

産卵種鶏의 制限飼養에 關한 研究

A Study on Restricted Feeding of Egg Type Stock

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INTRODUCTION

Field trials and research works have shown that the sexually retarded pullets are better equipped to lay larger eggs at the commencement of lay than the pullets grown under the natural conditions with no control over the rate of maturity. The method of delaying the sexual maturity by restricting the nutrient intake is receiving a considerable attention from the research workers, since the nutrient restriction can be a method of reducing the rearing cost.

Many experiments were carried out to study the effect of different methods of restricting the nutrient intake of the chicken. But the comparisons between these experiments are difficult because of the differences in the environment, management, type of breed and feed, and in the length of the time during which the feed intake was restricted. In addition the comparisons were not made on an economic basis in these experiments.

This experiment was designed to provide information on the reproductive responses to three different methods of restricting the nutrient intake in a egg type stock and to establish which methods are economically profitable.

MATERIALS AND METHODS

The four treatments compared were (i) the full feeding of the standard experimental diet (control), (ii) the restriction of the feed intake by 20 percent of the control, (iii) the restriction of the feed intake by 40 percent, and (iv) the full feeding of the low energy ration. The feed restriction was applied during the rearing period from 8 to 21 weeks of age. All groups were full fed during the laying period from 21 to 72 weeks of age.

Table 1. Formula of experimental diet and calculated composition

Ingredient	Growing Chicken				Laying hen (21-72wks)
	7-13WKS		14-20WKS		
	C*	LE**	C*	LE**	
Yellow corn	58%	45%	60%	45%	58%
Wheat bran	12	40	14	41	12
Extracted rice bran	9.3	—	15	—	5
Soybean oil meal	8	5	2	6	6
Perilla oil meal	3	3	1.5	4	3

Fish meal	6	3	3	—	7
Bone meal	1	1.5	1	1.5	1.70
Oyster shell	1	1.6	1.2	1.6	5.95
Salt	—	0.3	—	0.3	0.30
Dicalcium phosphate	—	—	—	—	0.50
Min. & vit. mix.	1.64	0.5	0.5	0.5	0.55
Antibiotics	0.06	0.1	0.1	0.1	—
Total	100	100	100	100	100
Crude protein (%)	17.25	16.10	13.15	13.72	16.04
M.E. (Kcal/kg)	2680	2226	2671	2174	2624
Ca (%)	0.97	1.27	1.02	1.14	2.74
P (%)	0.80	0.62	0.81	0.85	1.54

*C=Control

**LE=Low energy ration

The feed consumption of the control group was checked twice each week, and the amount of feed for the restricted groups was changed accordingly. The formula of experimental diets is shown in Table 1.

The experimental animals used were 300 pullets from the Colonial layer stock. A completely randomized design with three replications was used for comparison of the treatments. Twenty-five birds were allocated per treatment per replication. The birds were raised in the grower cage until 21 weeks of age. They were then transferred to the layer cage house, after being rerandomized with respect to the location of the cage.

RESULTS AND DISCUSSION

The mortality was slightly lower in the restricted groups than in the control, as shown in Table 2. However, the differences in the mortality was statistically insignificant in the rearing or in the laying periods. This result is in agreement with those of Naylor and Payne (5), Swan (7) and Peter (6).

Table 2. Results obtained during rearing period

Treatment	Mortality (%)	Body wts. gain (grams)	Feed efficiency	Feed cost (Won)*
Control	4.00	918	7.33	252
20% restricted	1.33	752	7.04	198
40% restricted	4.00	551	7.22	149
Low energy	1.33	758'	8.67	213

*1U.S. \$ = 400 Won

Table 3. Results obtained during laying period

Treatment	Mortality (%)	Body wts. gain (%)	Feed conv. to egg wts.	Age in days at 50% Prod.	Egg prod.		Ave. egg weight (grams)
					r. D. (%)	H.H. (No.)	
Control	13.89	1.70	3.75	163	59.56	194	52.77
20% restricted	9.11	1.69	3.47	176	62.03	212	53.79
40% restricted	5.56	1.61	3.44	195	59.73	209	55.12
Low energy	9.46	1.71	3.52	175	59.92	203	54.26

The body weight gain during rearing period was 918 grams for the control, 752 grams for the 20% restricted, 551 grams for the 40% restricted, and 758 grams for the full feeding of the low energy ration. These differences in the body weight disappeared by the time the birds reached 31 weeks of age. The body weight at 72 weeks of age was 1.70 kg for the control, 1.68 kg for the 20% restricted, 1.61 kg for the 40% restricted, and 1.7 kg for the low energy ration.

Restricting the feed intake from 8 to 21 weeks of age resulted in a feed saving of 20 to 40% during the rearing period. However, there was no significant difference among the treatments in the total feed consumption during the experimental period from 8 to 72 weeks of age, as shown in Table 3. The amount of feed required to produce a kilogram of eggs was reduced in the restricted groups by about 10~15% compared to the control(See Table 3).

The sexual maturity measured by the age at 50% production was 168 days for the control, 176 days for the 20% restricted, 195 days for the 40% restricted, and 175 days for the low energy ration. The result that the sexual maturity is delayed by the restricted feeding is in agreement with those of Milby and Sherwood (3)(4), Davis and Watts (1), Watson and Payne(8), Naylor and Payne(5), and Kim(2).

The average hen day egg production up to 72 weeks of age was 59.4% for the control, 62.1% for the 20% restricted, 59.7% for the 40% restricted, and 59.9% for the low energy ration. The average hen housed egg production per bird upto 72 weeks of age was 194 eggs for the control, 212 eggs for the 20% restricted, 209 eggs for the 40% restricted and 203 eggs for the low energy ration. This result agrees with the report of Watson and Payne(8), and is contradictory to the report of Davis and Watts(1).

The egg size was significantly increased in the restricted groups compared to the control(see Table 3). The difference between the restricted and control groups was highly significant for the extra large, large, and medium sizes. This result agrees with the report of Davis and Watts(1). But Milby and Sherwood(4), and Peter(6) reported that the restricted feeding had little effects on the egg size.

The economic analysis on the basis of the present results showed that under the Korean conditions the relative profit is about 10 to 13% higher for the restricted groups compared to the control.

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