Egyptian J. Anim. Prod. (2012) 49(1):67-76

EFFECT OF THE TIME OF FEEDING ON THE REPRODUCTIVE AND PRODUCTIVE PERFORMANCE OF DANDARAWI CHICKEN UNDER THE PREVAILING SUBTROPICAL CLIMATIC CONDITIONS IN ASSIUT

H.Y. El-Hammady, M. El-Sagheer and M.F.A. Farghly

Department of Animal and Poultry Production, Faculty of Agriculture, Assiut University, 71526 Assiut, Egypt

SUMMARY

Three hundred and sixty, 4 weeks old sexed Dandarawi chicken were classified into two equal groups, the first served as the control (C), while the second was the treatment (T). Each group included 90 males and 90 females, divided into three replicates of 60 birds each. The feed was offered two times daily at 10 AM and 4 PM for the C group and at 6 PM and 2 AM for the T group. Birds in the C and T groups were exposed daily, during the growing period, to 12 hrs artificial lighting, from 8 AM to 8 PM or 6 PM to 6 AM, respectively. Throughout the laying period, the photoperiod increased gradually to reach 16 lighting hrs from 8 AM to 12 PM and from 6 PM to 10 AM for the C and T groups, respectively. The achieved results could be concluded as follow: Males and females fed from 6 PM to 2 AM in the T group had better ($P\leq0.05$) body weight, body weight gain, body weight change and feed efficiency expressed as g feed/ g gain. Birds in T showed significantly ($P\leq0.05$) higher values in hen day egg production, egg weight, egg number, egg mass and economical efficiency, in addition to a remarkably improved ($P\leq0.05$) feed conversion, expressed as g feed/ g egg mass, fertility and true hatchability than the corresponding values for the C group. Also, they had fewer deaths than those in C group. No significant differences were observed in feed consumption during the growing and laying periods between the T and C groups.

In general, choosing the best adequate time for feeding the birds, associated with the most temperate climatic conditions could be considered as one of the most efficient manipulations to improve the production and reproduction performance of Dandarawi chicken raised under the prevailing hot climatic conditions in Assiut.

Keyword: Performance, feeding time, Dandarawi chicken

INTRODUCTION

The rapid development of the poultry industry and production, especially at the level of farmers and by small producers created and established a number of genetical, physiological and nutritional management schemes and manipulations in order to attain the highest possible fecundity of birds which leads to achieve the greatest possible economical efficiency. Poultry feeding could be practiced in different systems and regimens as providing the feed *ad. libitum,* choice feeding, once or twice per day and on restricted basis (Henuk and Dingle, 2002).

Also, poultry feed could be offered in different forms, as mash, pellets, crumbles and wet. Choosing the adequate feeding system as well as the best time all over the day for providing the feed could be considered among the most important practices, which help small poultry producers to achieve the best possible production performance especially under hot and humid climatic conditions in tropical and subtropical countries and regions (Harms, 1991; Leeson and Summers, 2000).

The deleterious and stressful effects of higher temperature and temperature humidity indexes (THI) than their comfort zone, that is adequate for raising domesticated birds on their productive and reproductive performance are well known (Sterling *et al.,* 2003). Because birds have only very few functional sweat glands, it is difficult for them to get rid off the excess body heat. Therefore, minimizing the temperature inside the poultry building until it reaches their comfort zone, results in a remarkable improvement in their production and reproduction performance. Therefore, since 1980 the department of animal and poultry production, Faculty of agriculture Assiut University started an integrated research program, aimed to study the effects of the high temperate and heat stress, relative humidity and THI on the different productive and reproductive traits of domesticated birds and rabbits (El-Hammady *et al.,* 2005, 2009 and 2010).

It is worth to mention that Assiut Governorate, which lies in south Egypt, at 370 Km from Cairo, represents the actual subtropical climatic conditions, since there are wide ranges between the averages of maximal and minimal values of temperature, relative humidity and THI indexes from the end of April to the end of August. The averages of minimal and maximal values in temperature and relative humidity in Assiut range from 18 Cº to 45 Cº and 40 to 75% in summer months versus 2 Cº to 21 Cº and 55 to 80% in winter months, respectively.

The adequate time all over the day for poultry feeding, especially in hot regions, could be considered as one of the most important factors that play an important role in the body thermoregulation of birds (Avila *et al.,* 2003a; and Ashour, *et al.,* 2004). The present work aimed to study the effect of changing the time of poultry feeding, in the summer, to be during the temperate climatic hours in stead of the hottest hours of the day on the productive and reproductive performance of birds.

