

Evaluation of broiler performance and productivity of the integrated broiler-fish rearing system and the deep litter system in Phichit Province, Thailand

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Abstract

A study was conducted to compare broiler performance and the economic gains from two systems of broiler production (deep litter system and the so called integrated chicken-fish rearing system) in Phichit province of Thailand. Under a split-plot design (main plot = season, sub-plot = floor), 200 broilers were randomly divided into 2 groups. One group was raised in coops over a fish pond (group 1) and the other in a deep litter system (group 2) under station management for 6 weeks during the rainy season. During the cold season, the experiment was repeated. To assess fish performance, 2,000 fish fry were randomly divided into 2 equal groups; one group was reared in a pond under the chicken coops (with chicken manure) and the other (group 2) in a pond without chicken manure (control pond). All fish were supplied with equal amounts of commercial fish feed. Broiler weight gain, feed efficiency, feed conversion ratio, morbidities and mortalities were monitored. Similarly, change in length and weight of fish raised in ponds under the chicken coops (with chicken manure) and a control pond (without chicken manure) were measured and the inputs and outputs of the 2 systems ascertained. Data were analysed according to a model specific for a split-plot design. The results indicated no significant differences ($p > 0.05$) in average daily weight gain, feed conversion ratio and mortality rate of broilers under the two rearing systems. Mean body weight and length gain of fish in the pond under a chicken coop were higher than those in the control pond. The integrated chicken-fish rearing system gave better economic gain than the deep litter system. The net gains (in Baht) were 53 % and 6% respectively. These results suggest that there is no difference in performance of broilers under the two rearing systems. However, the integrated chicken-fish rearing system has better economic benefit for the farmers.

Key words: broiler production, broiler productivity, integrated chicken-fish rearing system, deep litter system

Introduction

In Thailand, small scale broiler production is prevalent in many households and the deep litter system is commonly practised. A more recent method of broiler production is the so called integrated chicken-fish rearing system. This system is advocated because of its advantages of optimising the use of available resources and its probable positive effect on the overall economic gain from the farmers' investments. However, to date there is no precise data on the comparative advantages of this system over the deep litter system for broiler production. This

study assessed the broiler performance and compared the economic gains under the two systems.

Objective

The study was conducted to:

1. Compare the performance of broilers raised in coops in a deep litter system, and in coops over a fish pond (integrated chicken-fish rearing system) in terms of growth, feed efficiency and mortalities.
2. Compare the two broiler rearing systems in terms of inputs and outputs. Fish rearing is an integral part of the inputs in the chicken-fish rearing system. The chicken manure drops into the fish ponds under the chicken coops and probably fertilises the pond.

Materials and Methods

Under a split-plot design (STEEL and TORRIE, 1960) (main plot = season, sub-plot = floor), 200 broilers were randomly divided into 2 groups and one group raised in coops over a fish pond (group 1) and the other in a deep litter system (group 2) for 6 weeks during the rainy season under station management. The experiment was repeated to cater for the cold season. To assess fish performance, 2,000 fish fry were randomly divided into 2 equal groups; one group reared in a pond under the chicken coops (with chicken manure) and the other (group 2) reared in a pond without chicken manure (control pond). Both fish groups were fed with equal amounts of commercial fish feed.

Broiler weight gain, feed efficiency, feed conversion ratio, morbidities and mortalities were monitored. Similarly, change in length and weight of fish raised in ponds under the chicken coops (with chicken manure) and a control pond (without chicken manure) were measured and the inputs and outputs of the 2 systems ascertained. Data were analysed according to a model specific for a split-plot design using ANOVA procedure of SAS (1986).

Results and Discussion

The result indicated no significant differences ($p > 0.05$) in average daily weight gain, feed conversion ratio and mortality rate of broilers under the two rearing systems. Average daily gain ranged from 15.70 - 52.80 g/broiler/day in group 1 and from 14.40 - 64.70 g/broiler/day in group 2. Mean feed conversion ratio for 1 kilogram weight gain of broiler ranged from 1.30 - 1.97 (group 1) and from 1.43 - 2.05 (group 2). Total broiler mortality rate was 11.29 % in group 1 and 6.94 % in group 2.

Differences in mean body weight gain and mean length of fish were observed between fish from the two ponds. Mean body weight of fish at month 2, 4 and 6 were 72.84 g, 188.78 g and 337.54 g for fish from the fertilised pond (group 1) and, 53.35 g, 139.83 g and 264.13 g for the control group (in group 2). Mean length of fish at month 2, 4 and 6 were 12.50 cm, 19.76 cm, 26.80 cm for group 1, and 10.25 cm, 16.25 cm and 22.75 cm in group 2. The integrated chicken-fish rearing system gave better economic gain than the deep litter system. The net gain (in Baht) was 53 % and 6% respectively.

Conclusions

1. No significant differences in performance of broilers under the two rearing systems in terms of growth, feed efficiency and mortality were found.

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2. The integrated chicken-fish rearing system has more economic benefit and should be promoted for adoption by farmers.
3. The fish in the pond fertilised with chicken manure had better growth weight and growth length performance.
4. The density of chickens raised did not negatively affect the water quality.

References

- STEEL, R. G.D.; Torrie, J.H., 1960: Principle and procedures of statistics. N. Y.: McGraw - Hill Book Co., Inc.
- SAS, 1986: SAS for Linear Models. A guide to the ANOVA and GLM procedure. SAS Institute Inc, North Carolina. 231p.

Table 1: Summary of the major findings on broiler performance during the study

BROILER PERFORMANCE PARAMETER	Rearing system		Probability (p) value
	Integrated chicken- fish system (mesh floor)	Deep litter system (bedding or litter on floor)	
ADG (g/broiler)	42.50	42.90	(p > 0.05) ^{ns}
FCR (KG FEED/KG BW)	1.96	1.88	(p > 0.05) ^{ns}
MR (%)	11.29	6.94.	(p > 0.05) ^{ns}
	Rearing season		
	Rainy season	Cold season	
ADG (g/broiler)	41.40	44.00	(p > 0.05) ^{ns}
FCR (KG FEED/KG BW)	1.99	1.84	(p > 0.05) ^{ns}
MR (%)	8.23	10.00	(p > 0.05) ^{ns}

ns = not significant at p = 0.05 level

Table 2: Summary of the major findings on economic returns from the two rearing systems.

Item	Integrated chicken-fish system		Deep litter system	
	Rainy season	Cold season	Rainy season	Cold season
Total inputs	12,398.00	11,695.00	7,088.00	7,285.00
Total outputs	6,030.00	30,793.00	6,845.00	8,348.00
Net benefit in Baht	-6,368.00	19,098.00	-243.00	1,063.00
Net benefit in %	-51.36%	163.00%	-3.42%	14.59%
Net benefit in Baht for the 2 seasons combined	12,730.00		820.00	
Net benefit in % for the 2 seasons combined	52.83%		5.70%	