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The Effects of High Temperature on Breeding Characteristics and the Living Strength of the Japanese Quails (Coturnix Coturnix Japonica)

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Abstract: In this study, it was aimed to determine the effects of high temperature on the live weight, food consumption, taking benefit from the food, living strength, some carcass characteristics and the respective effects on the living strength. By this purpose, 584 quails at the age of 1 week were separated into two groups; one of the groups was identified as the control group to be placed under variable temperature (18-24°C), and the other group (trial group) was kept under 35°C. As a result of the research, the differences between the control and trial groups regarding to the live weight, carcass weight and carcass productivity, food consumption and the values of taking benefit from the food were found significant. ($P<0.05$, $P<0.01$). Depending on the higher temperatures, some decreases were found in the live weight, food consumption and the values of taking benefit from the food, living strength.

Key words: Quail, high temperature, body weight, carcass features, food consumption, food efficiency, survivality

Introduction

In respect of poultry breeding, optimum environmental temperature varies depending on the different periods of such breeding as of the moment after incubation. Even if a great care is given to the required temperature arrangement compared with the breeding periods during the intensive breeding performance, the required measures should be taken to ensure the cooling inside the coop when the outside temperature reached to the extreme values. The most of the problems occurred in breeding period is related to those insufficiently taken measures. Such mentioned problems have been noticed at the top level in countries and the regions taking part at tropical climate zones and those measures are mostly requiring the highest expenditures to be included in significant investments. Therefore, the researches regarding to the effects of the high environmental temperatures on poultry and the relevant solutions have gained a definite importance in such concerns (Poyraz *et al*., 1991).

The heat stress limits the physical activities of the winged animals, increases the water consumption, reduces the food consumption and recesses the development of them since it caused them lost the excessive humid due to faster respiration through the evaporation. Therefore, some decreases are noted in the increase of live weight, the rate of taking benefit from the food and the living strength (Bohren *et al*., 1982; Donkoh, 1989; Leeson, 1986; Senköylü and Altinsoy, 1999; Teeter *et al*.,1985; Wilson *et al*., 1972).

All physiologic reactions of the animals against the stress factors are called as general adaptation syndrome (GAS). Adrenal gland is playing a central role in GAS and the physiological reactions are characterized with 3 stages. These are as follows; 1st stage: Emergency (urgent) stage where the adrenalin and noradrenalin were secreted from medulla;2nd stage: Adaptation (strength) stage where the glycocorticoids were secreted from the adrenal cortex as defined as a long term reaction;3rd stage: Exhaustion (death) stage where the animals became unsuccessful so the death events were observed depending on the insufficiency of haemostatic mechanisms and adrenal gland (Donaldson *et al*., 1991; Freeman, 1985).

Likewise it was pointed out that the live weight, carcass weight, carcass productivity, food consumption and the values of live strength that were obtained from the quails, which were grown up in the spring season were higher than the ones grown up in the summer season; and this manner occurred depending on the high temperature (Özbey and Ekmen; 2000). It was also noted that the high temperature had the negative effect on the live weight and the growth speed in other researches (Bohren *et al*., 1981; Huston, 1965; Okan, 1999; Poyraz *et al*., 1991; Smith and Oliver, 1971).

It was pointed out that such mentioned temperature stress had the effect significantly in decrease of food consumption and increase of water consumption, in addition, the most important effect of the high temperature on the broiler performance had occurred as a decrease of food intake, which was a key factor in the efficiency related to the weight gaining of broilers as defined by many researches that were carried out to indicate the effects of the temperature stress on the winged animals (Al- Fataftah, 1987; El Boushy and Van Marle, 1978; Parker *et al*.,1972; Ueno *et al*., 1978). It is also inevitable to observe the occurrence of some fundamental psychological functional changes such as

decrease in food consumption, increase in water consumption, increase in body temperature and increase in respiration frequency and also to note the effects on various productivity characteristics shaped due to participation of the said physiological function partially or entirely and even on the living strength (Bohren *et al.*, 1982; El Boushy and Van Marle, 1978; Leeson, 1986).

In this research, it was aim to indicate the effects of the high temperature (35°C) on the live weight, food consumption and the value of taking benefit from the food as well as some carcass characteristics and the living strength of the quails.

Materials and Methods

The animal material of the research is constituted by total 600 quails, which passed from the incubation at the same day.

