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The Effect of Aspirin Supplementation in Drinking Water and Fasting on Some Productive Traits of Broiler Chickens Ross 308 Exposed to Cyclic Heat Stress

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Abstract

This study was conducted in the poultry field, affiliated with the Department of Animal Production at the College of Agriculture/University of Kufa for the period from 4/9 to 9/10/2025. The purpose of the study is to identify the effect of aspirin supplementary in drinking water and fasting on the productive performance of broiler chicks exposed to heat stress. In the experiment, 240 one-day-old, unsexed broiler chicks of Ross308 were used, prepared from the Al-Anwar hatchery located in the Al-Muradiya area of Babil Governorate. The chicks were randomly assigned to four treatments, 60 chicks per treatment and three replicates (20 chicks/replicate), according to the following treatments: (T_1): Control, provided with feed and water throughout the experiment without any addition, (T_2): Fasting from feed for 6 hours from 11:00 to 17:00, (T_3): Aspirin supplementation in drinking water at a rate of 100 mg/L for 6 hours from 11:00 to 17:00, (T_4): Fasting from feed for 6 hours from 11:00 AM to 17:00, aspirin was then added for 6 hours, from 5:00 PM to 11:00 PM. The chicks were fed a starter diet for 1-10 days, a grower diet for 11-24 days, and a finisher diet for 25-35 days. A Complete Randomized Design (CRD) was used to analyze the data, and significant differences between treatments were tested at significance levels of ($P \leq 0.05$) and ($P \leq 0.01$). The most important results were as follows:

- Significant increase in final body weights at 5 weeks of age for all treatments (T_2, T_3, and T_4) compared to the control treatment (T_1). Treatments T_3 and T_4 significantly exceeded treatment T_2.
- Significant increase in total weight gain for all treatments compared to the control treatment (T_1).
- Significant increase in total feed consumption for treatments T_3 and T_4 compared to the control treatment (T_1).
- Significant improvement in cumulative Feed Conversion Ratio FCR for treatment T_4 compared to treatments (T_1 and T_2).
- No significant differences were found in the dressing % for all experimental treatments.
- A significant increase ($p \leq 0.01$) was found in the production index and the economic index for all treatments T_2, T_3, and T_4 compared to the control T_1.
- No significant differences were found in the relative weight of the breast, thighs, and back in all experimental treatments. For the wing cut, there was a significant increase in treatment T_2 compared to T_2 and T_3, and a significant decrease in treatment T_4 compared to the control T_1. For the neck cut, there was a significant decrease in treatment T_3 compared to the control T_1 and treatments T_2 and T_4.

Keywords: Aspirin, Productive Traits, Broiler Chickens Ross 308, Heat Stress

Introduction

Broilers are an important source of food security, due to their production efficiency represented by the short growth cycle and high feed conversion, as the domestic bird industry plays a strategic role in promoting economic growth and creating job opportunities [(1)]. Despite this importance, the seasonal rise in temperatures above normal levels poses serious challenges for breeders due to the significant economic loss resulting from the decline in bird productivity and the increase in diseases and deaths [(2)]. Several studies have been conducted to combat the effects of heat stress, one of which is the use of aspirin (acetylsalicylic acid), as it is considered an anti-inflammatory, antipyretic and pain-relieving drug [(3,4)], which is an effective method used to reduce oxidative damage resulting from bird stress in poultry fields [(2)]. Additionally, the fasting system during peak temperature hours is an important method in alleviating heat stress on birds and improving productive performance [(5)]. This practice contributes to reducing the internal heat resulting from digestion processes, which in turn reduces the heat load inside the bird's body, leading to a noticeable decrease in the mortality rate as a result of heat stress [(6)]. The objective of the present study is to use both methods together (aspirin supplementation and fasting) at different times to reduce the potential negative effects of heat stress.

