11

Egypt. J. Anim. Prod. 22, No. 1, pp. 91-103 (1982)

Effect of Different Environmental Conditions on Feed, Nutrients and Minerals Efficiency in Fayoumi Layers

G.A.R. Kamar, M.I. El-Kotoury, M.M.El-Gindy, M.S. Samy and E.M.A. El-Masry

Faculty of Agriculture, Cairo University and National Research Centre, Egypt.

STUDIES were carried out to find out the effect of different environmental conditions of feed, nutrients and minerals efficiency in Fayoumi layers. 1. Feed efficiency: The control group was more efficient than the other groups. The periodical variations showed that the feed efficiency was generally governed by egg production more than feed consumption. The lowest efficiency was shown under heat stress especially in the fourth period. 2. Protein efficiency: The control group showed the higher efficiency. The artifically lighted group recorded the highest retention efficiency for protein. The periodical variations showed that the gross protein efficiency was affected more by egg production than protein consumption. The difference between periods also became lower in case of retention efficiency than in gross efficiency. These differences were wider in heat stress group. The data revealed an increase in protein excretion in the periods in which egg production declined. 3. Fat efficiency: Hens secreted in eggs more at than the ingested in the lighted and the normal groups meanwhile heat stress group secreted in eggs less fat than the ingested. The periodical variations showed that the periods of high egg production showed negative balance in case of fat retention efficiency. 4. Calcium efficiency: The lighted and normal groups which recorded more egg yield secreted in eggs more Ca than the ingested. The Ca secreted in eggs under heat stress was less than ingested due to the higher excretion. The bird assesses its feed consumption according to its need of calcium. 5. Phosphorus efficiency: The gross phosphorus efficiency was much lower than that of Ca. The amount of phosphorus utilized was so-small in proportion to the amount ingested. The amount ingested was more than the actual needs. The excretion via the excreta was the main channel. 6. Magnesium efficiency: The difference between the gross and retention efficiency was great for Mg, it was greatest in case of heat stress group. There was a correspondence between phosphorus and magnesium. The periodical variation showed negative balance in the retention efficiency of some periods. The birds were capable to regulate the negative balance in the next periods.

Since feed accounts for about 45 to 55 % of the cost of producing a dozen eggs, laying hen nutrition is of particular importance to the egg producer. Good egg production is dependent on, among other things, a ration that supplies enough of lhe various nutrients in the most favourable balance or proportion.

High temperature as achieved by many workers improved the efficiency. By raising the air temperature gradually from 25°to 35°feed utilization efficiency for egg production was improved from 47 to 61%. Constant temperature (35°) also induced improvement in the efficiency (Navar De Andrade, 1976 and ITO *et al.*, 1971). However, Sheikh *et al.*, (1974) showed that heat stress (35 °) had no significant effect of feed efficiency.

Birds and feeding

Thirty Fayoumi hens which had been in lay for about three months were randomly divided into three equal groups. The layers were housed individually in wire laying cages.

The birds were fed laying ration according to NAS-NRC (1977). Feed was available for the birds ad libitum, the actual consumption for each hen was recorded. The composition of the ration fed was as follows :

Corn	50·0%
Wheat bran	20·0%
Corn gluten feed	9·0%
Cottonseed meal, dehulled	10·0%
Fish meal	5·0%
Limestone, ground	5·5%
Mineralised salt	0·5%

Laying hen vitamin premix was mixed with the formula according to the manufacturer "Phizer" directions.

Crude protein and ether extract of the feed, eggs and excreta were estimated according to A·O·A·C· (1975), phosphorus was determined after Fiske and Subbarow (1925) while calcium and magnesium were analyzed according to Campell (1975). Chemical analysis of the ration was as follows:

Crude protein	19·80%
Ether extract	3·83%
Calcium	2·76%
Phosphorus	0·89%
Magnesium	0·20%

The birds were allowed for two weeks in the wire laying cages to adapt them on the new conditions and ration prior the begining of the experiment.

Experimental treatments

The first group "control one" was housed in the normal environmental conditions. The second group was confined in a light proof room. The day light was prevented and the room was illuminated by White fluorescent light. A lighting regime of 12 hr daily was maintained in the room from 6 a.m.to 6 p.m. The third group was located in a room under constant temperature of 35° allover the experiment period using thermostatic controlled electric heaters. Source of illumination was only the day light. Egg production and weight were recorded daily for each hen of the three groups.

