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EFFECT OF SOURCES OF WATER ON THE PERFORMANCE OF BROILER CHICKS

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Target Audience: Poultry nutritionist, poultry managers.

ABSTRACT

The effect of different sources of drinking water on the performance of broiler chicks fed a standard diet was investigated. The water sources were rain water (RNW), stream water (STW) and pipe-borne water (PBW) during the starter phase (week 0-4). The sources of water used during the finishing phase of the broilers (week 4-9) were well water (WLW), STW and PBW.

There was no significant effect of the sources of drinking water on feed intake, weight gain, feed:gain ratio or water intake:feed consumed (ml/g) ($p>0.05$) during the starter phase. There was also no significant effect of the sources of drinking water on performance during the finisher phase ($p>0.05$).

It is concluded that any of the water sources used in this experiment can be supplied to broiler chicks starter and finisher without adverse effects on performance.

Key words: Sources of water, performance, broiler chicks.

DESCRIPTION OF PROBLEM

Adegbola (2) pointed out that with the exception of South Africa, 90% of poultry stock in Africa are located in the rural area and managed under the traditional system. The implication of this is that any factor that affects the production in the rural areas will have serious influence on the national flock.

Under the traditional holding of poultry, extensive management system is practiced in which many species of poultry are kept together and allowed to roam the neighbourhood scavenging for food and water. In a survey (10), 61% of the respondents deliberately supplied drinking water to their birds. Sources of water included pipe-borne water and wells from which respondents obtained drinking water. The remaining 39% of the respondents did not supply water deliberately, and these mentioned streams, brooks, puddles and other stagnant water as sources from which birds drank. Reports from other parts of the country and other countries in Africa painted the same vivid picture (5,8,9,12).

Clearly, there are variations in the water quality available to scavenging chicken and to poultry in general depending on whether they are located in the urban or rural area. Pipe-borne water is chemically treated to make it suitable for human consumption. Water from streams, brooks, puddles and stagnant water which roaming birds in traditional holding drink is definitely not treated. Rainwater is another fairly cheap source of water available to rural chicken, and will almost invariably be available to birds without prior treatment. The effect of water quality, both chemical and microbiological is well documented (6,7). However, there is little or no information in literature on the effects of the different sources of drinking water on the performance of chickens.

Therefore, this study was initiated to investigate the possible effects of four different sources of water available to poultry in a typical peri-urban area on the performance of broilers for 9 weeks.

MATERIALS AND METHODS

The birds and experiments

The study was carried out in two stages. Experiment 1 lasted from weeks 0-4, while experiment 2 lasted from 4-9 weeks of the broilers' life.

Two hundred and eighty-five day-old broiler chicks of Olympia strain obtained from a commercial hatchery were used for the study. They were fed the same diet (Table 1) but allotted to 3 different treatments based on the sources of water used viz.: stream water (STW), pipe-borne water (PBW) and rain water (RNW). Thus there were 3 treatments each with 3 replicates, one replicate had 31 birds while the second and third replicates had 32 birds each.

Feed and water were supplied *ad libitum*. A preliminary period of one week was allowed to acclimatize the birds during which no data were collected. Data were collected on feed intake (g/bird/day), water intake (ml/bird/day) and body weight gain (g/bird/day). Evaporative water loss was accounted for by placing identical drinker with same volume of water at identical level and location with those from which birds drank. Loss of water from these drinkers measured over same period was taken as indication of evaporation through the drinkers and this was subtracted from the total water intake of the birds for those periods.

A total of 273 4-week old broilers were used for experiment 2. At the end of week 4, the same birds that were supplied with STW and PBW were continued on these treatments while the birds supplied with rain water were given well water (WLW) because there was no rain at the beginning of experiment 2. This was to simulate what operates in practice.

Data collection of the performance parameters was as in experiment 1.
Site of the experiment

Table 1: Composition of broiler feeds

Ingredient	Starter %	Finisher %
Corn	39.9	40.0
Maize offal	9.0	18.0
Palm kernel cake	5.0	3.0
Brewer dried grain	5.0	11.0
Groundnut cake	12.0	4.0
Soybean meal	10.0	6.5
Fish meal	4.0	4.0
Blood meal	3.0	4.0
Bone meal	4.0	4.0
Oyster shell	4.75	5.0
Yeast	3.0	2.0
Premix	0.15	2.3
DL-Methionine	0.05	0.05
L-Lysine	0.05	0.05
Anticoccidial	0.05	0.05
Salt	0.15	0.05
Total	100	100
Calculated analysis		
ME, kcal/kg	2593	2689
CP, %	22.1	20.8

