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Alleviating Adverse Effects of Heat Stress by Using Potassium Chloride or/and Sodium Bicarbonate for Broiler Chicks.

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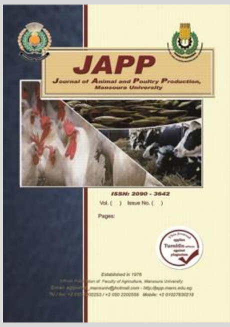

ABSTRACT

The experimental feeding trial of this research was carried out to estimate the effects of dietary supplementation with potassium chloride (KCI), Sodium bicarbonate ($NaHCO_3$); singly or in combination, on the performance and consequent physiological responses of broiler chicks reared under naturally occurring summer heat stress. Five hundred forty unsexed one-day-old broiler chikens were allocated to 12 experimental group, each with 3 replicates. All chicks were placed in a naturally ventilated rearing room. Diets of chicks supplemented with KCl or $NaHCo_3$ singly or in combination. Treatment 1 survived as a control, KCl at levels of 0.3, 0.6 and 0.9% of diets for chicks of T2, T3 and T4, $NaHCo_3$ at levels of 0.25 and 0.5% of diets for chicks of T5 and T6 respectively. Diets for chicks of T7, T8, T9, T10, T11 and T12 contain a mixture KCl and $NaHCO_3$. Broiler growth performance and selected blood parameters were expected. It was experiential that broiler chickens feeding a diet a containing combination between 0.6% potassium chloride and 0.5% sodium bicarbonate had significantly higher body weight and body weight gain with the best value of feed efficiency, more viability than other treatments and weights of carcass and percentages of liver, heart, gizzard, thighs and breast.

***Keywords*:** potassium chloride, sodium bicarbonate, broiler performance.

INTRODUCTION

Many factors that influence the poultry productivity. Such as, breed, age and environmental conditions have been identified to influence the growth rate of birds (Murawska, 2017). High ambient temperature negatively influences the performance of broilers; Several methods are available to assuage the effect of high environmental temperature on the recital of poultry. Because it is costly to cool animal buildings, such methods are attentive mostly on dietary manipulations. An ambient temperature above 30°C is considered to harm on the performance of broiler chicks. Earlier findings have suggested that reduced feed intake, body weight, and feed conversion efficiency are caused by high environmental temperatures (Azad *et al*., 2004; Mujahid *et al*., 2009). Also, Vandana *et al.* (2021) reported that heat stress reduces the growth, reproductive performance, and egg production in poultry birds. However, Yosi *et al.* (2017) found that the supplementation of 0.50% KCl in drinking water was the optimal level for improving the performance and physiological response of broiler chickens under environmental heat stress conditions . Furthermore, supplementing the diet with vitamins and minerals can alleviate some of these adverse effects on growth performance, attributed to high ambient temperatures (Sahin *et al.*, 2002). The negative effects of high temperatures on poultry performance can be minimized by the use of appropriate housing design, installation of cooling systems, feed formulations designed according to feed intake and weather conditions, and the use of some minerals, electrolytes, ascorbic acid, or acetylsalicylic acid in the drinking water of birds (Branton *et al*., 1986; Smith and Teeter, 1992 and Naseem *et al*., 2005). Several studies indicated that heat stress reduces the body weight (Al-Neemy and Hassan, 2002), immune response and also causes mortality Younis (2007) and different therapeutic measures are used to minimize the harmful effects of heat stress on the performance of broiler chicks such as ascorbic acid Younis (2007), vitamin E (Sahin *et al.,* 2002), acetylsalicylic acid (Naseem *et al*., 2005), potassium chloride (Al-Khateeb and Al-DdinSalih, 2005), sodium bicarbonate, acetic acid Hassan et al. (2009) and organic and inorganic chromium (Moeini *et al*., 2011; Abo-Egla *et al*., 2014).

In tropical regions, there is a great concern about high temperatures affecting overall poultry production. It is established that heat stress not only affects growth rate and feed efficiency but also increases death losses in the birds. The long summer months in our country adversely affect the broiler productivity and survival rate. Blood electrolytes balance is altered during heat stress (Mitchell and Siegel, 1979).