The experimental periods

The experiment duration lasted for 112 days (16 weeks) began on February, 9 and continued until May, 31. This duration was divided into 4 periods each of four weeks. Normal air temperature and day length values during the experimental periods are listed below :

Period and date	Air temperature	Average day length
1. Feb.,2 — March,8	14.8° (Max.,21 — Mini.,8.6)	hr, 11 and min, 10
2. March,9 — April,5	18.3° (Max,,24.8.— Mini.,11.8)	hr, 11and min, 46
3. April,6—May, 3	22.1° (Max.,39.6 — Mini.,14.6)	hr, 13 and min,11
4. May, 4 — May, 31	23.5° (Max.,31.4 — Mini.,15.7)	hr, 14 and min,1
Mean of the overall experiment	19.7° (Max.,. 26.6 — Mini.,12.7)	hr, 12 and min,32

Statistical analysis was conducted according to Snedecor (1959).

Results and Discussion

Herein the study depended on the individual feed consumption and egg production records under different environmental conditions. Feed and eggs were analyzed. This may give more understanding of the physiological bearing on feed utilization, not only by the feed consumption and egg mass but also by detailed informations about the major minerals and nutrients ingested and the portion of them secreted in eggs. The feed conversion (F/P) used in this study to measure efficiency is a suitable criterion to indicate the efficiency in digestion and metabolism.

Gross feed efficiency "Feed conversion"

The artificial light treatment showed highest feed efficiency since it was 3.69 g of feed/ g of egg produced, followed by normal conditions and high consant temperature. Luke *et al.* (1973) indicated that the month of highest production was more efficient that the rest of the season in feed conversion. In the present work, heat stress lowered the egg mass, consequently lower efficiency was recorded (Table 1).

Sheikh *et al.* (1974) showed that heat stress 35° had no significant effect on feed efficiency. Payne (1966) mentioned that feed conversion was more efficient at 35°.

TABLE 1. Feed, nutrients and minerals conversion on Fayoumi hens under different environmental conditions.

Criteria	Experimental conditions		
	Normal environmental conditions	Atificial light	High constant temperature
Feed	* 3.95 ± 0.14	3.69 ± 0.11	4.54 ± 0.21
Protcn	5.74 ± 0.24	5.62 ± 0.18	6.75 ± 0.27
Fat	1.47 ± 0.06	1.35 ± 0.04	1.62 ± 0.07
Calcium	2.18 ± 0.17	1.95 ± 0.10	2.50 ± 0.18
Phosphorus	9.03 + 0.07	6.23 ± 0.28	10.01 ± 0.61
Magnesium	10.30 ± 0.55	7.87 ± 0.35	*d*10.77 ± 0.49

* Standard error.
* * Data are on hen basis.

Periodical variations in feed efficiency

In the normal environmental "conditions control" group, the third period recorded the highest efficiency while the lowest one was in the first and-fourth periods (Table 3). In this case, the efficiency seems to be governed by the egg production than the amount ingested which were of near values. Artificial light treatment showed the highest feed efficiency in the second period, followed by the third, fourtn and first periods. For the high constant temperature (heat stress) group, the third period also showed highest feed efficiency. The fourth period recorded the lowest efficiency.

The data of periodical variations showed that the three treatments revealed a rise in efficiency till the second or third periods, followed by decline in the following ones. This coincided with that in feed consumption and egg production which were affected by the changed environmental conditions and according to the month in which the period lied. Mehta and Rajpurohit (1972) showed that feed conversion efficiency in May and June was significantly lower than in other periods).

Protein efficiency

The artificial light and control groups showed almost the same values of efficiency despite the highest egg production of the former. The heat stress recorded the lowest efficiency (Table 1).

Baulloun and Speers (1969) cited that White Leghorn showed the highest efficiency 37.3%. Hill (1964) mentioned that protein conversion was 27.0%

on the dry matter basis. The protein conversion was 24·4 to 26·8% according the purpose of selection wether it was for egg number or egg size (Bolton, 1960).

The retention conversion or "retention efficiency" is an expression could be quoted from the feed conversion (F/P) to be retained amount/secreted in egg (R/P). This may be useful to find out to what extent the bird can utilize the retained amount in egg production.

