INTERNATIONAL JOURNAL OF ADVANCED BIOLOGICAL RESEARCH

www.scienceandnature.org

EFFECT OF ADDITION DIFFERENT LEVELS OF DATES FLESH (*Phoenix dactyliphera* L) TO RATION CONTAIN PROBIOTIC ONBROILER CHICKENS PERFORMANCE REARED UNDER HEAT STRESS

[a]Taha Hasan jasim Al-Yasiri, [b]Meyada F. Mohammed, [c]Firase M. H. Alkhilani
[a]University of Missan, Basic College of Education, Missan, Iraq
[b]Public Health Department, University of Baghdad, Baghdad, Iraq
[c]Ministry of Agri ., State Board of Agric. Res., Baghdad, Iraq

ABSTRACT
The experiment was designed to study the effect of adding dates flesh to broiler ration that contain multi- strain probiotic on broiler chickens performance under heat stress condition. 750 chicks in one day old, were divided randomly into five equal treatment, the control (T0) which were given standard basal diet , the treatment (T1, T2, T3 and T4) were given basal diet plus 1.5,3,4.5 and 6% dates flesh respectively basal diets supplemented with multi-strain probiotic a minimum of 5×10^{12} cfu/kg and used 1000 gm / ton. At six-weekage, each treatment divided into two groups one of them exposed to heat stress (35˚c)for 6 hours daily until the end of the experiment. The feed intake, weight gain and feed conversion ratio were significantly ($P<0.05$) increased in treated (T3, T4) by the dietary inclusion of dates flesh as compared with the control group. This indicates that the dates flesh and probiotic reduced the heat stress effect and can be used as a growth promoter in broiler diets.

KEY WORDS: Dates Flesh, *Phoenix dactyliphera* L, Probiotic, Broiler, Chickens, Performance, Heat Stress.

INTRODUCTION

Heat stress remains one of the major challenges facing poultry production in many regions of the world (Teeter and Belay, 1996) particularly the tropics (Adeyinka *et al*., 2004; Lin *et al.,* 2006). Compared to other domestic animals, broiler chickens are more susceptible to changing environmental conditions mostly during growing-finishing phase. This can be attributed to their short production cycle, high feed efficiency, growth rate, rapid metabolism, high body temperature and no sweat gland (Abuja, 2010). An increase in ambient temperature causes birds to start panting(increase respiratory rate) as a physiological mechanism for controlling body temperature(Shane, 1988).Other physiological responses of broilers attempting to dissipate heat and maintain body temperature include changes in feed consumption, water consumption, body temperature, electrolyte balance, hematological parameters, hormone levels and behavioral (Teeter and Belay, 1996; Berrong and Washburn, 1998).Various researches have been conducted on the appropriate management techniques that can be employed to combat the effect of heat-stress, which includes control of temperature in the poultry house by using ventilators (Deefra, 2005).Feed and feeding manipulations (Gonzalez *et al*, 2006). Vitamin supplementation (Curca*et al.,* 2004), mineral supplementation (Teeter *et al.,*1985), honey, glucose, probiotic, agent given either in diets and/or in drinking water (Sayed and Shoeib, 1996 and Gross, 1988), stocking density (Aradas *et al*., 2005), and early exposure of the embryo and/or chicks to high ambient temperature to acquire heat tolerance (Yahav and McMurty, 2001).Probiotic is viable microbial additives (like *Lactobacillus acidophilus, Streptococcus faecium* and *Saccharomyces cerevisiae*). It has been reported to inhibit the growth of pathogenic microorganisms and provide digestive enzymes, as a result changes in the intestinal microflora, antibiotic production, and synthesis of lactic acid leads to lowering of the intestinal pH, adhesion or colonization to the intestinal mucosa and prevention of ammonia synthesis (Jin *et al*., 2000) vitamin supplementation (Curca *et al.,*2004). It has been reported in several studies that single and mixed probiotics increases poultry production (Mohan *et al*., 1996; Jin *et al*., 1998). Modern-day agriculture is gradually embracing organic agriculture, which involves the use of natural materials rather than synthetic material. Dates are a natural source of minerals, multivitamin, antioxidantready energy (glucose and fructose).The purpose of this study was to assess the possibility of date flesh (*Phoenix dactylifera* L) with probiotics to be used as broiler feed for effect on health and performance, of broiler chickens reared under heat stress. Iraq from the first countries in dates production and there are large amount of wasted dates, at same time poultry industry suffer from high temperature.

