Wayamba Journal of Animal Science – ISSN: 2012-578X; P236 - P240, 2012
First Submitted February 12, 2012; Number 1330363919

COMPARISON OF BERGAFAT POWDER AND OILS AS ENERGY SOURCE ON BROILER PERFORMANCE

M. Akter[1]and M. A. Zaman[2]

[1] Dept of Dairy and Poultry Science, Faculty of Veterinary Science, Chittagong Veterinary and Animal Sciences University Khulshi, Chittagong-4202, Bangladesh
[2] Dept of Dairy and Poultry Science, Faculty of Veterinary Science, Chittagong Veterinary and Animal Sciences University Khulshi, Chittagong-4202, Bangladesh

***Corresponding Author**: marjinajahivet@gmail.com*

The study was undertaken to compare the effects of different levels of oils and fat powders on broiler production. A total of 120 Cobb-500 broiler chicks as hatched were randomly allocated to five treatments with three replicates of eight chicks each. Five treatment diets were 3% soyabean oil (T1), 3% palm oil (T2), 3% bergafat HTL-306 (T3), 4% bergafat HTL-306 (T4),and 5% bergafat HTL-306 (T5) on iso-caloric (12.53-12.78 MJ/kg) and iso-nitrogenous (22%CP) basis calculated from tabulated value and fed to the broilers up to 5 weeks of age. The average body weight was significantly ($p<0.05$) highest in group T3 followed by T4 and T5 at first week of age. There was no significant different in feed intake among the treatment groups. The mean live weight gain of T4 group was significantly ($p<0.05$) highest in group T4 followed by T3, T2, T1 and in T5 groups at their fourth week of age. There was no significant difference in feed conversion ratio among the treatment groups. The cost effective group was found T2 group. It is concluded that 3% palm oil (T2) and 4% bergafat (T4) diets was found to be better in relation to growth performance compared to other treatment groups.

Key words: Broiler, Bergafat HTL-306, cost-effectiveness, production, Oils.

Feed cost contributes a major portion of production cost in poultry farming. Broiler requires high energy diet to achieve maximum body weight during the period of market age. In order to formulate high energy poultry rations for broilers, fat or oil of animal or plant origin is added since ordinary feedstuffs cannot furnish sufficient energy to the required level. Fats and oils are used as high energy source ingredients in broiler feed. However, their inclusion as true fat or oil in the ration is limited because of the high risk of rancidity on prolong exposure to air, heat, sunlight and poor storage conditions (Linfield *et al.*, 1985; Ali *et al.*, 2001). Fat provides concentrated source of energy and increases the energy content of diets. By escalating the rate of gain it can lower the market age. Fat lessen the passage rate of the digesta in the gastrointestinal tract and boost up the digestibility which ultimately improve nutrients absorption. (Firman *et al.*, 2008)

The sunflower oil, palm and soyabean oils are considered to be one of the beneficial energy sources for poultry nutrition since the market price for these by products are relatively lower. Soyabean oil and palm oil are frequently used in broiler ration (Senkoylu *et al.*, 2004). Recently, several feed companies bring fat powder (eg; Bergafat HTL-306) in market as an alternative source of oil. Bergafat (fat powder) is the commercial name of an acid oil mixture manufactured in Germany and obtained from soyabean, rapeseed, and palm oils. This feed grade fat is vegetable acid oil mixture tailored for broiler

production and mainly used in broiler feeds in Turkey. The fat powders (eg. Bergafat HTL-306) are enriched with phospholipids, which ensure better formation of micelles and thus promote digestion (www.berg-schmidt.de/pdf/Newsletter_en_06.pdf). As can be noted, the saturated fatty acid content of Bergafat is considerably higher than the others (Senköylü *et al.,* 2004). Bergafat HTL-306 is now providing energy in broiler rations in more than 40 countries all over the world. Though Bergafat is now use in poultry rations but no research has not been yet done to know its effectiveness on broiler production performance in Bangladesh condition. There are very limited research has been done to compare the suitability of fat powder over oils in broiler ration. Therefore the study was undertaken to compare efficacy of bergafat powder and oils on broiler production.

