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The impact of feed type and water quality on the edible viscera and dressing percentage of male and female Ross 308 broiler chickens

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Abstract

During the period of October 20, 2023, to November 25, 2023, a study was conducted in a local field in Nasiriya District/ Dhi Qar Governorate to ascertain how the kind of diet and the water quality affect the dressing percentage and the relative weights of the edible internal organs (heart, liver, and gizzard). In broiler chickens, both male and female. The following six treatments, each consisting of three replicates, were randomly assigned to 300 sexed one-day-old chicks, with an average weight of 40 grams, for a period of 35 days:

Drinking tap water and using mash feed for control constitute the first therapy. Providing drinking water (tap water) and pellet feed (control) is the second treatment. The third treatment involves giving out magnetized drinking water and mash meal. Providing magnetized drinking water and pellet feed is the fourth treatment. Providing drinking water (RO) and mash feed is the fifth treatment. The sixth treatment is providing pellet feed and drinking water (RO).

The treatment of RO water and magnetized water was superior in the percentage of filtration and the relative weight of the heart, liver, and gizzard over the liquefaction water treatment, as demonstrated by the findings, which indicated a substantial superiority (p0.05) for the quality of drinking water. Regarding fodder, the findings indicated a noteworthy rise in the heart's relative weight, but had no impact on the liver's or gizzards relative weight or the clearance rate.

Keywords: Feed form, Water quality, Edible viscera, Male broilers, Female broilers.

I. The introduction

Since the poultry industry has advanced significantly in recent decades, it is now necessary to provide and monitor the standard of water utilized in agricultural areas to ensure enhanced bird health and performance Aziz et al. (2013). Modern technology have thus been developed to clean the drinking water used in chicken fields for mother flocks, laying hens, and broilers. One such therapy is the application of magnetic technology for drinking water it aids in the search for ways to raise the standard of water utilized in animal husbandry and agriculture as a whole. Particularly, Mustafa (2007). In order to combat the excessive sodium in the water and achieve good water desalination with high quality criteria, reverse osmosis (RO) technology has also developed as a viable way to improve the quality of drinking water. Since it provides water with excellent physical, chemical, and microbiological properties without the

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need for chemicals, the magnetic treatment method for drinking water has been widely employed in chicken farms across the world Gilani et al. (2014). The beneficial effects of magnetically treated water on blood parameters, including improved chemical and physical qualities and easier blood flow through veins, impact bird productivity and arteries Aziz et al. (2013).

Nutrition is one of the most important factors that poultry farms must consider. Its influence on the productive performance of birds and the fact that it accounts for 65–75% of the overall cost of production make it economically significant Singh (1993). The quality of feed given to poultry, in particular, has a significant impact on its productive performance. One qualitative feature of the feed that influences both the digestive process and the quantity lost in feed determines its form Amerah et al. (2007). Poultry farms employ several types of feed, such as crumbs, pellet, and powdered feed. Several factors affect feed price and production performance, including these physical types of feed Al-Zubaidi (1986). Breeds and lines that are now well known for their rapid growth and excellent feed conversion efficiency are the product of improvements in broiler genetics. An array of factors, including high feed intake, climatic circumstances, nutritional density, feed physical condition, and others, might affect the growth rate of broilers, which can reach an average weight of 2 kg at 35 days of marketing Ahamed and Abbas (2013). Because of this, the chicken industry has recently demonstrated a rising interest in feed in an effort to get the highest caliber of output performance possible.

This research aims to ascertain the effects of feed type and drinking water quality on the edible viscera and dressing percentage of male and female broilers.

I. Materials & Methods

The 300 chickens were purchased from one of the nearby hatcheries in the Babil Governorate. From the very first day, they were divided into male and female groups, with the males distinguished by a plastic ring attached to their legs. The chickens were kept in cages from one day of age to market age (35 days), with each cage holding 16 birds, depending on the age of the bird. They were split up into six treatments, three copies of each. For the first week, the cages were furnished with feeders (plastic plates) and one-liter inverted drinkers; after that, the automated feeders and drinkers in the hall were utilized.

Water and nutrition

The birds had full access to food and water. Without restriction three different types of ready-made meals were supplied for each phase of the trial, all prepared by the Ghadeer Babel Feed Factory.

1. From one to 7 days of age, the beginning diet has 21% protein and 2966 calories per kilogram of feed.

2: Growing diet: from 7 to 21 days of age, 20% protein and energy (2900 kcal/kg feed).