The retention efficiency was 3·31, 3·10 and 3·58 grams of protein retained/g secreted in eggs (Table 2). The difference between heat stress and other treatments become less in the case of ingested/secreted. This indicates that the excretion of protein was higher in heat stress.

TABLE 2. **Conversion of retained nutrients and minerals in Fayoumi hens under different enivernomental conditions.**

Criteria	Experimental conditions		
	Normal environmental conditions *	Artificial light	High constant temperature
Protein	3.31 ± 0.13	3.10 ± 0.15	3.58 ± 0.20
Fat	1.06 ± 0.04	1.05 ± 0.04	1.14 ± 0.05
Calcium	1.09 ± 0.10	1.12 ± 0.08	0.96 ± 0.09
Phosphorus	2.69 ± 0.31	1.15 ± 0.17	2.99 ± 0.35
Magnesium	2.58 ± 0.25	3.36 ± 0.19	1.88 ± 0.41

* Standard error.
** Data are on hen basis.

Periodical variations of protein conversion

For the normal environmental conditions treatment, period three showed the highest efficency, followed by the second, fourth and first ones (Table 3). The retention efficiency showed the same trend (Table 4). The difference between periods in the case of retention efficiency was less than in the case of gross efficiency. This means that the birds try to assess the actual requirements of protein under the varying environmental conditions across periods and adjust it as possible via the excretion.

Artificial light rreatment, the periods may be ordered according to the value of gross protein efficiency as follows : second, third, fourth and the first (Table 3). These were in agreement with egg production, since the period which showed the higher efficiency was that of the higher productivity " se cond period".

The retention efficiency showed also thae same sequence. The values of retention efficiency are more lower than those of the gross efficiency. This means that the excretion of protein was higher in the periods in which egg production declined.

Normal environmental conditions group, period three showed the highest efficiency followed by the second, fourth and first ones. The efficiency then took the channel of egg production, since it raised gradually till the third period and a reduction occured in the fourth one (Table 3).

TABLE 3. **Effect of periodical variations on feed, nutrients and minerals conversion in Fayoumi hens under different environmental conditions.**

Periods	Criteria					
	Feed	Protein	Fat	Calcium	Phosphorus	Magnesium
			Normal environmental conditions			
1	5.25±0.50	6.83±0.79	1.96±0.26	2.71±0.34	8.96±1.25	7.92±3.95
2	4.22±0.36	5.98±0.46	1.63±0.13	2.40±0.30	9.92±0.84	13.25±1.25
3	3.38±0.14	5.33±0.23	1.27±0.06	1.84±0.23	9.86±1.16	9.15±0.67
4	4.50±0.54	6.46±0.78	1.59±0.20	1.99±0.33	11.59±1.31	10.83±1.47
			Artificial light			
1	4.56±0.57	6.90±0.54	1.68±0.14	2.42±0.56	9.42±1.13	11.88±1.69
2	3.16±0.05	4.79±0.09	1.19±0.03	1.76±0.20	6.11±0.42	6.43±0.28
3	3.88±0.16	5.44±0.26	1.32±0.07	1.87±0.27	6.81±0.61	6.56±0.39
4	4.09±0.25	6.26±0.43	1.33±0.06	1.86±0.27	5.25±0.52	10.19±0.71
			High constant temperature			
1	5.86±0.67	8.49±1.00	2.17±0.28	2.50±0.36	11.24±1.11	13.53±1.47
2	4.18±0.43	6.10±0.55	1.49±0.14	2.52±0.24	8.53±0.78	12.10±1.10
3	3.65±0.21	5.63±0.25	1.37±0.08	2.10±0.27	9.92±0.88	7.86±0.47
4	7.38±1.12	10.50±1.25	2.37±0.39	3.08±0.63	16.64±3.31	117.32±.16

* Standard error.

×× Data are on hen basis.

The retention efficiency (Table 4) showed the same trend. This means that the birds tend to assess the actual requirements of protein under the varying environmential conditions across periods and adjust it as possible via the excr etion.

TABLE 4. Effect of periodical variations on the conversion of retained nutrients and mineral in Fayoumi hens under different ernvisronmental conditions.