MATERIALS AND METHODS

This experiment was carried out at the experimental Poultry Research Farm, Faculty of Agriculture, Assiut University, Egypt. A total of three hundred and sixty, 4 weeks old, sexed Dandarawi birds of 165g ±2.0 average body weight, were wing banded, individually weighed and distributed into two equal groups. The first served as the control (C) and the second was the treatment (T)). Birds in each group (90 males and 90 females) were divided into three replicates; every 60 chicks were raised in a closed room (10 square meters), provided with wheat straw litter of 5-8 cm height. Water was available for all birds all the time, while the feed was offered two times daily: at 10 AM and 4 PM for the C group and 6 PM and 2 AM for the T group. Birds of the C and T groups were exposed daily, during the growing period, to a 12 hr artificial lighting photoperiod, from 8 AM to 8 PM and from 6 PM to 6 AM, respectively with a lighting density of 10 lux/m^2. The lighting period increased gradually to reach 16 lighting hrs from 8 AM to 12 PM and from 6 PM to 10 AM, respectively with a lighting intensity of to 20 lux/m^2. The only difference between the C and T groups was the time of feeding and photoperiod. This manipulation was practiced by changing the time of feeding, in the summer, to be during the temperate climatic hours from 10 AM and 4 PM to 6 PM and 2 AM. This was done, in order to minimize the deleterious effects of the high temperature on the productive and reproductive performance of birds.

The environmental climatic conditions:

Nine estimates for the interior temperature (Cº) and the relative humidity (%) were recorded for both the C and T groups throughout the experimental period using a thermo hygrograph at 8, 10 and 12 AM; 4, 6 and 8 PM; and at 10 PM; 12 midnight and 2 AM, respectively (Table 1). The overall means of temperature and relative humidity percentage were recorded and those of THI were calculated according to the formula of Marai *et al.* (2002) as follow:

THI=dbºC-((0.31-0.31RH)(dbºC-14.4)),

where: db°C= dry bulb temperature in Celsius and Rh = RH% / 100.

It is worth to mention that brooding, rearing and raising of the experimental birds were practices under the environmental climatic conditions prevalent in Assiut.

The experimental Diets:

The grower diet was offered to the birds from four weeks of age until the onset of sexual maturity at 24 weeks of age. The layer diet was used from the onset of laying until the end of the laying season. The chemical composition and calculated analyses of the experimental rations are presented in Table (2).

Traits under study:

Birds were individually weighed at 4, 12, 24, 36, 48 and 60 weeks of age. The body weight gain (BWG) was calculated from 4 to 24 weeks of age. The body weight changes (BWC) were also calculated by subtracting the final body weight minus the initial body weight during the periods from 4 to 24, 24 to 60 and 4 to 60 weeks of age. The feed consumption (FC) was recorded weekly and calculated from 4 to 12; 12 to 24; and then periodically every 12 weeks during the laying period. The feed conversion ratios (FCRg i.e. g feed/g gain), were also calculated, while the FCRe values expressed as g feed/g egg mass were calculated periodically, every 12 weeks from 24 to 60 weeks of age. Egg weight (EW), egg number (EN) and egg mass (EM) were daily recorded and calculated for every 12 weeks. The egg production was expressed as hen-day egg production (HDP) for every 12 weeks. Dead birds were recorded daily and expressed as percentages during both the growing and laying periods**.**

Eggs laid in both groups were collected daily and stored at 15-18ºC and 70-75% relative humidity for 7 days before incubation. Six hatches were obtained during 28th, 32th, 36th, 40th, 44th and 48th weeks of age. The incubation was carried out using automatic Patersime setter and Hatcher under the recommended temperature, humidity, ventilation and turning of the incubated chicken eggs. The fertility and hatchability percentages were calculated as follow: Fertility (%) = (Fertile eggs) x100 / Total eggs set. True hatchability (%) = (Viable hatched chicks) X100 / total fertile eggs.

Economical efficiency (EE):

The economical efficiency was based on both the FC costs and price of the bird at 4 weeks of age as well as the income/bird (BWC and egg production). The net revenue per bird is estimated as the difference between the total income/bird (LE), (growth and egg production) and the total costs.

Statistical analysis:

The Data were statistically analyzed using the General Linear Models Procedure of SAS software (SAS institute, version 6.12, 1996). Duncan's Multiple Range Test was used to detect the differences in the different means of the studied traits, if significance exists (Duncan, 1955). The percentage values of HDP, fertility and true hatchability were transformed to Arcsine values before analysis.

