PRODUCTIVE PERFORMANCE OF NAKED NECK LAYING HENS (Sharkasi) FED DIFFERENT DIETARY PROTEIN LEVELS

A. Abd El-Rahman and M.N. Makled

Animal and Poultry Prod. Dep., Fac. of Agric., Assiut Univ., Assiut

Abstract: A total number of 667 laying hen from three genotypes : heterozygous naked neck (Na/na), homozygous naked neck (Na/Na) and normally feathered genotype (na/na) were used to study the effect of the gene responsible of reduced feather coverage (Na), dietary protein levels (17%, 14%) and their combining effect on egg production performance. The main results could be summarized as follows:

1- A significant effect ($P<0.01$) was proved due to genotype on body weight at different ages.

2- The naked neck birds (Na/-) were earlier in sexual maturity ($P<0.01$) by about 4 days with an increase in total egg production by about 12.70% and 10% in Na/na and Na/Na when compared with their normally feathered counterparts.

3- The presence of Na gene improved egg weight by about 5.40% and 5.90% whereas, egg mass increased by 18.70% and 16.50% in Na/na and Na/Na genotypes, respectively.

4- The na/na genotype was more sensitive to the reduction in protein level than Na/- birds.

5- High protein level (17% vs 14%) reduced age at sexual maturity ($P<0.05$) and improved egg number, egg weight and egg mass by 5%, 2% and 6.70%, for Na/na, Na/Na and na/na genotype, respectively. Also, high protein improved body weight significantly ($P<0.01$) at 40 wks of age.

6- The presence of Na gene increased albumen by about 3%, 4.70% whereas it reduced yolk % by 3.80% and 5.80% in Na/na and Na/Na genotypes respectively. The Na/- birds exhibited low egg shell quality as measured by shell %, shell strength and thickness when compared with na/na genotype.

7- High protein level increased significantly ($P<0.01$) albumen by 2.2%. whereas it reduced yolk % by 2.7% without any significant effect on egg shell quality.

8- The presence of Na gene reduced feather by about 26.50% and 32.80% in Na/na and Na/Na genotypes, respectively. Also, it reduced abdominal fat by 19% and 37.70% in the previous two genotypes.

9- The Na/- birds exhibited a significant ($P<0.01$) improvement in dressing % when compared with the normally feathered hens. A highly significant differences ($P<0.01$) existed between the different genotypes in body temperature (B.T) where the Na/- birds were lower in B.T. than the normal.

10- An improvement in ovary and oviduct percentages occurred due to Na gene where the ovary increased by 14-25% and the oviduct increased by 10-15% as compared with normal (na/na).

11-With regard to protein level, high protein level improved significantly feather, giblets and dressing % by about 7.3%, 17.90% and 1.5%, respectively whereas it reduced abdominal fat by about 24%. Low protein level reduced significantly ovary and oviduct by 9% and 15%, respectively.

It can be concluded that naked neck gene play an important role in body thermoregulation and physiological status through increased heat loss from body surface with less depression of appetite which consequently leads to a better egg production performance even at low protein level.

Key words: Naked neck gene, protein level, egg production.

Introduction

In Upper Egypt, the naked neck gene (Na) is widespread in unselected local chicken population and known by peasants at various areas as Sharkasi chicken (Abd El-Rahman, 1998).

This gene reduced feather by about 20-40% and was associated with an advantage in egg production performance under moderate conditions which was more pronounced under subtropical and tropical conditions (Abd El-Rahman, 1990, 2000a,b; Horst *et al*., 1996; Abd El-Rahman and El-Hammady, 2000; Fathi and Galal, 2001; Singh *et al*., 2001).

The findings of Horst and Mathur (1994) indicated that the advantage of Na gene involved with the persistency and it was more pronounced effects in medium or high body weight birds than in lighter ones especially under heat stress conditions. The results obtained by Abd El-Rahman (1990) under natural or constant (25°C) temperatures revealed that heterozygous normal or dwarf naked neck (Na/na) laid more eggs, heavier egg weight and exhibited better feed conversion than their normal feathering (na/na) counterparts. Similar trend was also obtained by Abd El-Rahman (2000a,b) and Abd El-Rahman and Hammady (2000).

Under heat stress (32°C), Horst and Mathur (1992) reported that Na gene increase egg number and egg mass by about 6% and 7.4% , respectively. Also, Horst *et al*. (1996) found that under moderate temperature (18-20°C), Na gene improved egg number, weight and mass by 13.10%, 3.40% and 12.90%, respectively. The results obtained by Merat (1990), Abd El-Rahman (2000a,b) and Galal *et al*. (2000) proved a significant increase in egg weight, (2-3 g) associated with the presence of Na gene.

