

EFFECT OF IN OVO INJECTION OF DIFFERENT NUTRIENTS ON THE ECONOMIC EFFICIENCY OF COMMERCIAL BROILERS

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Abstract: A biological experiment was carried out to study the effect of *in ovo* feeding of 18th day old embryo on the economic efficiency of commercial hybrid broiler chicken up to six weeks of age. The broiler chicks were subjected to *in ovo* feeding of 0.5 ml of normal saline, 0.5 ml each of 10 per cent glucose, 0.5 per cent lysine, 0.5 per cent threonine or 0.5 per cent β -hydroxy- β -methylbutarate (HMB) in to amniotic fluid of 18day old embryos. The data on hatchability, transit chick weight loss, production performances, serum biochemistry, intestinal histomorphometry, carcass characteristics, and development of digestive organs, livability and economics were recorded. The economics of broiler chicken reared up to six week of age fed difference *in ovo* nutrients had increased returns per kg of live weight from Rs.0.76 to Rs.4.68. But Rs.13.12 loss was incurred in HMB *in ovo* nutrient fed chick due to the high cost of HMB. The broiler performance efficiency index (BPEI), was higher than control in all *in ovo* fed broiler treatments. The economics of rearing commercial broiler chicken up to six weeks of age fed either *in ovo* revealed that the net profit realized per kg of live weight was higher in treatment groups compared to control. *In ovo* feeding with threonine recorded highest profit in this study.

Keywords: Broiler, *in ovo* feeding, economics, broiler performance efficiency index.

Introduction

In ovo feeding facilitates direct supply of specific nutrients to growing embryos and may decrease the need for long term formulation of enriched costly rations for breeders to achieve similar effect. *In ovo* technology may also provide a precision nutrition at the specific time for peak absorption of specific nutrients, cofactors or metabolic modulators by the embryo. Further, the *in ovo* technology may reduce cost of inputs (chick) of broiler industry by the way of reducing the feed cost of breeders and also by improved hatchability. The first week represents an ever-increasing proportion of the broiler production cycle. A good start leads to a uniform flock of chicks with a good 7th day weight which is positively correlated to the slaughter weight of the birds (Noy and Skalan, 2005).

Keeping the above factors in mind a nutritional study consisting of three biological experiments was planned and designed to research at the Department of Poultry Science, Madras Veterinary College of Tamil Nadu Veterinary and Animal Sciences University to

study the effect of *in ovo* feeding and early chick nutritional supplement on growth performance of hybrid broiler chicken

Materials and Methods

In ovo injection of nutrient solutions was done as per modified Noor et al. (1995) method. The *in ovo* injection was carried out in empty incubation cabinet where the temperature and humidity was maintained at 37.5°C and 60 per cent respectively. On 18th day of incubation, 540 embryonated eggs were divided in to six groups each with three replicates of 30 eggs and were injected with 0.5 ml of normal saline, 0.5 ml each of 10 per cent glucose, 0.5 per cent lysine, 0.5 per cent threonine or 0.5 per cent β -hydroxy- β -methylbutarate (HMB) in to amniotic fluid. Control eggs were removed from the incubator together with the treated groups, and kept in the same environment for 15 minutes (Time utilized to complete the *in ovo* injection procedure for each group) to equalize the conditions for all treatment groups. After completion of *in ovo* injection, all eggs were transferred and incubated in hatching trays at the dry bulb temperature of 36.3°C and the wet bulb temperature of 30.2°C without turning from 19- 21 days. The hatch was taken on day 21. The hatch weight of the chick was individually recorded, treatment wise. Two hundred and eighty eight numbers of hatched-out broiler chicks from (each from experiment 2 and 3) were randomly allotted into 6 treatment groups each with three replicates. Sixteen chicks were allotted for each replicate. The experimental diets were analyzed as per AOAC (2007). The birds were fed *ad libitum* and provided clean drinking water. Standard broiler managemental practices were followed.

Body weight and feed intake recorded bi-weekly interval by using an electronic balance with 0.1 g accuracy. Feed conversion ratio was calculated by dividing average feed consumption by average body weight gain. Feed efficiency was calculated at 2nd, 4th and 6th week of age. Also mortality recorded bi-weekly interval. Bi-weekly body weight gain recorded as, weight of bird in gram minus hatch weight in gram and Feed conversion ratio (FCR) was calculated as a feed consumption (in kg) to body weight (in kg). All the experimental procedures were assessed and approved by the Institutional Animal Ethics Committee from the Tamil Nadu Veterinary and Animal Sciences University, Chennai -600 051 and all the institutional guidelines were followed. Economics of rearing broiler chicken fed with *in ovo* feeding of broilers was worked out. Broiler Performance Efficiency Index (BPEI) was calculated by using the following formula

$$\text{Broiler Performance Efficiency Index} = \frac{\text{Total saleable live weight (kg)}}{\text{No. of chicks purchased X FCR}} \times 100$$