MATERIAL AND METHODS

Cobb-500 day old broiler chicks were purchased and weighed individually and randomly distributed into five treatments with three replicates of eight chicks each. After brooding the birds were placed into 15 different replication pens according to treatment. Each pen was properly equipped with feeder and waterer. 1sq. ft floor space was provided for each bird. Throughout the rearing period, proper ventilation, temperature, lighting and humidity was adjusted in the house. Strict biosecurity measures were taken properly. All ingredients used in experimental diets were purchased from the local market. BergafatHTL-306, the trade name of palm fat powder, was collected from Prime International Ltd, Bangladesh. The five experimental diets excluding control (Table 1) were 3% Soya bean oil (T1), 3% Palm oil (T2), 3% Bergafat(T3), 4% Bergafat (T4) and 5% Bergafat (T5). Crude protein and metabolizable energy of experimental diets were calculated according to NRC (1994). All diets were iso-nitrogenous and iso-caloric contained 22%CP and diet 2995.23- 3055.72 Kcal energy. Access of feed and water to bird was *adlibitum* throughout the experimental period. Vaccination and medication was done as per requirements. Body weight, feed intake, and mortality were recorded weekly. Feed conversion ratio calculated per weekly basis. Cost of production by diet groups was estimated at the end of experiment.

Statistical Analysis

Data were subjected to analysis of variance (ANOVA), partitioned the performance parameters (body weight, live weight gain, feed intake, and feed conversion ratio) into diet and error to compare among the diets by using SPSS (Version 15). The treatment means were compared using the least significant difference (LSD). The statement of significant was considered on a probability of $p<0.05$.

Table 1: Ingredients and compositions of (%) of experimental diets

Feed ingredient (% in diets)	**Soya bean oil**	**Palm oil**	**Bergafat**		
	T1	T2	T3	T4	T5
Maize	53.00	53.00	53.00	51.00	49.00
Rice polish	6.50	7.25	7.25	7.00	7.5
Soyabean meal	20.25	21.5	21.5	19.75	19.75
Til oil cake	9.5	7.25	6.75	10.00	11.00
Protein concentrate	6.00	6.25	6.75	6.5	6.50
Bergafat	-	-	3.00	4.00	5.00
Soyabean oil	3	-	-	-	-
Palm oil	-	3	-	-	-
Dicalcium phosphate	1.00	1.00	1.00	1.00	1.00
Salt	0.50	0.50	0.50	0.50	0.50
Vitamin-mineral premix	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Calculated					
ME Kcal/kg	3013.00	2999.55	2995.23	3026.39	3055.72
CP%	22.10	22.07	22.15	22.20	22.24

RESULT AND DISCUSSION

Average body weight

The average body weight of bird was significantly ($p<0.05$) increased at fourth and fifth week of age (Table 2) in all treatment groups. Body weight of bird fed 3% soyabean oil at 21 days of age was 506.25 gm which was not in agreement

with Özpinar, (2003) and Azman *et al.*, (2004) who found 618.3 gm and 609.5gm body weight of birds fed 4% and 6 % soyabean oil respectively at 21 days age. This is may be due to increase level of soyabean oil in diet in the present research.

Table 2: Average body weight (gm) of broilers

Age in week	3% SO T1	3% PO T2	3%BF T3	4%BF T4	5%BF T5
1st	69.58±1.64	69.58 ±1.53	68.67± 1.30	67.50± 1.50	66.25± 1.57
2nd	270.83± 6.93	271.25±6.17	260.47 ±6.12	278.33 ±5.20	261.67 ±6.33
3rd	506.25± 23.37	516.67±18.22	470.83 ±25.88	501.25 ±11.49	483.33 ±20.78
4th	714.58± 20.52[a]	785.42±24.54[b]	870.83 ±22.30[c]	803.33 ±22.04[b]	685.47 ±21.59[a]
5th	1018.75 ± 26.03[a]	1137.50±34.74[b]	1205.42± 35.46[b]	1156.25± 25.94[b]	1045.83± 21.26[a]

N.B.: Values are mean ± SE

[a,b,c]: Means that do not share common superscripts in the same row differ significantly ($p<0.05$)

The average body weight of birds fed diet with 3% palm oil was 1137.50gm at 35 days of age and this result has similarity with the findings of Panja, (1996). In another experiment done by Azman *et al.*, (2004) found that birds fed with 6% soyabean oil had the body weight of 1554gm at 35 days of age. In this experiment it was observed that birds fed diet with 4% Bergafat (T4) gained the highest mean body weight (1205.41 gm) at 35 days of age which is significantly($p<0.05$) higher than 3% (1156.25gm) and 4% (1045.85gm) bergafat diet. This is might be due to presence of balance types of fat, fatty acids and phospholipids in bergafat. They have double function as physiological agents and biological emulsifiers. Phospholipids are surfactants and promote extremely fine dispersion of the fats in the digestive tract and thus increase their digestibility.