MATERIALS AND METHODS

Birds and Housing

750 Broiler chicks (Breed: Cobb) were obtained from Poultry Rearing Station at Abu- Ghreib referred to Animal Resources researches department of State Boards of agricultural Researches. After weighting, the chicks distributed randomly in (30) pens each pen contained (25) chicks. The chicks divided into 5 treatments, with three replicate. The chicks reared for 5 weeks of age 35thdays in standard condition ,at six weeks age the chicks exposed to heat stress by elevate the temperature of the chick's house to about (35c˚) for(6) hours. The chicks reared in (2× 2.5)

floor pens with a deep litter system of wood shavings floor. The bird had free access to water and feed.

Dietary treatments

The dietary treatments were: T0basal diet (control), T1, T2, T3 and T4 were given diet plus dates 1.5, 3, 4.5 and 6% respectively and multi-strain probiotic Biomin poultry starme 5×10^{12} cfu/kg and used 1000 gm/ton in starter and grower feed with all treatment from 1to 42 d the end of the experiment. Biomin poultry starme origin product from Austria it is a contains (*Enterococcussp, Bifidobacterium sp. Pediococcussp, Lactobacillus sp.*) a minimum of 5×1012 cfu/kg and used 1000 gm/ton.

Dates samples fruit (*phoenix dactyliphera* L)

Dates brought from Iraqi markets then removed the seed from it, by crushing (Morton., 1987; Vandercook *et al*., 1979) us, then the dates dried by automatic large ovens at about the temperature(60c^{o}) for 24 hours then the dried dates are ready to grind with crushing.

Dates analysis

Dates analysis conducted in the Central veterinary laboratories (C.V.Ls) for the state company of veterinary services in Baghdad. Moisture content the moisture content is determined by measuring the mass of a food before and after the water is removed by evaporation according (AOAC, 1990, and Shukr, 19830).The total solids content is a measure of the amount of material remaining after all the water has been evaporating. The determination of crude fibersaccording to Garcia *et al.*(1997) and Wolff (1968). To determine total ash, samples were incinerated in the muffle furnace at about 550°C for 8 h. according to fennema (1996). Tothe determination of total nitrogen (N) by Kjeldahl carried out as described by (Helrich, 1990). Crude fat determined from dried date according Afnor, (2002).Total carbohydrates estimated by difference of mean values: 100− (moisture + proteins + ash+fat+ fibre).

TABLE 1: show the Chemical composition of commercial Iraqi Zahedi date cultivates.

Composition	Percentage
Moisture	10.70
Total solids dry matter	89.30
Total carbohydrate	79.34
Protein	2.90
Fat	0.63
Ash	2.00
Crude Fiber	4.20