RESULTS AND DISCUSSION

The results presented in Table 3 showed no significant differences in body weight (BW) between the C and T groups at 4, 12 (spring) and 48 (winter) weeks of age for Males (M) or females (F). However, The BW of F or M for the T group was significantly ($P \leq 0.05$) higher than those of the C group at 24 (summer), 36 (autumn) and 60 (spring) weeks of age. The body weight change (BWC) for the F and M for the T group significantly ($P \leq 0.05$) exceeded those of the C group from 4 to 24 weeks of age. However, there were no significant differences in the BWC for the F or M between the C and T groups during the laying period. The body weight gain (BWG) of the F and M for T significantly ($P \leq 0.05$) exceeded those of the C group.

The achieved results showed remarkable increase in BW, BWG and BWC of the T group than those of the C group. This improvement could be attributed to the more temperate climatic conditions, that the T group was under, during the summer hottest hrs during the feeding time. These results are in agreement with those found by Wilson *et al*. (1989). They stated that feeding time is a factor that may lead to heat stress, due to the heat increment produced from exothermic reactions that occur during feed metabolism. The heat increment became higher in 5 h from feeding, in birds fed in the morning than that in birds fed in the evening.

Similar results were found by Arjona *et al.* (1988) who stated that exposing the growing and laying chicken hens in the summer season to a temperature higher than 35°C with 30 THI units (severe heat stress) evokes different detrimental changes in their biological functions. These changes lead to a remarkable depression in appetite, feed intake and the metabolizable energy for growth as well as to a decrease in the efficiency of feed utilization. Furthermore, there were disturbances in the metabolism of water, energy, protein and mineral balances as well as a decrease in the resistance and then increased mortality.

The results presented in Table (3), showed, no significant differences in FC values of the F or M between the T and C groups at all studied ages. Keshavarz (1998) attributed the greater feed intake during the afternoon than during the morning to an increased appetite.

The birds in the T group had less mortality than those of the C group. The mortality rate (MR) in the F and M of the T group was lower than those of the C group by 1.4, 1.7 and 1.6% and by 2.0, 1.2 and 1.6% from 4 to 24, 24 to 60 and 4 to 60 weeks of age, respectively. However, Avila *et al.* (2003a) found that the MR was similar among the tested treatments. Birds in the first treatment were fed at 6:30 AM. In the second treatment had 50% feeding at 6:30 AM and 50% at 3:30 PM. In the third treatment, the feeding was at 11:00 AM; and 3:30 PM.

The feed conversion expressed as g feed per g gain (FCRg) for F and M of the T group was significantly ($P \leq 0.05$) better than those of the C group (Table 3). The feed conversion expressed as g feed per g egg mass (FCRe), from 24 to 36 (autumn), 36 to 48 (winter), 48 to 60 (spring) and the overall mean of the T group was significantly ($P \leq 0.05$) better than those of the C group (Table 4). These results are in agreement with those reported by Keshavarz (1998) who, reported that feed conversion (FCR) for broilers fed during the period from 1 PM to 9 PM was superior to the other dietary treatments. Similar results were found by Abd El-Hakim and Abd-Elsamee (2003) who showed that feeding time significantly improved the feed conversion. Also, Roland *et al.* (1972) found that feeding the laying hens during the period from 2 PM to 10 AM increased the FCR above those of birds fed from 6 AM to 2 PM.

In autumn, winter and spring seasons, the birds of the T group had significantly ($P \leq 0.05$) higher egg weight (EW), hen day egg production (HDP), egg number (EN) and egg mass (EM) than those of the C group (Table 4). Also, the overall means of EW, HDP, EN and EM of the T group exceeded, significantly ($P \leq 0.05$), those of the C group (Table 4). These results are in agreement with those reported by Mongin and Sauveur (1974), Hassan *et al.* (2003), Avila *et al.* (2003b), and Ndubuisi, *et* *al.* (2008), who reported higher egg production for birds fed in late hours of the day. These results remarkably revealed the adverse effects of feeding birds during the hottest part of the day on the egg production performance (the control group) are in agreement with the findings of Wilson *et al*. (1989), which indicated that the time of feeding is a factor that may result in heat stress, due to the heat increment from exothermic reactions that occur during feed metabolism. These authors found that the increment in birds, which have been fed at 6:00 AM than in birds fed at 2:00 PM were higher at 5 h after feeding, as the increased interior temperature caused a remarkable increase in body temperature. Similarly, the results of Ndubuisi, et *al.*, (2008), revealed that the highest egg production could be achieved, when the ambient temperature was within the neutrality range. However, at air temperature of 25.5 Cº and above, a drop in egg number, weight and egg size has been observed. The authors added that a high temperature of 30°C and more decreased the productivity of layers. Under the high ambient temperature, the role of core blood supply to the synthesizing egg is reduced through the neuro-endocrine mechanism. Under this condition, the nutrients needed for egg production will not be adequately supplied. Hoverer, Cave (1981), Bootwalla *et al*., (1983), Wilson and Keeling (1991), and Samara *et al*. (1996) found that the feeding time did not affect egg production. In contrast, Brake and Peebles (1986), and Harms (1991), observed that changing the time of feeding of hens from morning to afternoon, resulted in a reduction in egg production.