The environmental temperature range within which poultry can keep a constant body temperature with minimum effort (‘thermoneutral zone’ or ‘comfort zone’) ranges from 16-26°C. In the tropics, environmental temperatures are above this range during most parts of the year. As temperature rises above the “comfort zone” (common in the tropics), poultry are susceptible to heat stress because they can no longer keep a balance between body heat production and heat loss. The effects of heat stress in poultry are varied and range from decreased feed intake (NRC, 1994; Yahav, 2000; Sohail *et al*., 2012), reduced weight gain and meat quality in broilers, increased feed conversion ratio (Imik *et al*., 2012), high mortality rate (Shane, 1988; Yahav, 2000) and reduces the deposition of protein and intramuscular fat in the breast

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muscles, which reduces the meat quality, nutritive value, and taste of the meat (Zaboli *et al.* 2018). The objective of this study was to examine the effects of dietary supplementation KCl and $NaHco_3$and their combination on heat stress condition for broiler chickens.

MATERIALS AND METHODS

A 540 unsexed day-old Cobb500 broiler chickens, were wing-banded and randomly divided into twelve treatments, three replicates containing 15 chicks. Placed in a naturally ventilated rearing room, provided continuous florescent illumination. During the first two weeks of the brooding period, however, supplemental heat was provided to chicks during the cold portion of the day. Reared under similar environmental; conditions, rind given the experimental starter diets contained about 23% CP and ME of 3000 Kcal/kg, from 0 to 3 weeks of age and grower diets contained 21% CP with ME content of 3150 Kcal/kg from 3 to 6 weeks of age(Table 1). From 1 to 6 weeks of age, diets of chicks supplemented with KCl or $NaHCo_3$ singly or in combination. Treatment 1 survived as a control, KCl at levels of 0.3, 0.6 and 0.9% of diets for chicks of T2, T3 and T4, $NaHCo_3$ at levels of 0.25 and 0.5% of diets for chicks of T5 and T6 respectively. Diets for chicks of T7, T8, T9, T10, T11 and T12 contain a mixture KCl and $NaHCO_3$.

Criteria measurement:

Criteria of the response included data on the performance of chicks for weight gain and feed conversion ratio, mortality rate and levels of some blood constituents.

To measure the body weight (BW) and weight gain (BWG), chicks were individually weighed, while their feed intake (FI) and feed conversion ratio (FCR) were recorded or calculated on the replicate basis at weekly intervals throughout the experimental period from 0 to 6 weeks of age. But mortality was daily recorded and its cumulative rate was calculated.

Table 1. Composition and calculated analysis of the basal starter and grower diets.

Ingredients %	Starter 0 – 3 wk	Grower 3 – 6 wk
Yellow corn	61.50	61.9
Soybean meal (48 % CP)	20.75	18.70
Corn gluten meal	13.3	10.75
Vegetable oil	0.00	1.70
Ground limestone	1.50	1.50
Dicalcium phosphate	1.80	1.80
Wheat brain	0.00	2.50
Common salt	0.30	0.30
Vit-Min. Premix*	0.30	0.30
DL-methionine	0.15	0.15
L-lysine-HCl	0.40	0.40
Total	100	100
Calculated chemical analysis (NRC, 1994)		
Crude protein, %	23.07	21.01
Metabolizable energy (Kcal/kg)	3038	3107
EE	2.84	4.55
CF	2.98	3.09
Calcium, %	0.71	0.71
Available phosphorus, %	0.46	0.46
Lysine, %	1.17	1.10
Methionine, %	0.58	0.54
Meth. + Cys., %	0.98	0.90
Determination		
K, %	0.65	0.63
Cl, %	0.22	0.22
Na, %	0.13	0.13

*** Premix at0.30 of the diet supplies, the following per Kg of the diets :Vit A1000I.U., Vit D3 2000 I.U., VitE10mg, VitK1mg, Vit$B_1$5mg, Vit$B_2$5mg, vit $B_6$1.5mg, Vit.B_{12} 0.01 mg, folic acid0.35 mg, biotin0.05mg, pantothenic acid 10mg,niacin30mg, choline 250mg, Fe30mg, Zn50 mg, Cu4mg and Se 0.1mg.**

Table 2. Means of indoor ambient temperature, relative humidity and temperature-Humidity Index measured within the open-sided house, during the experimental period (from July 2016 to August 2016).

