



Research Article

EFFECT OF WATER QUALITY ON THE PERFORMANCE OF BROILERS

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Abstract: The present experiment was conducted by using 90 day-old broiler chicks for a period of six weeks to study the effect of water quality on the performance of broilers. The broilers were divided into two groups with 45 birds each, one group provided with filtered drinking water (T₁) and the other group provided with raw drinking water (T₀). The average daily feed consumption for T₀ and T₁ groups (150.14±4.09 and 142.20±2.41 gm/day) showed significant difference (p<0.01) at 5th week with higher feed consumption rate in T₀ group. The average daily water consumption of T₀ and T₁ groups had no significant differences. The average weekly body weight of birds in T₀ and T₁ groups were observed to be significantly different (p<0.05) during 2nd (310.76±0.31 gm and 315.51±2.84 gm respectively) and 6th week (2011.89±28.00 gm and 2057.64±13.13 gm respectively) and (p<0.01) during 3rd, 4th and 5th week. The mortality (%) of experimental birds were found to be 4.44 and 2.22 in T₀ and T₁ groups respectively. Data generated may be helpful to improve the managerial aspects of broiler farming.

Keywords: Water, Quality, Broilers

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Introduction

The farmers in the state of Mizoram mainly use stream water, spring water and harvested rain water for their poultry birds without any filtration and pre-treatment. Provision of good quality water may definitely improve the production efficiency of birds. The cost involved in providing quality germ-free water is substantially lesser than the cost involved in treating waterborne illnesses caused due to provision of untreated water [1]. The effects of water on the growth of poultry birds may not be certain, unless the water sources and quality was proven to be good quality for poultry drinking water. Fairchild and Ritz reported that iron (Fe) bacteria are more likely to thrive in water with high iron concentrations and promote their proliferation. They also observed that a pH of 6.0-6.8 is preferred for broiler production, but birds could tolerate a pH range of 4-8. Zimmermann, *et al* [3] found that the mortality rate of broiler chicks decreased as K, Cl and Ca level in the drinking water increased. Thus, poor quality water may reduce the consumption or cooling capacity and have detrimental effects on both growth and reproduction performance. Kumar, *et al* [4] reported a lesser growth rate and 20% less feed consumption in birds when water is inadequate than the normal requirement. Therefore, being the essential nutrient ignored by most of the farmers, any deviation of water and use of untreated or contaminated water may affect broiler performance tremendously. Therefore, the present study was conducted to evaluate the effect of water filtration using a locally fabricated water filter on the performance of broilers.

Materials and Methods

The raw water and the filtered water obtained after filtration using a locally fabricated water filter were collected and analyzed for its bacteriological (*Faecal Coliform*), minerals (*Chloride and Iron*) and pH characteristics. Preliminary test was done at Department of Veterinary Public Health, College of Veterinary

Sciences and A.H., Selesih, Aizawl, and final test was done at Mizoram State PHE Department, Tuikhuahtlang, Aizawl, Mizoram, as per standard methods. The biological study was conducted by using ninety numbers of day-old commercial broiler chicks at Instructional Poultry Farm, College of Veterinary Sciences and A.H., Selesih, Aizawl, Mizoram. These chicks were wing banded, weighed and randomly grouped into two groups with forty five birds each for providing filtered (T₁) and raw drinking water (T₀). Rearing was done under deep litter system up to six weeks and the birds were provided with commercial broiler pre-starter, starter and finisher ration. The data recorded was subjected to statistical analysis as per Snedecor and Cochran [5].

Result and Discussion

The approximate Faecal Coliform count (MPN/100 ml), total chloride (mg/L), total iron (mg/L) and pH values for raw and filtered water has been presented in [Table-1].

