

FEED CONSUMPTION IN RELATION TO EGG FORMATION AND ENVIRONMENTAL TEMPERATURE IN DANDARAWI AND HY-LINE STRAINS.

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ABSTRACT

A total of one hundred eighty, 40 weeks old from both Dandarawi and Hy-line strains were used in this experiment. Birds within each strain were subdivided into two groups. The first group was maintained under the prevailing conditions in Assiut governorate (subtropical conditions with a temperature between 40-45°C) and considered as control, while the other one was kept under improved temperature (18-24°C). Hens were housed individually in laying hen batteries and feed and water were available *ad.lib*. Egg production as well as feed consumption was recorded daily throughout the experimental period (three periods, 28 days each). At the end of the experiment, birds were sorted according to their laying cycles into four categories; O for ovulation only; OL for ovulation and oviposition, L for oviposition only and X for neither ovulation nor oviposition. Finally, daily feed consumption was calculated and correlated with the reproductive status.

In general, the result showed significant difference ($P < 0.0001$) in feed consumption between strains, where the Dandarawi consumed more feed (126.9 g/day) than the Hy-line strain (116.2 g/day). No significant difference was found between the control and the treatment; however, birds that were kept under the prevailing conditions from both groups consumed less feed (120.3 g/day) than the other one (122.8 g/day). The amount of feed consumption in relation to the reproductive activity showed significant differences ($P < 0.001$) in both strains. In conclusion, feed consumption is affected by high temperature and egg formation in the female reproductive cycle.

Keywords: Dandarawi, Hy-Line, Egg formation, Feed consumption

INTRODUCTION

The productivity of animal is a function of their genetic potential and their interaction with the environment. Therefore, numerous management regimens (Muiruri and Harrison, 1991) and genetic selection (Abdellatif, 1989; Abdel-Rahman, 1989; Animesh et al., 1998, Flock, 1998 and Chen et al., 2004) have been used to optimize productivity. Environmental factors, particularly temperature is difficult to control in traditional housing conditions. At least it depressed reproduction and immune system (Mashaly, et al., 2004) during the hot weather and in extreme may kill the birds. Heat stress might affect reproduction directly through the hypothalamus (Donoghue, et al., 1989) or indirectly through feed consumption which in turn related to egg formation cycle. Previous studies on feed consumption in relation to ovulatory cycle in laying hens indicated that the consumption was higher when egg formation is taking place in the reproductive system than when no egg was formed (Morris and Taylor, 1967 and Choi, et.al., 2004). Also, feed consumption was greater when albumin was secreted than when shell was formed, (Morris and Taylor, 1967). According to the reproductive status of the

hen, it was indicated that feed consumption was higher on the days of ovulation or oviposition and/or both than days of neither ovulation nor oviposition (Morris and Taylor, 1967; Wood-Gush and Horne, 1970 ; Abdellatif et al., 1986 and Choi, et al., 2004).

The present study aimed to determine the effect of high temperature and egg formation or ovulatory cycle on daily feed consumption of the Dandarawi chickens as local stain and Hy-Line as commercial layers under prevailing conditions in Assiut.

MATERIALS AND METHODS

The present study was carried out in the research farm, Animal and Poultry Production Department, College of Agriculture, Assiut University. The research aimed to study the changes in feed consumption in relation to the female reproductive cycle and the environmental temperature.

Experimental Birds

One hundred eighty, 40 weeks old, Dandarawi and Hy-Line laying hens were used in this study. Birds from each strain were divided into two sub groups, the first one was maintained under the prevailing temperature in Assiut (40-45°C) and considered as a control, while the second group was provided with air conditions system to maintain the temperature within an optimum range between 18-24°C throughout the experimental period.

All birds were housed in individual cages and reared under similar conditions. Hens were fed a ration contained 16% protein, 2800 Kcal/kg and 3.5% calcium. The photoperiod was adjusted to 16 hours/day. Daily feed consumption was recorded at 9 AM for three consecutive periods, each 28 days. Also, egg production was recorded and the reproductive activity was determined and sorted according to Wood-Gush and Horne (1970) and Abdellatif et al., (1986) as follow; (X) for days without ovulation or oviposition; (O) for days with ovulation only; (OL) for days with both ovulation and oviposition and (L) for days with oviposition (laying) only. Thereafter, egg formation was correlated with the amount of feed intake.

Statistical Analysis: Statistical analysis was done by the General Linear Model (GLM) followed by least square means for comparisons among means.

RESULTS AND DISCUSSION

The averages of daily feed consumption in relation to the ovulatory cycle and the effect of environmental temperature for both Dandarawi and Hy-Line are presented in Figs. 1 and 2. The results showed that daily feed consumption during egg forming days was greater than that of non-egg forming days. Meantime, feed consumption greatly varied according to the ovulatory cycle where it is high on days of both ovulation and oviposition (OL) or oviposition only (L) compared to days of ovulation only (O) or days without ovulation and oviposition (X). Differences in feed consumption at the different type of days were highly significant ($P < 0.01$), Fig (1 and 2).