3. From the age of 21 to 35 days, the final diet has 18% protein and 303.0 kcal/kg of feed for energy.

For the numerous experimental methods, three different types of water (tap water, magnetized water at 1500 Gauss, and RO water) were provided, and each type of water underwent physical, chemical and microbiological evaluation.

Physical and chemical tests of the water were carried out in the central laboratory of the College of Agriculture, University of Basra, while microbiological analyzes were carried out in the Nutrition Laboratory / Department of Animal Production / College of Agriculture and Marshes.

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Table 1 shows the water utilized in the study's chemical, physical, and microbiological analyses (mean ± standard error).

Water quality / Qualities	Tap	Magnetized Gauss (1500)	RO
pH	7.70^{c} 0.02±	7.88^{b} 0.01±	8.30^{a} 0.06±
DO2 (mg/L)	9.10^{c} 0.06±	9.48^{b} 0.25±	10.13^{a} 0.01±
Chlorides (ppm)	44.00^{c} 3.00±	31.77^{b} 0.58±	21.00^{a} 1.00±
Ca (mg/L)	20.60^{b} 1.80±	17.45^{b} 1.25±	3.80^{a} 0.60±
Na (mg/L)	300.00^{b} 1.95±	297.85^{b} 2.01±	15.19^{a} 0.95±
K (mg/L)	15.13^{b} 0.85±	14.35^{b} 1.00±	1.55^{a} 0.08±
Nitrite (mg/L)	1.35^{b} 0.22±	1.20^{b} 0.20±	0.57^{a} 0.03±
EC(µs/cm)	15.40^{b} 0.25±	16.20^{b} 0.20±	92.03^{a} 2.35±
TDS (mg/L)	5132.25^{b} 80.00±	4762.83^{b} 44.39±	130.45^{a} 14.03±
Turbidity (NTU)	9.19^{c} 0.18±	2.11^{b} 0.03±	0.18^{a} 0.05±
Total hardness (mg/L)	15.14±850.11^{b}	14.40±801.25^{b}	1.13±153.18^{a}
Total bacteria $\times 10^{3}$ (mg/L)	28.02±200.25^{b}	7.35±103.32^{a}	0.95±67.14^{a}

*Differing letters in the rows denote statistically significant ($p \leq 0.05$) variations in the mean.

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Birds were weighed before slaughter, and then weighed after slaughter, and the internal organs eaten separately for males and females were weighed to calculate the relative weights of the heart, liver, and gizzard, and the dressing percentage according to the following equations:

Dressing percentage = Weight of cleaned carcass (g) excluding internal viscera / Weight of live body (g) × 100

Relative organ weight = ("internal organ weight (g)")/"live body weight (g)" x 100

Al-Fayad et al. (2011).

The statistical software SPSS (2018) was used to analyze the data statistically, and Gen Stat, 2016, a statistical programmer, was used to evaluate the significance of the mean differences and determine the LSD value.

II. Results and Discussion

Dressing percentage

A significant advantage ($p \leq 0.05$) in the drinking water quality is seen in Table No. 2. with RO and magnetized water outperforming tap water in the dressing percentage (72.18, 72.16, 69.87), respectively. These findings were consistent with those reported by (Mohammed, 2012; Saleh, 2015: Jamba and Ali, 2022) they found that the quality of water has an effect on the dressing percentage of broiler carcasses.

While that there was no discernible difference in feed type, gender, or the interaction between them The results of the study were in agreement with what was indicated by (Farghly et al., 2014; Attia et al., 2014; Fasuyi and Arire, a2015) that there were no significant differences for the form of the feed on the clearance percentage.

Table No. 2 displays the impact of feed shape and water quality on (dressing percentage, ± standard error).

