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Effects of Canola Oil Peroxide at Different Replicate of Heating on Blood Parameters in Japanese Quail

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ABSTRACT: This experiment was conducted to evaluate the effects of different levels (0, 2 and 4%) of canola oil and 2 levels of heat (1 and 2 time heated) on blood biochemical parameters of Japanese quails. This study carried out in factorial (3×2) experiment based on completely randomized design with 360 of Japanese quails in 6 treatments and 3 replicate for 35 of day. In this study, blood biochemical parameters are evaluated. Experimental diets based on corn and soybean meal. Different levels of canola oil and heat have no significant effect on serum glucose, cholesterol, HDL and LDL levels in Japanese quail. Serum triglyceride concentrations in quails fed with 4% oil (heated twice) was significantly higher than the other treatments (P<0.05). Using of canola oil can decrease quails blood HDL and LDL.

Keywords: Canola oil, heating, blood parameters, Japanese quail

INTRODUCTION

Broiler production plays a major role in food security for the rapidly increasing Cambodian human population. Their short production cycle, high feed efficiency and high biomass per unit of agricultural land are particularly attractive for the Cambodian production system. However, compared to other domestic animals, broiler chickens are more susceptible to changing environmental conditions (Nolan *et al.,* 1999).

The most practical method for increasing the energy density of diets in poultry feeding is through the addition of fats and oils (Peebles *et al.,* 2000). It was reported that fat metabolism and deposition in poultry could be affected by different dietary fats and fatty acids (Snaz *et al.,* 2000; Pesti *et al.,* 2002). Also they assist vitamin A and Ca absorption (Sklan, 1980; Corino *et al.,* 1980; Leeson and Atteh, 1995). Some concerns that should be noted with fat utilization include: use of higher levels of fat may negate the effects of pelleting, measurement of metabolizable energy (ME) content can be difficult, there is the potential for rancidity, equipment needs relative to fat additions must be adequate and potentially poor digestibility of saturated fats by the young bird (Chen and Chiang, 2005). By increasing fat sources to the diets of broilers, amount of feed intake decreased and improved feed efficiency (Jeffri *et al.,* 2010). Increasing dietary fat improved feed efficiency, but also may result in increased fat deposition (Salmon and Neils, 1971; Rivas and Firman, 1994). Carcass percentage, proventriculus, pancreas, spleen, heart and abdominal fat pad weights (as a percent of live weight) were not affected by using different levels of fish oil. Where as inclusion at 4% level, increased the thigh, breast, liver and small intestine weights (P<0.05). One of the oil sources in broiler chick's nutrition is canola oil. Canola oil has been recognized as adequate mixture of essential fatty acids, unsaturated fatty acids such a linolenic acid (C18:3) that can improve broiler performance, also linolenic acids can be converted to longer chain omega-3 fatty acids (Sim *et al.,* 1990; Yang *et al.,* 2000) that is an important factor in animal feeding and is for promote of health (Bezard *et al.,* 1994). Adding 3% of canola oil and poultry fat resulted in significant improvement in body weight and better feed conversion ratio in fed groups 3 % canola oil and poultry fat than other groups observed, no significant different were found in liver, breast, thigh weights in between groups fed lipid in comparison with the control group. Addition of 6% poultry fat caused significant increasing on abdominal fat, gizzard weight was significantly higher in control group in comparison with supplemented groups (Aghdam Shahryar *et al.,* 2011). It has been accepted that dietary canola oil is excellent supplement for commercial fish such as salmon (Huang *et al.,* 2008). On the other hand canola oil contains less than 2% of erucic acid (docosenoic acid, C22:1, n-9) in relation to the total fatty acid and less than 30 µmoles of glucosinolates per gram of free oil on seed dry matter basis. In birds, the adverse effects of adding erucic acid to the diets are reflected on intake, growth and the apparent digestibilities of total lipid and individual fatty acids (Leeson and Summers, 2001). Furthermore, chicks fed with diets containing erucic acid deposit less fat and utilize energy from this lipid less frequently (Leeson and Summers, 2001).

