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Effect of Supplementation of Liquid Whey on Feed Conversion Ratio (FCR) of Broilers

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Abstract

A study was conduct to investigate the effect of supplementation of liquid whey on FCR of broiler production reared under deep litter system 120 days old broiler bird were randomly divided into 4 groups and were supplemented different level of liquid whey by adding in drinking water @ 0%, 5%, 10%, 15% (v/v). They were fed standard ration and reared in separate pens. The FCR of broiler production was calculated at weekly interval age by dividing the weight of weekly feed consumed in grams by live weight gain in grams of the birds, it was found that best FCR was observed in 10% whey supplemented group (T3) followed by 5% supplemented group (T2) in comparison to control. The best performed was observed in (T3) group that were supplemented with 10% liquid whey along with drinking water.

Key words *: Broiler, liquid whey supplementation, FCR, deep litter.*

Introduction

Profit margin in boiler production depends on how efficiently the broiler birds convert the feed consumed to their live body weight.

Dietary interventions are a common practice in the poultry industry to promote optimal performance and health of animals. Growth-promoting antibiotics are among feed additives used to prevent growth of intestinal pathogens and improve growth performance in broilers. Recent concerns over human resistance to antibiotics together with consumers' increasing demand for healthy food have led to prohibition of use of growth-promoting antibiotics in poultry diets (1). (2) reported that the use of antibiotics as growth promoters in the poultry industry is of great concern to consumers because of emerging antibiotic-resistant strains of microbiota. Restrictions on the use of direct-fed antibiotics in many countries has increased problems in gut health, such as bacterial diseases, enteritis and dysbiosis (3), which decreases the performance of poultry. To overcome, these constraints, many studies have attempted to find appropriate substitutes for antibiotics and several alternatives have been suggested for the poultry industry (4).

Numerous studies have been carried out to examine effects of probiotics on growth performance of broilers, and layers. (5), in a study using meta-analytical methods, reported body weight gain and improved feed efficiency in broilers Another feed additive with prebiotic-like effects is whey powder. As a by-product of cheese processing, whey contains 65–80% lactose (6). Because their bodies lack lactase, birds cannot digest lactose which is eventually fermented into lactic acid and volatile fatty acids that may stimulate intestinal bacteria. (7) reported improved FCR by adding 4% whey powder to broiler diet. In addition, (8) added probiotics and whey powder to broiler feed and found that diets containing 500 and 750 g probiotics per ton with 2% whey led to weight gain in chickens on days 21. (9) found that adding 3.85% whey powder to broiler feed increased their body weight, although it did not affect FI and FCR.

Liquid whey also contains micronutrients like potassium, calcium, phosphorous and zinc. Whey proteins (lactalbumins and globulins) are of excellent quality. They are quite rich in lysine, tryptophan and sulphur-containing amino acids (Methionine and Cysteine). The concentration of calcium and phosphorus are greater in sour whey than in sweet whey.

In light of above facts, the study has been planned for utilizing liquid whey for supplementation in poultry drinking water with the objective: To determine the FCR of broiler with whey supplementation along with drinking water.

Materials and Methods

The present study was carried out on 120 commercial broiler chicks reared under deep litter system. The chicks were randomly selected and divided into 4 groups of 30 chicks each. First group was treated as T_1 (Control) and were supplemented with normal drinking water without adding liquid whey along with standard broiler feed. Second group T_2 were supplemented with 5% (v/v) liquid whey added with drinking water. Third group T_3 were supplemented with 10% (v/v) liquid whey added with drinking water and similarly fourth group T_4 were supplemented with 15% (v/v) liquid whey added with

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drinking water till 42 days of age. Same space/bird with similar environmental and managemental condition and same standard ration was fed to all the bird of every treatment group.

A total of 120 day-old straight run commercial broiler chicks were purchased from Hitech Nutrisol Pvt. Ltd, Hajipur. All the chicks were of the same hatch in order to keep the uniform genetic makeup. The chicks were vaccinated against Marek's disease, Gumboro and Ranikhet disease. On first day, the chicks were given only crushed maize and then given commercial starter ration for 2 days. On 3rd day chickens were wing banded, weighed individually and randomly distributed into four different dietary treatment groups of 30 chicks each. Each group were replicated 3 times with 10 chicks in each, so that the average body weight was similar in all groups. The chicks were reared under deep litter system of management with similar managemental and environmental conditions.

Dry saw dust was used to form deep litter. The litter was kept 3 inches during the first month and thickness was raised one inch more thereafter. The litter was racked weekly to prevent cake formation. Temperature of rearing pens was maintained using two 200 watt bulbs hanging in each pen about 2 feet above the floor. In rearing pens, chicks were served fresh and clean water adding the required amount of liquid whey as per treatment groups and broiler ration as per weekly specification. The broilers were reared under uniform condition of housing including broiler, supplementation, watering, lighting etc.

The commercial starter and finisher ration was supplemented to broiler chicken from 0-4 weeks and 4-7 weeks, respectively. The dietary treatment consisted of a commercial broiler ration with drinking water without adding any liquid whey served as control group (T1). The dietary treatment group (T2) consisted of commercial broiler ration with drinking water having 5 per cent liquid whey. Commercial broiler diet with drinking water supplemented with 10 per cent liquid whey served as treatment group (T3) and commercial broiler ration with drinking water supplemented with 15 per cent liquid whey served as treatment group (T4).

Data Collection :

1. Feed Intake : A daily record of the fresh feeds offered and weigh back was maintained for each group to calculate the feed consumption. Left over of feed was weighed weekly.

2. Body Weight : The chicks were weighed individually at the start of the experiment and subsequently at weekly intervals. The weekly live weight gain was calculated from the difference in body weights attained at the end and at the start of the period in question.