It is worthy to mention, that slight disadvantage of naked neck birds (Na/-) was noticed for egg shell quality as measured by percentages of shell-less eggs, cracked eggs, breaking strength and shell thickness (Merat, 1990; Abd El-Rahman, 2000a,b, 2003; Singh *et al*. 2001). However Galal (1995) reported no significant differences in egg shell quality between Na/na and na/na genotypes. Also, Galal *et al*. (2000), Galal and Fathi (2002), El-Safty *et al*. (2003) and Mahrous *et al*. (2003) reported that Na gene increased shell weight and percentage compared to na allele.

Recently, interest has been developed in the use of low crude protein (CP) diets as means of lowering expenses particularly when the cost of dietary protein sources is high. Several studies have shown that protein levels of 10 to 14% CP (with supplemental essential amino acids) satisfy the protein requirement of hens already in lay (Lopez and Leeson, 1995). Most studies have also reported beneficial effects of increasing protein in the diets in terms of age at sexual maturity, body weight, egg production and egg weight (Abd El-Hakim *et al*., 1992; El-Hammady *et al*., 1992; Summers, 1993; Joseph *et al*., 2000; Zanaty *et al*., 2001; Metwally, 2004; Yakout *et al*., 2004).

The objective of this study was to describe quantitatively the separate and combining effect of naked neck gene and dietary protein level on egg production performance of Sharkasi layers .

Materials and Methods

Birds and Experimental diets:

This study was carried out at Poultry Research Farm of Assiut University during the period from 2002–2004. From a basic local brown stock, brown heterozygous naked neck (Na/na) males and females mated to produce the offspring which segregated for the three genotypes used in this study, namely:-

1- Homozygous naked neck (Na/Na).

2- Heterozygous naked neck (Na/na).

3- Normal feathering genotype (na/na).

A total number of 667 laying birds were used (157,290 and 220 birds of Na/na, Na/Na and na/na genotypes, respectively). At 18 wks of age pullets from each genotype were leg banded randomly, divided in pens into two equal subgroups one of them received diet with high crude protein (17%) and the other received diet with low protein level (14%). The composition of the diets are presented in Table (1). All birds were raised in pens under prevailing environmental temperature and humidity (Table 2). Birds received 14 lighting hours, and feed and water were available ad libitum throughout the whole experimental period (18-54 wks of age).

Table(1): Composition and analysis of the experimental diets.

Ingredients (%)	High protein level	Low protein level
Ground yellow corn	63.85	63.75
Soybean meal	17.00	14.90
Gluten	5.00	-
Wheat bran	5.00	10.00
Limestone	6.25	6.25
Bone meal	2.00	2.00
Vitamin mixture	0.25	0.25
Salt	0.25	0.25
Lysine	0.20	0.30
Methionine	0.10	0.20
Mineral mixture	0.10	0.10
Corn oil	-	2.00
Calculated analysis		
Crude protein %	17.01	13.96
ME Kcal/kg	2840.00	2841.00
Lysine	0.94	0.94
Methionine	0.42	0.44
Methionine + cystine	0.69	0.65
Fibers	3.35	3.62
Calcium	3.00	2.98
Available phosphorus	0.37	0.37
Total phosphorus	0.62	0.64
Salt	0.33	0.33

Traits studied:

Body weight (B.W) at 24, 40 and 52 wks of age, age at sexual maturity (A.S.M.), laying rate (L.R. %) throughout 8 successive laying periods (28 days each), total egg number (T.E.N.), average egg weight (A.E.W.), average laying rate (A.L.R.%), egg number, laying rate till 90 days from age at sexual maturity (E90, LR90%) and total egg mass (TEM) were recorded.

At 40 and 52 wks of age random sample of 300 eggs from all genotypes were taken to determine egg quality parameters: egg weight, proportions and percentages of albumen, yolk, shell thickness and strength using an cracking machine (Germany). Also, at the same ages a random sample of 120 females were slaughtered, feather removed and eviscerated. Then giblets, carcass and reproductive organs were removed and weighed (Gilbert *et al.*, 1983). Rectal body temperature was measured for all laying birds by thermocouple thermometer.

Statistical analysis

Data of body weight, age at sexual maturity .. etc from the laying hens were subjected to analysis of variance using General Linear Models (GLM) procedure of of SAS (SAS, Institute 1990) by the following model:

$$\mathbf{Y_{ijk} = \mu + G_i + P_j + (GxP)_{ij} + E_{ijk}}$$

where Y_{ijk} is the k^{th} observation of the i^{th} genotype and j^{th} protein level, μ is overall mean, G_i is the effect of i^{th} genotype, P_j is the effect of j^{th} protein level $(GxP)_{ij}$ is the interaction effect of genotype with protein level and E_{ijk} is the random error.