In autumn and winter seasons, the percentages of fertility (FP) and true hatchability (HP) of the T group were significantly ($P \leq 0.05$) higher than those of the C group (Table 4). Also, the overall FP and HP means of the T group were significantly ($P \leq 0.05$) higher than those of the C group. The achieved results are in agreement with the findings of Brake (1988) who found that feeding laying hens in the afternoon resulted in higher FP than those fed in the morning. Hassan *et al.*, (2003), found that the FP and HP were higher in quail birds fed during the period from 2 to 10 PM than from 6 AM to 2 PM. The improvement of FP may be attributed to the increased egg specific gravity and the egg production, while the improvement in HP may be due to the increased egg specific gravity, egg production, and FP. Mongin and Sauveur (1974) showed that the highest calcium consumption of the commercial laying hens, from 18-28 weeks of age, takes place in the early morning. Lennards *et al.*, (1981), reported that the commercial laying hens became deficient in calcium during the early morning hours and added that the time of calcium intake has an important role in the ability of laying hens to calcify eggshells.

The findings presented in Table (5), showed that the economical efficiency (EE) of the T group exceeded that of the C group by 53%. These results are also in agreement with the findings of Abd El-Hakim and Abd-Elsamee, (2003) who stated positive effect of the time of feeding (skip a day and skip a half day i.e.12 hr feed + 12 hr fast) during summer season which improved the EE of Arbor Acres broiler chicks, significantly.

CONCLUSION

Changing the time of feeding to be in the late afternoon and in early next morning, as the ambient temperature was most temperate instead of feeding during the hottest part of the day, was found to be more suitable for raising Dandarawi birds. It resulted in better production performance through minimizing the adverse effects of the high temperature. Therefore, the time of feeding is an important managerial factor, which has to be considered as a potent manipulation to achieve better poultry production under the summer hot environmental climatic conditions as in Assiut region.

ACKNOWLEDGMENTS

We thank all the staff members and our colleagues at the Animal and Poultry Production Department, Faculty of Agriculture, Assiut University for their kind encouragement and their assistance.

REFERENCES

Abd El-Hakim, A.S. and M.O. Abd-Elsamee, 2003. Effect of feeding systems and phytase supplementation on the performance of broiler chicks during summer season. Egypt. Poult. Sci. J. 24: 297-310.

Arjona, A.A., D.M. Denbow, and W.D. Jr. Weaver, 1988. Effect of heat stress early in life on mortality of broiler exposed to high environmental temperatures just prior to marketing. Poult. Sci. 67: 226-231.

Ashour, G., S. Ibrahim, A.M. Ismail, and K.H. El-Kholy, 2004. Physiological reactions and biological performance of rabbits to summer heat stress. 2nd Conf., Physiological Response to Environmental Conditions, 28-31 July, 2004, Fac. Environ. Agric. Sci., Suez Canal Univ., El-Arish, Egypt, pp. 165-186.

Avila, V., J.A. Penz, P. Brum, P. Rosa, A. Guidoni, and E. Figueiredo, 2003b . Performance of female broiler breeders submitted to different feeding schedules. Rev. Bras. Cienc. Avic. 6:5.

Avila, V., J.A. Penz, P. Rosa, P. Brum, A. Guidoni, and M. Ledur, 2003a. Influence of feeding time on sexual maturity and carcass composition in female broiler breeders. Rev. Bras. Cienc. Avic., 5:3.

Bootwalla, S., H.R. Willson, and R.H. Harms, 1983. Performance of broiler breeders on different feeding systems. Poult. Sci. 62:2321-2325.

Brake J.D., 1988. Relationship of time and strain to egg shell quality and hatchability in broiler breeders. Poult. Sci. 67:538-543.

Brake, J.D. and E.D. Peebles, 1986. Effects of strain and time of feeding on reproductive performance and shell quality of broiler breeders. Poult. Sci. 65 (Suppl. 1):156. (Abstr.)