Periods	Cirteria				
	Protein *	Fat	Calcium	Phosphorus	Magnesium
			Normal environmental conditions		
1	3.72±0.59	1.51±0.23	1.01±0.20	2.23±0.64	0.78±1.05
2	3.46±0.28	1.11±0.09	1.15±0.13	2.48±0.34	2.09±0.68
3	3.31±0.14	0.89±0.06	1.10±0.13	3.93±0.54	3.54±0.42
4	3.67±0.45	1.20±0.17	1.07±0.18	3.79±0.85	3.18±0.32
			Artificial light		
1	3.60±0.30	1.28±0.10	1.37±0.30	1.93±0.26	5.69±0.77
2	2.64±0.09	0.89±0.03	1.19±0.15	0.89±0.20	2.55±0.15
3	3.18±0.20	1.06±0.07	0.77|+0.22	2.03±0.44	3.19±0.24
4	3.40±0.28	1.03±0.06	1.13±0.19	0.68±0.24	3.43±0.29
			High constant temperature		
1	4.06±0.35	1.57±0.15	0.69±0.15	2.14±0.43	0.54±1.23
2	3.34±0.42	1.06±0.11	1.00±0.16	2.57±0.50	2.24±0.61
3	3.25±0.16	0.93±0.06	1.03±0.13	3.65±0.66	2.35±0.36
4	5.11±0.70	1.56±0.20	1.16±0.19	4.34±0.83	3.24±0.53

* Standard error.

** Data are on hen basis.

High constant temperature treatment, was distinguished by lower protein efficiency. Gradual increase in efficiency till the third period also occurred but the fourth period showed the lowest.

The retention efficiency showed the same graduation but differences between periods were obviously narrow than gross efficiency.

Fat efficiency

The gross fat efficiency was 1·47, 1·35 and 1·62 ·62g of fat consumed/ g secveted in eggs for the normal, lighted and heat stress groups respectively (Table 1). The low fat content of the ration used in addition to the high percentage of egg fat may be the direct explanation for the high fat efficiency.

The efficiency of retention was 1·06, 1·05 and 1·41 g retained/ g secreted in eggs in the normal, lighted and heat stress groups respectively (Table 2). This means that the amount of fat excreted was not high since the values were near to those of gross efficiency.

Periodical variations of far conversion

Normal environmental conditions group, the gross fat conversion was 1·96, 1·63, 1.27 and 1.59 g of fat consumed/g secreted in eggs for the four periods respectively (Table 3). The corresponding figures for retention efficiency were 1·51, 1·11, 0·89 and 1·20 respectively (Table 4). The period of highest egg production "the third" recorded negative balance.

Artificial light group, the fat conversion was 1·68, 1·19, 1·32 and 1·33 g of fat consumed/ secreted in eggs for the four periods respectively (Table 1). The corresponding figures for retention efficiency were 1·28, 0·89, 1·06 and 1·03 respectively. The second period showed negative balance, this means that the hens used the reserved far in egg formation. It is considered that the fatty acids deprive mainly from the depot fats and that the stimulus causing their release acts on the individual lipids of these depots (Heald *et al.*, 1964).

High constant temperature group, this group revealed lower gross fat efficiency than the other groups. The efficiency was also affected by egg production, the third period was the highest in the efficiency. Concering the retention efficiency, the third period of the relatively higher egg production showed slight negative balance. (Table 4).

Calcium efficiency

The gross calcium efficiency was 2·18, 1·95 and 2·50 g of calcium consumed/g secreted in eggs in the normal, artificial light and heat stress group respectively (Table 1). The efficiency may be affected by egg production since the lighted treatment showed the best efficiency versus to the heat stress one. Comparing these data with that obtained by Mueller (1959) on uncontrolled and high temperature treatments, it can be found that the normal conditions groups is more efficiency than the uncontrolled one, in the same time the high temperature is amlost the same as Mueller's value. In this connection Hurwitz (1964) demonstrated that Ca storage, depletion and repletion are related to the structural bone. It was added that this gives importance to each bone segment as a Ca storage bone. The decreased amount of calcium which was shown to be secreted in eggs in case of heat stress treatment indiates that great amount of ingested calcium is excreted and that is the main cause for reduced egg production and lower e.ficiency.

The efficiency of retention was 1·09, 1·12 and 0.96 g of calcium retained/g secreted in eggs for the control, lighted and heat stress treatments respectively. The normal environmental treatment in the current work revealed similar values in Ca retention to that of uncontrolled one in Mueller's study (1959), meanwhile the high temperature in both studies showed almost the same results.