Results of egg quality and anatomical and physiological parameters were analysed according to the following model:

$$\mathbf{Y_{ijkl} = \mu + G_i + P_j + A_k + (GxP)_{ij} + (GxA)_{ik} + (PxA)_{jk} + E_{ijkl}}$$

where A_k is the effect of k^{th} age; $(GxP)_{ij}$ is the interaction between genotype and protein level; $(GxA)_{ik}$ is the interaction between genotype and age and $(PxA)_{jk}$ is the interaction between protein level and age. The other factors in this model are similar to those in the first model.

Duncan's Multiple Range Test (Duncan, 1955) was used for means comparisons.

Table(2): Minimum and Maximum degrees of ambient temperature (°C) and relative humidity (%) during the experimental period (18-54 wks).

Laying period	Age	Ambient temp. (°C)		Relative humidity (%)	
		Min.	Max.	Min.	Max.
-	18-22	19	36	15	54
1	23-26	20	37	20	60
2	27-30	21	38	20	58
3	31-34	21	36	25	65
4	35-38	17	33	25	68
5	39-42	15	30	28	70
6	43-46	12	27	30	75
7	47-50	9	22	30	75
8	51-54	7	21	35	80
Average	-	15.70	31.10	25.30	67.20

Results and Discussion

Egg production performance:

Means of laying rate (%) of 8 successive laying periods (28 days each) and the other results of egg performance and body weight are presented in Tables (3,4). The naked neck birds (Na/-) were significantly (P<0.01) earlier in sexual maturity (170 d) than their normal sibs (174 d). The delay in sexual maturity of na/na genotype was noticed to coincide with the remarkable reduction in laying rates and total egg number (Table 3,4). Within genotype or protein level the maximum laying rates were from the 2^{nd} to the 4^{th} laying period, whereas the lowest rates were observed mainly at the 5^{th} and the 8^{th} laying period (Table 3).

The results shows that highly significant differences (P<0.01) due to genotype or protein level with a significant interaction during the most of laying periods (Table 3). Under high or low temperatures (Table 2) the results exhibited that naked neck genotypes (Na/-) had better start and higher laying rates than their normally feathered (na/na)

counterparts. The laying rate declined gradually after the 4th laying period till 54 wks of age, however the naked neck birds were significantly more persistent in laying especially the Na/na genotype (51.80%) than their normal (45.70%) counterparts. Similar trend was also obtained by Abd El-Rahman (1990) and Abd El-Rahman and El-Hammady (2000). Ali Hussain (1983) found similar fluctuations in laying rate throughout the laying season in different body weight populations. He reported that differences in laying rate could be attributed to the stressful effect of temperature in the tropics.

With regard to egg number, the results showed a superiority due to the presence of Na gene, where egg number or laying rate during the first 90 days from sexual maturity improved by 7.30% and 6.60% in Na/na and Na/Na genotypes, respectively. Similar effect was observed for total egg number or average laying rate, the Na/na and Na/Na hens laid more eggs by about 12.70% and 10% when compared with na/na genotype. The obtained results are in full-agreement with those reported by Abd El-Rahman (2000a,b) and Abd El-Rahman and El-Hammady (2000), Singh *et al*. (2001), Galal and Fathi (2002), El-Safty *et al*. (2003) and Mahrous *et al*. (2003).

The results presented in Table 4 exhibited no interaction effect between genotype and protein level on average egg weight, the gene effect deviation from na/na was 5.40% and 5.90% for Na/na and Na/Na genotype, respectively. Merat (1990) concluded that superiority of Na gene in layers raised under high environmental temperatures was due its effect on egg weight of Na/na and to a larger extent in Na/Na genotype (3-4 g).

As might be expected, the increase in egg number and egg weight due to the presence of Na gene improved the total egg mass by about 18.70% and 16.50% in Na/na and Na/Na genotypes, respectively. Horst (1982) reported that high temperature (32°C) was associated with 7.40% increase in egg mass during the first 3 months of production.

Taking into consideration, the interaction effect between Na gene and protein level (G x P) for the important parameters (TEN, ALR, TEM), the results proved that na/na genotype was more sensitive to the reduction in protein level (17% vs. 14%) than Na/- birds. The reduction in ALR due to protein level was about 4%, 2.40% and 8.70% in Na/na, Na/Na and na/na genotype; respectively. These reduction values were 5%, 4.20%, and 10.80% in the TEM. The obtained results support the hypothesis that there is a significant relationship between feather coverage and protein level.