F1-2

These significant variations in feed consumption during the ovulatory cycle are in full agreement with the findings of Abdellatif et al (1986) and Wood-Gush and Horne (1970) who suggested that at the egg forming days, an increase of feed consumption is necessary due to the fact that albumin secretion and shell formation require some more nutrients from the feed intake than days of non-egg formation. Considering certain nutrient requirements as limiting or regulating factors to feed consumption of the hen according to the ovulatory cycle, it is noticed that feed consumption on days of shell calcification greatly increased due to the decrease of total and diffusible calcium of the blood which provides continuous stimulation for the voluntary feed consumption regulator of the bird (Hertelendy and Taylor 1960 ; Taylor and Hertelendy 1960; and Abdellatif et al 1986). Also, the increment in feed consumption during egg forming days in comparison with non-egg forming days was attributable to the fact that ovum transportation along the oviduct, secretion of albumen and shell gland activity must expenditure more energy which resulted in an increase in the nutrient requirements, (Morris and Taylor, 1967). Moran, (1987) reported that albumen is largely synthesized by the tubular gland cells in the magnum and steroid hormones are required for this process. As consequence, hens increase their protein intake at this time. The data in Fig. 1 and 2 showed less feed consumption when there is no ovulation or oviposition (X). This is logic and confirms the previous results because of the lack of the reproductive activity.

Regardless of the applied treatment and the reproductive activity, it is observed that the daily feed consumption in Dandarawi (126.9 g.) hens is significantly ($P<0.0001$) higher than the Hy-Line strain (116.2g). This means that the Hy-line hens (commercial layers) more efficient than the local strain in feed utilization, (El-Bogdady et al., 1995).

Daily feed consumption in relation to the ovulatory cycle for all hens maintained under the optimal temperature (18-24° C) was greater than that of hens maintained under the prevailing temperature with the exception of the (O) group in Hy-Line strain (almost equal amount) (Fig. 1 and 2). This result reflects the effect of the high prevailing temperature on feed consumption., similar findings were reported by El-Boushy et al., (1978) when feed consumption of birds under high and optimal temperatures was compared. Although, the effect of high temperature on feed consumption was not significant in this study, however, in other experiment using the same birds and under the same treatments (prevailing and improved temperature), a significant difference ($P<0.05$) in egg production was observed in Hy-Line but not in Dandarawi. The variation in egg production between the two strains could be explained by the genetic differences (Abdelnabi and Ottinger, 2000). In addition, the differences between treatments within each strain could be due to the direct effect of temperature on the hypothalamo-hypophysial – gonadal axis and the capability of hens to stand heat stress. Donoghue, et al., (1989) found a lower concentration of hypothalamic LHRH in heat stressed hen compared with unstressed one.

From the present study it could be concluded that feed consumption of laying hens widely varied in relation to the ovulatory cycle . Daily feed

consumption was greater on days of egg forming than that of non-egg forming. Feed consumption of all birds maintained under the optimal temperature was higher than that under the prevailing temperature. Daily feed consumption in relation to the ovulatory cycle of Dandarawi hens was greater than that of Hy-line hens. The response of the two strains for the environmental temperature widely varied and directly affected their feed consumption during the ovulatory cycle in different manner .

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علاقة الغذاء المستهلك بتكوين البيضة ودرجة الحرارة الخارجية لكل من دجاج الدندراوى والهاى لاين

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استخدم فى هذا البحث عدد ١٨٠ دجاجة عمر ٤ أسبوع من سلالتى الدندراوى والهاى لاين ، قسمت الطيور فى داخل كل سلالة الى مجموعتين وقد تم وضع المجموعة الأولى تحت الظروف السائدة فى محافظة اسيوط (كنترول) بينما وضعت المجموعة الثانية تحت درجة الحرارة المثلى (١٨-٢٤° م). أثناء فترة التجربة والتي استمرت لثلاث دورات متتالية لوضع البيض ومدة كل دورة ٢٨ يوم وتم تسجيل إنتاج البيض لكل دجاجة وأيضا استهلاك الغذاء اليومى وفى نهاية البحث تم تصنيف الإناث على حسب الحالة التناسلية لها الى اربع درجات.

المجموعة الأولى اشتملت على الإناث التى حدثت بها عملية التبويض فقط (O) ، المجموعة الثانية اشتملت على الإناث التى حدثت بها عملية التبويض ووضع البيض (OL)، المجموعة الثالثة اشتملت على الإناث التى حدثت بها عملية وضع البيض فقط (L) أما المجموعة الرابعة اشتملت على الإناث التى لم يحدثت بها تبويض أو وضع البيض (X). تم حساب كمية الغذاء المستهلك لكل دجاجة ثم إيجاد العلاقة بين كمية الغذاء المستهلك ودرجة الحرارة والحالة التناسلية.

أظهرت النتائج بصفة عامة وجود اختلافات معنوية ($P<0.01$) بين السلالتين فى كمية الغذاء المستهلك حيث كانت حوالى ١٢٦,٩ جم/يوم فى الدندراوى وحوالى ١١٦,٢ جم/يوم لسلالة الهاى لاين. لم تظهر أى اختلافات معنوية لتأثير درجة الحرارة ولكن على الرغم من ذلك فان استهلاك مجموعة الكنترول كان أقل (١٢٠,٣ جم/يوم) من المجموعة التى تم تربيتها على درجة الحرارة المثلى (٢٢٠,٨ جم/يوم). كما أظهرت النتائج اختلافات معنوية ($P<0.01$) فى كمية الغذاء المستهلك وعلاقته بالحالة التناسلية فى كل من السلالتين. وقد خلص الباحث الى ان هناك تأثير غير معنوى لدرجة الحرارة وتأثير عالى المعنوية للحالة التناسلية على كمية الغذاء المستهلك.