Materials and Methods: This study was conducted at the poultry field of the Department of Animal Production at the College of Agriculture / University of Kufa from 4/9 to 9/10/2025 for a period of 35 days. The study evaluated the effect of aspirin supplementation in the drinking water and fasting from feed on the productive performance of broiler chicks exposed to heat stress. A total of 240 one-day-old, unsexed Ross 308 broiler chicks, with an average initial weight of 45 g, were used. The chicks were sourced from the Al-Anwar hatchery located in the Al-Muradiya area of Babylon Governorate. The chicks were randomly assigned to four experimental treatments, with 60 chicks per treatment and three replicates (20 chicks/replicate). Coarse wood shavings, 5 cm thick, were used for bedding. The birds were fed three diets (starter, grower, and finisher). The starter diet was provided from 1 to 10 days of age with an energy and protein content of 3015 kJ/kg and 23.11%, respectively. The grower diet was provided from 10 to 24 days of age with an energy and protein content of 3081 kJ/kg and 21.51%, respectively. The finisher diet was provided from 25 to 35 days of age with an energy and protein content of 3210 kJ/kg and 19.58%, respectively. The treatments were as follows: (T_1): Control, provided with feed and water throughout the experiment without any addition, (T_2): Fasting from feed for 6 hours from 11:00 to 17:00, (T_3): Aspirin supplementation in drinking water at a rate of 100 mg/L for 6 hours from 11:00 to 17:00, (T_4): Fasting from feed for 6 hours from 11:00 AM to 17:00, Aspirin was then added for 6 hours, from 5:00 PM to 11:00 PM.

Statistical Analysis: Data for the studied traits were analyzed using the SAS (2012) statistical software package*. Treatment effects were evaluated using a Completely Randomized Design (CRD). Treatment means were compared using Duncan's Multiple Range Test (1955) * with statistical significance of 0.05 and 0.01, and the following mathematical model was adopted:

$Yij = \mu + Ti + eij$

Results and Discussion

1- Live Body Weight and Weight Gain:The effects of the experimental treatments on live body weight and body weight gain from weeks 1 to 5 are presented in Tables 1 and 2. As shown in Table 1, no significant differences were observed in live body weight for the first and second weeks of the experiment. In the third week, treatments T_4 and T_3 are significantly higher than the control treatment T_1 and treatment T_2 ($P \leq 0.05$). In the fourth and fifth weeks of the experiment, birds in all treatments T_3, T_3, and T_4 significantly superior birds in the control treatment T_1 ($p \leq 0.01$). Similarly, birds in treatments T_4 and T_3 significantly surpass those in treatment T_2. Whereas, Table (2) shows that there are no significant differences in weight gain between all treatments for the first and second weeks of the experiment. However, in the fourth and fifth weeks and the total weight gain, we observe a highly significant superiority $P \leq 0.01$ for all treatments T_2, T_3 and T_4 compared to the control treatment T_1, and the superiority of treatments T_3 and T_4 over treatment T_2.

Table (1) Effect of Aspirin supplementation in drinking water and fasting on the average live body weight of broiler chickens exposed to cyclic heat stress [3] for ages (1-5) weeks

Treatments[1]	Average live body weight (g/bird) per week Mean ± Standard error [2]				
	1	2	3	4	5
T_1	1.70±175.16	2.72±475.66	b1.23±897.60	d 4.14±1427.0	d3.60±2010.62
T_2	1.59±179.20	1.98±470.69	c1.33±888.21	c 3.003±1480.73	c4.38±2091.54
T_3	1.51±180. 70	2.30±482.50	a1.93±914.22	b 5.02±1502.61	b4.39±2142.50
T_4	2.71±172.31	3.93±478.00	a3.28±917.50	a 5.72±1521.81	a3.38±2184.30
Significance	N. S	N. S	*	**	**

*, ** Different letters vertically indicate significant differences between treatments ($P \leq 0.05$, $P \leq 0.01$, respectively). N.S. - No significant differences between treatments.

[1-] Treatments: T_1 - Control group; T_2 - fasting for 6 hours from 11:00 to 17:00; T_3 - aspirin supplementation to drinking water at a rate of 100 mg/L for 6 hours from 11:00 to 17:00; T_4 - fasting for 6 hours from 11:00 to 17:00, followed by the aspirin supplementation for 6 hours from 17:00 to 23:00.

[2-] (Mean ± Standard Error).

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[3]- Cyclic day temperature.

Table (2) Effect of Aspirin supplementation in drinking water and fasting on the rate of weight gain of broiler chickens exposed to cyclic heat stress [3] for ages (1-5) weeks

Treatments[1]	Average ± Standard Error Average weight gain (g/bird) per week [2]					
	1	2	3	4	5	Total
T_1	1.15± 129.0	4.38 ± 300.50	b 3.65 ± 421.94	b 4.48± 529.40	d 2.83 ± 583.62	d 2.81 ± 1964.79
T_2	1.86± 133.20	0.60± 219.49	b 1.18± 417.52	a1.90 ± 592.52	c 6.64 ± 610.81	c 4.32 ± 2045.54
T_3	1.57± 134.53	1.48± 301.80	a 1.45 ± 431.72	a 3.43 ± 588.39	b 1.09 ± 639.89	b 4.11 ± 2096.33
T_4	2.90± 126.81	6.46± 305.69	a 7.21 ± 439.50	a 8.10 ± 604.31	a 8.94 ± 662.94	a 3.67 ± 2138.80
Significance	N. S	N. S	*	**	**	**

*, ** Different letters vertically indicate significant differences between treatments ($P \leq 0.05$, $P \leq 0.01$, respectively). N.S. - No significant differences between treatments.

