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Effect of Silkworm Pupae on the Growth and Egg Production Performance of Rhode Island Red (RIR) Pure Line

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Abstract: A total of 63 day-old straight run Layer chicks up to 45 weeks of age on 3 isonitrogenous and isoenergetic diets D_1 (6% PC+ 0% SWP), D_2 (0% PC+ 6% SWP), and D_3 (0% PC+ 8% SWP) were fed to observe the effect of dietary SWP on growth and egg production performance. This study revealed that profitability, growth and egg production performance of RIR pure line were significantly ($P<0.01$) higher in D_2 dietary treatment groups as compared to D_1 and D_3 treatment. No significant difference ($P<0.05$) in livability was found which could be attributed to the dietary SWP levels. Feed cost/kg was gradually declined on increasing dietary levels of SWP. The efficiency by the birds receiving SWP were better as compared to the control. The result of this study demonstrated that cheaper SWP could be an excellent substitute of costly protein concentrate in formulating diets for layers leading to increase profitability.

Key words: Silkworm pupae, growth and egg production performance, profitability, RIR pure line

Introduction

Feed cost covers 60-80% of the total production cost (Bhuiyan, 1998) and protein cost accounts 15% of feed cost (Banerjee, 1992; Singh, 1990) in livestock and poultry farming. Total production of concentrate (both energy and protein concentrate) feed in Bangladesh is about 1.37 million tons compared to the requirement of over 15 million tons (Tareque and Saddullah, 1988). Scarcity of livestock and poultry feed particularly protein feeds is the most burning problem in Bangladesh. The existing requirement of protein concentrate is mostly supplied by importation. Presently, at least 14 brands of protein concentrate are being imported for feeding ever growing livestock and poultry production in this country. Generally different oil cake, fishmeal and protein concentrate (having crude protein content of 30-60%) is the mostly scarce and costly. Fishmeal protein (650 tons annually) is far bellow the requirement even for the poultry industry.

Waste silkworm pupae (SWP) generate vast resources of nutrients for livestock and poultry. SWP is one of the unconventional top class protein (65-75%) and lipid (Bhuiyan *et al*., 1989) feed which is a waste product of silk industry and is obtainable 4 times in a year. Annual production of SWP 51 tons (Howlider, 1999). Among many alternative protein sources, SWP are considered as an important dietary protein source for poultry after proper processing at a reasonable cost. To develop the technique for utilizing of SWP as livestock or poultry feed would partly meet the protein feed deficiency of the country. With those considerations the present study was designed with the objectives to compare the growth and egg production performance of RIR pure line fed on different levels of SWP diet and to study the economic feasibility of SWP on layer ration.

Materials and Methods

The present study deals with evaluating SWP in a feeding trial using layer chicks (RIR pure line) and concluding SWP may be an efficient and economic substitute of protein concentrate (PC) under Bangladesh condition. SWP were collected from BRAC, Reeling centre, Dhaka office. The upper silk layer was discarded by heating with baking powder solution for 30 minutes and properly washed by using fresh water, sun dried and ground to powder and used as silk worm pupae meal (SWPM).

A total number of sixty three day old layer chicks (RIR strain) were allocated randomly to three dietary treatments D_1 (6% PC+ 0% SWP), D_2 (0% PC+ 6% SWP), and D_3 (0% PC+ 8% SWP) each with 3 replications having 7 birds in each replication and each to receive 1-3 diets formulated to be isonitrogenous and isoenergetic from 45 weeks of age. Replicate wise body weight gain, feed intake and mortality was recorded, feed efficiency and economics for each of the 3 diets were also calculated. After 20 weeks of age, egg production, body weight, egg weight, feed intake were also recorded for each of the 3 diets.

Statistical analysis: All recorded and calculated data are input in computer for statistical analysis using analysis of variance (ANOVA) technique by a computer using a

Table 1: Growth performance and Feed cost of RIR fed on diets containing different levels of SWP

Variable	Dietary level of SWP (%)			Mean±SE	SED (LSD) and Significance
	0	6	8		
Live weight (g/ bird)	1406	1500	1450	1459±23.04	30.23**
Feed intake (g/bird/day)	78	68	72	73±0.28	2.87*
Feed conversion ratio (FCR)	20.89	15.69	18.94	18±0.14	1.80*
Survivability (%)	86.66	86.66	93.33	86±0.83	3.35^{NS}
Feed cost/bird (Tk)	90.70	71.50	72.08	77±0.10	3.07**
Feed cost/Kg (Tk)	12.83	11.00	10.60	11±0.01	0.83*

^{ns} Non significant (P>0.05); ** P<0.01; * P<0.05.

Table 2: Egg production performance of RIR fed on diets containing different levels of SWP

Variable	Dietary level of SWP (%)			Mean±SE	SED(LSD) and Significance
	0	6	8		
Live weight (g/ bird)					
Start of the expt.	1406	1500	1450	1459±23.04	30.23**
End of the expt.	1650	1850	1750	1733±33.08	53.43**
Egg production(%)					
(28-45 weeks, HD basis)	79.25	81.50	79.33	80±1.72	1.72*
Egg weight (g)	59.40	60.01	60.01	59±0.02	1.98^{NS}
Feed intake (g/bird/day)	105	103	107	104±0.01	3.28^{NS}
Feed efficiency (kg feed/kg egg mass)	2.26	2.10	2.24	2.19±1.83	3.26*
Survivability (%)	100	100	100	100	NS

NS: Non significant (P>0.05); ** P<0.01; * P<0.05.