Date	Ambient temperature (ºC)		Relative humidity (%)		Temperature-Humidity Index	
	minimum	maximum	minimum	maximum	minimum	maximum
1/7/2016	25.30±0.08	34.25±0.50	48.02±2.27	79.05±1.84	23.54±.05	32.97±0.56
1/8/2016	25.02±0.47	34.66±0.14	47.13±0.19	79.90±0.60	23.28±.40	33.39±0.11

At the termination of the feeding trial at 6 weeks of age; simultaneously upon slaughtering of chicks, blood sampling was also performed. Blood samples were collected from the jugular vein into heparinized tubes. The plasma was isolated by centrifugation at 3000 rpm for 15minutes. Concentrations of plasma total protein, total (T lip) lipids, cholesterol, AST and ALT of plasma, were determined calorimetrically; using Commercial kits of diagnostic examination (Biomerieux, Spinreact, and Randox Co., imported from France, Spain and United Kingdom, respectively) according to the methods described by Gornall *et al*., (1968), Bragdon (1960), Trinder (1960), Watson (1960), Kind and King (1954), and Van Kampen and Zijlstra (1961), respectively. Concentrations of plasma Na and Cl, and K were also determined calorimetrically, using commercial Kits of Teco diagnostics (ANAHEIM, CA, France) according to the method described by Henry (1974) and Tietz (1974), respectively.

Total concentrations of plasma T3 and T4 were determined, using commercial kits of a diagnostic examination (Equipar, Italy) according to the methods described by Sterling (1975) and Liewendahi (1990), Respectively. Plasma corticostrone level was also determined, using commercial Kits of Diagnostic examinations [Diagnostic Products Corporation (DPC), Los Angeles, U.S.A.] according to the method described by Sainio *et al*. (1988).

After the feeding trial at 6 weeks of age, 4 chicks from each treatment; whose body weights were near the average of their respective treatment, were selected for the slaughter test. Before slaughter, the birds were held 16 hours without feed. Just prior to slaughter and after complete bleeding, the birds were individually weighed, immediately after i was scalding feathers were plucked and evisceration was performed. Eviscerated carcasses were weighed, and weights of different body parts and organs and abdominal fat were also recorded.

Statistical analysis:

Data were statistically studied (SAS, 2006) by the application of the least square producer. Tests of significance for the differences among treatments were according to Duncan (1955).

RESULTS AND DISCUSSION

Growth performance:

Growth performance parameters of broiler chickens as influenced by potassium chloride (KCI), Sodium bicarbonate ($NaHCO_3$) and combination are listed in Table3.

As presented in table 3, no significant (sign) differences in initial live body weights for broiler chickens subjected to different levels of potassium chloride, Sodium bicarbonate or combination, investigated here. At 6 weeks of age, chicks subjected to a diet containing combination between 0.9% potassium chloride and 0.5% sodium bicarbonate achieved significantly better live body weight, total body weight gain, total feed intake and total feed conversion compared with the control birds and other treatments.

Our data agree with the finding by Yosi *et al.* (2017) the supplementation of 0.50% KCl in drinking water was the optimal level for improving body weight gain, feed conversion ratio of broiler chickens under environmental heat stress conditions. Also, Naseem *et al.* (2005) declared that during heat stress, KCl and $NaHCO_3$ at levels of 1.5% and 0.5% respectively, improved weight gain for boilers; and Ahmed *et al.* (2008) found that broiler offered 0.6% KCl consistently increased the BW gain 7.9% at 42 d of age, compared with the control.

Table 3. Effect of potassium chloride (KCI), Sodium bicarbonate ($NaHCO_3$) and combination on growth performance of broiler chicks.