All percentages in the table take from dry matter

Feeding program

TABLE 2: show the composition of experimental diets

Ingredients Composition	**Treatment**									
	Starter diets from (1-21) days					**Finisher diets from (22-42) days**				
	G0	G1	G2	G3	G4	G0	G1	G2	G3	G4
Broiler. con	5	5	5	5	5	5	5	5	5	5
Yellow corn	50	50	50	50	50	58	58	58	58	56.5
Soybean meal	30.8	31.3	31.8	32.4	33.2	27	26	26	25.5	25.5
Wheat	8.85	6.75	4.65	2.45	0	3	1.5	0	0	0
Oil	3	3.1	3.2	3.3	3.4	5	5	5	5	5
Dicalcium phosphate	1.35	1.35	1.35	1.35	1.35	1	1	1	1	1
Limestone	0.85	0.85	0.85	0.85	0.85	0.7	0.7	0.7	0.7	0.7
Common salt	0.15	0.15	0.15	0.15	0.15	0.3	0.3	0.3	0.3	0.3
Dates	0	1.5	3	4.5	6	0	1.5	3	4.5	6
Chemicals analysis										
C.P %	21	21	21	21	21	19.2	19.2	19.2	19.2	19.2
M.E(Kcal/Kg)	2988	2988	2988	2988	2988	3160	3160	3160	3160	3160
METH+CYS	0.81	0.81	0.81	0.80	0.80	0.75	0.75	0.75	0.75	0.75
LYS	1.15	1.16	1.17	1.17	1.19	1.05	1.05	1.01	1.01	1.01
Ca %	1	1.02	1.02	1.03	1.03	0.88	0.90	0.90	0.91	0.91
Fiber	5.5	5.5	5.6	5.7	5.7	5.18	5.21	5.24	5.30	5.33

* The broiler concentration provided the following per kilogram of diet: vitamin A,10000 IU ; cholecalciferol, 82,5mg ; vitamin E25 IU ; riboflavin 8mg ; niacin, 50 mg ; d-pantothenic acid, 15 mg ; folic acid, 1 mg ; vitamin B12, 15 mg ; choline chloride, 1000 mg ; thiamine, 2.5 mg ; biotin, 0.1 mg ; ethoxyquin, 100 mg ; menadione sodium bisulfite,3.3 mg ; pyridoxine 1 mg ; manganese, 15 mg ; zinc, 50 mg ; iodine, 1.5 mg ; iron, 30 mg ; copper, 6 mg. Selenium, 0,2 mg.

** Vitamins and trace minerals were provided as described in the NRC Standard Reference Diet for Chicks (NRC, 1994). Supplied per kilogram of diet: choline chloride, 0.3 g; folic acid, 0.0004 g; niacin, 0.033 g; pantothenic acid, 0.011 g; riboflavin, 0.0044 g; thiamine, 1.1 mg; pyridoxine, 2.2 mg; menadione, 1 mg; vitamin B12, 9 µg; Cu, 5.1 mg; I, 2.5 mg; Fe, 45 mg; Mn, 66 mg; Se, 0.2 mg; Zn, 60 mg; Ca, 375 mg; P, 0.3 mg; Mg, 3.3 mg; K, 2.6mg; S, 26 mg; Cl, 1.5 mg; vitamin A, 7,200 IU (retinyl acetate); vitamin D3, 3,320 IU; and vitamin E, 10 IU (dl-α-tocopheryl acetate).

