

## LAYING PATTERNS AND EGG PRODUCTION OF INDIGENOUS 'KAMPUNG' CHICKENS

ENGKU AZAHAN\*

*Keywords:* Laying patterns, Egg production, 'Kampung chickens', Commercial layer.

### RINGKASAN

Corak-corak peneluran dan pengeluaran telur ayam-ayam kampung yang dipelihara secara intensif dengan memberi makanan dagangan, telah dikaji pada jangkamasa peneluran selama sebelas minggu. Keputusan-keputusan yang diperolehi telah dibandingkan dengan ciri-ciri peneluran yang didapati dari ayam-ayam penelur dagangan yang dipelihara di bawah sistem pengurusan dan pemakanan yang sama. Ayam-ayam kampung mencapai kematangan seks (sexual maturity) pada umur 24 minggu. Secara am corak penelurannya menunjukkan saiz 'clutch' yang kecil; ianya diselangi oleh masa rehat yang pendek dan jangkamasa pengeraman yang panjang. Pengeluaran telur ayam kampung adalah rendah dan saiz telur ringan. Sebaliknya ayam-ayam penelur dagangan mempunyai 'clutch' telur yang lebih panjang ( $P < 0.01$ ) dan juga menghasilkan jumlah telur yang lebih tinggi ( $P < 0.01$ ) serta saiz yang lebih besar ( $P < 0.01$ ) dari ayam kampung. Didapati sifat pengeraman tidak ada pada ayam penelur. Satu persamaan yang kelihatan pada kedua-dua jenis ayam ini ialah umur pencapaian kematangan seks adalah lebih kurang sama. Prestasi pengeluaran telur yang rendah pada ayam-ayam kampung adalah disebabkan oleh pengeraman, yang mengurangkan hari-hari peneluran. Walau bagaimanapun, faktor utama yang menyebabkan pengeluaran telur yang rendah dan corak peneluran yang tidak seragam serta diselangi masa pengeraman yang panjang pada ayam kampung diduga ketiadaan apa-apa program membaikbiak dan pemilihan di kalangan ayam-ayam tempatan.

### INTRODUCTION

The performance of the indigenous 'Kampung' chickens of Malaysia, in terms of growth, feed consumption, efficiency of utilising feed, livability, carcass characteristics and meat quality have recently been reported (ENGKU AZAHAN and ZAINAB OTHEMAN, 1980; ENGKU AZAHAN, *et. al.*, 1980, ENGKU AZAHAN and SEET, 1981; ENGKU AZAHAN and WAN ZAHARI, 1983). However, reports on their laying performance are lacking. The only literatures available on the subject were by the SCHOOL OF AGRICULTURE (1947), KELLY, (1958) and DEVARAJ, (1958). Reports from these sources consistently alleged that local chickens were poor egg producers.

The present strains of indigenous 'Kampung' chickens are unlike those of the 1940s or 1950s; crossbreedings with exotic layers and broilers as well as with the local jungle fowl (*Gallus gallus*) have taken place since then, and the present mixed strains of 'Kampung' chickens have improved over their predecessors in terms of growth per-

formances (ENGKU AZAHAN and ZAINAB OTHEMAN, 1980; ENGKU AZAHAN *et. al.*, 1980). Their physical attributes have also changed considerably and are so variable that no single description can fit the entire flock. It is expected that there will be differences in their laying performance.

This study was conducted with two main objectives namely, to examine the laying patterns of the present day 'Kampung' chickens reared intensively in battery cages and to determine the egg production performance of these birds. Their performance were compared with those of hybrid commercial layers.

### MATERIALS AND METHODS

One hundred day-old indigenous 'Kampung' chicks and same number of Welp Line layer birds of the same age were brooded in separate litter floor pens under hovers provided with electric bulbs. Each pen measured 3.7 m x 3.7 m. Both groups were provided *ad libitum* with proprietary chick starter mash from day-old to six weeks, after which the diet was replaced by chick

\*Poultry/Pig Branch, MARDI, Serdang.

grower mash until the birds attained the age of 18 weeks. Forty-five female 'Kampung' birds and the same number of commercial Welp Line brown layers were then randomly selected and transferred into individual battery cages. They were divided into five groups. Each group, which comprised of nine birds, represented a replicate. From the 19th week onwards the birds were fed with proprietary layer diet *ad libitum* and had free access to water.