Treatments	Initial	BW (g) at 6 wks	BWG (g) 0-6 wks	FI (g) 0-6 wks	FC (g/g) 0-6 wks
T1	38.66	1627.7^{de}	1589.1^{de}	3471.4^{bc}	2.18^{a}
T2	38.76	1681.1^{bc}	1642.3^{bc}	3473.1^{bc}	2.11^{b}
T3	38.86	1600^{ef}	1561.1^{ef}	3395.8^{cd}	2.18^{b}
T4	37.67	1602.2^{ef}	1564.6^{ef}	3452.1^{cd}	2.21^{a}
T5	38.86	1660^{cd}	1621.1^{cd}	3566^{ab}	2.20^{a}
T6	38.46	1717.3^{ab}	1678.8^{ab}	3622.3^{a}	2.16^{b}
T7	38.90	1705.7^{ab}	1666.9^{ab}	3648.7^{a}	2.19^{a}
T8	38.80	1612.2^{ef}	1573.4^{ef}	3463.6^{c}	2.20^{a}
T9	38.66	1681.1^{bc}	1642.3^{bc}	3473.1^{bc}	2.11^{c}
T10	37.90	1627.7^{de}	1589.1^{de}	3471.4^{bc}	2.18^{a}
T11	39.10	1742.2^{a}	1703.1^{a}	3588.5^{a}	2.11^{c}
T12	38.76	1600^{ef}	1561.1^{ef}	3395.8^{cd}	2.18^{a}
SEM	0.56	10.10	10.09	10.42	0.01
Sig. level	NS	**	**	**	**

T1, control, T2: 0.3% KCl, T3: 0.6% KCl, T4: 0.9% KCl, T5: 0.25% NaCo3, T6: 0.5% , T7: 0.3% KCl +0.25% NaCO3, T8: 0.6% KCl +0.25% NaCO3, T9: 0.9 KCl +0.25% NaCO3, T10: 0.3% KCl +0.5% NaCO3, T11: 0.6% KCl +0.5% NaCO3 and T12: 0.9% KCl +0.5% NaCO3

a-f: Means in the same column bearing common superscript are not significantly(sign) different ($P\leq0.05$)

Blood parameters:

Results of blood parameters of 6 weeks-old broilers as affected by feeding on potassium chloride (KCI), Sodium bicarbonate ($NaHCO_3$) and combination are presented in Table (4 and 5). Results exposed that control treatment showed the best significantly level of total protein, albumin, the concentration of AST, level of CL and concentration of corticosterone when compared with other feeding treatments; however the highest significantly level of total lipids, cholesterol and concentration of ALT showed with T7, T9, T11, respectively. Treatment 10 showed the highly significant concentration of T3 and T4; furthermore, T12 recorded the highest significant level of Na and K.

The same results were observed by Kurtoglu *et al.* (2007) found that using sodium bicarbonate (0.38 and 1.5%), potassium chloride (0.7%) and sodium chloride (0.25) in diets of laying hens showed significantly increased in values of total protein, albumin, Cl, Na and K in plasma when compared with the control diet.

Table 4. Effect of potassium chloride (KCI), Sodium bicarbonate ($NaHCO_3$) and combination on blood parameters of broiler chicks.