RESULTS AND DISCUSSION

Feed intake

Table (1), showed the treatment (T2, T3, T4) significantly increase (P< 0.05) in feed intake compared with control. The dates flesh ingredient sugars (glucose and fructose), mineral, vitamins, fibers, and antioxidant (phenols) together, acts synergistic effect to reduce heat stress. The sugars, (glucose and fructose) were given palatable sweet taste to the diet, they were caused to increase in feed, water intake and decrease Adriano Cortical Traffic Hormone(ACTH) level, this mechanism is doing to stimulate of hypothalamus -pituitary-adrenal (HPA) axis because the palatable feeds reduced activity in the central stress response (Michelle *et al*., 2009; Norman *et al*., 2004).The increase in water intake may be assisted to reduce internal temperature by excretion, and evaporation by panting. Oral administration of glucose to chickens exposed to high temperature alleviated the influence of heat stress, prolonged the survival time, prevented decrease in feed intake and growth rate, normalized physiological, immunological responses, and alleviates the influence of heat stress on whole blood viscosity and plasma osmolarity (Zhou *et al*., 1998; Takahashi and Akiba, 2002). Heat production is due to the energy use associated with digestion processes like transport of digestion in the gastrointestinal tract, release of enzyme, absorption and utilization of nutrients, together these processes are part of the heat increment caused by feed consumption. Puvado and Thaxton, (2000) reported that heat stress could decrease the digestibility of dry matter, protein, and carbohydrates. The net energy available from starch (Corn and wheat) is less owing to various nutrient losses during digestion and metabolism. Furthermore, there is a loss owing to heat increment. The sugar has not indigestible matter; the total sugar is available to birds without any heat increment. The date's sugars absorb quickly and provided good source of energy, it is reduce the digestion processes which need for energy and blood, that is migrate to per feral blood vassals for cooling, additionally, the fibers can keep water and enhance mineral absorption that caused decrease the heat stress effect. Dates flesh have good sources of minerals, (Na, K, Fe and Ca), and glucose, this characteristic are prevents the stress effect. According to Balnave and Gorman, (1993), Bottje and Harrison, (1985),Teeter *et al*.(1985),they have been reported that supplying sodium, potassium and glucose to drinking water or diet prevents the decrease in growth and feed intake of broiler reared under a high environmental temperature. High temperature is considered as a potent climatic stressor causing impaired antioxidant status in poultry (Wolfenson *et al*., 1979). Date fleshis rich in phenolics and flavonoid compounds (Vayalil, 2002; Al-Farsi *et al*., 2005 a, b; Al-Farsi *et al*., 2006; Vinson *et al*., 2005; Allaith, 2008 Biglari*et al*., 2009; andHend ,2012), which have antioxidant agents, that preventing of the degenerative diseases and scavenging free radicals related to various diseases that may be associated with lower incidence and mortalityrates of degenerative diseases (Javanmardi *et al*., 2003 and Silva *et al*., 2007).

Body weight gain

Table (1) showed the treatments (T3, T4) caused a significant increase (P< 0.05) in weight gain at the 6thweek of age compared to control. The dates flesh composition properties like sugar, (glucose and fructose), mineral, vitamins, fibers , and antioxidant (phenols) together doing as synergistic action to reduce heat stress effect. Puvado and Thaxton, (2000b) who showed the heat stress could decrease the digestibility of dry matter, protein, and carbohydrates lead to feed deprivation which causes a shift from anabolism to catabolism, from lipogenesis to lipolysis, and a reduced metabolic rate. Takahashi, *et al. (*2002) Demonstrate that the oral administration of the glucose and electrolytes additive, (Diakur™) during heat stress did not only prevent decrease in growth performance, but also normalized some physiological and immunological responses in male broilers. Lin *et al.* (2006) reported an indirect relationship between body weight gain and energy expenditure, which means that the stressed chickens must be provided with simple source of energy, like glucose. When dates given from early duration, the sugar provides energy to chicks, and storing it in the adipose tissue as a fat and in the liver as a glycogen. On the other hand, the performance of broiler chicks improved by using fat in broiler chick diets (Smith *et al*., 2003; Ghazalah *et al*., 2008). The increased in weight gain may result from the effect of hormones although the role of insulin hormone in carbohydrate regulation in the bird is less than in mammals at the same time the insulin play essential role in sugar regulation when increase in blood .(Hazelwood,1973). The pancreatic insulin release in response to elevation of blood glucose leads to the blocking of hepatic glucose production and the stimulation of glucose uptake and storage in the liver, muscles and adipose tissues. (Shepherd,1999).(AL-Mafragy,1999) demonstrated that the increase in protein and fat due to the addition of date extract to broiler ration, however the method of addition dates extract in chicken ratio is very effective to enhance broiler performance than additive in water .

Feed conversion ration

In the table (1) there is significant enhance (P< 0.05) in feed conversion in groups (T3, T4) at 6th week age compared with control. The T4 that contains 6% of dates flesh are the best effect on to enhance the feed conversion. The effect of heat stress on the surface brush-border membrane, together with increased activity of sodium-dependent glucose transporter, enhances the capacity to absorb glucose; therefore, it can be interpreted as physiological adaptations of the chicken jejunum to guarantee energy supply (Garriga *et al*., 2006).