Eggs were collected and weighed daily on individual basis, from the point of lay (referred to here as the age of sexual maturity) to the 34th week when the trial was terminated because of heavy mortality caused mainly by stress. The age of sexual maturity, clutch size, clutch interval, number of clutches and occurrences of broodiness were also recorded.

## RESULTS

### Laying patterns

The mean ages of sexual maturity for 'Kampung' birds and Welp Line layers were 171.4 and 171.7 days respectively (*Table 1*). The difference was not significant. The age of the first 'Kampung' chicken to reach sexual maturity was 154 days (22.00 weeks) while the earliest maturing commercial layer laid her first egg at the age of 152 days (21.71 weeks).

Within the laying period of 24th week to 34th week, the average clutch size for 'Kampung' birds and Welp Line layers were 2.02 and 4.40 eggs respectively. This difference was highly significant ( $P < 0.01$ ). There were 11 clutches for both types of birds.

Pauses in laying occurred in both the 'Kampung' and layer birds. 'Kampung' chickens experienced both short pauses (range 1–6 days) and broodiness (range 8–40 days) while the layers had only short pauses between clutches. The mean short

pause for 'Kampung' birds and the Welp Line layers were 1.4 and 1.5 days respectively. In addition the 'Kampung' birds also lost an average of 19.4 days of laying per bird through broodiness. These two pauses in laying resulted in a mean combined clutch interval of 4.9 days for the 'Kampung' birds, and this figure was significantly higher than that for commercial layers ( $P < 0.01$ ). Seventy-five percent of the 'Kampung' birds were broody over the 11 laying weeks under study, and out of this 35% of the birds had two incidents of broodiness, while the rest had only one. Results of *Table 1* are also summarised in *Figure 1*.

### Egg production and egg weight

The commercial layers achieved a hen-house production of 62.3% over 11 laying weeks while the 'Kampung' birds recorded only 29.3% over the same period (*Table 1*). The difference was highly significant ( $P < 0.01$ ). Similarly, the eggs of the layers were significantly heavier than those of the kampung birds ( $P < 0.01$ ).

No mortality was observed in layer birds over the 11 laying weeks, while the 'Kampung' birds recorded only one death within the same period. During the first week of egg recording (24th week), the 'Kampung' birds recorded a production of 10.0% and the figure reached 50.7% during the 34th week. The corresponding figures for the commercial layers were 11.1% and 85.7% within the same period. In both types of birds, egg weights were heavier in the later part of the laying period than at the beginning. *Figure 2* summarised the results of *Table 2*.

## DISCUSSION

The laying behaviour of domestic fowls, like that in all birds, is influenced by the sequence in which the eggs are laid, by the interval between pauses or interruption in the sequence, and by whether or not the

TABLE 1: LAYING PATTERNS OF 'KAMPUNG' AND LAYER CHICKENS OVER 11 LAYING WEEKS

	Maturity age (days)	Clutch size	Range of clutch size	No. of clutches per bird	Short pause interval (days)	Broodiness (%)	Broody interval (days)	Broody range (days)	Combined clutch interval (days)
Kampung	171.4	2.02	1-6	11.2	1.4	75	19.4	8.4	4.9
Layer	171.7	4.40**	1-28	10.9	1.5	0	0	0	1.5**