The chicks that were taken from the hatching machine were put into the main machine to keep them for 1 week after the releasing weight of the broilers was noted. In this period, the broilers were provided with the temperature of 35°C. Following the first week, 282 broilers (94 males + 188 females) of the rest total 566 were put in the room under the variable temperature (18-24°C) with the control purpose and the other rest of 282 broilers (94 males + 188 females) was placed into the breeding cages at the room under full controlled stable temperature (35°C).

The heating process was achieved through the electrical thermostat adjusted radians in divisions of experiment group. The quails were placed equally (1 males + 2 females) into the cages consisting of four floors and each floor was considered as the repetition. The live weight measures were done with the electronic scale in basis of 0.01 g. Such measures were done on the day and at the time equal to the day of the birth.

Group feeding was applied to the quails and the feed consumption was identified once 7 days. By deducting the rest feed from the total feed given for one week then dividing into the numbers of the chicks, the average of daily feed consumption was found per animal. The feed efficiency was calculated by the proportion of the total feed consumed per quail until the 6th week regarding to the gained live weight compared with the 1st week weight.

Subject to record the death quails, the numbers of living quails per week were determined at the end of the application period. The survivality of the quails was founded by the proportional calculation of the numbers lived until the 6th week as to the numbers of the living chicks at the beginning of the 1st week. By the purpose of identifying the carcass features, 40 quails from each group (20 males + 20 females) were slaughtered at the end of the 6th week.

In statistical evaluations, t test was used to indicate the effect of the temperature factor on the researched characteristics. The said statistical analyses were made with SPSS 10 statistical program (Özdamar, 1997).

Results

The average values related to the analyzed live weights, some carcass weights, food consumption, capability of taking benefit from the food and the living strength of the quails in control (18-24°C) and trial (35°C) groups that were arranged depending on the temperature until the end of 6 week, are given in the following Table.

The differences among the live weight values in the weeks of growth such as 2 ($P<0.05$), 3, 4, 5 and 6 ($P<0.01$) as well as the differences that were seen between the carcass weight ($P<0.01$) and carcass productivity values ($P<0.05$) were found important statistically.

The food consumption and the values of taking benefit from the foods in both control and trial groups were found as 589,47g and 3,52 and 489,68 and 3,93; furthermore the differences between the groups in respect of the food consumption ($P<0.01$) and the values of taking benefit from the food ($P<0.05$) were found important statistically.

The live strength value of the control and trial group at the end of the 6th week was determined as 77,65% and 78,03%. The difference between both groups was not found important statistically.

Discussion

In this research during the breeding period (1-6 weeks) some significant decreases were found in trial group compared with the control group in respect of the live weight values (Table 1). The differences among the live weight values and the carcass weight ($P<0.01$) and carcass productivity values ($P<0.05$) in the weeks of 2 ($P<0.05$), 3, 4, 5 and 6 ($P<0.01$) of breeding are important statistically. It was found that the high temperature had effect on the live weight and the growing up speed negatively and reduced the productivity and the weight of carcass. These results were similar with the researches (Al-Fataftah, 1987; Bohren *et al.*,1981; Bohren *et al.*,1982; Donkoh, 1989; El Boushy and Van Marle, 1978; Huston, 1965; Okan, 1999; Özbey and Ekmen, 2000; Poyraz *et al.*, 1991; Smith and Oliver, 1971; Teeter *et al.*, 1985; Wilson *et al.*, 1972).

As it is known obviously, high temperature reduces the food consumption. It was determined that the higher temperature led a decrease in food consumption of the quails ($P<0.01$) and also reduced the capability of taking benefit from the food at a significantly important level statistically ($P<0.05$). These obtained results are conforming to the findings indicating that the higher temperature reduces the food consumption and the capability of taking benefit from the food (Al-Fataftah, 1987; Bohren *et al.*,1981; Bohren *et al.*,1982; Donkoh,

Table 1: The results of statistical analysis relating to weights, carcass features, feed consumption, feed efficiency and survivality