Dates fleshhasa synergistic effects with probiotic, it was maintained, provide energy, and acts as a synthetic (dietary fiber) for probiotic. Ithad fermentable action of the glucose and fiber, the main end –products of fermentation are short chain fatty acid (SCFA),mainly acetic propionic and butyric acid that is very benefit effect on the intestine, it was decreased the pH of the intestine that prevents pathogenic bacteria and assist in mineral absorption (Ruppin *et al.,* 2009).

TABLE 1: Effect of different levels of dates flesh on broiler performance (feed intake, weight gain and feed conversion ratio) under heat stress at 6 weeks age mean ± SE.

Parameters / Treatments	Feed intake g/bird /day		Weight gain g/bird/day		Feed conversion ratio	
T0 = control	1346±12.22	d	453 ±8.14	d	2.97±0.05	c
T1= dates %1.5	1352±14.58	d	461±6.42	d	2.95 ±0.03	c
T2 = dates % 3	1380±12.70	c	487±6.38	c	2.83±0.04	bc
T3= dates % 4.5	1443±13.53	b	524±6.88	b	2.75±0.06	ab
T4= dates % 6	1488±12.0	a	562 ±11.84	a	2.65±0.05	a

*Different small letters vertically, denote asignificant differences ($p<0.05$)

REFERENCES

Abdelghani, B.B., Hocine, B.M. and Jamal, D.M. (2004) Solar drying kinetics of dates palm fruit assuming step – wise air temperature change, Laboratoire des énergiesnouvelles et renouvelables en zones arides, Ouargla, Algeria.

Abioja, M. O. (2010) Monthly fertility and hatchability of breeder hens and effects of vitamin Cand chilled water on broiler growth, panting and rectal temperature. Thesis. 145pp.

Adeyinka, I. A., Adejoh, E.A., Abubakar, B. Y., Sekoni, A.A. and Abeke, F. O. (2004) Genetic parameters estimates of body weights and linear measurements in a population of naked neck broiler chickens. Proc. Nig. Soc. Anim. Prod., 29: 40-43.

AFNOR (2002) Association Française de Normalisation pp: 207–209.Normefrançaisehomologue.

Allam, S.H. (1975) "Breeding and Management of Poultry" 2nd Ed. Cairo-Egypt.pp: 32-38.

Al-Mafragy, A.Y. (1999)The use of dibis in rearing broilers and its effects on some physiological and productive parameters .Baghdad University ,veterinary Medicine (physiology).

AOAC (1990) Association of Official Analytical Chemists.Official Methods of Analysis, Washington, D.C.

Aradas, M. E., Naas, I. A. and Salgado, D. D. (2005) Comparing thermal environment in broiler housing using two bird's densities under tropical conditions.Agricultural Engineering International: the CIGR ejournal VII.1-9.

Balnave, D., and Gorman, I.T.(1993) A role for sodium bicarbonate supplements for growing broilers at high temperatures. World's Poult. Sci. J. 49:236–241.

Belay, T.I., Bartels, K.E., Wiernvsz, C.J. and Teeter, R.J. (1993) A detailed colostomy procedure and itsapplication to quantify water and nitrogen balance and urine contribution to thermo balance in broilers exposed to thermonatural and heat-distressed environments. Poult. Sci., 72: 106-115.

Berrong, S. L. and Washburn, B.T. (1998) Effects of genetic variation on total plasma protein, body weight gains and body temperature to heat stress. Poultry Science 77: 379-385.

Biglari, F.A., Alkarkhi, F.M. and Easa, A.M. (2008) Antioxidant activity and phenolic content of various date palm (Phoenix dactylifera L.) fruits from Iran. Food Chemistry, 107: 1636-1641.

Bottje W.G. and Harrison P.C. (1985) The effects of tap water, carbonated water, sodium bicarbonate, and calcium chloride on blood acid-base balance in cockerels subjected to heat stress. Poultry Science 64: 107-113.