Results and discussions

Economics of rearing broiler chicken up to six week of age administered various nutrients through *in ovo* on 18th day of incubation is presented in table 4.23 and the cost of production per kg of live broiler chicken, net profit and BPEI are given in Fig.7, 8 and 9 respectively. The cost of *in ovo* feeding per bird involved in this experiment was Rs. 0.25 for 0.5 ml of 0.5 per cent normal saline, Rs.0.28 for 0.5 ml of 10 per cent glucose solution, Rs. 0.33 for 0.5 ml of 0.5 per cent lysine, Rs.0.75 for 0.5 ml of 0.5 per cent threonine and Rs.52.50 for 0.5 ml of 0.5 per cent HMB. With this, the cost of production per bird was worked out. The lowest cost was in lysine *in ovo* fed broiler chicken (Rs.139.43) and the highest in HMB *in ovo* fed broiler chicken (Rs.192.54). The cost of production of broiler chicken without *in ovo* feeding (control) was Rs.140.55 per bird.

The cost of production of one kg of live broiler chicken ranged from Rs. 62.89 in threonine injected group and Rs.87.12 in HMB injected group and in control (Rs.67.57). The net profit per kg live weight was Rs.6.43 in control in *in ovo* fed groups ranged from Rs.8.23 in lysine *in ovo* fed group to Rs.11.11 in threonine group. The loss of Rs.13.12 in HMB group was due to high cost of *in ovo* nutrient supplement. In *in ovo* fed broiler chicken, the broiler performance efficiency index (BPEI) was higher ranging from 99.92 (Lysine injected group) to 115.03 (Threonine injected). The glucose *in ovo* fed chicks had the BPEI of 103.84 and HMB *in ovo* fed chicks with 114.31 BPEI. The efficiency index of control and saline *in ovo* injected group was low with value of 80.27 and 92.53 respectively. To conclude the *in ovo* feeding of various nutrients has proved to improve the BPEI in this study.

Conclusion

In conclusion, the economics of broiler chicken reared up to six weeks of age fed *in ovo* nutrients was worked out to be Rs.7.19 to 11.11 (in threonine treatment) as profit per kg live weight (except HMB) than control (Rs.6.43).

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Conflict of Interests

The author expresses no conflict of interest with regard to the information discussed in this manuscript.

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Table 1. Economics of rearing broiler chicken up to 6 weeks of age as influenced by *in ovo* feeding on 18th day of incubation

Treatments	Body weight (kg)	<i>In ovo</i> feeding cost/egg (Rs)	Feed consumption/bird (g)			Feed cost/bird (Rs)	Cost of production/ kg live weight (Rs)	Livability (%)	Returns/bird (Rs)	Net profit/kg live weight (Rs)	BPEI*	
			Pre-starter	Starter	Finisher							
Control	2.08	-	122.16	1080.57	2160.28	111.55	67.57	85.42	153.92	6.43	80.27	
<i>In ovo</i> feeding of 0.5 ml	0.5% Normal Saline	2.14	0.25	120.24	1067.64	2171.08	113.72	66.81	95.83	158.36	7.19	92.53
	10% Glucose	2.16	0.28	123.81	1052.48	2324.54	112.22	65.51	97.92	159.84	8.49	103.84
	0.5% Lysine	2.12	0.33	116.67	1034.81	2163.69	110.10	65.77	91.67	156.88	8.23	99.92
	0.5% Threonine	2.24	0.75	119.05	1049.26	2209.62	111.13	62.89	97.92	165.76	11.11	115.03
	0.5% HMB	2.21	52.50	113.10	1056.02	2157.78	111.04	87.12	87.12	163.54	- 13.12	114.31

*BPEI – Broiler Performance Efficiency Index

1. Chick cost Rs.25.00/each

2. Miscellaneous cost Rs.4.00/bird

3. Feed cost

Pre-starter mash Rs. 30.00/kg

Starter mash Rs. 29.00/kg

Finisher mash Rs. 28.00/kg

4. Sale price of birds Rs.74.00/kg live weight

5. Cost of *in ovo* feeding:

0.5 ml of 0.5% NS Rs.0.25/egg

0.5 ml of 10% Glucose Rs.0.28/egg

0.5 ml of 0.5% Lysine Rs.0.33/egg

0.5 ml of 0.5% Threonine Rs.0.75/egg

0.5 ml of 0.5% HMB Rs.116.67/egg