[1]- Treatments: T_1 - Control group; T_2 - fasting for 6 hours from 11:00 to 17:00; T_3 - aspirin supplementation to drinking water at a rate of 100 mg/L for 6 hours from 11:00 to 17:00; T_4 - fasting for 6 hours from 11:00 to 17:00, followed by the aspirin supplementation for 6 hours from 17:00 to 23:00.

[2]- (Mean ± Standard Error).

[3]- Cyclic day temperature.

Live body weight and body weight gain are critical productive traits in broiler production due to their direct impact on marketing age and subsequent economic returns. Thus, the results show that aspirin and fasting have contributed to reducing the effects of high temperatures on birds. Consequently, this has led to an improvement in productive performance, represented by live weight and weekly and total weight gain. The significant increase in body weight and weight gain of birds observed in treatment T_2, fasting for 6 hours compared to control treatment T_1, can be attributed to the role of fasting in reducing body temperature, as feed consumption generates energy resulting from food metabolism. This was confirmed by [5], as birds fasted for 8 hours achieved a significant increase in body weight compared to non-fasted birds. They concluded that fasting for this duration is an effective management strategy to alleviate the impact of heat stress under hot and humid environmental conditions. The significant improvement in body weight and weight gain of birds in the T_3 treatment compared to the T_1 was similar to the findings of [7,4], who recorded a significant improvement in body weight and weight gain using aspirin in broiler diets. The significant improvement in body weight of birds in the T_3 treatment may be due to the continuous role of aspirin in reducing body temperature during hot times of the day, thus enhancing the activity of antioxidant enzymes, which protect tissues from oxidative damage and improve productive performance [8]. Furthermore, aspirin exhibits distinct antipyretic, analgesic, and anti-inflammatory properties [4], which positively impact the health and productive performance of the birds. The highly significant superiority ($P \leq 0.01$) achieved in final body weight and weight gain for the birds in treatment T_4 was due to the distinctive role of fasting in reducing body temperature during the hot time of day (11:00 - 17:00). The birds were prevented from eating feed after it was provided after 17:00, along with the aspirin administration to reduce body temperature resulting from metabolic processes, which positively impacted body weight and weight gain, as detailed in Table (3). Aspirin enhances antioxidant enzymes activity, thereby protecting tissues from oxidative damage and improving productive performance [8]. These findings align with those of [7,4], who demonstrated that aspirin use led to positive results in both weight and weight gain. Conversely, our results our results contradict the findings of [9], who reported that aspirin administration had no significant effect on live body weight. The significant improvement in body weight of the T_2 treatment birds compared to the T_1 control is due to the role of fasting in reducing body temperature. This was confirmed by a study conducted by [5], where birds fasting for 8 hours achieved a significant increase in weight compared to non-fasting birds. They concluded that implementing a fasting protocol for the specified duration serves as an effective management strategy to alleviate the impact of heat stress under hot and humid environmental conditions

2- Feed Consumption

During weeks one and two, no significant differences were observed among any of the experimental treatments. In the third week, however, treatments T_3 and T_4 exhibited a significant increase ($P \leq 0.05$) in feed consumption compared to T_2 as shown in Table (3), while no significant variations were detected among all treatments relative to the control treatment T_1. However, in the fourth and fifth weeks, regarding total feed consumption, a highly significant superiority ($P \leq 0.01$) was observed for birds in all treatments T_2, T_3, and T_4 compared to birds in the control treatment T_1, while treatment T_4 ($P \leq 0.01$) achieved a highly significant elevation over both treatments T_2 and T_1 in total feed consumption.

Table (3) Effect of Aspirin supplementation in drinking water and fasting on feed consumption of broiler chickens exposed to cyclic heat stress [3] for ages (1-5) weeks

Treatments[1]	Average ± Standard Error Weekly and Total Feed Consumption (g/bird) for Weeks[2]					
	1	2	3	4	5	Total
T_1	1.42±150.33	4.40±361.16	ab10.32±620.73	c2.85±856.66	b22.95±1111.82	c32.55±3100.70
T_2	1.58±156.20	2.83±370.20	b3.87±607.25	b3.43±895.32	a7.33±1181.20	b9.14±3210.17
T_3	2.09±153.41	2.69±365.32	a3.96±630.42	b3.77±900.54	a2.07±1193.33	ab2.29±3243.02
T_4	3.02±155.00	2.58±372.56	a2.52±632.20	a3.62±915.20	a2.64±1200.72	a4.23±3275.68
Significance	N. S	N. S	*	**	**	**

*, ** Different letters vertically indicate significant differences between treatments ($P \leq 0.05$, $P \leq 0.01$, respectively). N.S. - No significant differences between treatments.