Treatments	TP g/dl	Alb g/dl	TL mg/dl	Chol mg/dl	AST IU/L	ALT IU/L
T1	6.61^{a}	4.33^{a}	20.17^{ab}	100.25^{bc}	47.25^{a}	40.49^{bcd}
T2	6.28^{ab}	3.51^{b}	18.35^{d}	99.25^{bc}	46.50^{a}	41.78^{b}
T3	6.07^{bc}	3.46^{b}	19.60^{bc}	96.75^{bc}	41.50^{bcd}	40.56^{bcd}
T4	5.46^{d}	3.28^{b}	16.71^{f}	96.75^{bc}	40.50^{cd}	38.15^{e}
T5	6.10^{bc}	3.43^{b}	17.44^{e}	92.00^{c}	45.75^{a}	39.69^{cd}
T6	5.95^{bcd}	3.19^{b}	18.94^{cd}	93.00^{c}	45.00^{a}	40.22^{cd}
T7	6.03^{bc}	3.59^{b}	20.32^{a}	102.75^{abc}	44.50^{ab}	40.18^{cd}
T8	5.74^{cd}	3.10^{b}	19.54^{bc}	111.75^{ab}	41.25^{bcd}	40.20^{cd}
T9	5.63^{cd}	3.48^{b}	18.70^{d}	116.25^{a}	40.50^{cd}	40.41^{cd}
T10	6.36^{ab}	3.56^{b}	17.40^{e}	94.00^{c}	43.75^{abc}	40.99^{bc}
T11	5.46^{d}	3.59^{b}	16.26^{f}	91.50^{c}	40.75^{cd}	44.14^{a}
T12	5.99^{bc}	3.48^{b}	16.12^{f}	86.50^{c}	39.50^{d}	39.36^{de}
SEM	0.16	0.24	0.23	5.01	1.12	0.43
Significance	**	**	**	*	**	**

T1, control, T2: 0.3% KCl, T3: 0.6% KCl, T4: 0.9% KCl, T5: 0.25% NaHCo3, T6: 0.5% , T7: 0.3% KCl +0.25% NaHCO3, T8: 0.6% KCl +0.25% NaHCO3, T9: 0.9 KCl +0.25% NaHCO3, T10: 0.3% KCl +0.5% NaHCO3, T11: 0.6% KCl +0.5% NaHCO3 and T12: 0.9% KCl +0.5% NaHCO3

a-f: Means in the same column bearing common superscript are not significantly(sign) different ($P\leq0.05$)

Table 5. Effect of potassium chloride (KCI), Sodium bicarbonate (NaHCO3) and combination on blood parameters of broiler chicks.

Treatments	T3 ng/ml	T4 ng/ml	Cortico ng/ml	Na mEq/L	K mEq/L	Cl mEq/L
T1	1.33^{ef}	8.20^{cd}	13.44^{a}	115.43^{f}	1.90^{g}	107.79^{a}
T2	1.44^{de}	8.75^{bc}	10.82^{cd}	115.21^{f}	2.21^{f}	106.33^{b}
T3	1.46^{de}	9.25^{ab}	11.65^{bcd}	123.27^{e}	2.41^{e}	102.68^{c}
T4	1.65^{cd}	9.41^{ab}	14.23^{a}	126.61^{ed}	2.54^{cde}	97.96^{ef}
T5	1.70^{abcd}	6.06^{e}	11.05^{cd}	125.10^{e}	2.44^{de}	100.23^{d}
T6	1.88^{abc}	7.80^{d}	11.56^{cd}	126.28^{ed}	2.59^{bcd}	99.01^{de}
T7	1.95^{ab}	9.12^{abc}	10.94^{cd}	123.16^{e}	2.68^{abc}	100.27^{d}
T8	1.16^{f}	6.30^{e}	13.26^{ab}	128.96^{d}	2.72^{ab}	97.82^{ef}
T9	1.58^{de}	8.45^{bcd}	13.52^{a}	133.03^{c}	2.74^{ab}	97.28^{f}
T10	1.97^{a}	9.96^{a}	12.51^{abc}	136.65^{b}	2.69^{abc}	97.19^{f}
T11	1.68^{bcd}	6.80^{e}	11.51^{cd}	137.79^{b}	2.79^{a}	96.62^{fg}
T12	1.46^{de}	9.06^{abc}	10.43^{d}	142.56^{a}	2.84^{a}	95.65^{g}
SEM	0.09	0.30	0.55	1.16	0.05	0.46
Sign. Level	**	**	**	**	**	**

T1, control, T2: 0.3% KCl, T3: 0.6% KCl, T4: 0.9% KCl, T5: 0.25% NaHCo3, T6: 0.5% , T7: 0.3% KCl +0.25% NaHCO3, T8: 0.6% KCl +0.25% NaHCO3, T9: 0.9 KCl +0.25% NaHCO3, T10: 0.3% KCl +0.5% NaHCO3, T11: 0.6% KCl +0.5% NaHCO3 and T12: 0.9% KCl +0.5% NaHCO3

a-g: Means in the same column bearing common superscript are not significantly(sign) different ($P\leq0.05$)