Live weight gain

The analysis of data on live weight gain (Table 3) revealed no significant different among treatment groups up to 35 days of age except fourth week of age. The mean live weight gain of T4 group was significantly ($p<0.05$) different from other treatment groups. The mean weight gain of T1 group was differed significantly ($p<0.05$) from T2, T3, and T4 group in fourth week of age. The mean body weight gain (208.33gm) of birds fed diet with 3% soyabean oil at 28 days of age is not supported by the Wongsutthavas *et al*., (2007), who found the mean body weight gain 647 gm at 28 days of age birds fed diet with 3% soyabean oil. In this experiment birds fed diet with 3% palm oil gained average body weight 352.08 gm at 35 days of age which has not statistically significant with other treatment groups. Panja, (1996) also reported that the diet with 2% of palm oil did exert any effect on body weight gain compared to the control (no palm oil inclusion in diet) but chicks given 4, 6 and 8% palm oil diets gained 46.07, 46.07 and 48.21 g/d, respectively, and were significantly different ($P<0.05$) to the control and 2%o palm oil and 20.004% CP diet. T5 group of birds shown the highest body weight gain (360.41gm) at 35 days of age which is significantly different ($P<0.05$) from T1 group (304.16gm). Among three levels of bergafat inclusion, birds fed 5% bergafat diet showed highest body weight gain at 35 days of age.

Table 3: Live weight (gm) gain of broiler

Age in week	3 % SO T1	3% PO T2	3%BF T3	4%BF T4	5%BF T5
2nd	201.25± 6.051	201.67± 5.471	205.83± 4.77	193.75± 5.27	195.42± 5.70
3rd	235.42± 17.46	245.42± 14.33	222.92± 8.35	210.42± 21.44	221.67± 16.44
4th	208.33± 14.33[a]	268.75± 13.39[b]	302.08± 17.04[b]	400.00± 13.45[c]	202.08± 15.19[a]
5th	304.17± 17.52	352.08± 20.29	352.92± 16.13	334.58± 23.74	360.45± 19.27

N.B.: Values are mean ± SE

[a,b,c]: Means that do not share common superscripts in the same row differ significantly ($p<0.05$)

Feed intake

The statistical analysis on weekly feed intake (Table 4) revealed no significant difference between treatment groups. The highest (16845 kg) mean feed intake was observed in T4 group followed by 16435kg, 16265kg, 15062 kg, and 14857kg in T3, T2, T1, and T5 group respectively. Panja, (1996) reported that the amount of feed consumed varied from 93.93 g/d for birds on 6% palm oil to 97.86 g/d for birds on 8% palm oil. Anjum *et al.,* (2004) observed that the average feed intake (g/d) at1-4 week of age was 1717- 1859 gm at 5-6 weeks of age birds fed with 2% fresh soyabean oil and 21.45% CP diet.

Feed conversion ratio

The analysis of data on feed conversion ratio (Table 4) showed no significant difference in FCR value within the treatment groups. The mean FCR value was highest (2.49) in group T5 followed by FCR value 2.26, 2.20, 2.19, and 2.17 in T1, T3, T4 and T2 respectively. In this study the feed conversion ratio of birds fed diet with 3% soyabean oil was 2.26 which is in close agreement with Tangtaweewipat *et al.,* (2008) also observed the feed conversion ratio of birds fed diet with 3% soyabean oil was 2.28 but not supported by another experiment done by Wongsutthavas *et al.,* (2007), who found the feed: gain ratio of bird fed diet with 3% soyabean oil and 18% CP was 1.97. Anjum *et al.,* (2004) observed the FCR value at 5-6 weeks of age was 2.57 birds fed with 2% fresh

Table 4: Effect of different diets on feed intake and feed conversion ratio of broiler

Parameters	3% SO (T1)	3% PO (T2)	3%BF (T3)	4%BF (T4)	5%BF (T5)
Total feed intake	15062.50± 3810.96	16265.00± 4458.62	16845.00±5045.55	16435.00± 4570.62	14857.50± 3996.14
FCR 35th day	2.26± 0.11	2.17± 0.07	2.19± 0.08	2.21± 0.06	2.50± 0.07