\*\*Significantly different at 1% level in the same column of figures



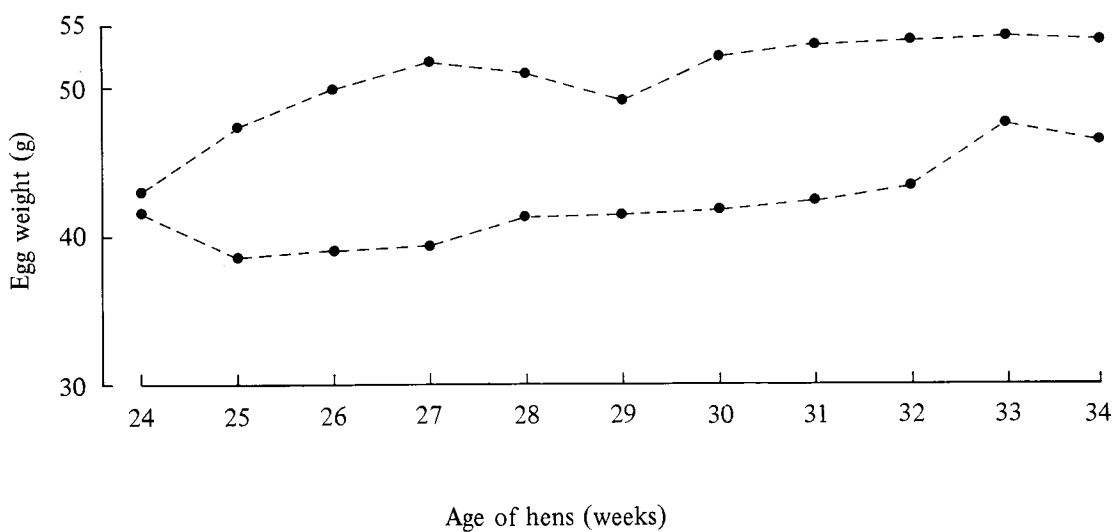
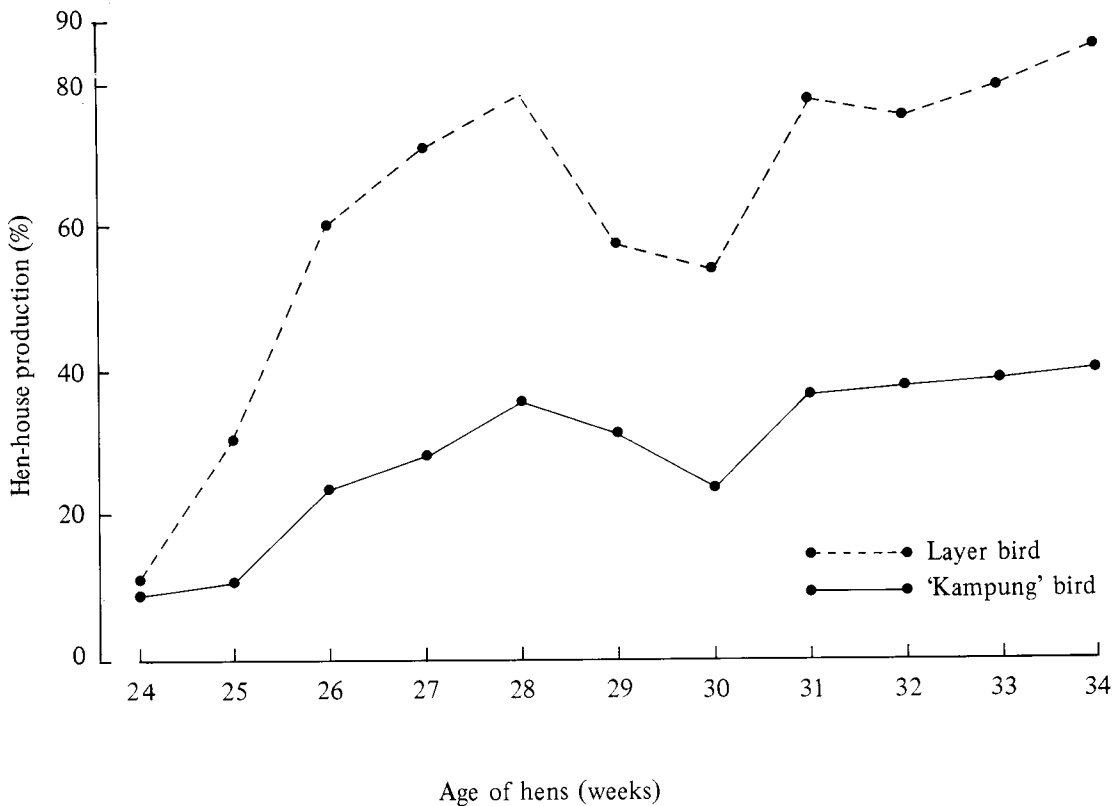


Figure 2: Weekly egg production and egg weight of 'Kampung' and layer birds.