Mortality rate:

Results illustrated in Table 6 showed mortality and viability percentage as affected by experimental treatments. Results showed that treatment 11 (broiler chicks feeding a diet containing combination between 0.9% potassium chloride and 0.25% sodium bicarbonate) showed the highest significantly ($P<0.05$) percentage of viability with the lowest percentage of mortality when compared to control and other treatments.

Same trend with fining by Moghaddam, *et al*. (2006) found that supplementing the drinking water with NH_4Cl can decrease mortality under acute heat stress and male chicks are more sensitive.

Also, Ahmed *et al.* (2008) found that KCl supplementation didn't show any significant effects on mortality.

Table 6. Effect of potassium chloride (KCI), Sodium bicarbonate ($NaHCO_3$) and combination on mortality of broiler chicks.

Treatments	Mortality %	Viability %
T1	17.09^{a}	82.01^{e}
T2	15.60^{b}	84.40^{d}
T3	9.95^{bc}	91.07^{c}
T4	6.60^{cd}	93.30^{bc}
T5	4.40^{cd}	95.53^{abc}
T6	4.40^{cd}	95.53^{abc}
T7	0.00^{d}	100.00^{a}
T8	2.20^{d}	97.77^{ab}
T9	2.20^{d}	97.77^{ab}
T10	2.20^{d}	97.77^{ab}
T11	0.00^{d}	100.00^{a}
T12	2.20^{d}	97.77^{ab}
SEM	1.92	1.93
Sign. Level	**	**

T1, control, T2: 0.3% KCl, T3: 0.6% KCl, T4: 0.9% KCl, T5: 0.25% NaHCo3, T6: 0.5% , T7: 0.3% KCl +0.25% NaHCO3, T8: 0.6% KCl +0.25% NaHCO3, T9: 0.9 KCl +0.25% NaHCO3, T10: 0.3% KCl +0.5% NaHCO3, T11: 0.6% KCl +0.5% NaHCO3 and T12: 0.9% KCl +0.5% NaHCO3

a-d: Means in the same column bearing common superscript are not significantly(sign) different ($P \leq 0.05$)

Carcass traits:

Carcass traits of broiler chicks as influenced by potassium chloride (KCI), Sodium bicarbonate ($NaHCO_3$) and combination are listed in Table 7.

Results in Table 7 showed that treatment 11, a combination between 0.6% potassium chloride and 0.5% sodium bicarbonate achieved significant the value of the heavier live body, with the significantly highest percentage of carcass, liver and gizzard, compared with the control birds and other treatments. But, treatment 12 showed the significantly highest percentage of thighs and breasts.

These results in disagree with the finding by Souza *et al.* (2002) who did not find any effect of KCl supplementation on carcass response. Also, Ahmed *et al.* (2008) didn't find any significant effects on carcass weight and breast weights due to KCl supplementation were noticed.

Table 7. Effect of potassium chloride (KCI), Sodium bicarbonate ($NaHCO_3$) and combination on carcass traits of broiler chicks.

