

## Feed Consumption Pattern of Laying Hens in Relation to Time of Oviposition

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**ABSTRACT** : A total of sixty 67 week-old Manina White strain laying hens were individually housed in cages to investigate feed consumption pattern during the day in relation to time of oviposition. Hourly feed intake and time of oviposition were recorded for each bird for seven days. Mean hourly feed intake of all hens showed a smaller peak at 10:00-12:00 and a larger peak at 17:00-19:00. There were no significant differences in amount of daily feed consumption and hourly eating pattern between egg-laying days and non-laying days. However, hens consumed about 10 g more feed ( $p < 0.01$ ) on egg-forming days (the day before oviposition) than on non-egg-forming days. Hourly feed intake decreased prior to oviposition, but increased immediately during the time of oviposition. The peak consumption during the evening hours (17:00-19:00) was consistent regardless of the time of oviposition. (*Asian-Aust. J. Anim. Sci.* 2004, Vol 17, No. 3 : 371-373)

**Key Words** : Laying Hens, Oviposition Time, Feed Intake, Egg-forming Days

### INTRODUCTION

It is well established that the pattern of feed intake of laying hens is influenced by the egg-forming cycle. Morris and Taylor (1967) reported that pullets consumed more feed on egg-forming day than on non-egg forming day and that feed consumption was greater when albumen was being secreted during shell formation. Roland et al. (1972) observed the same pattern of general feed intake regardless of laying or non-laying day and reported that hens on laying days consumed two percent more feed than on non-laying days. Duncan and Hughes (1975) found that feeding activity was decreased at the time of luteinizing hormone release, increased at ovulation, increased again when the egg entered the shell gland, decreased an hour or two prior to oviposition and then increased following oviposition. Taylor (1972) suggested that feed intake on the egg-forming day may be determined by the need for calcium rather than energy. Hughes (1972) reported that calcium intake is regulated on an hour-to-hour basis by the needs of egg formation.

The objective of the present experiment was to investigate feed intake pattern of hens during the day with respect to egg formation and time of oviposition.

### MATERIALS AND METHODS

Sixty 67 week-old Manina White (Chunho Breeding Co. Ltd. Korea) strain laying hens that were producing approximately 70% eggs in hen-day basis were individually

caged. A 15 L:9 D light program was applied, with the light period of 05:00 to 20:00 h. The hens were given a commercial corn-soybean meal diet containing 15.7% crude protein, 3.7% calcium and 0.62% total phosphorus. Hourly feed intake was measured by weighing residual feed in the individual feeding trough every hour during light period for 7 days. Feed intake during dark period was also measured to calculate daily feed consumption. Oviposition time of each hen was recorded. The day of oviposition was termed laying day and the day before oviposition was termed and regarded as an egg-forming day.

### RESULTS AND DISCUSSION

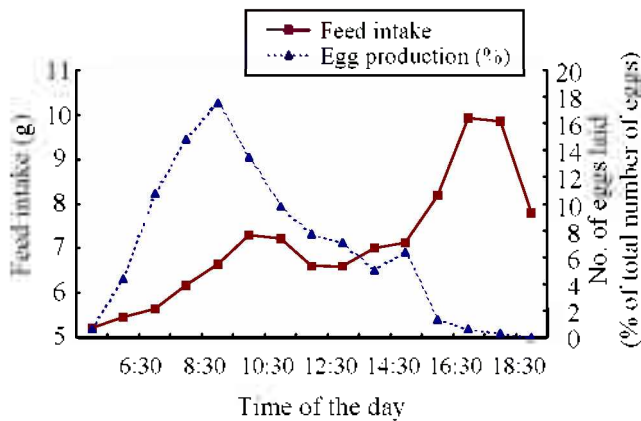
Hourly feed intake showed two peaks during the day (Figure 1), a smaller peak at 10:00-12:00 and a larger one at 17:00-19:00. Time of oviposition showed a peak at 09:00-10:00. Wilson and Keeling (1991) reported that peak oviposition time were 10:00 and 11:00. Chah (1972) reported that egg production peaked at around 11:00, with peak intake of energy and protein at this time but intake of feed and calcium increased markedly in the afternoon. He assumed that intake of energy and protein was greatly related to the physiological activity because the hen ovulates an ovum about 30 minutes after oviposition of the previous egg. He also assumed that increased calcium intake in the afternoon was associated with an appetite for calcium because it takes approximately 4 to 5 h for an egg to reach the shell gland after ovulation. Taylor (1970) reported that calcium requirement appeared to be a major factor controlling feed consumption on the egg-forming day.

