EFFECTS OF DIETARY GLYCEROL ADDITION ON GROWTH PERFORMANCE IN BROILER CHICKENS

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SUMMARY

The effects of dietary inclusion of gliserol which is a low degree of purity as biodiesel by-product at 5% or 10% were examined on weight growth and carcass traits in broiler chickens. For this aim, a total of 270 one-day-old male Ross 308 broiler chickens were randomly divided into 3 equal groups according to the glycerol amounts included into diets [0%, 5% and 10%] for 42 days. Growth parameters, feed consumption and efficiency were weekly evaluated. Carcass traits were determined at the end of the trial. Weight growth was significantly increased in treated birds. The glycerol supplementation has improved feed efficiency. These results show that glycerol may be incorporated into broiler diets at least at 5-10 % without compromising growth and carcass traits.

Introduction

Biodiesel is a product which is obtained from oils and it has similar physical and chemical properties like as diesel oil. In biodiesel industry, 10% of the total production is glycerine.

Usage of glycerine in animal feeds such as an alternative energy source has been got attention in recent studies [2, 4, 5, 6, 7, 8, 9,10].

Material and Methods

In this experiment, 270 one-day-old male Ross 308 broiler chicks were randomly divided into 3 groups according to the dietary regimen and each group was constituted by 5 subgroups of 18 birds. Chickens were fed with diets based on corn and soybean meal (Table I). Birds from the groups 2 and 3 received standard diets supplemented with 5% or 10% glycerol respectively for the whole experimental period. Feeds were analyzed for crude protein, calcium, and total phosphorous according to the reference methods [1].

Body weights were determined by pen on days 1, 7, 14, 21, 28, 35 and 42 and food intakes were measured during each feeding period. The corresponding cumulated body weight gains (from the 1st day to the ith day) and feed conversion ratios were calculated for the whole feeding period (between 1st to 42nd days of experiment). The weight of the edible carcass and the weights of liver, spleen, gizzard, heart, glandular stomach and cloacal fat were recorded and all values were expressed as percentages of the carcass weight for a same bird.

All data were analyzed by ANOVA using SPSS 11.50 program (Inc., Chicago, II, USA). Significant differences among treatment were determined using Duncan's multiple range tests [3] with a 5% level of probability.

TABLE I: Composition and chemical analysis of the broiler diets, %

	0-10 day			11-28 day			29-42 day		
Glycerol	0	5	10	0	5	10	0	5	10
Corn	52,33	46,33	40,38	54,13	48,13	42,13	54,8	48,73	42,63
Soybean meal	32	33,05	34,00	31	32	33	31,13	32,2	33,3
Corn gluten	7	7	7	6,5	6,5	6,5	5	5	5
Vegetable oil	4	4	4	4,5	4,5	4,5	5,5	5,5	5,5
Limestone	1	1	1	0,9	0,9	0,9	0,9	0,9	0,9
DCP	2,25	2,25	2,25	2	2	2	2	2	2
Salt	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Vitamin premix	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Mineral premix	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
DL-Methionine	0,35	0,35	0,35	0,2	0,2	0,2	0,1	0,1	0,1
L-Lysine	0,50	0,45	0,45	0,2	0,2	0,2	0	0	0
	100	100	100	100	100	100	100	100	100
Crude protein	23	23	23	22	22	22	21	21	21
ME, kcal/kg	3107	3106	3107	3152	3153	3153	3201	3201	3200
Ca	1,02	1,03	1,03	0,92	0,93	0,93	0,92	0,93	0,93
Available P	0,50	0.50	0,50	0,46	0,46	0,46	0,46	0,46	0,46
Met.+Cys.	1,13	1,12	1,11	0,96	0,95	0,94	0,82	0,82	0,81
Lysine	1,46	1,44	1,45	1,2	1,21	1,22	1,03	1,04	1,06

ME: metabolisable energy; Met.: methionine; Cys: Cysteine; 1Vitamin premix provided per kilogram of diet: vitamin A, 15000 IU; vitamin D3, 5000 IU; vitamin E, 50 mg; vitamin K3, 10 mg; vitamin B1, 4 mg; vitamin B2, 8 mg; vitamin B6, 5mg; vitamin B12, 0.025mg; niacin, 50 mg; pantothenic acid,20 mg; folic acid, 20 mg; biotin, 0.25 mg; choline, 175 mg. 2Mineral provided per kilogram of diet: manganese, 100 mg; zinc, 150 mg; iron, 100 mg,;cupper, 20 mg; iodine, 1.5 mg; cobalt, 0.5 mg; selenium, 0.2 mg; molybdenum, 1mg; magnesium, 50 mg. 3Results have been found out with calculation.