Periodical variations of calcium conversion

Normal environmental conditions treatment, the gross Ca efficiency was 2·71, 2·40, 1·84 and 1·99 g/of mineral consumed/g secreted in eggs for the four periods respectively (Table 3). The efficiency increased till the third period then decreased in the fourth one, the same role as egg production. The efficiency of retention was 1·01, 1·15, 1·10 and 1·07 of Ca retained/g secreted in eggs for the four periods respectively (Table 4). The first period showed a reversal result in gross and retention efficiency. It seems that hens reassess their needs and adjust the actual requirements as possible through excretion and retention.

Artificial light treatment,the gross efficiency was 2·42, 1·76, 1.87 and 1·86 g of Ca consumed/g secreted in eggs for the four periods respectively. The efficiency was related to egg production more than Ca consumption. The efficiency of retention was 1·37, 1·19, 0·77 and 1·13 g retained Ca/g secreted in eggs for the four periods respectively. The third period showed negative balance.

High constant temperature, the gross efficiency was 2·50, 2·52, 2·10 and 3·08 g of Ca consumed/g secreted in eggs for the four periods respectively. The efficiency increased till the third period, was obviously less in the first and fourth periods where egg production decreased. The efficiency of retention was 0·69, 1·00, 1·03 and 1·16 g of Ca retained/g secreted in eggs in the four periods respectively. Hens showed perefound negative balance which was gradually regulated across the four periods.

Phosphorus efficiency

The gross efficiency was 9·03, 6·23 and 10·01 g of phsophorus consumed/g secreted in eggs for normal, artificial light and high constant temperature groups respectively (Table 1). This was in accordancne with egg production since the lighted treatment recorded the highest while the heat stress one showed the lowest efficiency.

The retention efficiency was 2·69, 1.15 and 2·99 g of phosphorus retained/g secreted in eggs for normal, lighted and heat stress treatments respectively (Table 2). This denotes high excretion of phosphorus via the excreta. Thus the lighted treatment exhibited the best retention efficiency because of its highest egg production.

Periodical variations of phosphorus efficiency

Normal environmental conditions, the gross efficiency was 8·96, 9·92, 9·86 and 11·59 g of phosphorus consumed/g secreted in eggs for the four periods respectively (Table 3). The fourth period showed the lowest efficiency. The highest efficiency of the first period was due to the low consumption and relatively high secretion in eggs. The efficiency of retention was 2·23, 2·48, 2·93 and 3·79 g of phosphorus retained/g secreted in eggs (Table 4).

Artificial lighted treatment, the gross efficiency was 9·42, 6·11, 6·81 and 5·52 g of phosphorus consumed/g secreted in eggs for the four periods respectively. The fourth period showed the highest efficiency because of the increased secretion of phosphorus in eggs. The efficiency of retention was 1·93, 0·89, 2·03 and 0·68 g of phosphorus retained/g secreted in eggs for the four periods respectively (Table 4). On the same table, the receprocal relationship between Ca and phosphorus seems very clear.

High constant temperature, the gross efficiency was 11·24, 8·53, 9·92 and 16·62 g of phosphorus consumed/g secreted in eggs for the four periods respectively. The fourth period showed lowest efficiency due to its low egg production. The retention efficiency was 2·14, 2·57, 3·65 and 4·34 g of phosphorus retained/g secreted in eggs.

The great difference between the gross and retention efficiency showed that the amount ingested was more than the actual needs and the excretion via the droppings was the main channel since the egg production was significantly low under heat stress.

Magnesium efficiency

The gross efficiency was 10·30, 7.87 and 10·77 g of magnesium consumed/g secreted in eggs for the three treatments respectively (Table 1). The retention efficiency was 2·58, 3·36 and 1·88 g of Mg retained/g secreted in eggs for the three groups respectively (Table 2). A graduation in the efficiency can be noticed, heat stress treatment showed the highest value. This was due to difference in retention since it graduated to record the highest value in the lighted group, followed by the control and the lowest amount in the heat stress one.

Periodical variations of magnesium efficiency

Normal environmental conditions, the gross efficiency was 7·92, 13·25, 9·1 and 10·83 g of Mg consumed/g secreted in eggs for the four periods respectively (Table 3). Periods one and three were of relatively higher efficiency. The retention efficiency was 0·78, 2·09, 3·54 and 3·18 g of Mg retained/g secreted in eggs for the four periods respectively (Table 4). The first and second periods showed high efficiency because of the high excretion and low retention and not to the high egg production. The negative balance shown in the first period was due to the reduction in the amount retained and the percentage of retention was 7·26%. Similar results were obtained by Guenther and Lenkeit (1964).