The presence of Na gene improved significantly ($P<0.01$) body weight of layers at different ages. Such improvement at 40 and 52 wks amounted 3.10% and 4% in Na/na and Na/Na genotype, respectively. Horst *et al*. (1996) reported that the advantages of Na gene was more pronounced in high body weight populations than lighter ones. In contrast, Abd El-Rahman (1990, 2000a,b) in support with the results of the present study, exhibited additional advantages of the Na gene in small body weight population.

Although the ambient temperature was not controlled in the present study (Table 2), the Na/- birds exhibited relative advantages in the most of studied traits under the prevailing conditions compared with its normally feathered counterparts (na/na). Several mechanisms appeared to be responsible for higher productivity 1). The plumage reduction achieved by Na gene coincided with an increase in body surface temperatures particularly at poorly feathered sites, leading to faster heat dissipation and hence less depression of appetite at high temperatures (Pech-Waffenschmidt *et al*., 1995). 2). Reduced feathering results in increased flexibility in regulating body temperature at high ambient temperature (Eberhart and Washburn, 1993a,b; Yunis and Cahaner, 1999). 3). The Na/- birds exhibited a higher levels of T3 under heat stress (Kan and Mitchell, 1994) or less reduction in serum T3 under acute heat stress (Ozkan *et al*., 1996). 4). Feather reduction, leaving more protein for growth and may be for egg production too (Merat, 1990; Abd El-Rahman, 1998; Yahav *et al*., 1998; Abd El-Rahman and El-Hammady, 2000). 5). Finally, several studies with normally feathered birds showed a high performance at low or moderate temperature, hence the Na/- birds with lower body temperature under high ambient temperatures showed equivalent performance to that at lower environmental temperatures (Yahav and Hurwitz, 1996; Yahav *et al*., 1998).

Taking into consideration, the effect of protein level, high level (17%) reduced the age at sexual maturity. Also, it improved egg number and laying rate till 90 days by about 2%, whereas, it increased the total egg number (TEN) or average laying rate by about 5%.. High protein also improved egg weight and egg mass by about 2% and 6.60%, respectively. Summers (1993) reported that hens fed low protein diets (13% vs. 17%) resulted in similar egg production, however egg weight and thus egg mass were slightly reduced with the lower protein diets.

Similarly, Jensen *et al*. (1990) reported that the performance of hens fed 13% or 14% protein diet containing adequate levels of amino acids was not as satisfactory as that of hens fed 16% or more protein. Joseph *et al*. (2000), Garces *et al*. (2001), Hocking *et al*. (2002) and Yakout *et al*. (2004) reported a high egg number, weight and egg mass due to the increase in the protein levels (12.5% vs. 14.5% or 16.5%). Hens that received more protein (16% or 18%) in the diet produced more egg number and larger eggs because they were given proportionately more essential amino acids than hens fed on the 14% diet (Joseph *et al*., 2000). The increase in albumen percentage in the eggs from the higher protein treatment supports this finding (Table 5).

The results showed an increase ($P<0.01$) in body weight at 40 wks (2.50%) as a result of increasing protein level without any interaction between genotype and protein level. At 52 wks of age a highly significant interaction between genotype and protein level since the Na/- birds were heavier in body weight under low protein level (14%) than their normal counterparts (Table 4). The results obtained in this study are in agreement with those reported by Garces *et al*. (2001) and Hocking *et al*. (2002).

Egg quality parameters:

Results of egg quality per genotype within each protein level or age are presented in Table (5). The results indicate that no significant interactions between the main factors (GxP; GxA and PxA). The naked birds (Na/-) exhibited higher albumen percentages with lower yolk and shell percentages than their its normal feathering sibs (na/na). The presence of Na gene increased the albumen percentage by about 3% and 4.70% whereas, it reduced yolk % by 3.80% and 5.80% in the Na/na and Na/Na genotypes, respectively.

It could be noticed that the Na/Na birds exhibited the lowest shell percentage (10.40%) followed by the Na/na (10.70%) compared with that normally fathered counterparts (11.05%). The significant reduction in shell % led to a significant reduction ($P<0.01$) in breaking strength and shell thickness. Egg shell strength was 4.84, 4.48 and 5.54 kg/cm^2 whereas shell thickness was 0.39, 0.37 and 0.41 mm for the Na/na, Na/Na and na/na genotypes, respectively. These results are in agreement with those reported by Merat (1990); Abd El-Rahman (2000a,b, 2003) and Abd El-Rahman and El-Hammady (2000). Abd El-Rahman (2000b) reported significant

correlations between shell percentage, shell strength and thickness.

