Effect of split diets on laying performance and egg quality of hens during the late laying period by manipulating the time of access to calcium and phosphorus

H. Zarghi, S. Zakizadeh, A. Zeaeei
1Ferdowsi University of Mashhad, Mashhad, Khorasan Razavi, Islamic Republic of Iran,
2Hasheminejad High Education Center, Mashhad, Khorasan Razavi, Islamic Republic of Iran,
Email:sonia_zaki@yahoo.com

Introduction Nowadays, commercial strains of laying hens lay the majority of their eggs (about 90%) during the morning (Leeson and Summers, 1978). Also, shell is deposited around the albumen when the egg remains in the shell gland. The period of shell deposition coincides mainly in the afternoon and evening. As a result of these processes, hens my have higher calcium (Ca) requirement during the afternoon and in evening. The higher phosphorus (P) requirement in the morning is needed to replace the bone minerals which have been reabsorbed during the previous night when shell formation occurred (Keshavarz, 1998). Regarding these facts, it has been shown that reducing dietary P during the afternoon and evening had a beneficial effect on shell quality (Roland and Harms, 1976). Hence, we investigated if it would be possible to improve laying performance and egg quality when hens received diets with adequate levels of P only in the morning and Ca only in the afternoon and evening.

Materials and methods There hundred and eighty four (384) 54-wk-old hens of a commercial Leghorn strain (Hi line W- 36) were used in a factorial complete random design experiment with four treatments and five replications for a period of seven weeks. Treatments included diets with different available levels of Ca and P in the morning (0500 to 1300 h) and in the afternoon and evening (1300 to 2100 h). Treatment 1 was a control standard diet with 0.25% P and 3.5% Ca levels which were fed in the morning and in the afternoon, equally. Treatment 2 had a lower calcium content (0.5%) in the morning and higher calcium content (6.5 %) in the afternoon and evening, while treatment 3 had a higher P level (0.4 %) in morning and lower P content (0.1 %) in afternoon and evening. In treatment 4, hens received 0.5% Ca and 0.4% vailable P in the morning, but 6.5% Ca and 0.1% P in the afternoon and evening. Feed intake, egg production (% hen/ days) and egg mass (g hen/ days) were recorded daily. All the eggs produced during three consecutive days (from 1500 h of the first day to 1500 h of the third day) on a bi-weekly period were saved for the measurement of egg weight. 25% of these eggs were used for the measurement of egg components (white, yolk and shell weight), shell thickness, and Haugh unit. In the morning of the last day of experiment one hen from each replicate was killed and the left tibia was saved for ash determination. Data were analyzed for production performance and egg quality in a factorial complete random design by JMP V 4.0.4.

Results The data presented in Table 1 shows that split diets had significant positive effect on feed conversion ratio, cost of feed per egg production, egg mass ($p<0.01$) and egg yield ($p<0.05$), but it had no effect on feed intake, shell thickness, bone ash, Haugh unit, egg weight or components. Treatment 4 had the greatest effects on production performance.

Conclusion This experiment clearly showed that the use of diets with different concentrations of Ca and P in the morning and afternoon/evening, could improve the performance of production without affecting feed intake or egg quality, and hen health during the lat laying period.

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References

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Table 1: Effect of split diets on feed conversion (FC), cost of feed per egg production (CFP), egg mass (EM) and egg yield (EY)

Diet	FC	CFP (Rls)*	EM (g)	EY (%)
1	2.69	5655	42.1	67.5
2	2.48	5221	45.0	71.1
3	2.50	5258	45.1	71.4
4	2.54	5136	46.31	73.2
SE	0.05	98	0.82	133
P	0.01	0.01	0.01	0.05

1RIS= 0.0011 $ US