SPSS statistical computer package program in accordance with the principles of the Completely Randomized Design (Steel and Torrie, 1984).

Results and Discussion

Growing Stage: In this stage the result of live weight, feed consumption, feed conversion, livability and production cost are presented in Table 1. Body weight at 20 weeks of age were almost linearly increased with increasing dietary 6% SWP levels (D_2) but the data gives an impression that dietary 8% SWP level (D_3) had little effect on live weight. Increased growth performance of birds on increasing levels of dietary SWP is supported by Das and Saikia (1972); Panda (1968). Horie and Watanabe (1980) opined that there might be some unidentified growth factors in SWP, which might contribute to the better growth of birds. The result of this present study however contradicts with Joshi *et al.* (1979) and Virk *et al.* (1980a). They found depression growth on different levels of SWP incorporation in the diet. The efficiency of feed conversion increased with the increasing concentration of (up to 6%) SWP in diet. The feed conversion efficiency was higher on diets with SWP in current study coincides with the findings Sengupta *et al.* (1995). However, contradicting findings of this study were reported by Virk *et al.* (1980b) as declined feed efficiency on SWP diets. No significant difference (P>0.05) in livability was found which could be attributed to the dietary SWP levels. Sengupta *et al.* (1995) and Das and Saikia (1972) reported that mortality did not increase with SWP feeding. This indicated that SWP is not acutely toxic to birds. Feed cost/kg at 20 weeks of age gradually declined on increasing dietary levels of SWP.

Laying stage: The results of egg production, egg weight, body weight, livability and feed efficiency are presented in Table 2. The egg production throughout the experimental period, in spite of significant difference (P<0.01) suggests that the quality of SWP protein was better to that protein concentrate for laying hen. However, Virk *et al.* (1980a) found that the egg production of pullets progressively declined with increasing level of SWP replacing on diet. They suggested that SWP contained some factor(s), which impaired the digestive utilization of nutrients that in turn reflected on egg production. In contrast, mean egg weights were similar in all the treatments groups that coincide with the finding of Virk *et al.* (1980b). Feed conversion expressed as feed required /kg egg mass was also affected by the addition of SWP in the diet. This efficiency by the birds receiving SWP was better as compared to the control (D_1).

Conclusion: The effects of SWP on growth and production performance are good. The growth performance, egg production performance and profitability almost linearly increase up to 6% dietary levels. The result of this study demonstrated that cheaper SWP could be an excellent substitute of costly protein concentrate in formulating diets for layers leading to increase profitability.

References

Bhuiyan, M.Z., 1998. Complete replacement of fish meal by full fat soybean and supplementation of lysine and methionine to broilers. M. S. Thesis, Dept. of Poultry Science, Bangladesh Agricultural University, Mymensingh.

Banerjee, G.C., 1992. Poultry (3rd edition). Oxford and IBH publishing Co. Pvt. Ltd. New Delhi, 168-172.

Bhuiyan, A.K.M.A., N.N. Begum, M. Begum and M.E. Hoq, 1989. Survey of potential fish feed ingredients of Bangladesh on the basis of their availability and biochemical composition. Final Report. FRI Research Progress Report 1. Freshwater station, Fri, 70.

Das, P.C. and A. Saikia, 1972. Utilization of industrial and agricultural by-products in starter ration for meeting amino acid requirement with special reference to SWP of Assam. Ind. Poult. Rev., 4: 263-270.

Howlider, M.A.R., 1999. The availability of feed and its importance of poultry production. Seminar and International Poultry Show, April (24-26). The World s Poultry Science Association-Bangladesh Branch, pp: 48.

Horie, Y. and H. Watanabe, 1980. Recent advances in sericulture. Annual Review of Entomology, 25: 49-71.

Joshi, P.S., P.V. Rao, A. Mitra and B.S. Rao, 1979. The effect of feeding de-oiled silkworm pupae meal on the performance of broiler chicks. Ind. J. Poult. Sci.,14: 225-228.

Panda, B., 1968. Silkworm pupae meal. Ind. Poult. Gaz., 53: 29-30.

Sengupta, S., K. Choudhury, I.K. Bhattacharyya and S.K. Choudhury, 1995. Effect of feeding muga silkworm pupae waste as a substitute for fishmeal in broiler ration. Ind. J. Anim. Sci., 65: 827-829.

Singh, R.A., 1990. Poultry Production, 3rd ed. Kalyany publishers, New Delhi, Ludhiana.

Steel, R.G.D. and J.H. Torrie, 1984. Principles and procedures of statistics. Mc Graw Hill Book Company, INC, New York, Toronto, London.

Tareque, A.M.M. and M. Saadullah, 1988. Feed availibility, requirements for animals and current pattern of feed utilization in Bangladesh. In: Non-conventional feed resources and Fibrous Agricultural Residues. (Editor, C. Devendra). International Development Research, Krishi Bhavan, New Delhi, India. 116-130.

Virk, R.S., G.N. Lodhi and J.S. Ichhponani, 1980a. De-oiledSWPM as a substitute for FM in White Leghorn laying ration. Ind. J. Poult. Sci., 15: 149-154.

Virk, R.S., G.N. Lodhi and J.S. Ichhponani, 1980b. Nutritive value of untreated, water and acid treated De-oiled silkworm pupae meal for broiler. Ind. J. Poult. Sci., 15: 155-161.