have only two taste sensors, salt and bitter. In nature most poisons are associated with bitter taste or alkaloids. Therefore it may be natural response birds will not consume more water if there is a bitter or alkaloid taste associated with it.

HARDNESS

Hardness refers to presence of dissolved minerals such as calcium and magnesium in either bicarbonate form or sulphate form. It measures the tendency of water to precipitate and form scale. Hardness is not commonly harmful to poultry unless certain ions are present in toxic amounts. High levels of Magnesium sulphate ($MgSO_4$) may cause an increase in water consumption, wet droppings and a drop in production. Extreme hardness may affect the effectiveness of water-administered medications, disinfectants and cleaning agents.

SALINITY

Salinity is the measure of the dissolved salts in the water. Salinity

is usually highest during the periods of low flows and increases as water levels decrease. Salinity is measured as either TDS (Total Dissolved Solids), which measures the amount of dissolved salts in the water or EC (Electrical Conductivity), which is the property of the substance which enables the substance to serve as a channel or medium for electricity. Salty water conducts electricity more readily than pure water.

Suggested salinity levels limits for poultry are described as follows.

Less than 1,000 milligrams per litre mg/l: considered low. This level is excellent for all classes of poultry.

1,000-2,999 mg/l: very satisfactory for all classes of poultry. Temporary mild diarrhoea or watery droppings may be noticed in birds which are not accustomed to this level of salinity.

3,000-4,999 mg/l: considered as poor water quality for poultry. Watery droppings, increased mortality and increased morbidity associated with poor growth may occur. Turkeys are particularly susceptible.

5,000-6,999 mg/l: It is not suitable for poultry consumption.

7,000-10,000 mg/l: Unfit for poultry consumption but may be suitable for other livestock.

Above 10,000 mg/l: Unfit for any livestock and poultry.

TURBIDITY

Turbidity is the measure of the ability of the light to pass through the water, that is, a measure of water's murkiness (Mc Cuffrey). Turbidity is measured in Nephelometric Turbidity Units (NTU). Turbidity usually results from the suspension of materials such as silt, clay, algae or organic materials in water. Levels of turbidity above 5ppm results in unpalatable water and indicates surface contamination. Turbidity gives the estimate of suspended solids in the water. Suspended solids usually enter the water as a result of soil erosion from the disturbed land or can be traced to the inflow of effluent from sewage plants or industry. Pollutants such as nutrients and pesticides may bind with the suspended solids and settle in the bottom sediments where they may become more concentrated.

MINERAL CONTAMINANTS

A wide variety of minerals are commonly found in drinking water. Normally they are present in low concentration and cause no harm. However levels of nitrates, metals and other elements in water are also important to consider for poultry suitability. For each component the maximum contaminant level (MCL) indicates the uppermost limit at which water should be considered safe to use.

COLIFORM BACTERIA

Coliform bacteria are the microorganisms found in the gastrointestinal tract of the livestock, humans and birds. While these bacteria may not be harmful, their presence often indicates the presence of other disease-causing bacteria. The main source of coliform bacteria is animal waste. Bacteria and other microorganisms can develop rapidly in the drinkers used for turkeys and chickens raised under both floor and free range system. The water supplied for the poultry should not contain any coliform organisms more

than 50/ml. If water tests indicate the presence of bacteria then thoroughly test the water supply system for the possible entry of pathogens. It is advisable to clean the drinkers on a daily basis. A recommended practice is to scrub the drinkers thoroughly with the brush and then rinse with the disinfectant.

BLUE-GREEN ALGAE

Toxic blue-green algae can contaminate surface drinking water supplies. In livestock, blue-green algae poisoning causes muscle tremors, diarrhoea, lack of

coordination, collapse, liver damage, and death. Effects can occur within a few minutes to a day, and animals that recover often shed large sections of the unpigmented (white) areas of their hides. Algae can be controlled with copper sulphate in concentrations of about 1.0 ppm. Algal blooms can also occur in stock tanks if nutrients and temperature conditions are favourable. Periodically cleaning the stock tank to remove the nutrient source is the best way of preventing algal blooms there. Animals must be denied access to the algae-contaminated water and provided with a supply of suitable water.

WATER TREATMENT

To run a successful poultry farm without any diseases caused from the adverse water quality one must test his water quality by collecting the water samples at suitable methods from the water source supplied to the birds. If the water quality does not meet out the requirements as per the standards, we must take steps to identify the problem and eliminate the cause. Routine water analysis is required to determine if water treatment procedures are necessary. Some basic water treatment procedures are chlorination, filtration, and ozone treatment, using softeners, polyphosphates and electrical or

MINERAL CONTAMINANTS	MAXIMUM LEVEL CONTAMINANTS	REMARKS
Selenium	0.5 mg/l	Higher levels are toxic
Nitrate-N	440 mg/l	Causes problems in fetal development
Cadmium	0.05 mg/l	Highly toxic. Affects egg production
Boron	5.0 mg/l	High weight loss and affects growth rate
Chromium	1.0 mg/l	Skin and soft tissue problems
Lead	0.1 mg/l	Affects egg production
Mercury	0.001 mg/l	Acute poison
Zinc	25 mg/l	Not much detritus
Copper	0.6 mg/l	Higher levels produce bad odour and taste
Iron	0.3 mg/l	Higher levels produces bad odour and taste
Magnesium	125 mg/l	Higher levels have a laxative effect
Sodium	32 mg/l	Higher levels affect the performance of the birds
Sulphate	250 mg/l	Higher levels affect the performance of the birds

magnetic devices.

Poor water quality can retard growth, curtail egg production or produce lower egg quality. Testing the water quality for salinity and other toxic elements is very much necessary if water quality is not known. If the test report shows that water contains toxic substances exceeding the upper limits then the treatment is necessary before the birds drink the water. However, there usually are no simple answers or quick fixes for toxic water problems. In many cases, water treatment may be impractical or too costly. Some circumstances may warrant the use of ion-exchange filters, distillation or dilution to correct the problem. Consultant with the sanitary or water engineer or waste water treatment specialist on a case-by-case basis is the best recommendation.

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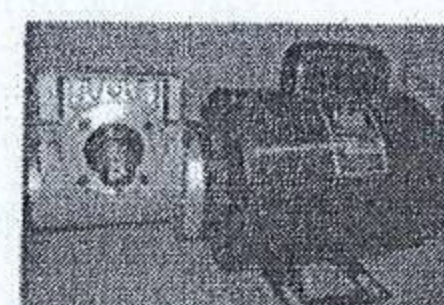
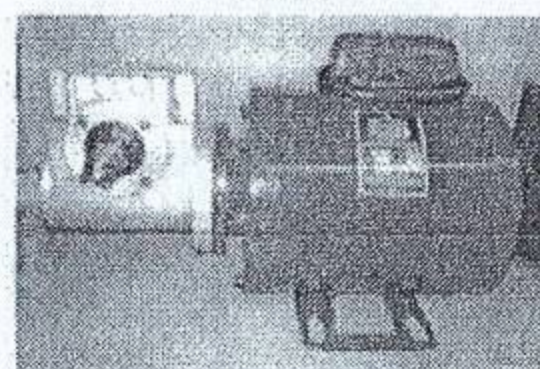
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