Features	Control (18-24°C)			Experiment (35°) (35°C)			P
	n	$\bar{x}$	$S_{\bar{x}}$	n	$\bar{x}$	$S_{\bar{x}}$	
1st week	282	28.64	2.92	282	27.93	2.48	-
2nd week	263	63.25	2.51	260	61.30	2.46	*
3rd week	251	91.75	2.64	247	87.73	2.57	*
4th week	242	126.01	5.39	237	120.61	2.52	**
5th week	234	159.69	5.,57	228	148.90	5.41	**
6th week	229	177.61	2.61	220	167.78	2.57	**
Slaughter weight (g)	40	178.23	2.53	40	168.32	2.89	**
Carcass yield (g)	40	123.92	2.58	40	109.40	5.28	**
Carcass yield (%)	40	69.57	3.65	40	65.02	2.89	*
Feed consumption (g/hy)	589.47	5.11	489.68	4.96	**		
Feed efficiency (%)	3.52	0.24	3.93	0.25	*		
Survivality (%) (1-6th week)	81.12	0.62	78.03	0.56	-		

-: P>0.05 * : P<0.05 ** : P<0.01

1989; El Boushy and Van Marle, 1978; Huston, 1965; Leeson, 1986; Okan, 1999; Parker *et al.*, 1972; Poyraz *et al.* 1991; Smith and Oliver, 1971; Ueno *et al.*, 1978; Wilson *et al.*, 1972). Since a decrease in food consumption may cause some defects in the way of Purin analysis depending on the higher temperature (Rodwel, 1991; Tufft and Nockles, 1991), this shall lead the immune insufficiency and cause the quails become more sensitive against the infections.

Likewise since the quails involved in the control group consume more foods they got more food. The increase of the consumed food has reflected on the productivity. Many previous studies also supported these findings. (Bohren *et al.*,1982; El Boushy and Van Marle, 1978; Özbey and Ekmen, 2000; Teeter *et al.*, 1985; Wilson *et al.*, 1972). According to one of the researches, Muiruri and Harrison, 1991; determined that even if the food consumption was 143,1 gr under the room temperature of 35°C, it became 163,1 g under the room temperature of 25°C. Hurwitz *et al.*, 1980; pointed out that a stable temperature between 12 and 20°C had no negative effect on the live weight, however the live weight decreased by 2% for each 1°C after the temperature of 20°C.

During the breeding period (1-6 weeks), any significant changes were not determined in live strength subject to the application of higher temperatures. The obtained values of live strength were similar with the values in some researches (Cerit and Altinel, 1998; Donkoh, 1989; Muiruri and Harrison, 1991). Even if the temperature stress had negative effect on the breeding performance during the analyzed period, it might be considered that the result of the adaptation to the higher degrees of the quails as of the 1st week (Donaldson *et al.*, 1991; Freeman, 1985) would not have a significant effect on the live strength.

As a conclusion, the temperature stress occurred as the result of the breeding period of the quails has increased the loss of live weight to a significant level by affecting the metabolism and accordingly, the increase of live weight negatively and by also decreasing the food consumption. It was decided that the increase of temperature would cause the immune insufficiency and the quails became more sensitive to the infections. Since the quails shall adapt to the environment when the temperature is regularly high and the instantaneous temperature increases are not observed as of the first week of growing up period, the temperature shall not have a negative effect on the live strength statistically in older ages.

By intending to reduce the negative effects of the temperature, some measures except the cooling and isolation applications such as leaving the broilers hungry temporarily, resting them during the high temperatures, applying different feeding methods such as preferring only the early hours in the morning and in the evening hours, changing the ingredients of the food and developing the races resistant to the temperature stress are taking an important place in such scope. (Smith and Oliver, 1971). In the further stages of the research, reducing the negative effects of the temperature stress on the quails shall be analyzed depending on the applications as already mentioned above in scope of the higher temperatures.

References

Al-Fataftah, A.A, 1987. Effect of high temperature on broiler performance. Dirasat, 14: 179-190.

Bohren, B.B., J.R. Carson and J.C. Rogler, 1981. Response to Selection at Two Temperatures for Fast and Slow Growth from Five Nine Weeks of Age in Poultry. Genetics, pp: 443-456.

Bohren, B.B., J.C. Rogler and J.R. Carson, 1982. Performance at Two Rearing Temperatures of White Leghorn Lines Selected for Increased and Decreased Survival under Heat Stress. Poult. Sci., 61: 1939-1943.

Cerit, H. and A. Altinel, 1998. Japon Bildircinlarinin (Coturnix Coturnix Japonica) Çesitli Verim Özelliklerine Ait Genetik Ve Fenotipik Parametreler. J. Vet. Fac. Istanbul Univ., 24: 111-136.