Cave, NA., 1981. Effect of diurnal programs of nutrient intake on performance of broiler breeder hens. Poult. Sci. 60:1287-1292.

Duncan, D.B., 1955. Multiple range and multiple F test. Biometrics 11:1-42.

El-Hammady, H.Y., M.A. Abdelnabi, M.A. Awadallah, M.N. Abd El-Ati, and A. Abdel Kareem, 2010. Effect of housing model on the productive performance of Bouscat rabbits raised under subtropical conditions in Assiut. The 6th Inter. Con. on Rabbit Prod. in Hot Clim., Assiut, Egypt, 485-502.

El-Hammady, H.Y., M. El-Sagheer, S. Maak, and A.M. El-Gammal, 2009. Performance of force molted chicken hens affected by high temperature. 2. Effect on egg quality traits and egg components. The 5th International Poultry Conference, 10-13 March 2009, Taba-Egypt, R (16): 1563-1581.

El-Hammady, H.Y., S. Maak, M. El-Sagheer, and A.M. El-Gammal, 2005. Performance of force molted chicken hens affected by high temperature. 1. Effect on egg production, feed consumption, feed conversion ratio and mortality rate. The 3rd International Poultry Conference, Hurghada, Egypt, April: 576-588.

Harms, RH., 1991. The influence of changing time of feeding on performance of broiler breeder hens. Poult. Sci. 70:1695-1698.

Hassan, S.M., M.E. Mady, A.L. Cartwright, H.M. Sabri, and M.S. Mobarak, 2003. Effect of early feed restriction on reproductive performance in Japanese quail (Coturnix coturnix japonica). Egypt. Poult. Sci. J. 23:1163–1169.

Henuk, Y. L. and J.G. Dingle, 2002. Practical and economic advantages of choice feeding systems for laying poultry. World's Poult. Sci. 58: 199-208.

Keshavarz, K., 1998. Investigation on the possibility of reducing protein, phosphorus, and calcium requirements of laying hens by manipulation of time of access to these nutrients. Poult. Sci. 77:1320–1332.

Leeson S.A. and J.D. Summers, 2000. Broiler breeder production. Uni. Books, Gyelph, Onlario, Canada, N1H6N8.

Lennards, R., D.A.S. Roland, and J.A. McGuire, 1981. The relationship of serum calcium to shell weight and other criteria in hens laying a low or high incidence of shell-less eggs. Poult. Sci. 60: 2501- 2505.

Marai, I.F.M., A.A.M. Habeeb, and A.F. Gad, 2002. Rabbits productive, reproductive and physiological performance traits as affected by heat stress: a review. Livest. Prod. Sci. 78: 71– 90.

Mongin, P. and B. Sauveur, 1974. Voluntary food and calcium intake by the laying hens. Br. Poult. Sci. 15:349–359.

Ndubuisi E.C., F.C. Iheukwumere, and P.E. Etusim, 2008. Diurnal effects of periodic litter change on egg production and physical qualities in a deep litter system. Inter. J. of Poult. Sci. 7 (2): 151-155.

Roland, D.A., D.R. Sloan, and R.H. Harms, 1972. Calcium metabolism in the laying hen. 3. Pattern of feed (calcium) intake as influenced by time of day and oviposition. Poult. Sci. 51:1388–1391.

Samara, M.H., K.R. Robbins, and M.O. Smith, 1996. Interaction of feeding time and temperature and their relationship to performance of the broiler breeder hen. Poult. Sci. 75:34-41.

SAS, 1996. SAS User's Guide, Statistics (6.2th ed.) Cary NC: SAS Institute Inc.

Sterling, K.G., D.D. Bell, G.M. Pesti, and S.E. Aggrey, 2003. Relationships among strain, performance, and environmental temperature in commercial laying hens. J. Appl. Poult. Res. 12:85-91.

Wilson, H.R., F.B. Mather, R.L. Brigmon, E.L. Besch, V.P. Dugan, and N.Z. Boulus, 1989. Feeding time and temperature interactions in broiler breeders. Poult. Sci. 68:608-616.

Wilson, H.R. and L.J. Keeling, 1991. Effect of time of feeding on oviposition time and production parameters in broiler breeders. Poult. Sci. 70:254-259.