The remarkable disadvantage of Na gene on egg shell quality may be attributed not only to a direct gene effect but also to the significant increase in egg number and more pronounced to the increase in egg weight (Table 4). The reduction in egg shell quality due to Na gene especially for the Na/Na genotype support the findings of Abd El-Rahman (2000a,b, 2003) and Abd El-Rahman and El-Hammady (2000) who reported that reduction in egg shell quality was correlated with a significant decrease in serum calcium of Na/- birds as compared with na/na genotype. Moreover, Abd El-Rahman (2000b) suggested that more studies are still needed to determine the best requirements of calcium for the naked neck genotypes (Na/-).

It is worthy to mention, that high protein level (17%) increased significantly ($P<0.01$) egg weight and albumen percentage by about 2.20% and 1.90%, whereas it reduced yolk percentage by about 2.70%. However significant effect due to protein level on egg shell quality as measured by shell % or shell strength. Shell thickness increased significantly ($P<0.05$) as protein level decreased and this may be attributed to the reduction in egg number or egg weight (Tables 4,5). These results are in disagreement with those reported by Yakout *et al*. (2004) who found that increasing protein level (from 12.5% to 16.5%) increased egg shell thickness but it reduce egg shell %.

The results in Table (5) showed significant differences due to age of birds on the most of egg quality traits. Advancing age from 40 to 52 wks increase egg weight and yolk % by about 12.20% and 3.80%, respectively whereas age of birds reduced albumen and shell % by about 1.70% and 2.4%, respectively. This is in accordance with the results reported by Lopez and Leeson (1995).

Anatomical and physiological parameters:

Results of anatomical and physiological parameters are presented in Table (6). The results exhibited no significant interaction between the main factors (genotype, protein and age) in the most of studied traits.

The presence of Na gene reduced significantly the feather percentage by about 26.60% and 32.80% in the Na/na and Na/Na genotypes, respectively. the results are in agreement with the findings of Abd El-Rahman and El-Hammady (2000), Fathi and Galal (2001) and Singh *et al*. (2001). The gene not only reduced the feather % but also the female abdominal fat where, the

reduction due to Na gene was 19% and 37.70% in the Na/na and Na/Na genotypes, respectively. The lower abdominal fat may be due to the utilization of a higher proportion of the lipids for thermoregulation (Yahav *et al.*, 1998; Yunis and Cahaner, 1999) or may be associated with higher egg production of the naked neck birds (Na/-) when compared with their na/na counterparts (Tables 3,4).

The presence of Na gene improved female giblets and carcass percentages. Such increases were coincided with higher dressing percentage by about 8.10% and 9.70% in Na/na and Na/Na genotypes and this is in agreement with that reported by Abd El-Rahman (1998).

The results showed that naked neck birds (Na/-) were lower in body temperature (B.T.) by about 0.3-0.6°C than na/na birds. The results are in accordance with that reported by Eberhert and Washburn (1993a,b), Ozkan *et al*. (1996) and Abd El-Rahman (2000a). Eberhert and Washburn (1993a) reported that both acclimated and un-acclimated birds showed a rise in body temperature upon exposure to high environmental temperatures, but the acclimated birds had the capacity to stabilize their body temperature above the normal body temperature, whereas the B.T. of un-acclimated birds continued to rise at rapid rate and this occurred in normally feathered genotype (na/na).

Pech-Waffenschmidt *et al*. (1995), Yahav *et al*. (1998) and Abd El-Rahman (2000b) suggested that Na/- birds could dissipate heat from the naked neck and breast skin more efficient to avoid the risk of additional increase in B.T. under high environmental temperature as compared with fully covered feather genotype and this is considered as a useful expression of thermoregulation and heat tolerance.

It could be noticed that Na/- birds had the highest ovary and oviduct percentages (Table 6). The increase in ovary % was 14% and 25% whereas the increase of the oviduct % was 10.20% and 14.90% in the Na/na and Na/Na genotypes, respectively. The increase in reproductive organs coincided with high egg production (number, weight and mass) as shown in Table (4) or may be attributed to a linkage between Na gene and other genes responsible of hormone secretion.