The experiments were carried out in the brooding and rearing house on the premises of Faculty of Agriculture, Obafemi Awolowo University, Ile Ife which is located in a typical rain forest ecosystem. Pipe-borne water was obtained from the mains that supply the faculty, it is thus water that is chemically treated and fit for human consumption. Stream water was obtained from a stream that flows close to the students' residential area. It is sometimes drunk and is typical of streams that flow in a typical village community. Rainwater was harvested when it rained and was stored in plastic containers before it was used. Usually, rainwater was not stored for more than 3 days before use. Well water was obtained from a well sunk outside the University premises. It was a well from which people fetched water for domestic use and was supplied to the birds without prior treatment to closely reflect what is available to scavenging chicken.

Chemical analyses

Chemical analysis of the waters used was carried out (3), while the pH of the water was determined by Kent EIL 7020 pH meter.

Statistical Analysis

Data collected were subjected to analysis of variance as outlined (10).

RESULTS

Table 2 shows the concentration of some dissolved inorganic ions in the waters used. Pipe-borne water and WLW used had similar concentration of bicarbonate and chloride while STW had the least. STW used had the highest concentration of nitrate while WLW had the least. RNW used had the least concentration of sulphate while WLW had the highest.

Table 2: Concentration of ions in the Various Sources of Water used

Minerals	STW	RNW	PBW	WLW
Bicarbonate () meq/100ml	0.02	0.03	0.04	0.04
Chloride () meq/100ml	0.010	0.005	0.01	0.01
Nitrate ( ) %	2.60	2.50	2.20	0.17
Sulphate () ppm	0.003	0.0006	0.0039	0.004
pH	6.90	7.00	7.05	7.10

Table 3 shows the effect of sources of water on the performance of broilers from week 1-4. There was no significant effect of source of water on any of the performance parameters measured ($p>0.05$).

Table 3: Effects of Sources of Water on Performance of Broilers, week 1-4*

Parameters	STW	RNW	PBW
Feed Intake (g/bird/day)	26.22.21	25.32.08	25.82.18
Water Intake (ml/bird/day)	69.26.40	67.96.41	69.46.46
Body Weight Gain (g/bird/day)	13.21.12	13.11.11	13.41.14
Feed:Gain	1.99	1.93	1.90
Water/Feed (ml/g)	2.64	2.68	2.69

*There was no statistical significant effect of water source on any of the performance parameters measured ($p>0.05$).

Table 4 shows the effect of source of water on the performance of broilers from week 4-9. There was no significant effect of the source of water on any of the performance parameters measured ($p>0.05$).

Table 4: Effects of Sources of Water on Performance of Broilers, week 4-9*

Parameters	PBW	WLW	STW
Feed Intake (g/bird/day)	115 ± 5.70	114 ± 5.34	115 ± 5.69
Water Intake (ml/bird/day)	288 ± 2.68	292 ± 2.52	292 ± 2.68
Body Weight Gain (g/bird/day)	45.8 ± 3.61	43.0 ± 3.41	42.2 ± 4.14
Feed:Gain	2.51	2.67	2.73
Water/Feed (ml/g)	2.50	2.55	2.53

* There was no statistical significant effect of water source on any of the growth performance parameters measured ($p>0.05$)

DISCUSSION

In this study the source of water used for the birds had no effect on the performance of the birds. Adams *et al*(1) documented the effect of some dissolved ions on the performance of birds. However, the concentration of the ions used was far in excess of what is usually obtained under normal farm conditions. Illian *et al*(6) reported that broilers and growing chicks physiologically can utilize brackish (3000 ppm hard) water as adequately as soft water. It appears that when the concentration of the ions is less that 4000 ppm, it is not toxic to the birds. The concentration of the ions determined in the various water sources used in this study falls far below the 4000 ppm toxic mark.

Although, Bailey (4) noted that broilers that had higher water to feed ratio had better feed utilization. The results of this study did not confirm this observation. The source of water a farmer uses will depend largely on what is locally and more cheaply available to the farmer. Except in very rare (but not impossible) cases of highly brackish water or when the stream is known to be heavily polluted with things such as excreta or oil, the water that a farmer makes available to birds, if clean, is not a subject of undue concern.

CONCLUSIONS AND APPLICATIONS

1. The water sources used in this experiment had similar concentrations of ions and in acceptable quantities and so had no deleterious effects on the growth performance of the broilers up to 9 weeks.
2. A farmer could use any of the sources of water used in this experiment for starting and finishing broilers without experiencing any adverse effect.
3. Farmers should be encouraged to supply their birds with water that is cool, clean and free from contaminants.

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