TABLE 2: EGG PRODUCTION AND EGG WEIGHT OF 'KAMPUNG' AND LAYER CHICKENS OVER 11 LAYING WEEKS

	Laying percentage (%)	Mean egg weight (g)	Total egg mass/bird (g)
'Kampung'	29.3	42.8	965.6
Layer	62.3**	50.1**	2401.8**
Superiority of layer to 'Kampung' (%)	112.2	17.1	148.7

\*\*Significantly different at 1% level in the same column of figures

birds become broody after their eggs are laid. Laying sequences of most domestic birds are not regular and vary between breeds or strains (STURKIE, 1970). Each individual breed/strain however, will demonstrate certain general pattern/s of lay which begins from the time the female bird attains sexual maturity. The number of eggs laid by a bird is a direct consequence of its laying pattern and this is influenced, to a great extent, by genetics (breed). Other influencing factors include environmental conditions (especially light), nutrition and management systems.

Sexual maturity seems to be a physiological factor not much affected by genetics. Under the same management and nutrition both the 'Kampung' and Welp Line layers generally attained maturity at the mean age of 24–25 weeks. Observations made by ENGGU AZAHAN (unpublished) on Shaver layers and by YEONG (pers. comm.) on Hisex brown layers support this contention; both of them observed sexual maturity in their respective strains, under comparable environment and management, generally between ages 24 to 26 weeks. DEVARAJ (1958) obtained a mean age of sexual maturity at 24.8 weeks for local birds confined in deep-litter pens. For birds reared semi-intensively, the mean age obtained was 22.4 weeks which would suggest that birds with more freedom of movement achieved sexual maturity earlier.

From the point of sexual maturity onwards similarity between the 'Kampung' and the commercial layer birds ceased; their

laying patterns and egg production differed considerably. The mean clutch size for 'Kampung' chickens was 2.02 and this figure was significantly less than that for layers ( $P < 0.01$ ). DEVARAJ (1958) obtained a mean size of 1.6 for his birds which completed three months of lay. The mean number of clutches observed over 11 weeks was about 11 for both 'Kampung' and layer chickens, and this apparently resulted in more eggs for layers than 'Kampung' chickens over the same period.

In this study, pauses or interruptions in sequential egg-laying were separated into short pauses (normal physiological interruptions of 1–7 days) and broodiness (interruptions of eight or more days). 'Kampung' chickens experienced both types of pauses whereas the layers had only short pauses between clutches. The mean short pauses for 'Kampung' and layer chickens differed very little but the prevalence of broodiness among the 'Kampung' chickens resulted in their mean clutch interval being significantly longer than that of layers ( $P < 0.01$ ).

The occurrence of broodiness is considered by many to be controlled by the concentration of hormone prolactin in the blood stream. This is believed to have a threshold point at which broodiness occurs, after which degrees of broodiness depend upon characteristics of prolactin. Seventy-five percent of the 'Kampung' birds were broody during the trial period with an individual range of 1–2 incidents of broodiness (mean 1.3). The mean duration

of the broody period was 19.4 days with a range of 8 to 40 days. DEVARAJ (1958) reported that during the early part of their pullet year practically every local bird was broody approximately once a month giving a mean number of two incidents (range 1–5) over three laying months while KELLY (1958) reported a mean figure of 2.8 over four laying months. The mean durations of broodiness reported by DEVARAJ (20.5 days) and KELLY (19.4 days) compared well with the figure recorded in this study although it should be reminded that the periods of study by DEVARAJ and KELLY were slightly longer than the duration of this study. The other characteristics of broodiness were less severe in the local birds of today than those of 1958 and this was probably due to crossbreeding which occurred through the years between the broody 'Kampung' birds and the non-broody or less broody exotic birds.

Essentially, laying patterns of the 'Kampung' birds for the 11-week laying period could be classified as follows:

- i. those exhibiting short pauses (less than six days) of laying without broodiness
- ii. those exhibiting short pauses with one incident of broodiness, and
- iii. those exhibiting short pauses with two incidents of broodiness.

Hen-house production and mean egg weight of the 'Kampung' birds over 11 laying weeks were both significantly lower than those for the commercial layers ( $P < 0.01$ ) and the superiority of the layers to the 'Kampung' birds was persistent throughout the 11 laying weeks. This was due to the fact that the layers were highly selected for egg-laying characteristics whereas the 'Kampung' chickens were unselected mongrels (ENGKU AZAHAN *et. al.*, 1980).

The average total egg mass produced

by each bird over 11 laying weeks was 965.6 g for the 'Kampung' birds and 2401.8 g for the layers, showing a superiority of 148.7% for the layers over the 'Kampung' chickens. Similar superior situation of commercial broilers over the 'Kampung' birds in terms of growth performance was reported by ENGKU AZAHAN and ZAINAB OTHEMAN, (1980) and ENGKU AZAHAN, *et. al.*, (1980).