Hens consumed 4.24 g (3.88%) more feed on the egg laying day ( $p < 0.10$ ) than on the non-laying day (Table 1). Hourly eating pattern did not differ greatly between laying

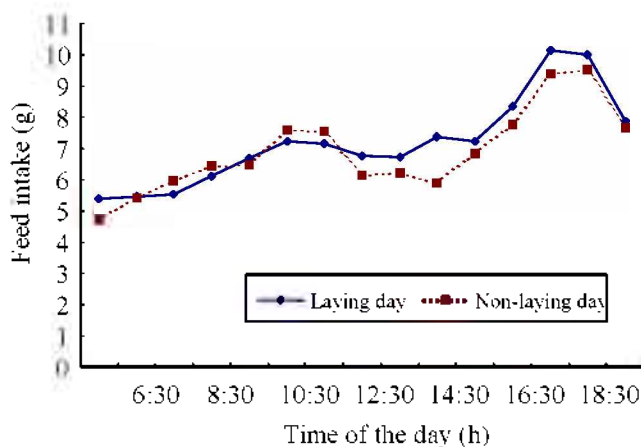
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**Figure 1.** Hourly feed intake and distribution of eggs laid during the day. Feed intake of 5.70 g during the dark period (20:00-05:00) is not included. The average total daily intake was 112.5 g/hen.



**Figure 2.** Hourly feed intake pattern on laying day and non-laying day.

days and non-laying days (Figure 2), as observed by Roland et al. (1972). However, feed consumption patterns of hens on egg-forming day (the day before oviposition) and non-egg-forming day showed a significant difference (Figure 3). Feed intake between 09:00 to 13:00 on egg-forming day was higher than that of non-egg-forming day, resulting in a significant ( $p < 0.01$ ) difference of 9.56 g (9.20%) in the daily feed consumption. Bhatti (1987) reported that egg-formation cycle affected feeding activity. Taylor (1970) indicated that the increased feed consumption on egg-forming days as compared with non-egg-forming days was a response to the increased requirements of calcium. From the data of Table 1, it is evident that the comparison between egg-forming day and non-egg-forming day, rather than the comparison between egg laying day and non-laying day, demonstrates more clearly that feed intake pattern is related to egg production.

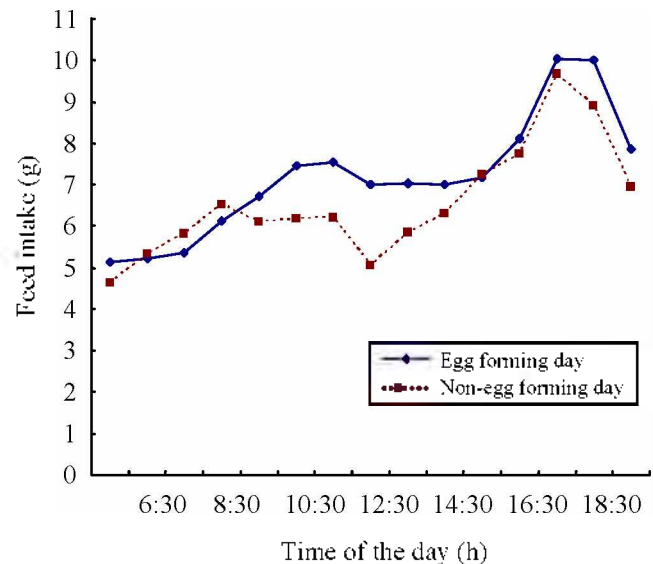
Figure 4 shows hourly feed intake pattern of laying hens

**Table 1.** Daily feed intake on egg laying day and non-laying day and egg forming day and non-egg forming day

	Daily feed intake (g/bird)	Standard error
Egg laying day	113.50	1.23
Non-laying day	109.26	2.20
Egg forming day <sup>1</sup>	113.45 <sup>A</sup>	1.32
Non-egg forming day	103.89 <sup>B</sup>	2.54

<sup>1</sup> The day before egg laying day was regarded as an egg forming day.