[1]- Treatments: T_1 - Control group; T_2 - fasting for 6 hours from 11:00 to 17:00; T_3 - aspirin supplementation to drinking water at a rate of 100 mg/L for 6 hours from 11:00 to 17:00; T_4 - fasting for 6 hours from 11:00 to 17:00, followed by the aspirin supplementation for 6 hours from 17:00 to 23:00.

[2]- (Mean ± Standard Error).

[3]- Cyclic day temperature.

The highly significant increase $P \leq 0.01$ in feed consumption during the fourth and fifth weeks and in total feed consumption of birds in treatments T_2, T_3, and T_4 compared to birds in the control treatment T_1 may be due to the role of fasting and aspirin in reducing the high body temperature resulting from exposure to heat stress. This mechanism aligns with previous findings by [10,11], who reported that feed consumption in broiler chickens decreases by (1.5–3.5%) for every rise above the thermoneutral zone. This was confirmed in cyclic heat stress, and the effect is increased by constant temperature [12,13]. The reasons for this decrease in feed consumption are due to heat increment, as the bird seeks to reduce the heat resulting from digestion and metabolism to avoid raising its internal body temperature. In addition, fasting and aspirin play a role in reducing the bird's temperature during the hot times of the day. Aspirin may reduce inflammation resulting from heat stress [4], as heat stress stimulates the secretion of the immunosuppressive hormone corticosterone, which causes inflammation [14], which reduces the birds' appetite and thus reduces feed consumption.

3- Feed Conversion Ratio

As shown in Table 4, no significant differences were observed in the feed conversion ratio (FCR) during the first, third, fourth, and fifth weeks of age. However, in the second week, there was a significant improvement ($p \leq 0.5$) in the feed conversion ratio of birds in treatments T_1, T_3, and T_4 compared to treatment T_2. Regarding the cumulative FCR, there was a significant improvement for birds in treatments T_3 and T_4 compared to the control treatment T_1 and treatment T_2.

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Table (4) Effect of Aspirin supplementation in drinking water and fasting on feed conversion ratio of broiler chickens exposed to cyclic heat stress [3] for ages (1-5) weeks

Treatments[1]	Mean ± Standard Error Feed Conversion Ratio (g/bird) per week [2]					
	1	2	3	4	5	Cumulative
T_1	0.01±1.16	b 0.02±1.20	0.03±1.47	0.02±1.61	0.13±1.74	a 0.02±1.58
T_2	0.01±1.21	a0.01±1.27	0.01±1.45	0.01±1.51	0.03±1.93	a 0.01±1.56
T_3	0.02±1.14	b0.01±1.21	0.02±1.45	0.03±1.52	0.01±1.86	b 0.01±1.54
T_4	0.05±1.22	b 0.02±1.21	0.02±1.43	0.03±1.51	0.02±1.81	b 0.01±1.53
Significance	N. S	*	N. S	N. S	N. S	*

*, ** Different letters vertically indicate significant differences between treatments ($P \leq 0.05$, $P \leq 0.01$, respectively). N.S. - No significant differences between treatments.

[1]- Treatments: T_1 - Control group; T_2 - fasting for 6 hours from 11:00 to 17:00; T_3 - aspirin supplementation to drinking water at a rate of 100 mg/L for 6 hours from 11:00 to 17:00; T_4 - fasting for 6 hours from 11:00 to 17:00, followed by the aspirin supplementation for 6 hours from 17:00 to 23:00.

[2]- (Mean ± Standard Error).

[3]- Cyclic day temperature.

The significant improvement in feed conversion ratio (FCR) of the birds in treatments T_3 and T_4 was in agreement with the findings of [15,7,14], who indicated that the use of aspirin in chicken diets improved the FCR. Heat stress is considered one of the most important factors affecting the gut microbiota, as it reduces the levels of beneficial bacteria such as Lactobacillus and Bifidobacterium and increases the numbers of harmful bacteria such as coliforms and Clostridium [5]. Conversely, [8] aspirin works to enhance intestinal barrier integrity, which positively reflects on nutrient digestion and absorption of nutrients, increases the bird's utilization of feed, improves the feed conversion ratio, and also promotes beneficial bacteria in the microbial communities in the intestines of broiler chickens. A previous study indicated that adding salicin extracted from white willow at different levels led to enhanced disease resistance by reducing the number of *staphylococci* and *Escherichia coli* while increasing the numbers of lactobacilli in the intestinal microbial communities of broiler chickens exposed to heat stress [8]. It is believed that the mechanisms mentioned in these studies, along with their positive impact on the digestive system, ultimately enhance feed conversion efficiency.