Table 1. The overall means of indoor temperature (C°), relative humidity (%) and temperature humidity index (THI) during the experimental period

Season/ Age (in wks)	Temperature	Humidity	THI
Spring (April, May, June) (4-12 w)	19 - 27	40 - 65	18 – 25
Summer (July, August, September) (12-24 w)	24 - 34	40 - 65	22 -31
Autumn (October, November, December) (24-36 w)	19 - 32	40 - 65	18 - 30
Winter (January, February, March) (36-48 w)	16 - 22	40 - 65	16 - 23
Spring (April, May, June) (48-60 w)	19 - 27	40 - 65	18 - 25

Table 2. Composition and calculated analysis of experimental diets

Ingredients	Dandarawi chicken	
	Growing (%) (4 -24 wks)	Layer (%) (24 -60 wks)
Yellow corn	63.4	62.2
Soybean meal (44%)	30.8	23.0
Wheat bran	1.7	5.0
Limestone	1.0	5.0
Dicalcium phosphate	2.2	4.0
Vit. & min. premix*	0.1	0.2
Mineral premix **	0.4	0.2
DL-Methionine	0.1	0.1
Lysine	0.1	0.1
Salt	0.2	0.2
Total	100	100
Calculated Analysis:* **		
Protein, %	19.5	16.5
ME (KCal/ Kg diet)	2866.0	2750.0
Calcium, %	1.0	2.98
Available phosphorus, %	0.48	0.79

* Vitamin premix for laying, each 3 Kilogram contains Vit. A 100000 IU, Vit D 100000 IU, Vit E 10000 IU; Vit B, 1000mg, Vit B_2 5000mg, Vit B6 1500mg, Vit B_{12} 10mg, Pant. acid 1000mg, folic acid 1000mg, biotin 50 mg and niacin 3000mg.

** Mineral premix for laying, each 3 kilogram contain Fe 30000mg, Mn 6000mg, Cu 4000mg, Zn 50000 mg, I 300mg, Co 100mg and Selenium 100mg.

*** Calculated according to NRC (1994).

Table 3. Means ±SE of body weight, body weight change, body weight gain, feed consumption, feed conversion and mortality rate for females and males Dandarawi chicken as affected by time of feeding

Season/ Age (in wks)	Females		Males	
	C	**T**	**C**	**T**
Body weight (g)				
At 4 w	157.3±2.2	159.0±2.2	172.3±2.1	174.5±2.2
Spring (at 12 w)	607.7±6.6	614.0±6.5	654.2±10.3	688.0±11.2
Summer (at 24 w)	1264.8^{b}±9.3	1301.5^{a}±7.8	1375.4^{b}±6.5	1421.7^{a}±6.2
Autumn (at 36 w)	1514.5^{b}±8.2	1544.8^{a}±5.9	1641.4^{b}±2.6	1654.5^{a}±2.4
Winter (at 48 w)	1605.3±8.9	1621.3±7.6	1715.4±16.9	1747.5±12.0
Spring (at 60 w)	1638.6^{b}±9.9	1673.6^{a}±6.1	1789.9^{b}±9.0	1833.8^{a}±8.0
Body weight change (g)				
4 – 24 w	1107.5^{b}±9.5	1142.5^{a}±8.0	1203.0^{b}±9.1	1247.0^{a}±8.6
24 – 60 w	373.9±7.4	374.2±7.4	414.5±8.6	412.2±9.1
4 – 60 w	1481.3^{b}±8.4	1514.6^{a}±9.9	1617.6^{b}±8.5	1659.2^{a}±9.9
Body weight gain (g/bird/day)				
4 – 24 w	7.91^{b}±0.13	8.16^{a}±0.10	8.59^{b}±0.10	8.91^{a}±0.12
Mortality rate (%)				
4-24 w	3.6	2.2	2.9	1.2
24-60 w	3.2	1.2	1.2	0.00
Total (4-60)	6.7	3.5	4.1	1.3
Feed consumption during growing period (g/bird/day)				
4 – 12 w	38.3±0.8	36.7±0.8	42.2±1.4	40.2±1.6
12 – 24 w	71.2±1.2	67.9±0.7	77.8±1.1	73.8±0.9
Overall mean (4 – 24)	58.0 ±1.1	55.4±0.9	63.6±1.3	60.4±1.6
Feed consumption during laying period (g/bird/day)				
Autumn (24-36 w)	104.5±1.3	102.0±1.2	110.9±1.2	108.3±1.3
Winter (36-48 w)	107.3±1.7	104.9±1,5	114.9±1.3	111.8±0.9
Summer (48-60 w)	106.6±1.3	105.0±1.2	113.5±1.6	112.0±0.9
Overall mean (24-60 w)	106.1±2.14	103.9±1.0	113.5±1.9	112.0±0.6
Overall mean (4-60 w)	82.1±0.4	79.7±0.6	88.3 ±0.9	85.5 ±0.4
Feed conversion (g feed/g gain)				
4 – 24 w	7.02^{a}±0.41	6.22^{b}±0.2	7.29^{a}±0.3	6.63^{b}±0.3

[a and b] Means within each row for each division (F and M) with different superscripts are significantly different (P≤0.05).