Artificial lighted treatment, the gross efficiency was 11·88, 6·43, 6·56 and 10·19 g of Mg consumed/g secreted in eggs for the four periods respectively. Efficiency coincided with egg production. The retention efficiency was 5·69, 2·55, 3·19 and 3·43 g of Mg retained/g secreted in eggs for the four periods respectively. The first period still also the least efficient one. The retention efficiency was also in agreement with egg production.

High constant temperature treatment, the gross efficiency was 13·53, 12·10,7·86 and 17·32 g of Mg consumed/g secreted in eggs for the four periods respectively. The relative high efficiency of the third period despite the high Mg consumption was due to the high amounts secreted in eggs "high egg production". Gross efficiency was generally low in this group, the fourth period showed the lowest efficiency among all the minerals and nutrients studied.

The retention efficiency was —0·54, 2·24, 2·35 and 3·24 g of Mg retained/g secreted in eggs. The negative balance and efficiency of the first period was greater than that of the same period under control treatment. This may be related to the environmental conditions or to the physiological status of layers during this period of the year. However, the hens of both treatments were capable to regulate the excretion and retention in the next periods.

References

Association of Official Agricultural Chemists (1975) "*Official Methods of Analysis*," 12th ed., Washington, D.C.

Balloun, S.L. and **Speers, G.M.** (1969) Protein requirements of laying hens as affected by strain. *Poultry Sci.* **48**, 1175.

Bolton, W. (1960) A comparison of the efficiency of food utilization for egg production oj some inbred lines of Brown Leghorn fowls. J. *Agric. Sci*, **55**, 241.

Campell, W.R. (1975)The estimation of Ca and Mg. *Canada* J. *Biochem. Physiol.* 35, 1032.
Fiske, C.H. and **Subbarow, Y.** (1925) The colorimetric determination of phosphorus. J., *Biol., Chem.* **66**, 375.

Guenther, K. and **Lenkeit, W.** (1964)Long term studies of the calcium phosphorus and magnesium metabolism of laying hen, *Ztier Physiol Tier enahr Fotter Mittlek Unde* **19**, 265.
Heald, P.J., Badman, H.G., Wharton, J., Wulwick, C.M. and **Patricia, H.** (1964) Lipid metabolism in the laying hen. II. The nature and quantities of the free fatty acids of the plasma during the onset of laying. *Biochimet Biophys Acta*, **84**, 1.

Hill, E.W. (1964) The experimemtal basis of advances efficiency of poultry nutrition. *Federation Proc.* **23** (*Part* 1), 857-862.

Hurwitz, S. (1964) Bone composition and Ca^{45} retention in fowl as influenced by egg formation *Am.* J. *Physiol.* **206**, 198.

ITO, T., Morya, T., Yamamoto, S. and **Mimura, K.** (1971) Effect of environmental temperature on egg production, food intake and Water consumption in laying white Leghorns. J. *Fac. Fish Anim. Hueb. Hiroshima Univ.* **9**, 151.

Luke, F., Trappmann, W. and **Schmitten, F.** (1973) The shape of production curves in laying hens of different origins under cage management. *Zuchtungs hunde* **45**, 447.

Mehta, V.S. and **Rajpurohit, D.S.** (1972) Study on feed intake, egg production, egg weight and feed efficiency in White Leghorn layers, *Indian J, Anim. Sci.*, **42**, 132.

Muller, W.J. (1959) The effect of environmental temperature and humidity on the calcium balance and serum calcium of laying pullets, *Poultry Sci.*, **38**, 1 296.

National Academy of Sciences-National Research Council (1977)" *Nutrient Requirements of poultry*" Washington, D.C. : NAS-NRC No. 1, 7th rev. ed.

Naver De Andrade, A. (1976) Effect of high environmental temperature and diet on egg shell quality and performance of laying hens. Dissertation Abstracts International,. *B* 36 (7) 3138.

Payne, C.G. (1966) Practical aspects of environmental temperature for laying hens. *world's Poultry Sci. j.*, **22**, 126.