Water	Feed	Sex		Interaction water and feed
		Male	Female	
Tap water	Mash	69.20±2.44	69.03±3.16	69.12±2.21
	Pellet	71.20±3.02	70.06±2.31	70.63±2.24
Magnetized	Mash	72.23±3.43	72.34±1.45	72.29±3.18
	Pellet	72.82±1.47	71.25±2.82	72.04±3.80
RO	Mash	72.44±2.57	71.60±2.84	72.02±1.34
	Pellet	72.38±0.90	72.35±1.68	72.37±2.58
				Average water effect
intersection water and sex	Tap water	70.20±2.79	69.55±2.14	69.87±2.08
	Magnetized	72.52±3.38	71.79±3.80	72.16±1.58

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	RO		72.39±4.86		71.98±2.94	72.18±2.00
						Average feed effect
intersection feed and sex	Mash		71.29±1.93		70.99±1.62	71.14±1.39
	Pellet		72.13±1.84		71.22±1.41	71.68±1.39
Average Sex			71.71±1.65		71.10±1.92	
LSD 0.05						
Water	Feed	Sex	Feed×Water	Sex×Water	Sex×Feed	Sex×Feed×Water
2.03	NS	NS	NS	NS	NS	NS

The heart's relative weight

According to Table No. (3), the RO water significantly ($p \leq 0.05$) outperforms the magnetized water and tap water treatments, with (0.63, 0.61, and 0.60)%, respectively The reason for the high rates of relative heart weights of carcasses treated using reverse osmosis water may be due to the direct relationship between body weight and organ weight. This study did not agree with what was stated by Jamba and Ali (2022), who said that the relative weight of the heart was not significantly affected by the quality of the water.

Table No. 3 Displays the impact of feed type and water quality on the relative heart weight %, ± standard error.

water	Feed	Sex		Interaction water and feed
		Male	Female	
Tap	Mash	0.58±0.09	0.60±0.10	0.59±0.05
	Pellet	0.62±0.02	0.60±0.3	0.61±0.06
Magnetized	Mash	0.61±0.09	0.59±0.07	0.60±0.05
	Pellet	0.63±0.07	0.61±0.08	0.62±0.07
RO	Mash	0.62±0.07	0.61±0.01	0.62±0.02
	Pellet	0.63±0.09	0.62±0.09	0.63±0.08
				Average water effect
intersection water and sex	Tap water	0.60±0.05	0.60±0.07	0.60±0.08

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	Magnetized		0.62±0.01	0.60±0.06		0.61±0.02
	RO		0.60±0.01	0.62±0.09		0.63±0.09
						Average feed effect
intersection feed and sex	Mash		0.60±0.5	0.60±0.03		0.60±0.02
	Pellet		0.63±0.03	0.61±0.05		0.62±0.01
Average Sex			0.61±0.06	0.60±0.02		
LSD 0.05						
Water	Feed	Sex	Feed×Water	Sex×Water	Sex×Feed	Sex×Feed×Water
0.021	0.013	NS	0.020	NS	0.028	0.03

Furthermore, the table shows a significant ($p \leq 0.05$) advantage of the feed form over the heart's relative weight, with the pellet form feed treatments outperforming the mash form ones (0.62, 0.60), respectively. The current study's findings did not agree with those of (Zakaria et al., 2013; Shabani et al., 2015), who found no evidence of a significant effect of feed type on the relative weight of the heart.

In terms of their interaction, the RO water treatment and pellet feed had the greatest value, demonstrating a significant advantage ($p \leq 0.05$). The lowest result (0.63, 0.59) % was observed for the treatment of tap water and mash feed. and the table shows that there is a significant ($p \leq 0.05$) difference in the interaction between sex and feed, as the treatment of males that were provided with feed in the form of pellet recorded the highest value compared to the males and females of the treatments that were provided with feed in pellet form mash (0.63, 0.60)%, and the interaction between water, feed, and gender showed a significant difference ($p \leq 0.05$), with males treated with RO water and pellet feed recording the highest relative heart weight compared to males in the tap water and mash feed treatment, which recorded the lowest value (0.63, 0.58%). The interaction between sex and feed is significantly different ($p \leq 0.05$) in the table, with the male treatment receiving pellet feed recording the greatest value when compared to the male and female treatments receiving mash feed. The lowest result (0.63, 0.59)% was observed for the treatment of tap water and mash feed.. the interaction of water, feed, and gender showed a significant difference ($p \leq 0.05$), with males treated with RO water and pellet feed recording the highest relative heart weight compared to males treated with tap water and mash feed, which recorded the lowest value (0.63, 0.58)%.

The liver's relative weight

Table No. 4 the relative weight of the liver demonstrated a substantial ($p \leq 0.05$) advantage of the RO water and magnetized water treatments over the tap water treatment in terms of drinking water quality, with the latter recording (3.34, 3.08, 2.61%) %, respectively, These results did not agree with what was reported by Jamba and Ali (2022), who said that the relative weight of the liver was not significantly affected by the quality of the water.