Table-1 Water quality for raw and filtered drinking water

Group	Approximate Faecal Coliform count (MPN/100 ml)	Total Chloride (mg/L)	Total Iron (mg/L)	pH
Raw water	2000	12.5	Trace	6.8
Filtered water	23	10	Trace	7

Water filtration using the locally fabricated water filter reduced the faecal coliform count to a very great extent below the maximum permissible levels for drinking water. The chloride concentration for both raw and filtered drinking water was within the average permissible level. The iron concentration was observed to be trace for both types of drinking water. The pH level of drinking water was within the acceptable limit *i.e.*, 5-8 ppm [6]. The pH for raw drinking water was slightly acidic in nature which was found to come towards the neutral pH levels 7.0 in filtered

drinking water, which might be due to the efficiency of the water filter as the pH of water has the tendency towards neutral pH level when the dissolved materials are removed by water purification. The average feed consumption (gm/day) of birds from first to sixth week has been presented in [Table-2]. The average feed consumption was found to be significantly higher ($p<0.01$) at 5th week of age in T₀ group. The results obtained are similar with the findings by Katouli, *et al* [7]. The average water consumption (ml/day) per broiler ranged from 24.73 ± 0.08 to 392.38 ± 4.37 and 24.73 ± 0.10 to 399.04 ± 7.33 in T₀ and T₁ group respectively. No significant difference was observed in the average daily water consumption between the two groups.

Table-2 Average feed consumption of birds (gm/day):

Age	Feed Consumption (gm/day)	
	T ₀	T ₁
1 st week	18.00 $\pm$ 0.32	19.20 $\pm$ 0.24
2 nd week	33.47 $\pm$ 0.25	34.27 $\pm$ 0.37
3 rd week	84.70 $\pm$ 0.61	78.13 $\pm$ 1.62
4 th week	109.13 $\pm$ 1.62	110.02 $\pm$ 1.24
5 th week	150.14 $\pm$ 4.09 ^b	142.20 $\pm$ 2.41 ^a
6 th week	180.02 $\pm$ 2.28	178.60 $\pm$ 6.96

Means bearing different superscript (a, b) in a row between R and F differ significantly ($P<0.05$)

The weekly water consumption per bird were comparable only up to second week with the findings of Kumar, *et al* [4], but from 3rd week onward the water consumption rate was much higher compared to various workers which might be due to the suitable climatic conditions of the region leading to higher water consumption which was proportional with the higher feed intake and higher body weight. The average weekly body weight (gm/wk) of birds for groups T₀ and T₁ was observed to be significantly different ($p<0.05$) during 2nd and 6th week and ($p<0.01$) during 3rd, 4th and 5th week [Table-3]. The significantly higher final body weight of birds at 6th week for T₁ group could be ascribed to a higher feed consumption, water consumption and better health condition due to availability of suitable drinking water. The feed conversion ratio (FCR) ranged from 1.35 ± 0.02 to 1.82 ± 0.02 and 1.31 ± 0.01 to 1.76 ± 0.01 in T₀ and T₁ groups respectively. Significantly better FCR were observed for T₁ group than T₀ group during 3rd week ($p<0.05$). The results were comparable with the findings of previous reports [3,8].

Table-3 Average weekly body weight (gm/wk) per broiler

Age	Weekly Body Weight (gm/wk)	
	T ₀	T ₁
1 st week	131.77 $\pm$ 0.95	137.86 $\pm$ 3.09
2 nd week	310.76 $\pm$ 0.31 ^a	315.51 $\pm$ 2.84 ^b
3 rd week	660.34 $\pm$ 1.87 ^A	667.97 $\pm$ 6.01 ^B
4 th week	1049.56 $\pm$ 4.33 ^A	1065.64 $\pm$ 21.18 ^B
5 th week	1501.56 $\pm$ 55.50 ^A	1531.97 $\pm$ 34.53 ^B
6 th week	2011.89 $\pm$ 28.00 ^a	2057.64 $\pm$ 13.13 ^b

Means bearing different superscript (a, b & c/ A, B & C) in a row differ significantly ($P<0.05$ / $p<0.01$)

The total mortality percentage was higher in T₀ (4.44) than in T₁ (2.22) group which might be due to the improvement in the quality of water in respect of faecal coliform, and pH level.

Conclusion

The present experiment revealed that the improvement in the drinking water quality had significantly improved the growth performance of broiler bird and FCR. The mortality rate could also be reduced in the broiler birds provided with filtered drinking water. It may be concluded that filtered water may be used for the broiler birds as filtered water improved the performance of broilers under farm condition.

Application of Research: Data generated may be of use for better management practises for optimum profitability from broiler farming.

Abbreviations:

FCR : Food conversion ratio

mg/L : Miligram per litre

MPN : Most portable number

et al. : *et alii*

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