

INVESTIGATIONS ON THE EFFECT OF SYNTHETIC FEED ON BROILER CHICKEN

¹Aswin, S.R., ¹Bijukumar, B.S., and ²Jayaram, V.S.

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Abstract

Progressive genetics and management has allowed the broiler industry to produce heavier chicken in a more efficient manner. Consequently the age to market from farm in broiler chicken has been gradually reduced. This is due to the use of synthetic feed as broiler diet. Carbohydrates produced by several grains and protein supplements are the two main components of broiler feed. In addition to these, aminoacids like methionine,lysine etc., are also added to increase the weight. In the present study the effects of synthetic feed on weight gain, feed conversion ratio, cholesterol level and morphological and anatomical variations on broiler chicks (Cobb 500) were studied. The experimental period was 21 days. This study was led to the conclusion that synthetic feed induces significant weight gain in broilers. In addition to it synthetic diet also results higher cholesterol level and cardiac deformities.

Key words: Broiler, feed conversion ratio, methionine, lysine, cholesterol, cardiac deformities

Introduction

Poultry meat is an important source of proteins, minerals and vitamins to balance the human diet. Specially developed varieties of chicken are now available with quick growth and high feed conversion efficiency. Depending on the farm size, broiler farming can be a main source of income. Poultry farming includes raising of various types of domestic birds commercially for the purpose of meat, eggs and feather production. The most common and widely raised poultry in the world are chicken. Again, these may be broilers or layers. Commercial chicken farming is most successful business in Asia and other parts of the world. Proper care of birds and farm management practices will result in decent profits in short period of time. Basically broilers are raised for meat purpose whereas layers for egg production (Iji, P. A., A. A. Saki, and D. R. Tivey. 2001). Farmers can even go for back yard chicken farming or country chicken rising at

home. Apart from meat and egg production, manure that produced in the farm has good market value. This manure can be used as organic compost in various field crops. Poultry meat production in the country has increased 18 fold from 81,000 tons in 1971 to 1440,000 tons in 2004 (Adeola O,1994).

Materials and Methods

Animal selection

Broiler chickens, *Gallus gallus domesticus* (Cobb 500) are, bred and raised specifically for meat production. Commercial broilers generally reach slaughter weight in between five to seven weeks of age. One day old broilers which are healthy and active were purchased from a commercial hatchery in Thiruvananthapuram. Broilers of bodyweight of almost 50g were used for the experiment. They were kept in pens with raised wire floors in an environmentally controlled room.

¹Postgraduate Department of Zoology and Research Centre, Mahatma Gandhi College, Thiruvananthapuram, Kerala, India
email: bijukumarbsd@gmail.com (Bijukumar B.S. Corresponding Author)

²Government College, Kariavattam, Thiruvananthapuram, Kerala, India

Experimental design

The birds were divided into two groups consisting of six in each pen. The dimension of the pen was 2m x 8m. The group I (Normal Feed-NF) was kept as control which was given normal feed. Normal feed was formulated with millets and rice. Group II (Synthetic Feed-SF) was fed with synthetic diet. The experimental period was 21 days. The feed and water were supplied *ad libitum* throughout the experimental period. The feeders and drinker were fixed in such a way that the birds were able to eat and drink conveniently. Feed and fresh drinking water were supplied to the experimental birds daily once in the morning and again in the afternoon. The birds were always exposed to continuous lighting of 24 hours. The brooder temperature was maintained at about 34°C up to seven days of age, gradually decreased to 26°C by 21st day of age. Body weight gain, feed intake, and feed conversion ratio were calculated. Feed conversion ratio can be calculated by the formula,

Feed Conversion Ratio (FCR)

= Feed intake (g) / Live weight (g)

Cholesterol estimation

At the end of third week, one bird of average weight from each pen was selected and blood was collected from the wing vein. Blood samples were taken in test tubes without anticoagulant and labelled according to each pen and the serum was collected. Cholesterol was determined according to CHOD-PAP [cholesterol oxidase (CHOD) - phenol + aminophenazone (PAP)] method (Ellefson, RD and Garaway, WT).

Anatomical studies

At the end of third week, one bird of average weight from each pen was selected and the heart from the birds were dissected out and was cross sectioned.

Statistical analysis

Student's t test was done for finding the significance.

Results

1. Body weight gain

Weight gain of birds fed with normal and synthetic feed show marked differences. The weight gain at the end of three week experiment was 405 g and 725 g respectively. Weight gained by broilers is given in table 1, 2 and 3.

Table 1 Weight gain during the first week

DAYS	CONTROL (g)	SYNTHETIC FEED (g)
1	50	50
2	55	55
3	59	65
4	65	85
5	75	105
6	85	125
7	105	150

Table 2 Weight gain during the second week

DAYS	CONTROL (g)	SYNTHETIC FEED (g)
1	115	175
2	130	205
3	150	230
4	170	275
5	190	305
6	215	350
7	250	400

Table 3 Weight gain during the third week

DAYS	CONTROL (g)	SYNTHETIC FEED (g)
1	275	455
2	300	485
3	325	535
4	330	595
5	350	640
6	380	685
7	405	725

2. Feed intake

The feed intake at the end of three week experiment was 70g and 69g for normal and synthetic chicks respectively. There was no significant difference in feed consumption. The feed intake of broilers is given in the table 4, 5 and 6.