Donaldson, W.E., V.L. Christensen and K.K. Krueger, 1991. Effects Of Stressors On Blood Glucose And Hepatic Glycogen ConcentrationsIn Turkey Poults. Comp. Biochem. Physiol. A. Comp. Physiol., 100: 945-947.

Donkoh, A., 1989. Ambient temperature: a factor affecting performance and physiological response of broiler chickens. Int. J. Biometeor., 33: 259-265.

El Boushy, A.R. and A.L. Van Marle, 1978. The Effects of Climate On Poultry Physiology In Tropics And Their Improvement, World's Poult. Sci., 34: 155-171.

Freeman, B.M, 1985. Stress And The Domestic Fowl. Physiological Fact Or Fantasy. World's Poult. Sci., 41: 45-51.

Huston, T.M., 1965. The Influence of Different Environmental Temperatures on Immature Fowl. Poult. Sci., 44: 1032-1036.

Hurwitz, S., M. Weýselberg, U. Eisner, I. Bartov, G. Riesenfeld, M. Sharvit, I. Niv and S. Bornstein, 1980. The Energy Requirements and Performance of Growing Chickens and Turkeys as Affected by Environmental Temperature. Poult. Sci., 61: 1082-1086.

Leeson, S., 1986. Nutritional considerations of poultry during heat stress. World's Poult. Sci. J., 42: 69-81.

Muiruri, H.K. and P.C. Harrison, 1991. Effect of Roost Temperature on Performance of Chickens in Hot Ambient Temperature. Poult. Sci., 70: 2253-2258.

Okan, F., 1999. Effectes of dietary supplemental sodium bicarbonate on some egg characteristics and blood parameters in Japanese Quail reared under high envirmental temperature. Tr. J. Vet. Anim. Sci., 23: 139-143.

Ozbey, O. and F. Ekmen, 2000. The effectes of season and stocking density on growth rate, survivability and carcass performance on Japanese Quails. J. Vet. Fac. Yüzüncü Yil University, 11: 28-33.

Ozdamar, K., 1997. The Data Analysis of Statistical with Set Programs I. The Publications of Anadolu University, Number. 1001, Eskisehir, Turkey.

Parker, J.T., M.A. Boone and J.F. Knechtges, 1972. The effect of ambient temperature upon body temperature, feed consumption and water consumption, using two varieties of turkeys. Poult. Sci., 51: 659- 664.

Poyraz, O., M. Inan and A. Akcan, 1991. The effect of high enviromental temperature on layer hens. I. Some production traits. Journal of Veterinary Faculty of Ankara University, 38: 24-39.

Rodwel, V.W., 1991. Metabolism Of Purine And Pyrimidine Nucleotides. In: Harpers Biochemistry. Twenty-Second Ed. Appleton And Lange, Norwalk, Connecticut/ Los Altos, California, pp: 342-355.

Smith, A.J. and J. Oliver, 1971.Some Physiological Effects Of High Environmental Temperatures On The Laying Hen. Poult. Sci., 50: 912-925.

Senkoylu, N. and M. Altinsoy, 1999. The physiological views of stress (Stresin Fizyolojik Yönü). J. Farm, Istanbul, Turkey, 187: 37-39.

Teeter, R.G. and M.O. Smith, F.N. Owens and S.C. Arp, 1985. Chronic Heat Stress and Respiratory Alkalosis: Occurence and Treatment in Broiler Chicks. Poult. Sci., 64: 1060-1064.

Tufft, L.S. and C.F. Nockles, 1991. The Effects of Stress, Escherichia Coli, Dietary EDTA, and their Interaction on Tissue Trace Elements in Chicks, Poult. Sci., 70: 2439-2449.

Ueno, T., Y. Miyazono and T. Komiyama, 1978. Breed differences of feed and water consumption and some physiological traits of chickens reared under different environmental temperatures. Jap. Poult. Sci., 15: 189-194.

Wilson, W.O., Th. Siopes, Ph. Ingkasuwan and F.B. Matherz, 1972. The Interaction of Temperature of 21°C And 32°C and Photoperiod of 8 and 14 Hours of White Leghorn Hens Production. Archiv Für Geflügelkude, 2: 41-45.