4- Dressing Percentage, Production Index, and Economic Index Values

As illustrated in Table 5, no significant differences were observed in the dressing percentage across all experimental treatments. However, a significant increase ($P \leq 0.01$) was detected in both the production index and economic index values in favor of all experimental treatments compared to the control treatment T_1, with treatment T_4 being superior to treatments T_2 and T_3.

Table (5) Effect of Aspirin supplementation in drinking water and fasting on dressing percentage, production index and economic index of broiler chickens exposed to cyclic heat stress [3] for ages (1-5) weeks

Treatments[1]	Mean ± Standard error [2]		
	Dressing %	Production Index	Economic Index
T_1	1.77 ± 70.25	d4.99 ± 364.47	d4.99 ± 364.47
T_2	0.08 ± 69.33	c2.88 ± 382.28	c2.88 ± 382.28
T_3	0.40 ± 69.70	b2.17 ± 393.62	b2.17 ± 393.62
T_4	0.71 ± 70.97	a1.47 ± 408.73	a1.47 ± 408.73
Significance	N. S	**	**

*, ** Different letters vertically indicate significant differences between treatments ($P \leq 0.05$, $P \leq 0.01$, respectively). N.S. - No significant differences between treatments.

[1]- Treatments: T_1 - Control group; T_2 - fasting for 6 hours from 11:00 to 17:00; T_3 - aspirin supplementation to drinking water at a rate of 100 mg/L for 6 hours from 11:00 to 17:00; T_4 - fasting for 6 hours from 11:00 to 17:00, followed by the aspirin supplementation for 6 hours from 17:00 to 23:00.

[2]- (Mean ± Standard Error).

[3]- Cyclic day temperature.

The reason for the superiority of treatment T_4 over the other treatments in the experiment is due to the increase in the average body weight of the treatment on the one hand, and the significant improvement in the feed conversion ratio on the other hand, which was reflected positively on the values of the production index and the economic index.

5- Relative weight of carcass cuts

As shown in Table 6, no significant differences were observed in the breast, thigh, and back cuts among all experimental treatments. However, regarding the wing cut, a significant increase ($P < 0.01$) was found in treatment T_2 compared to treatments T_3 and T_4, with no significant difference observed between treatments T_2 and T_1. Meanwhile, T_4 significantly decreased compared to the control T_1. As for the neck cut, a superiority ($P<0.01$) was found for treatments T_2 and T_4 compared to T_3, with no significant differences for all experimental treatments compared to control T_1.

Table (6) Effect of Aspirin supplementation in drinking water and fasting in the main cuts of broiler chickens exposed to cyclic heat stress [3]

Treatments[1]	Mean ± Standard error [2]				
	Breast %	Thighs %	Wings %	Neck%	Back%
T_1	0.73 ± 35.05	1.00± 28.89	ab 0.29±10.33	a 0.02± 5.92	0.53± 19.27
T_2	0.70± 35.88	0.35± 27.65	a 0.02 ± 10.69	a 0.10± 5.99	0.70± 19.11
T_3	0.04± 37.9	1.32 ± 28.44	bc 0.10 ± 9.75	b 0.34 ± 5.22	0.37± 18.68
T_4	0.67± 36.66	0.30 ± 28.02	c 0.26 ± 9.61	a 0.27 ± 6.64	0.30± 18.49
Significance	N. S	N.S	**	**	N.S

*, ** Different letters vertically indicate significant differences between treatments ($P \leq 0.05$, $P \leq 0.01$, respectively). N.S. - No significant differences between treatments.

[1]- Treatments: T_1 - Control group; T_2 - fasting for 6 hours from 11:00 to 17:00; T_3 - aspirin supplementation to drinking water at a rate of 100 mg/L for 6 hours from 11:00 to 17:00; T_4 - fasting for 6 hours from 11:00 to 17:00, followed by the aspirin supplementation for 6 hours from 17:00 to 23:00.

[2]- (Mean ± Standard Error).

[3]- Cyclic day temperature.

Our results differ from the findings of [16], who reported that aspirin supplementation at various levels led to a significant increase in the relative weights of the breast and thighs in broilers exposed to heat stress

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