With regard to protein level effects, the results indicate that high protein level (17%) increased significantly feather, giblets and dressing percentage by about 7.30%, 17.90% and 1.40%, respectively. Low protein level (14%) increased significantly ($P<0.01$) abdominal fat by about 24%. Low dietary protein level reduced significantly ovary and oviduct percentages. The reduction was 9% and 15% which reflects the reduction in nutrients requirement for egg formation associated with smaller number of ovarian follicles and the reduced egg mass output from these birds.

It is mentioned that feather and ovary percentage reduced with advancing age, the reduction was about 6.20% and 10.20%, whereas the abdominal fat was increased by 24.80% with advancing age.

From the above mentioned results, it can be concluded that Na gene play an important role in body thermoregulation and physiological status of the bird through increased heat loss from body surface, less depression of appetite which consequently lead to a better productivity even at low protein levels.

References

Abd El-Hakim, N.F.; A.A. Amer; K.A. El-Khimsawy and M.A. Aboul-Ella (1992). The effect of step up and down protein level on the performance of growing egg-type chickens. Al-Azhar J. Agric. Res. 15: 37-56.

Abd El-Rahman, A. (1990). Significance of some major genes in relation to the productive adaptability of four German sublines compared with local Egyptian chickens under Assiut subtropical conditions. Ph.D. Thesis, Assiut Univ., Assiut, Egypt.

Abd El-Rahman, A. (1998). Effect of naked neck gene (Na) on growth and carcass measurements in local Sharkasi males under Assiut conditions. In "Proceeding of 10th Conference of Egyptian Society of Anim. Prod." Assiut, 13-15 December pp: 315-333.

Abd El-Rahman, A. (2000a). Evaluation of egg production performance of the naked neck chickens (Sharkasi) under long-term heat stress conditions. Assiut J. of Agric. Sci. 31 (4): 269-289.

Abd El-Rahman, A. (2000b). Effect of naked neck gene (Na) and housing system on egg production performance of Sharkasi chickens under subtropical conditions. Egypt. Poult. Sci. 20 (IV): 905-926.

Abd El-Rahman, A. (2003). Effect of naked neck gene (Na) on egg weight loss, shell quality and hatching ability of Sharkasi chickens. Assiut J. of Agric. Sci. 34 (6): 54-69.

Abd El-Rahman, A. and H.Y. El-Hammady (2000). Effect of frizzle (F) and naked neck (Na) gene on productive adaptability of German genotypes as compared with local chickens under subtropical conditions. Assiut J. of Agric. Sci. Vol. 31 (2): 196-206.

Ali-Hussein, S. (1983). Genotype x environment interaction in layers housed in tropical (Malaysia) and temperate (Germany) locations. Ph.D. Thesis, TU Berlin, Germany.

Duncan, D.B. (1955). Multiple Range and Multiple F-test. Biometrics, 11: 1-42.

Eberhert, D.E. and K.W. Washburn (1993a). Variation in body temperature response of naked neck and normally feathered chicken to heat stress. Poult. Sci. 72: 1385-1390.

Eberhert, D.E. and K.W. Washburn (1993b). Assessing the effects of the naked neck gene on chronic heat stress resistance in two genetic populations. Poult. Sci. 72: 1391-1399.

El-Hammady, H.Y.; H.H. Sharara and T.M. El-Sheiekh (1992). Effect of dietary protein level on growth performance of the Egyptian native egg type replacement pullets. Egypt. Poult. Sci. 12: 791-817.

El-Safty, S.A.; M.M. Fathi; A.H. El-Attar and A.Z. El-Dein (2003). Laying performance of naked neck and normally feathered genotypes of chicken produced from different parental lines. Egypt. Poult. Sci. Vol. 23 (1): 169-181.

Fathi, M.M. and A. Galal (2001). Assessing the combined effects of naked neck and crest genes on growth performance and meat yield of chicken under high ambient temperature. Egypt. Poult. Sci. 21: 319-338.

Galal, A. (1995). Effect of naked neck gene on growth and other productive traits of chicken under hot climate conditions. M.Sc. Thesis, Ain Shams University.

Galal, A. and M.M. Fathi (2002). Introducing crest gene to enhance productive performance of naked neck chickens under moderate ambient temperatures. Egypt. Poult. Sci. 22: 611-628.

Galal, A.; A.H. El-Attar and M.M. Fathi (2000). Laying performance of naked neck and frizzled genotypes of chicken under low ambient temperature. Egypt. Poult. Sci. 20: 889-904.

Garces, A.; N.H. Casey and P. Horst (2001). Productive performance of naked neck, frizzle and dwarf laying hens under various natural climates and two nutritional treatments. South African J. of Anim. Sci. 31 (3): 174-180.