Treatments	live weight	carcass %	Liver %	Heart %	Gizzard %	Thighs %	
T1	1469.00^{e}	68.19^{b}	2.15^{b}	0.57	3.03^{b}	28.34^{bc}	34.10^{c}
T2	1437.50^{e}	69.26^{b}	2.12^{c}	0.55	3.05^{b}	28.71^{bc}	34.83^{bc}
T3	1494.75^{de}	69.95^{b}	2.10^{c}	0.60	3.06^{b}	29.17^{b}	35.02^{b}
T4	1473.00^{e}	70.00^{ab}	2.17^{b}	0.58	3.01^{b}	29.05^{b}	35.19^{b}
T5	1650.50^{bc}	70.25^{ab}	2.17^{b}	0.57	3.01^{b}	29.35^{b}	35.15^{b}
T6	1629.75^{bcd}	69.38^{b}	2.15^{b}	0.56	3.08^{b}	28.35^{bc}	35.30^{b}
T7	1447.25^{e}	69.39^{b}	2.18^{b}	0.58	3.06^{b}	28.99^{bc}	34.58^{b}
T8	1502.00^{de}	69.86^{b}	2.17^{b}	0.53	3.02^{b}	29.66^{b}	34.48^{b}
T9	1567.50^{de}	69.82^{b}	2.13^{b}	0.57	3.08^{b}	29.17^{b}	34.87^{bc}
T10	1614.75^{bcd}	69.10^{b}	2.15^{b}	0.56	3.05^{b}	29.22^{b}	34.12^{c}
T11	2092.50^{a}	72.39^{a}	2.25^{a}	0.58	3.20^{a}	30.09^{a}	36.12^{a}
T12	1747.25^{b}	72.20^{a}	2.23^{a}	0.56	3.13^{a}	30.11^{a}	36.17^{a}
SEM	44.35	2.18	0.05	0.002	0.09	1.25	1.82
Sign. Level	**	**	**	NS	**	**	**

T1, control, T2: 0.3% KCl, T3: 0.6% KCl, T4: 0.9% KCl, T5: 0.25% NaCo3, T6: 0.5% , T7: 0.3% KCl +0.25% NaCO3, T8: 0.6% KCl +0.25% NaCO3, T9: 0.9 KCl +0.25% NaCO3, T10: 0.3% KCl +0.5% NaCO3, T11: 0.6% KCl +0.5% NaCO3 and T12: 0.9% KCl +0.5% NaCO3

a-e: Means in the same column bearing common superscript are not significantly different ($P \leq 0.05$)

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التخفيف من الآثار الضارة للاجهاد الحرارى باستخدام كلوريد البوتاسيم و بيكربونات الصوديوم لكتاكيت التسمين

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أجريت هذ الدراسة لتقييم آثار الاضافات الغذائية بكلوريد البوتاسيوم (KCI) ، وبيكربونات الصوديوم ($NaHCO_3$). منفردة أو مجتمعة ، على الأداء الإنتاجى والاستجابات الفسيولوجية المترتبة على دجاج التسمين التي يتم تربيتها تحت إجهاد حراري طبيعي خلال فصل الصيف ، استخدم فى هذه التجربة كتاكيت كب 500 عمر يوم ، قسمت التجربة إلى 12 مجموعة تجريبية بكل مجموعة 45 كتكوت ، قسمت كل مجموعة منها إلى 3 مكررات. وتم معاملة جميع الكتاكيت بنفس الظروف البيئة والغذائية ، تم إضافة كلوريد البوتاسيوم (KCI) وبيكربونات الصوديوم ($NaHCO_3$) منفردة أو مجتمعة إلى علائق الكتاكيت كالآتى: المعاملة الأولى كنترول و المعاملة 2 و 3 و4 تم إضافة كلوريد البوتاسيوم عند مستويات 0.3 و 0.6 و 0.9٪ من العلائق على التوالى والمعاملة 5 و 6 تم إضافة بيكربونات الصوديوم بمستويات 0.25 و 0.5٪ من العلائق على التوالي. و المعاملات 7 و 8 و 9 و 10 و 11 و 12 على خليط كلوريد بوتاسيم و بيكربونات صوديوم بالنسب السابقة على التوالى. تم تقدير الأداء الإجمالي للكتاكيت ومقاييس الدم . وأظهرت النتائج أن تغذية كتاكيت التسمين على نظام غذائي يحتوي على تركيبة من 0.6٪ كلوريد البوتاسيوم و 0.5٪ بيكربونات الصوديوم أدى إلى زيادة وزن الجسم بشكل ملحوظ مع أفضل قيمة لكفاءة الغذاء ، وتقليل نسبة النافق عند ممقارنتها بباقى المعاملات وكذلك وزن الذبيحة والنسب المئوية لكلا من القلب والكبد والقوانص والفخذين والصدر.