3. Feed Conversion Ratio (FCR) : The feed conversion ratio was calculated by using the formula given below :

FCR = Total amount of feed consumed (g)/Body weight gain (g)

Results and Discussion

Table-1 presents the effect of supplementation of liquid whey on FCR of broilers. The mean values for feed conversion ratio (FCR) of broiler birds supplemented with different levels of whey supplementation has been depicted in Table-1 and their Analysis of Variance up to sixth week of study period in Table-1, the average value for FCR in first week recorded were 1.81, 1.76, 1.73 and 1.79 in T_1, T_2, T_3 and T_4; respectively. In this week of trial, higher value of FCR was recorded in control group (T_1) and lowest in T_3 group. T_2 and T_3 differed significantly ($P<0.01$) from each other and also from other treatment groups for FCR. But T_1 and T_4 didn't differ significantly ($P<0.01$) FCR from each other. In the second week, the mean values of FCR obtained were 1.25, 1.24, 1.22 and 1.25 in T_1, T_2, T_3 and T_4; respectively. In this week, numerically lowest value for FCR was recorded in T_3 group (10 percent whey supplementation) but it showed similarity with T_2 group (5 percent whey supplementation). However, T_1 and T_4 group didn't differ significantly ($P<0.05$) from each other in FCR but showed similarity with T_2 group. In third week of study period, the mean value of FCR were 1.84, 1.61, 1.52 and 1.74 in T_1, T_2, T_3 and T_4; respectively. In this week, although numerically lowest value was recorded in T_3 group but it didn't differ significantly ($P<0.01$) from T_2 group. But both T_2 and T_3 groups differed significantly ($P<0.01$) from T_1 and T_4 groups. In fourth week, the mean value of FCR were 2.22, 1.96, 1.91 and 2.11 in T_1, T_2, T_3 and T_4 groups; respectively. In this week, treatment groups T_2 and T_3 had statistically similar FCR and didn't differ significantly ($P<0.01$) from each other. Similarly, treatment group T_4 didn't differ significantly ($P<0.01$) from control group (T_1). In the fifth week, the mean values of FCR were 2.06, 1.95, 1.87 and 2.10 in T_1, T_2, T_3 and T_4 groups; respectively. The mean values of FCR of all treatment groups differed significantly ($P<0.01$) from each other. The lowest value for FCR was recorded in T_3 followed by T_2, T_1 and highest value in T_4 group. In the sixth week of study period, the mean values of FCR were 2.37, 1.89, 1.79 and 2.61 in T_1, T_2, T_3 and T_4; respectively. In this week also numericaly lowest value was recorded in T_3 group, but it didn't differ significantly ($P<0.01$) from T_2 group. However, T_2 and T_3 groups differ significantly ($P<0.01$) from T_1 and T_4 group. Lowest value for FCR up to six week of age was recorded in T_3 group and showed better feed utilization. Therefore, supplementation of whey up to 10 percent level in drinking water of broiler birds improved FCR but increasing to the

Table-1 : Average feed conversion ratio of broiler birds on whey supplementation under different treatment groups (Mean ± SE).

Days	Treatments			
	T_1	T_2	T_3	T_4
1st week	$1.81^{c} \pm 0.005$	$1.76^{b} \pm 0.015$	$1.73^{a} \pm 0.01$	$1.79^{c} \pm 0.005$
2nd week	$1.25^{b} \pm 0.005$	$1.24^{ab} \pm 0.005$	$1.22^{a} \pm 0.003$	$1.25^{b} \pm 0.003$
3rd week	$1.84^{c} \pm 0.014$	$1.61^{a} \pm 0.032$	$1.52^{a} \pm 0.02$	$1.74^{b} \pm 0.02$
4th week	$2.22^{b} \pm 0.005$	$1.96^{a} \pm 0.015$	$1.91^{a} \pm 0.008$	$2.11^{b} \pm 0.05$
5th week	$2.06^{c} \pm 0.008$	$1.95^{b} \pm 0.012$	$1.87^{a} \pm 0.005$	$2.10^{d} \pm 0.008$
6th week	$2.37^{b} \pm 0.04$	$1.89^{a} \pm 0.017$	$1.79^{a} \pm 0.003$	$2.50^{c} \pm 0.058$
Overall FCR	1.925	1.735	1.674	1.915

Means with different superscripts in a row differ significantly ($P < 0.05$).

level of 15 percent showed poor FCR up to fourth week of age and after 4th week again showed poor FCR than control group. In accordance with our results, (10) also found that FCR improved ($P<0.05$) with 0.1 percent whey powder-supplemented diets compared with the control group. Moreover, (11) revealed that supplementing whey in the drinking water led to enhanced feed conversion ratio at 20-46 days of the age. (12) concluded that the supplementation of whey protein in broiler diets improved their feed/gain ratio. (12) observed better FCR in Milk Protein Concentrate supplemented chickens than control birds. (13) observed that whey powder diet in Japanese quail improved FCR in grower period (15- 35 days) but no effect in starter phase (1-14 days). (13) revealed that feed conversion ratio (FCR) was significantly ($P<0.01$) improved as whey levels increased in broiler chickens. Findings of (13,14) are in agreement with the present findings of improved FCR in broiler chickens upon whey supplementation.

Conclusions

It was found that supplementation of liquid whey upto 10% (v/v) along with drinking water in broilers improved the FCR leading to higher profit margin but further increase of liquid whey consideration exhibited poor FCR as compare to control broilers farmers may be recommended to supplement fresh liquid whey upto 10% (v/v) along with drinking water for better profit margin in broiler farming.

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