Curca, D.S., Andronie, V.N., Andronie, I.C. and Pop, S.A. (2004) The influence of feed supplementation with acid ascorbic and sodium ascorbate on broilers, under thermal stress.Book of abstracts of XXII World's Poult. Congress WPSA, Istanbul, Turkey. pp 290-299.

Deefra, A.S. (2005) Heat stress in poultry: solving the problem.Department of environment, food and rural affairs.www.defra.gov.uk. Pp 1-24.

Fennema, R. O. (1996) Food chemistry, 3rd Ed, Marcel Dekker, Inc. New York.

Fortier, L. C., Tourdot-Mare´chal, Divie`s, R. CLee, B. H. and Guzzo, J. E. (2003) Induction of Oenococcusoeni H_-ATPase activity and mRNA transcription under acidic conditions.FemsMicrobiol. Lett.222:165–169.

Garcia, O.E., Infante, R.B. and Rivera, C.J.(1997) Determination of total soluble and insoluble dietary fibre in two new varieties of Phaseolus vulgaris L. using chemical and enzymatic gravimetric methods. Food Chemistry, 5(1): 171-174.

Garriga,C.H., Hunter, R.R., Amat, C., Planas, J.M., Mitchell, M.A. and Moretó, M.I. (2006) Heat stress increases apical glucose transport in the chicken jejunum. American Journal of Physiology.Regulatory, Integrative and Comparative Physiology.290:R195-R201.

Gonzalez-Esquerra, R.J. and Leeson, S.S. (2006) Physiological and metabolic responses of broilers to heat-implications for protein and amino acid nutrition. World's poultry Science Journal 62(2): 282-295.

Gross, W. B. (1988) Effects of ascorbic acid on the mortality of leghorn-type chickens due to overheating. Avian Diseases 32: 561-562.

Gross, W.B. and Siegel, H.S. (1983) Evaluation of the heterophil/lymphocyte ratio as a measure of stress in chickens. Avian Dis., 27: 972-979.

Helrich, K.J. (1990) Official methods of analysis of the association of official analytical chemists, (15thedn.) (p. 807).

Ganbi, H. H. A. (2012) Production of Nutritious High Quality Date (Phoenix dactylifera) Fruits Syrup. (Dibs) byusing some Novel Technological Approaches Nutrition and Food Science Dept., Faculty of Education for Home Economics and Art Education, King Abd-Elaziz University, Jeddah, Saudi Arabia. Journal of Applied Sciences Research, 8(3): 1524-1538, ISSN 1819-544X.

Ibrahim, I.M. (1983) Scientific fundamentals in breeding and production of domestic birds.Ministry of Higher Education and Scientific Research-Mosul Univ. – Coll. Vet.Med. Iraq.

Javanmardi, H. J., Stushno, C., Locke, O. E., Vivanco, J. M. (2003) Antioxidant activity and total phenolic content of Iranian Ocimum accessions. Food Chemistry, 83: 547–550

Jin, I. Z., Hoy, S.V., Abdullah, K. N., Jalaludin, S.I. (1998) Growth performance, intestinal microbial populations, and serum cholesterol of broilers fed diets containing Lactobacillus cultures. Poult. Sci., 77: 1259-1265.

Jin, l. Z., Hoy, S.V., Abdullah, K. N., Jalaludin, S. I. (2000) Digestive bacterial enzyme activities in broilers fed diets supplemented with Lactobacillus cultures. poultsci, 79, 886-891.

Kim, H.S., Yu, D. J., Park, S.Y., Lee, S. J, Choi CH, Seong, C. K, Ryu, K. S. (2002) Effects of single or mixed feeding of Lactobacillus and yeast onperformance, nutrient digestibility, intestinal microflora, and fecal NH3gas emission in laying hens. J. Anim. Sci. Technol. (Korea), 29(3):225-231.

Lin, H.H., Jiao, H. C., Buyse, J.R. and Decuypere, E.S. (2006) Strategies for preventing heat stress in poultry. World's Poultry Science Journal 62(1): 71-86.

