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Effect of different sources of drinking water on the haematological and biochemical parameters of commercial broiler chicken

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Abstract
A study was carried out to investigate the effect of water from five different sources on the biochemical and haematological parameters of broiler chicken. Among the haematological parameters, the mean values of haemoglobin and PCV levels did not differed significantly (P>0.05) among the broiler chicken offered different sources and treatment of water. The biochemical parameters namely total serum protein and serum glucose were estimated for broiler chicken offered different sources and treatment of water. The total serum protein levels did not differ significantly (P>0.05) among the broiler chickens offered different sources and treatment of water. However, the serum glucose levels differed significantly (P<0.05) among the broiler chicken offered different sources and treatment of water. The treatment of water significantly (P<0.05) increased the total serum glucose levels of all the groups of broiler chicken offered differed sources of water.

Keywords: Water sources, Treatment of water, Acidifier and sanitizer, Haemoglobin, Serum glucose

Introduction
Water is a vital nutrient, involved in every aspect of metabolism in poultry. It plays important role in regulating body temperature, digesting food, transportation of nutrients and elimination of waste products (Abd-El-Kader *et al.*, 2009) [1]. A safe and adequate supply of water is therefore essential for efficient poultry production. Water is the most important nutrient for poultry and survival time is limited in its absence. Although the necessity of providing a plentiful supply and sufficient access is well understood, but the importance of water quality on performance is often overlooked (www.aces.edu). Numerous factors, including equipment, management practices, house environment and housing type play a role in broiler performance, but water quality may be the most critical and least appreciated. Good quality of water is essential for the production of livestock and poultry. It is an essential ingredient for life, and is also involved in many essential physiological functions such as, digestion, absorption, enzymatic function, nutrient transportation, thermoregulation, lubrication of joint and organs, elimination of waste. It is also an essential component of blood and tissues (Abdullah, 2011). Water quality attributes can have a direct or indirect effect on the performance of broiler chicken. Depending on the age a bird's body can contain between 70 to 85% water. A loss of only 10% of that water will result in the bird's death (www.uspoultry.org, 2013). According to Abdullah (2013) [2], chicken can survive for longer period without any other nutrient than they can survive without water.

Materials and Methods
A total of 450 day-old commercial broiler chicks (Cobb 400) having similar body weight from a single hatch were procured from a local hatchery of Guwahati city. The chicks were weighed and randomly divided into ten experimental groups namely, untreated group with ring well water, treated group with ring well water, untreated group with tube well water, treated group with tube well water, untreated group with bore well water, treated group with bore well water, untreated group with pond water, treated group with pond water, untreated group with rain water and treated group with rain water. Further each group was again subdivided in 3 replicates containing 15 chicks in each group. The birds were offered both untreated and

treated drinking water of these five sources. The treatment of water was done with the combination of acidifier and sanitizer at the rate each of 0.05 ml per liter of drinking water. water samples from all the untreated and treated groups were analysed for various physico-chemical parameters. For estimation of haematological parameter like hemoglobin (Hb) and Packed Cell Volume (PCV) count, about 2 ml of blood was collected aseptically with anticoagulant from 5 birds of each group. Then the blood was estimated for the above parameter with the instrument "Automatic Haematolyzer" in Teaching Veterinary Clinical Complex, College of Veterinary Science, AAU, Khanapara. For estimation of Glucose, 5 birds were selected randomly from each group and about 5 ml blood was collected aseptically from each bird. Then the blood samples were centrifuged for separation of serum. Then the total serum Glucose was estimated using spectrophotometer (Systronics model No. 106) with the Glucose Kit (GOD/POD methodology) supplied by Tulip Diagnostics Ltd.

$$\text{Serum glucose (mg/dl)} = \frac{\text{Absorbance of test sample}}{\text{Absorbance of standard}} \times 100$$

For estimation of serum Protein, 5 birds were selected randomly from each group and about 5 ml blood was collected aseptically from each bird. Then the blood samples were centrifuged for separation of serum. Then the total serum Protein was estimated using spectrophotometer (Systronics model No. 106) with the Total Protein Kit (Biuret methodology) supplied by Tulip Diagnostics Ltd.

Calculation

$$\text{Total Protein (g/dl)} = \frac{\text{Absorbance of test sample}}{\text{Absorbance of standard}} \times 8$$

Results and Discussion

In the present findings, the haematological parameters namely haemoglobin and PCV were not significantly (P>0.05) affected by different sources of water. These findings were in agreement with the report of Ibitoye *et al.* (2013) [4], wherein they reported that different water sources (pipe borne, bore hole and well water) had no significant (P>0.05) effect on majority of haematological parameters including PCV of birds under their study.