C= Control group (birds were fed at 10AM and 4PM) T= Treatment group (birds were fed at 6PM and 2AM)

Table 4. Means±SE of feed conversion (g feed/g egg), egg weight (g), hen day egg production (%), egg number (egg/hen), egg mass (g/egg/hen), fertility (%), and true hatchability (%) for Dandarawi chicken as affected by time of feeding.

Season/ Age (in wks)	C	T	C	T
Feed conversion:			Egg weight:	
Autumn (24-36 w)	$5.16^{a}\pm0.01$	$4.49^{b}\pm0.02$	$44.4^{b}\pm0.6$	$45.5^{a}\pm0.3$
Winter (36-48 w)	$3.59^{a}\pm0.05$	$3.13^{b}\pm0.03$	$45.9^{b}\pm0.3$	$47.8^{a}\pm0.4$
Spring (48-60 w)	$3.80^{a}\pm0.06$	$3.28^{b}\pm0.04$	$46.0^{b}\pm0.5$	$47.8^{a}\pm0.4$
Overall mean	$4.07^{a}\pm0.04$	$3.53^{b}\pm0.03$	$45.5^{b}\pm0.3$	$47.0^{a}\pm0.2$
Hen day egg production:			Egg number:	
Autumn (24-36 w)	$45.5^{b}\pm1.8$	$49.7^{a}\pm0.7$	$38.2^{b}\pm0.2$	$41.8^{a}\pm0.3$
Winter (36-48 w)	$65.0^{b}\pm2.6$	$70.2^{a}\pm2.2$	$54.6^{b}\pm0.4$	$59.0^{a}\pm0.1$
Spring (48-60 w)	$61.0^{b}\pm2.5$	$67.0^{a}\pm1.5$	$51.2^{b}\pm0.6$	$56.3^{a}\pm0.2$
Overall mean	$57.1^{b}\pm1.9$	$62.3^{a}\pm2.1$	$144.0^{b}\pm0.2$	$157.1^{a}\pm0.1$
Egg mass/hen:				
Autumn (24-36 w)	$1701.6^{b}\pm9.1$	$1906.0^{a}\pm5.5$		
Winter (36-48 w)	$2509.3^{b}\pm5.5$	$2818.1^{a}\pm4.5$		
Spring (48-60 w)	$2355.3^{b}\pm8.5$	$2689.5^{a}\pm6.5$		
Cumulative	$6566.2^{b}\pm7.2$	$7413.5^{a}\pm3.3$		
Fertility:			True Hatchability:	
Autumn (24-36 w)	$87.2^{b}\pm0.5$	$95.9^{a}\pm1.6$	$78.0^{b}\pm1.2$	$85.8^{a}\pm1.0$
Winter (36-48 w)	$86.8^{b}\pm0.6$	$94.6^{a}\pm1.6$	$65.3^{b}\pm1.3$	$73.7^{a}\pm1.1$
Overall mean	$87.0^{b}\pm1.4$	$95.3^{a}\pm1.1$	$71.6^{b}\pm1.3$	$79.7^{a}\pm1.2$

[a and b] Means within each row with different superscripts are significantly different ($P\leq0.05$).

C= Control group (birds were fed at 10AM and 4PM) T= Treatment group (birds were fed at 6PM and 2AM)

Table 5. Economical efficiency in Dandarawi chicken as affected by time of feeding during the experimental period

Ex. groups / Items		C	T
Costs / L.E:			
Bird at 4 weeks of age	LBW/bird (g)	164.8	166.7
	Purchasing price/bird (L.E)	5.000	5.000
Feed	FC from 4 – 24 w (kg/bird)	8.512	8.106
	FC from 24 – 60 w (kg/bird)	27.72	27.72
	Total FC from 4 – 60 w (kg/bird)	36.232	35.826
	Feed costs from 4 – 24 w (L.E)	23.16	22.06
	Feed costs from 24 – 60 w (L.E)	107.72	106.51
	Total Feed costs (L.E)	130.88	128.57
Total costs (L.E)		**135.88**	**133.57**
Revenue / L.E:			
Bird at 60 weeks of age	LBW/bird (g)	1714.3	1753.7
	Selling price /bird/ L.E	34.29	35.07
Egg yield	Egg number/hen	144	157.1
	Selling price as fertile egg/hen/L.E	129.60	141.39
Total revenue (L.E)		**163.89**	**176.46**
Net revenue/ bird (L.E)		**28.01**	**42.89**
Economical efficiency/bird (E.E.)		**0.21**	**0.32**
Relative economical efficiency/bird		**100**	**153**