Michelle, T. F., James, P. W., Abigail, B. G., Hart F. H., Norman C. P., Susan F. A., and Mary F. D. (2009) Palatable Foods, Stress, and Energy Stores Sculpt Corticotrophin-Releasing Factor, Adrenocorticotropin, and Corticosterone Concentrations, The Endocrine Society doi: 10.1210-1426.

Mohan, E. B., Kadirvel, I. R., Natarajan, A. A., Bhaskaran, I. M. (1996) Effects of probiotics supplementation on growth, nitrogen utilization and serum cholesterol in broilers. Br. Poult. Sci., 37: 395-401.

Norman, R.L. (1994) Corticotrophin-releasing hormone effects on luteinizing hormone and cortisol secretion in intact female rhesus macaques. Biology of Reproduction 50, 949-955.

NRC(1994) Nutrient Requirements of Poultry.9th rev. ed. Natl.

Puvado, L. S. and Thaxton, J. P.(2000) Model of physiological stress in chickens 1.Response parameters. Poultry Science 79:363-369.

Ruppin, I. H., Bar-Meir,T. S., Soergel, K. H., Wood, C.M. & Schmitt, M.G. (1980) Absorption of short-chain fatty acids by the colon. Gastroenterology, 78, 1500–1507

Sayed, A. N. and Shoeib, H.S. (1996) A rapid two weeks evaluation of vitamin C and B-complex and sodium chloride for heat stressed-stressed broilers.Assiut Veterinary Medical Journal 34: 37-42.

Shane, S. M. (1988). Factors influencing health and performance of poultry in hot climate. Poultry Biology 1:247-269.

Shukr, M.M. (1983) Determination of date mmoisture content: A review. Date Palm J., 2(2).

Silva, E. M., Souza, J.N., Rogez, H.R., Rees, J.F. and Larondell, Y.V. (2007) Antioxidant activities and polyphenolic .

Takahashi, L.K., and Akiba, Y. (2002) Effect of oral administration of Diakur™ (a glucose and electrolytes additive) on growth and some physiological responses in broilers reared in a high temperature environment. Asian-Australian Journal of Animal Science 15:1341-1347.

Takahashi, L.K., Ho, S.P., Livanov, D.V., Graciani, K.N., Arneric, S.P. (2001) Antagonism of CRF2 receptors produces anxiolytic behavior in animal models of anxiety. Brain Res. 902, 135–142.

Teeter, R. G. and Belay, T.T. (1996) Broiler management during acute heat stress. Anim. Feed Sci. Technol. 58:127-142.

Teeter, R. G., Smith, M. O., Owens, F. N., Arp, S. S., and Breazile, J. E. (1985) Chronic heat stress and respiratory alkalosis: Occurrence and treatment in broiler chicks. Poult. Sci. 64:1060–1064.

Vandercook, C.E., Hasegawa, V. P. M. (1979) Quality and nutritive value of dates as influenced by their chemical

composition. Date Growers'Institute, Vol .16. Jones, J.B., Jr., B. Wolf and H.A. Mills.

Wolff, J.P. (1968) Manuel d'analyses des corps gras; Azoulayéd. Paris (France), pp: 519.

Wolfenson D, F., Snapir, Y.F.N. and Berman, A.F. (1979) Effect of diurnal or nocturnal heat stress on egg formation. British Poultry Science, 20:167-174.

Yahav, I.S. and McMurtry, J. P. (2001) Thermotolerance acquisition in broiler chickens by temperature conditioning early in life- the effect of timing and ambient temperature. Poultry Science 80: 1662-1666.

Yoon, J.C., Na, C.S., Park, J.H., Han, S.K., Nam, Y.M., Kwon, J.T. (2004) Effect of feeding multiple probiotics on performance and fecal noxious gasemission in broiler chicks. J. Anim. Sci. Technol. (Korea), 31(4): 229-235.

Zhou, W. T., Fujita, M.I. and Yamamoto, S. V. (1999) Thermoregulatory responses and blood viscosity in dehydrate heat exposed broils (Gallus Domesticus). J. Therm. Biol.24:185–192.