<sup>A, B</sup> Means within the column with different superscripts are significantly different ( $p < 0.01$ ).

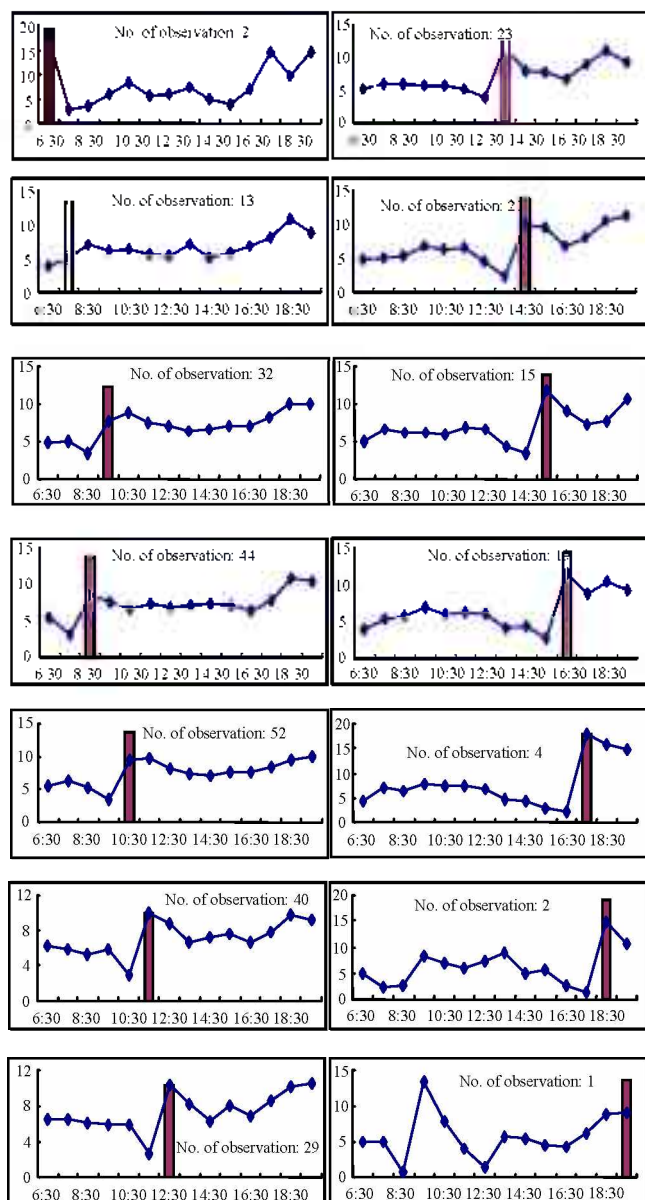


**Figure 3.** Hourly feed intake pattern on egg forming day and non-egg forming day.

in relation to time of oviposition, in which all laying hen days were grouped according to time of oviposition.

Hourly feed consumption decreased prior to oviposition but increased sharply during the hour of oviposition and remained relatively high in feed intake for 1 or 2 h. Savory (1977) and Kadono et al. (1981) reported that eating activity decreased an hour or two prior to oviposition and then increased following oviposition. The high feed intake during the hour zone of oviposition may be a reaction to compensate the low feed intake prior to oviposition and increased demand for the nutrients related to ovulation that occurs half an hour after oviposition. In general, feed intake was high during the last few hours of daylight from 17:00 to 19:00. These results are in agreement with the previous studies (Ballard and Biellier, 1969; Wood-Gush and Home, 1970).

In conclusion, peak time of oviposition was 09:00-10:00, whereas hourly feed intake peaked at 17:00-19:00. Comparison of feed intake on egg forming day and non-egg-forming day reflected feed requirement for egg production more clearly than that of laying day and non-laying day.



**Figure 4.** Hourly feed intake pattern of laying hens in relation to the time of oviposition (shaded areas represent hour zone of oviposition; vertical scale is feed intake in g; horizontal scale is time of the day).

**ACKNOWLEDGEMENT**

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