Gilbert, A.B.; M.M. Perry; D. Waddington and M.A. Hardie (1983). Role of atresia in establishing the follicular hierachy in the ovary of the domestic hens. Journal of Reprod. and Fertility, 69: 221-227.

Hocking, P.M.; R. Bernard and G.W. Roberton (2002). Effect of low dietary and different allocations of food during rearing and restricted feeding after peak rate of lay on egg production, fertility and hatchability in female broiler breeders. Brit. Poult. Sci. 43: 94-103.

Horst, P. (1982). Genetical perspectives for poultry breeding on improved productive ability to tropical conditions. 2nd World's Poultry Congress of Genetic Applied to Anim. Prod. Madrid Spain, 1992, pp. 887-892.

Horst, P. and P.K. Mathur (1992). Trends in economic values of selection traits for local egg production. In "Proceedings of 19th World's Poultry Congress". Amsterdam-Netherlands: 20-24 September, pp. 577-583.

Horst, P. and P.K. Mathur (1994). Feathering and adaptation to tropical climates. In "Proceedings of 9th European Poultry Conference. Glasgow U.K. 7-12 August, 1994. pp. 79-82.

Horst, P.; P.K. Mathur and a. Valle. Zarate (1996). Breeding policies for specific tropical environments using appropriate combination of major genes. In Proceedings of XX World's Poultry Congress, New-Delhi, India 2-5 September, 1996, pp. 633-640.

Jensen, L.S.; V.M. Calderon, and C.X. Mendonca, Jr. (1990). Response to tryptophan of laying hens fed practical diets varying in protein concentration. Poult. Sci. 69: 1956 -1965.

Joseph, N.S.; F.E. Robinson; D.R. Korver and R.A. Renema (2000). Effect of dietary protein intake during the pullet-to-breeder transition period on early egg weight and production in broiler breeders. Poult. Sci. 79: 1790-1796.

Kan, P. and M.A. Mitchell (1994). A comparison of plasma thyroid hormone response to heat stress in normal and naked neck broilers. In "Proceedings of 9th European Poultry Conference". Glasgow, U.K. 7-12 August 1994 pp. 125-126.

Lopez, G. and S. Leeson (1995). Response of broiler breeders to low-protein diets. 2- Adult breeder performance. Poult. Sci. 74: 685-695.

Mahrous, M.A.; A. Galal; M.M. Fathi and A. Zein El-Dein (2003). Improving productivity of layer chickens in hot environmental conditions by introducing naked neck and frizzle genes. Egypt. Poult. Sci. Vol. 23(II): 393-408.

Merat, P. (1990). Pleiotropic and associated effects of major genes. In "Poultry Breeding and Genetics". R.D. Crawford. Editor Elsevier Scientific Publishers, Amsterdam, 1990. Chap. 20: 429-467.

Metwally, M.A. (2004). Effects of different dietary protein and lysine levels on performance of forty weeks Dandrawi laying hens after peak period. Egyptian. J. Anim. Prod. 41: 423-435.

Ozkan, S.; S. Yalcyn; H. Ozkylyc and M. Argon (1996). Variation in serum T3 and body temperatures response to acute heat stress in naked neck (Na) and normal (nana) broiler. In "Proceedings of XX World's Poultry Congress". New Delhi-India., 2-5 September, 1996, pp. 655-659.

Pech-Waffenschmidt, V.; E. Bogin; A. Avidor and P. Horst (1995). Metabolic and biochemical changes during heat stress in relation to feathering degree of the domestic hen. Avian. Pathol. 24: 33-44.

SAS, User's Guide: Statistics 1990. SAS Institute, Inc. Cary, NC., U.S.A.

Singh, D.P.; D. Kumar and Y.P. Singh (2001). Potential usefulness of the plumage reducing naked neck (Na) gene in poultry production at normal and high ambient temperatures. World's Poult. Sci. J. 57: 139-156.

Summers, J.D. (1993). Influence of prelay treatment and dietary protein level on the reproductive performance of White Leghorn hens. Poult. Sci. 72: 1705-1713.

Yahav, S. and S. Hurwitz (1996). Induction of thermotolerance in male broiler chickens by temperature conditioning at any early age. Poult. Sci. 75: 402-406.

Yahav, S.; D. Luger; A. Cahaner; M. Dolan; M. Ruzan and S. Hurwitz (1998). Thermoregulation in naked neck chickens subjected to different ambient temperatures. Brit. Poult. Sci. 39: 133-138.

Yakout, H.M.; M.E. Omara; Y. Marie and R.A. Hasan (2004). Effect of incorporating growth promoters and different dietary protein levels into Mandrah hens layer's diets. Egypt. Poult. Sci. 24 (IV): 977-994.