N.B.: Values are mean ± SE

soyabean oil and 21.45% CP diet. The feed conversion ratio of birds fed diet with 3% palm oil 2.17 which is not in agreement with Tangtaweewipat *et al.,* (2008) who observed feed conversion ratio of birds fed diet with 2.39 for birds feed diet with 3% palm oil. Panja, (1996) also reported that feed conversion ratio was 2.21 for birds fed diet on 2% of palm oil at 49 days of age. In this experiment, among three different level of bergafat inclusion, 5% bergafat showed highest FCR (2.50) than other two levels. But Khan *et al.,* (2006) observed a better feed conversion ratio (FCR) of 1.99 ($P<0.01$) in birds fed diet with 2% bergafat.

Table 5: Feed cost ($) involved at the end of 35 days

Parameters	3% SO T1	3% PO T2	3%BF T3	4%BF T4	5%BF T5
Feed cost/Taka /kg live weight	0.43	0.42	0.42	0.43	0.43
Feed cost involved/bird	0.97	0.91	0.93	0.94	1.01
Total production cost/kg live weight	1.61	1.52	1.53	1.54	1.72

Economy of Production

No significant difference was found among the treatment groups in feed cost and total production cost (Table 5) involved in per kg body weight. The highest feed cost and total production cost per kg live weight was highest in T5 group and lowest in T2 group and this is because of high price of soyabean oil and inclusion of high percentage of bergafat in diet. But the most cost effective group was found to be 3% palm oil.

CONCLUSION

The experiment indicates that 3% palm oil and 3% bergafat has superior influence on broiler than other treatment groups in terms of production performances and perspective of economic. However, further experiment is needed to fix up the standard level of oil and fat powder in broiler diet

considering the effect of environment and different level of crude protein.

REFERENCES

1. Ali, M.L., Miah, A.G., Salma, U. and Chowdhury, R. P. (2001). Effect of Soybean Oil on Finisher Period of Broiler at Hot Weather in Bangladesh. Journal of Biological Science. 1(8): 714-716.

2. Anjum M. I., Mirza I. H., Khan A. G. and Azim A. (2004). Effect of fresh versus oxidized soybean oil on Growth performance, organs weights and Meat quality of broiler chicks. Pakistan Veterinary Journal. 24(4): 173.

3. Best feed. Berg+Schmidt's Newsletter: 2010, Issue 6. www.berg-schmidt.de/pdf/Newsletter_en_06.pdf

4. Azman. M. A., Konar, V. and Seven, P.T. (2004). Effects of different dietary fat sources on growth performances and carcass fatty acid composition of broiler chickens. Méd. Vét. 156(5): 278-286.

5. Firman, D J., Kamyab, A. and Leigh, H. (2008). Comparison of fat source in rations of broilers from hatch to market. International Journal of Poultry Science. 7(12): 1152-1155.

6. Khan, S. H., Bhatti, B. M., Rehman, A. and Anjum, M. A. (2006). Effects of Berga fat HTL-306 supplementation on broiler performance, CAB abstracts.

7. Linfield, W. M., S. Serota. and L. Sivieri. (1985). Lipidlipase interaction, a new method for the assay of lipase activity. Journal of American Oil Chemistry Society. 62: 1152- 1154.

8. NRC (1994). Nutrient Requirements of poultry. 9. Revised Edition. National Academy Press, Washington D.C.

9. Özpinar, H. (2003). Effect of different fat sources and their levels on performance of broilers, The 11th International Symposium of World Association of Veterinary Laboratory Diagnosticians and OIE Seminar on Biotechnology, November 9-13.

10. Panja, P. (1996). Effects of Supplementation of Palm Oil in Isonitrogenous diets on Broilers, www.tijsat.tu.ac.th/issues/1996/no1/1996_V1_No1_7.PDF .

11. Tangtaweewipat, S., Cheva-Isarakul, B. and Mahuemaung, T. (2008). Production of low fat and low cholesterol broiler meat by supplementing organic minerals or polyunsaturated oil. Paper presented in 9-AAAP, Malaysia, Broiler Conference document.

12. Wongsuthavas, S., Yuangklang, C., Wittayakun, S., Vasupen, K., Mitchaothai, J., Srenanual, P, and Beynen, A. C. (2007). Dietary Soybean Oil, but Not Krabok Oil, Diminishes Abdominal Fat Deposition in Broiler Chickens. International Journal of Poultry Science. 6(11): 792-795.