However, feed type, gender, or their combination had no discernible impact. These results were not in agreement with the results obtained by Amirabdollahian et al. (2014; Attia et al., 2014; Fasuyi and Arire,

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2015), which indicated higher rates of relative liver weights in broiler carcasses fed with pelleted fodder compared to those fed with mash fodder.

Table No. 4 displays the impact of meal shape and w ater qua lity on the relative liver weight. %, ± standard error.

W ater	Feed	Sex		Interaction water and feed
		Male	Female	
Tap water	Mash	2.57±0.37	2.45±0.21	2.51±0.27
	Pellet	2.93±0.08	2.48±0.40	2.69±0.30
Magnetized	Mash	3.28±0.46	3.01±0.43	3.15±0.41
	Pellet	3.12±0.21	2.91±0.37	3.02±0.27
RO	Mash	3.47±0.05	3.44±0.13	3.45±0.19
	Pellet	3.29±0.24	3.16±0.28	3.26±0.24
				Average water effect
intersection water and sex	Tap water	2.75±0.41	2.47±0.33	2.61±0.36
	Magnetized	3.20±0.41	2.96±0.47	3.08±0.22
	RO	3.38±0.18	3.30±0.28	3.34±0.25
				Average feed effect
intersection feed and sex	Mash	3.10±0.36	2.97±0.30	3.03±0.33
	Pellet	3.11±0.20	2.85±0.31	2.98±0.27
Average Sex		3.11±0.36	2.91±0.36	

LSD 0.05						
Water	Feed	Sex	Feed×Water	Sex×Water	Sex×Feed	Sex×Feed×Water
0.44	NS	NS	NS	NS	NS	NS

The gizzard's relative weight

Table No. 5 makes this evident: the quality of water used in the experimental treatment performed significantly better ($p \leq 0.05$) than the relative weight of the gizzard. The RO water and magnetized water treatments outperformed the tap water treatment, recording (1.94, 1.81, and 1.66%) over straight; these

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findings conflicted with those of Jamba and Ali (2022). They discovered no discernible relationship between the relative weight of the gizzard and water quality.

Although there was no discernible advantage in terms of feed type, gender, or their interaction with regard to the gizzard's relative weight, these results were not in agreement with the results obtained by (Amirabdollahian et al., 2014; Attia et al., 2014; Fasuyi and Arire, 2015), It showed that grill carcasses fed pelleted fodder had a greater rate of relative weights of gizzards than carcasses given mash-form fodder.

Table No. (5) Illustrates how meal shape and water quality affect the gizzard's relative weight. %, ± standard error.

Water	Feed	Sex		Interaction water and feed
		Male	Female	
Tap water	Mash	1.69±0.13	1.60±0.15	1.65±0.18
	Pellet	1.74±0.13	1.62±0.05	1.66±0.08
Magnetized	Mash	1.83±0.26	1.71±0.18	1.76±0.16
	Pellet	1.92±0.19	1.79±0.15	1.85±0.16
RO	Mash	1.98±0.14	1.91±0.20	1.94±0.20
	Pellet	1.89±0.16	1.97±0.22	1.93±0.17
				Average water effect
intersection water and sex	Tap water	1.71±0.18	1.61±0.28	1.66±0.20
	Magnetized	1.88±0.20	1.75±0.26	1.81±0.23
	RO	1.94±0.10	1.94±0.19	1.94±0.15
				Average feed effect
intersection feed and sex	Mash	1.83±0.13	1.73±0.26	1.78±0.14
	Pellet	1.85±0.15	1.79±0.16	1.82±0.15
Average Sex		1.84±0.18	1.76±0.20	

LSD 0.05						
Water	Feed	Sex	Feed×Water	Sex×Water	Sex×Feed	Sex×Feed×Water
0.13	NS	NS	NS	NS	NS	NS

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III. Conclusion

Our conclusion from this study is supported by the statistical analysis's results, which show that when broilers are given water with high quality features, some of the production characteristics (dressing percentage, relative weight of edible internal organs, and feed form) significantly improve (P≤0.05). The relative weight of the heart for the treatments that received feed in the form of tablets demonstrated a significant advantage (P≤0.05) in the findings. They were mathematically superior to the other qualities that were investigated. Gender had no significant impact (P≥0.05) on the characteristics this study looked at.

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