Yunis, R. and A. Cahaner (1999). The effects of the naked neck (Na) and frizzle (F) on growth and meat yield of broilers and their interactions with ambient temperatures and potential growth rate. Poult. Sci. 78: 1347-1352.

Zanaty, G.A.; A.S. Radyi; A.M. Abou-Ashour and F.H. Abdou (2001) Productive performance of Norfa chickens as affected by dietary protein level, brooding system and season. Egypt. Poult. Sci. 21: 237-254.

الأداء الإنتاجي للدجاج البياض العاري الرقبة (الشركسي) مغذاة تحت مستويات مختلفة من البروتين

أسعد عبد الرحمن ، محمد نبيل مقلد
قسم الإنتاج الحيوانى – كلية الزراعة – جامعة أسيوط

أستخدم فى التجربة 667 دجاجة بياضة من ثلاثة تراكيب وراثية هى العاري الرقبة الخليط والأصيل والطبيعى الترييش لدراسة تأثير جين الرقبة العارية ومستوى البروتين (17%، 14%) والتداخل بينهما على إنتاج البيض. وأمكن تلخيص النتائج كما يلى :

1- أظهر التركيب الوراثى تأثيراً معنوياً (1%) على وزن الجسم فى الأعمار المختلفة.

2- أظهرت الطيور العارية الرقبة تبكيراً معنوياً (مستوى 1%) فى النضج الجنسي مع زيادة فى إنتاج البيض بحوالي 12.70% و 10% فى كلاً من العاري الخليط والأصيل بالمقارنة بالطبيعى الترييش.

3- أدى وجود جين الرقبة العارية إلى تحسين فى وزن البيضة بحوالى 5.4% و 5.9% وزادت كتلة البيض 18.70% و 16.50% فى كلاً من العارى الخليط والأصيل على التوالى.

4- كان التركيب الوراثى الطبيعى الترييش أكثر حساسية للانخفاض فى مستوى البروتين عنه فى الطيور العارية الرقبة.

5- أدى ارتفاع مستوى البروتين (17%) إلى خفض العمر عند النضج الجنسى وتحسن إنتاج البيض ووزن البيضة وكتلة البيض بحوالى 5%، 2%، 6.70% على التوالى وتحسن وزن الجسم معنوياً (مستوى 1%) عند عمر 40 أسبوع .

6- أدى وجود جين الرقبة العارية إلى زيادة فى نسبة البياض بحوالى 3% ، 4.7% بينما أنخفض الصفار بحوالى 3.8% و 5.8% فى كلاً من العاري الخليط والأصيل. وأظهرت الطيور العارية الرقبة انخفاضاً فى جودة القشرة بالمقارنة بالطبيعى الترييش.

7- تحسنت نسبة البياض معنوياً بارتفاع نسبة البروتين بينما أنخفضت نسبة الصفار وبدون أى تأثير على صفات جودة القشرة.

8- أدى وجود جين الرقبة العارية إلى خفض نسبة الريش بحوالى 26.5% ، 32.8% فى كلاً من العارى الخليط والأصيل على التوالى وأنخفض دهن البطن بحوالى 19% و 37.70% للتراكيب الوراثية السابقة.

9- أظهرت الطيور العارية تحسناً معنوياً (1%) فى نسبة التصافى كما أنخفضت درجة حرارة الجسم معنوياً بالمقارنة بالطبيعية الترييش .

10-ازدادت نسبة المبيض بحوالى 14-25% وكذلك القناة المبيضية بحوالى 10-15% فى الطيور العارية عند مقارنتها بالطبيعية الترييش.

11-وبالنظر إلى مستوى البروتين فإن ارتفاع مستوى البروتين أدى إلى ارتفاع فى نسبة الريش ، الحوائج ونسبة التصافى بحوالى 7.3%، 17.90%، 1.5% بينما أنخفض دهن التجويف البطنى بحوالى 24%. أدى انخفاض نسبة البروتين إلى نقص نسبة المبيض والقناة المبيضية 9%، 15% على التوالى.

والخلاصة هى أن العامل الوراثى للرقبة العارية يلعب دوراً هاماً فى تنظيم درجة حرارة الجسم والحالة الفسيولوجية للطائر من خلال زيادة الحرارة المفقودة من سطح الجسم ويقلل من الانخفاض فى شهية الطيور وما يترتب على ذلك من تحسن واضح فى أداء إنتاج البيض وتحت المستويات المنخفضة للبروتين تبعاً للظروف البيئية السائدة.