Table 4 Feed intake during the first week

DAYS	CONTROL (g)	SYNTHETIC FEED(g)
1	10	10
2	13	12
3	15	14
4	15	16
5	20	20
6	25	27
7	27	32

Table 5 Feed intake during the second week

DAYS	CONTROL (g)	SYNTHETIC FEED(g)
1	30	38
2	33	40
3	35	43
4	40	50
5	45	52
6	50	55
7	52	56

Table 6 Feed intake during the third week

DAYS	CONTROL (g)	SYNTHETIC FEED (g)
1	55	58
2	58	60
3	60	63
4	62	65
5	63	66
6	66	68
7	69	70

3. Feed Conversion Ratio (FCR)

Feed conversion ratio of broilers fed with normal and synthetic food show no significant difference in the first week. But in second and third week FCR shows a marked difference. The feed conversion ratio at the end of three week experiment was 0.170g and 0.096g respectively. The feed converting efficiency of chicks fed with synthetic feed is very high in comparison with the control one. The feed conversion ratio of broilers is given in table 7, 8 and 9.

Table 7 Feed conversion ratio during the first week

DAYS	CONTROL (g)	SYNTHETIC FEED (g)
1	0.2	0.2
2	0.236	0.218
3	0.254	0.215
4	0.230	0.188
5	0.266	0.190
6	0.294	0.216
7	0.257	0.213

Table 8 Feed conversion ratio during the second week

DAYS	CONTROL (g)	SYNTHETIC FEED (g)
1	0.260	0.217
2	0.253	0.195
3	0.233	0.186
4	0.235	0.181
5	0.236	0.170
6	0.232	0.157
7	0.20	0.14

Table 9 Feed conversion ratio during the third week

DAYS	CONTROL (g)	SYNTHETIC FEED (g)
1	0.20	0.127
2	0.193	0.123
3	0.184	0.117
4	0.187	0.109
5	0.18	0.103
6	0.173	0.099
7	0.170	0.096

4. Average weight gain, feed intake and feed conversion ratio (FCR)

Average body weight gain, feed intake and food conversion ratio of broilers is given in table 10.

Table 10 Average weight gain, feed intake and FCR

Experiment	Weight gain	Feed intake	Feed conversion ratio (FCR)
Control	253.33	49.33	0.209
Synthetic feed	425	52.66	0.149

5. Cholesterol level in serum (mg/dl)

The results of serum cholesterol level were presented in table 11. The cholesterol level of control group is lower than that of broilers given synthetic feed.

Table 11. The cholesterol level

Experiment	Cholesterol level (mg/dl)
Control	176.27
Synthetic feed	186.44



Figure 1. Heart of normal diet fed chick (left) and synthetic diet fed chick (right)



Figure 2. Cross section of a normal chicken heart (left) and heart from a chicken fed with synthetic diet (right).

Discussion

From the study it was found that poultry fed with synthetic diet showed marked increase in body weight. Maximum carcass yield is an important objective in the modern poultry industry, which demands an optimum protein supply. Methionine is an important amino acid in protein synthesis in broilers. The presence of methionine and lysine in synthetic feed play a major role in increasing the body weight of chicks. The -

increasing weight gain with increasing methionine levels in the diet was also been reported by Dilger RN, Baker DH (2008). The synthetic diet fed chicks show a lower FCR than control. Lower FCR indicates high feed converting efficiency and increased body weight gain. Gadzirayi, E. Mutandwa (2006) reported that pellet diets gave greater feed intake than did normal forms.

In the present study significantly higher level of serum cholesterol was observed in poultry fed with synthetic diet. Hypercholesterolemia (higher level of cholesterol) may be due to higher dietary intake of fatty food or due to higher cholesterol synthesis in the body. The observed result may be due to the combined effect of both these mechanisms (Kwiterovich, P.O., 1997).

In our study, synthetic diet fed chicks showed difficulty in locomotion. It was observed that these chicks often lie on the floor of the cage. Lesions were also observed on the legs of these chicks. Skeletal problems in broilers affect predominantly the locomotor system and are often referred to under the general term leg weakness. Similar results were reported by Chehraghi *et al* (2013)

In our study it was found that the heart of broilers fed with synthetic feed showed enlargement (Figure 1). Marked dilation of both ventricular chambers and considerably thinner left ventricular wall were observed (Figure 2).

Broilers suffer from two forms of heart failure: ascites and sudden death syndrome (SDS). Ascites and SDS are relatively common and are likely to be due to the fact that the broilers' fast growth requires high levels of oxygen to support metabolic demands (Blair, 1990). All their energy is spent on growth and efficient feed conversion, leaving them short of oxygen for their other bodily needs so that their hearts have to work much harder. Ascites affects fast growing chickens when the right side of their hearts becomes enlarged in response to increased work-

load during the bird's rapid growth (Olkowski *et al* 1995). The bird has to breathe more rapidly and its lungs become congested. SDS is an acute heart failure disease that affects mainly male fast-growing chickens which seem to be in good condition (Bin *et al* 2007).

Conclusion

From the study it was found that broiler chicken fed with synthetic diet showed significant weight gain than that of control. Synthetic diet fed poultry exhibited lower FCR. This indicates their high ability to convert food into meat. Poultry fed with synthetic diet showed some morphological and anatomical deformities. It includes leg lesions and overgrown right ventricle of the heart. Regarding serum cholesterol level, synthetic diet induced higher level of cholesterol than normal.

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