C= Control group (birds were fed at 10 AM and 4 PM) T= Treatment group (birds were fed at 6 PM and 2 AM)
Purchasing price of bird (L.E) = 5.000 Cost of 1 kg of live body weight = 20.00 L.E.
Price of 1 fertile egg = 0.90 L.E. Price of 1 kg of growing ration = 2.721 L.E.
Price of 1 kg of laying ration = 2.973 L.E. L.E = Egyptian pound.
Economical efficiency/bird =Net revenue per unit / total costs
Relative economical efficiency = $(E.E.)_T$ / $(E.E.)_C$
*Constant costs include: housing, labour, heating, cooling, lighting and treatment regimens.

تـأثير وقت التغذيـة علـي الآداء الإنتـاجي والتنـاسـلي للـدجاج الدنـدراوي تحـت الظـروف المناخيـة شبـه القاريـة السائده في أسيوط

حاتم يوسف الحمادي، محمد الصغير محمد، محمد فرغلي علم الدين

قسم الإنتاج الحيواني والدواجن، كلية الزراعة، جامعة أسيوط، ٧١٥٢٦ أسيوط، مصر

أستخدم في هذه الدراسة عدد ثلاثمائة وستون طائر مجنس من دجاج الدندراوي عند عمر ٤ أسابيع ، تم تقسيمها الي مجموعتين استخدمت الاولي كمجموعة للمقارنة والثانية كمعاملة. وأشتملت كل مجموعة علي ٩٠ ذكر ، و ٩٠ أنثي، قسم كل منها الي ثلاث مكررات بكل منها ٦٠ طائر. وكان العلف يقدم علي مرتين يوميا في الساعة العاشرة صباحا والرابعة بعد الظهر للمجموعة المقارنة ، وفي الساعة السادسة مساءا والثانية صباحا للمجموعة المعاملة. ولقد تم يوميا تعريض طيور المجموعتين خلال فترة النمو لـ ١٢ ساعةاضاءة صناعية وذلك من الساعة الثامنة صباحا الي الساعة الثامنة مساءا للمجموعة المقارنة ، ومن الساعة السادسة مساءا وحتي الساعة السادسة صباحا للمجموعة المعاملة. أما خلال فترة انتاج البيض ، لقد ازدادت فترة الاضاءة تدريجيا حتي وصلت الي ١٦ ساعة يوميا من الثامنة صباحا الي الثانية عشر مساءا للمجموعة المقارنة ، ومن الساعة السادسة مساءا وحتي الساعة العاشرة صباحا للمجموعة المعاملة.

أمكن تلخيص النتائج المتحصل عليها فيما يلي: لقد تميزت الذكور ، والاناث ، وكذلك الاناث مع الذكور والتي تناولت غذاء في الساعة السادسة مساءا ، والساعة الثانية صباحا في وزن الجسم ، والزيادة في وزن الجسم ، والتغير في وزن الجسم ، وكذلك في الكفاءة الغذائية مقدرة علي اساس جرام علف / جرام زيادة في الوزن وذلك بالمقارنة بمجموعة المقارنة. وبصورة مماثلة تميزت الطيور في مجموعة المعاملة عن مثيلاتها في مجموعة المقارنة في الانتاج اليومي من البيض، ووزن البيض ، وعدد البيض، وكتلة البيض، والكفاءة الاقتصادية ، وذلك بالاضافة الي تحسن ملحوظ في كفاءة تحويل الغذاء معبرا عنها جرام علف / جرام كتلة بيض ، وفي نسبتي الخصوبة والفقس الحقيقة. وكذلك تميزت طيور المجموعة المقارنة بقلة النفوق بالمقارنة بمجموعة المقارنة. وهذا لم تلاحظ فروق معنوية في كمية العلف المستهلك خلال فترتي النمو وانتاج البيض بين مجموعتي المعاملة والمقارنة.

وبصفة عامة ، يمكن اعتبار ان اختيار أفضل الاوقات المرتبطة باكثر الظروف المناخية اعتدالا علي مدار اليوم كأحد أهم المعالجات الفعالة لتحسين الاداء الانتاجي والتناسلي للدجاج الدندراوي المربي تحت الظروف المناخية الحارة السائدة في أسيوط .