Sheikh, Z.M., Ullah, M.F., Chaudry, M.R. Ahmad, K.N. (1974) Comparative heat stress studies on New-Hampshire and White Cornish layers. *Pakistan iournal ot Scientific Reseasch*. 24 (1/2) 1-4.

Snedecor, G.W. (1959) "*Statistical Methods*" Iowa State College Press, Ames Iowa.

تأثير الظروف البيئية المختلفة على كفاءة تحويل الغذاء والمركبات الغذائية والعناصر المعدنية فى الدجاج الفيومى

محمد جمال الدين قمر ، محمد ابراهيم القطورى ، محمد سعيد سامى والسيد محمد المصرى

كلية الزراعة – جامعة القاهرة والمركز القومى للبحوث

فى دراسة لكفاءة تحويل الغذاء والمركبات الغذائية والعناصر المعدنية فى الدجاج الفيومى تحت الظروف البيئية ، (أ) ظروف عادية ، (ب) اضاءة صناعية لمدة ١٢ ساعة ، ١٢ ساعة اظلام ، (جـ) درجة حرارة عالية ثابتة ، تحصل على النتائج التالية :

كفاءة تحويل الغذاء : أظهرت مجموعة الظروف العادية تفوقا على باقى المجموعات • أظهرت التغيرات الفترية ان الكفاءة التحويلية كانت محكومة بانتاج البيض أكثر من استهلاك الغذاء وأقل كفاءة تحويلية كانت فىمجموعة الاجهاد الحرارى وخاصة فى الفترة الرابعة •

الكفاءة التحويلية للبروتين : تبين أن مجموعة الظروف العادية كانت أفضل فى الكفاءة التحويلية • أظهرت مجموعة الضوء الصناعى كفاءة احتجاز للبروتين أعلى من باقى المجموعات ورغم ذلك فقد قلت الفروق بين المجموعات بشكل واضح فى حالة كفاءة الاحتجاز عنها فى حالة الكفاءة التحويلية الكلية للبروتين • أظهرت التغيرات الفترية تأثر الكفاءة التحويلية الكلية للبروتين أكثر بانتاجالبيض ، الفروق بين قيم الكفاءة التحويليةللجزء المحتجز للفترات الأربعة صارت أقل عن ما كانت عليه فى حالة الكفاءة التحويلية الكلية وخاصة فى مجموعة الاجهاد الحرارى •

الكفــاءة التحويلية للدهن : أفرزت الدجاجات فى البيض كميــة من الدهن أكبر من المـأكولة ذلك فى مجمـوعتى الاضاءة الصناعية والظروف العادية بينما كان افراز الدهن فى البيض فى مجموعة الاجهاد الحرارى أقل من الكمية المـأكولة • أظهرت التغيرات الفترية أن الفترات التى كان انتـاج البيض بها مرتفعا أظهرت ميزانا سالبا فيما يختص بكفاءة تحويل الدهن الممتص •

كفاءة تحويل الكالسيوم : مجموعتى الاضاءة الصناعية والظروف العادية كان انتاج البيض لهما مرتفعا افرزتا فى البيض كمية من الكالسيوم أكثر من المـأكول • الكالسيوم الذى افرز فى البيض تحت ظروف الاجهاد الحرارى كان أقل من الكمية المـأكولة منه • تبين أن الطائر يحدد اســتهلاكه من الغذاء تبعا لاحتياجاته من عنصر الكالسيوم •

كفاءة تحويل الفوسفور : الكفاءة الكلية لتحويل الفوسفور كانت أقل كثيرا منه فى حالة الكالسيوم • كمية الفوسفور التى أفرزت فى البيض كانت قليلة جدا بالنسبة للكمية التى تناولها الطائر • والكميــة التى تم تعاطيها من الفوسفور كانت أكثر من الاحتياجات الفعلية • افراز الفوسفور عن طريق الخرج كان المخرج الرئيسى •

كفاءة تحويل المـاغنسيوم : الفرق بين كفــاءة تحويل المـاغنسيوم المـأكول والممتص كانت كبيرة ، كان الفرق أكبـر فى مجموعة الاجهــاد الحرارى • أظهرت التغيرات الفترية ميزانا سالبا فى كفاءة المـاغنســيوم الممتص فى بعض الفترات • أمكن للطيور التغلب على الميـزان السالب فى الفترات التالية •