The main cause of low egg production in the 'Kampung' birds was the occurrence of broodiness. With a mean occurrence of 1.35 times and a mean broody interval of 19.4 days, the number of days lost through broodiness was 26.2 days out of 11 weeks. During the remaining 50.8 days a mean of 22.6 eggs were produced which accounted for a laying percentage of 29.3%. Had broodiness been absent and the period substituted with similar laying pattern as during the non-broody period, the hen would hypothetically produced an extra 11.6 eggs and the production over 11 weeks would have been 44.4%. On this basis broodiness was responsible for about 15% reduction in percentage lay over 11 weeks. The hypothetical calculated figure of 44.4% from this study still fell short of the figure recorded for the commercial layers over 11 weeks of laying (62.3%). This was probably due to the fact that the exotic layers had made drastic improvements over the last two decades through controlled selective breeding, whereas the improvements achieved by the 'Kampung' chickens through unplanned crossbreeding had been relatively small.

#### ACKNOWLEDGEMENTS

The author wishes to thank Cik Zainab Otheman and other staff members of the Poultry unit for the assistance rendered during the course of the experiment. Thanks are also due to Encik Ahmad Shokri Othman for the statistical analysis of the data and Puan Jamiah Shahlan for typing this manuscript.

#### SUMMARY

Laying patterns and egg production of indigenous 'Kampung' chickens reared intensively on commercial feed were investigated over a laying period of eleven weeks. Results were compared to

corresponding laying characteristics of a commercial layer strain reared under similar management and nutrition. 'Kampung' chickens attained sexual maturity at the mean age of 24 weeks. The laying patterns were generally characterised by small clutch size interrupted by short pauses in laying and long periods of broodiness. The egg production was low and the size of the egg small. In contrast, the commercial layers had bigger egg clutches ( $P < 0.01$ ) and laid more eggs ( $P < 0.01$ ) which were also heavier ( $P < 0.01$ ) than those of the 'Kampung' birds. They were also non-broody. The only apparent similarity between the 2 types of birds was that accession to sexual maturity occurred at about the same age. The poor laying performance of the 'Kampung' chickens was attributed partly to the occurrences of broodiness which accounted for a considerable portion of laying days. However, the prime factor contributing to the overall low productivity and the non-uniform laying pattern of the 'Kampung' birds was probably the total absence of any selective breeding among the local fowls.

## REFERENCES

- DEVARAJ, R.M. (1958). Observations on local (Malayan) tropical fowls. III. A comparison of laying patterns, *J. Mal. Vet. Med. Assn.* 2: 9-19.
- ENGLU AZAHAN, (1981). Unpublished data.
- ENGLU AZAHAN and SEET, C.P. Observation on the performance of some exotic broiler strains in relation to the indigenous 'Kampung' chickens. *Proc. of the Conference on Exotic and Cross-bred Livestock Performance in Malaysia*, Sept. 11-12, 1981, p. 136-144.
- ENGLU AZAHAN and WAN ZAHARI MOHAMED (1983). Observations on some characteristics of carcass and meat quality of indigenous 'Kampung' chickens in Malaysia. *MARDI Res. Bull.* (In press).
- ENGLU AZAHAN and ZAINAB OTHEMAN (1980). Tumbesaran ayam kampung dan ayam daging di bawah sistem pengurusan intensif dan separa intensif. *Teknologi Pertanian. Jil. 1, Bil. 2* : 47-52.
- ENGLU AZAHAN, SEET, C.P. and ZAINAB OTHEMAN (1980). a comparative study of physiological and production performances on local ('kampung') and commercial chickens. *Malays. agric. J.* 52 : 61-70.
- KELLY, R.B. (1958). Broodiness, egg laying and sample size in Canton-type fowls. *J. Mal. Vet. Med. Assn.* 2: 1-8.
- SCHOOL OF AGRICULTURE, MALAYA (1947). Livestock husbandry. Part II. Poultry husbandry.
- STURKIE, P.D. (1970). Avian Reproduction. *Dukes 'Physiology of Domestic Animals.* ed. Melvin J. Swenson. p 1339-1355.
- YEONG, S.W. (1981). Personal communication.