Table 1: Average values of haematological parameters of broiler chicken under different sources and treatment of water

Parameters	Source Treatment	Ring well	Tube well	Bore well	Pond	Rain
Hemoglobin(g/dl)	Untreated	8.25±0.25	8.23±0.23	8.33±0.25	8.25±0.22	8.35±0.18
	Treated	8.25±0.41	8.25±0.22	8.40±0.20	8.30±0.15	8.38±0.17
	p-value	0.6202	0.9390	0.7116	0.792	0.9230
PCV %	Untreated	27.63±0.25	27.78±0.63	28.10±1.09	28.08±0.42	29.35±0.23
	Treated	27.53±0.35	27.78±0.63	28.50±0.29	28.08±0.42	29.35±0.23
	p-value	0.8245	0.7056	0.0600	0.242	0.9482

The present finding implied that different sources of water had no adverse effect on the haemoglobin and PCV of broiler chicken. This finding showed that treatment of water had no any significant (P<0.05) effect on haemoglobin and PCV of broiler chicken under study. In contrary to the present finding, Manwar *et al.*(2012a) [6] found significantly (P<0.05) higher haemoglobin concentration (10.03±1.71 g/dl) in broiler chicken offered open well water treated with the combination of acidifier and sanitizer. In another study, Das (2013) [3] reported that haemoglobin content was significantly (P<0.05) low (8.76±0.21 g/dl) in birds offered treated water with sanitizer alone than the untreated (9.64±0.26 g/dl) and treated (9.06±0.21 g/dl) drinking water with the combination of acidifier and sanitizer.

In the present study, the total serum protein level did not differ significantly ((P>0.05) in broiler chicken offered different sources of untreated and treated water. However, the total protein level improved significantly (P<0.05) in broiler chicken offered tube well and bore well water treated with the combination of acidifier and sanitizer. In respect of other groups, there was numerical increase in total serum protein level. Hence, it could be stated that treatment of water had beneficial effect on total protein levels. This might be due to the fact that acidifier increases pancreatic discharge which improves the absorbability, assimilation and retention of amino acids (Jongbloed *et al.*, 2000) [5]. This increase in amino acid may result in higher protein synthesis. Similar observation was cited by Das (2013) [3], while treating ring well water with the combination of acidifier and sanitizer.

Table 2: Average values of biochemical parameters of broiler chickens under different sources and treatment of water

Parameters	Sources Treatment	Ring well	Tube well	Bore well	Pond	Rain
Total Serum Protein (g/dl)	Untreated	4.48^{ab}±0.47	4.72^{abA}±0.41	3.40^{bA}±0.29	4.06^{ab}±0.33	5.06^{a}±0.56
	Treated	5.43^{b}±0.35	5.79^{bB}±0.35	6.93^{aB}±0.24	4.48^{b}±0.46	5.66^{b}±0.49
	p-value	0.3338	0.0276*	0.0111*	0.8725	0.6670
Serum Glucose (mg/dl)	Untreated	153.92^{bA}±4.32	177.11^{bA}±3.01	204.90^{aA}±3.20	169.58^{bA}±2.15	180.27^{bA}±3.14
	Treated	216.72^{bB}±5.93	248.19^{abB}±4.73	252.11^{abB}±1.06	265.96^{aB}±6.36	293.37^{aB}±5.69
	p-value	0.0319*	0.0439*	0.0119*	0.0058*	0.0197*

The serum glucose level of broiler chicken offered different sources and treatment of water differed significantly (P<0.05). In contrary to the present findings, Manwar *et al.* (2012a) [6] reported that treatment of open well and bore well water with the combination of acidifier and sanitizer had no effect on the serum glucose level of the broiler chicken. In a similar study Das (2013) [3] found significantly (P<0.05) higher level of serum glucose in broiler chicken of acidifier treated drinking water as compared to other treated and untreated sources. Significantly (P<0.05) higher level of serum glucose found in

broiler chicken of all the treated sources of the present study might be due to better metabolism leading to higher body weight.

Conclusion

Thus, it is concluded that during monsoon season, all the physico-chemical and microbiological qualities of drinking water were found to be within the maximum permissible level after treatment with the combination of Acidifier and Sanitizer @0.01%. Hence, all the treated sources of water under study will be more useful for broiler chicken production during monsoon season.

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