Results and Discussion

The growth performance and the feed intakes in broilers according to the dietary treatments are summarized in the Table II. The body weights and the body weight gains during the 42 days significantly increased in the glycerol supplemented groups.

The differences for feed intakes were not significant among groups. In this experiment feed conversion ratio was improved in broilers supplemented with glycerol.

In Table III, the carcass traits, the organ weights and the corresponding indices were summarized. No significant difference in carcass yield, intestinal pH, cloacal fat, liver indices, spleen indices, heart indices and glandular stomach indices was evidenced according to the 3 dietary regimens. However, the relative gizzard weights were decrease in glycerol supplemented broilers.

As a conclusion, the results of the current study indicate that glycerol addition to diets had significant positive effects on growth performance in broilers chickens. No significant effect on feed consumption but positive effects on feed efficiency in broilers chickens.

Dietary glicerol no significant effect on carcass traits and organ indices in broiler chickens. But level of %10 dietary glicerol remarkable negatives effects on gizzard indice.

This experiment indicates that low degree of purity glycerol from biodiesel by-product could be effectively used in broiler diets.

TABLE II: Growth performances, food intakes and food conversion ratios in broiler chickens

n=5

	Dietary treatments			SEM	p
	Control	**%5 glycerol**	**%10 glycerol**		
	Body weights (g)				
Day 1	46,21	46,12	46,14	0,166	0,975
Day 7	154,55	152,5	149,02	1,83	0,494
Day14	362,56	373,03	359,72	3,74	0,334
Day 21	684,30	730,82	704,82	10,37	0,192
Day 28	1112,60 b	1221,96 a	1198,17 a	18,67	0,027
Day 35	1635,13 b	1806,15 a	1785,35 a	24,75	0,001
Day 42	2110,73 b	2282,20 a	2228,90 a	25,75	0,005
	Body weight gains (g)				
Day 1-7	108,35	106,40	102,88	1,78	0,481
Day 8-14	208,01	220,51	210,70	3,20	0,260
Day15-21	321,73	377,79	345,10	8,16	0,194
Day 22-28	428,30 b	491,14 a	493,34 a	11,31	0,014
Day 29-35	522,53	584,19	586,18	14,25	0,111
Day 36-42	475,60	482,06	444,56	10,50	0,318
Day 1-42	2064,52 b	2242,09 a	2182,77 a	25,75	0,005
	Feed intake (g)				
Day 1-7	131,06	138,28	134,11	3,81	0,767
Day 8-14	296,33 a	292,00 ab	274,17 b	4,02	0,044
Day15-21	523,53	544,33	510,23	7,03	0,134
Day 22-28	800,41	819,69	783,72	7,00	0,104
Day 29-35	1010,48	1033,99	1019,51	10,18	0,670
Day 36-42	972,67	985,57	928,,08	12,77	0,157
Day 1-42	3734,48	3813,86	3649,83	31,27	0,092
	Feed conversion ratio (kg/kg)				
Day 1-7	1,21	1,31	1,31	0,042	0,585
Day 8-14	1,43 a	1,33 b	1,30 b	0,021	0,019
Day15-21	1,64	1,53	1,48	0,029	0,064
Day 22-28	1,88 a	1,67 b	1,59 b	0,043	0,005
Day 29-35	1,97	1,77	1,74	0,050	0,125
Day 36-42	2,05	2,05	2,10	0,033	0,820
Day 1-42	1,81 a	1,70 b	1,67 b	0,020	0,003

TABLE III: Carcass traits and organ indices in broiler chickens according to the dietary (g/100g BW)

	Carcass yield, %	İntestinal pH	Cloacal fat	Liver	Spleen	Heart	Gizzard	Glandular stomach
	n=15	n=15	g/100 g Body Weght, n=15					
Control	74,92	6,28	1,34	2,09	0,11	0,46	1,41 a	0,37
%5 glycerol	74,59	6,30	1,42	1,84	0,09	0,42	1,34 ab	0,33
% 10 glycerol	69,93	6,36	1,58	1,97	0,11	0,47	1,19 b	0,34
SEM	1,29	0,031	0,086	0,052	0,008	0,013	0,032	0,010
p	0,216	0,532	0,532	0,158	0,525	0,275	0,015	0,274

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