In the present experiment the effects of three levels of canola oil (0, 2 and 4 percents) and 2 levels of heat (1 and 2 times of heating) were investigate on blood biochemical of Japanese Quails.

MATERIALS and METHODS

This study was conducted as 3×2 factorial experiment with 3 levels of canola oil (0, 2 and 4) and 2 levels of heat (1 and 2 time heated). In this experiment 360 Japanese quail were allocated randomly to 6 experimental diets. The diets and water was provided ad libitum. To study the effects of different dietary treatments on blood parameters, blood samples were collected from birds in each treatment.

The data were subjected to analysis of variance procedures appropriate for a completely randomized design using the General Linear Model procedures of SAS Institute (2005). Means were compared using the Duncan multiple range test. Differences were considered significant at $P<0.05$.

RESULTS and DISCUSSION

The effects of different levels of canola oil and heat and interactions of them on blood biochemical parameters in Japanese quail are summarized in Table 1. There were no significant differences between treatments with added dietary canola oil. Treating of diets with 1 and 2 times heat showed no significant on blood parameters. The interaction of canola oil × heating times had significant effect on HDL of Japanese quail ($P<0.05$). The highest and lowest HDL (130 mg/dl) and (79.67 mg/dl) resulted in groups with 4% of canola oil and one and 2 times heating respectively. The reasons those mentioned about canola oil, could also cause significant difference in interactions between canola oil levels and treating with heat. Compared with the levels of canola oil, interaction canola oil × heat time could not significantly affect the amount of glucose, cholesterol HDL and LDL. However using canola oil and heat time had adverse effects on amount of triglyceride.

Pal *et al.,* (2002) reported that the type of fat added to the diet did not affect the glucose levels and omega-3 fatty acids changed the effects of insulin and glucagon on the plasma glucose. Atakisi *et al.,* (2009) reported that omega-3 fatty acids reduced egg and plasma cholesterol as well as plasma glucose level and no change was observed in triglyceride levels with the supplementation in quails. Zanini *et al.,* (2008) reported that supplementing broiler diets with canola oil resulted in a decrease in the lipid content of edible portions. Lipid accretion accounts for part of the body mass of animals and birds. It would therefore appear that in quail, canola oil could probably cause a decrease in lipid accretion of tissues which could explain the similarities in the growth performance of the quail. Magubane *et al.,* (2013) observed that female quail on a standard diet supplemented with canola oil (10% w/w) had significantly higher ($P<0.05$) plasma triglycerides compared to their counterparts on the control diet.

Table 1: Effects of different levels of canola oil and heat on blood biochemical parameters in Japanese quail.

Treatment						
Canola oil		glucose	cholesterol	triglyceride	HDL	LDL
0		303.67	199.67	93.33	112.50	122.60
2%		298.00	234.83	118.67	101.70	109.40
4%		313.83	215.17	104.83	98.10	92.77
P-Value		0.1459	0.0869	0.3404	0.6671	0.1005
SEM		6.95	7.12	9.65	5.70	6.33
Heat times						
0		303.67	199.67	93.33	112.50	122.60
one time		300.00	226.67	110.17	103.50	101.13
2 times		311.83	223.33	113.33	96.30	101.03
P-Value		0.2635	0.7494	0.8223	39.79	0.9914
SEM		6.95	7.12	9.65	5.70	6.33
Interaction of canola oil × heating						
0	0	303.66	199.67	93.33^{b}	112.50	122.60
2%	one time	278.67	240.00	104.67^{ab}	105.00	106.87
2%	two times	317.33	229.67	96.67^{ab}	98.40	111.93
4%	one time	321.33	213.33	97.67^{ab}	102.00	95.40
4%	two times	306.33	217.00	130.00^{a}	94.20	90.13
P-Value		0.1258	0.5071	0.0086	0.9425	0.5800
SEM		9.82	10.08	11.64	8.06	8.95

a,bMeans within a column that do not share a common superscript are significantly different ($P < 0.05$).

CONCLUSION

The overall results indicated that in Japanese quails adding canola oil until 4% without any adverse effects on blood biochemical parameters of broilers is possible, but treating 2 times with heat has adverse effects in these respects and is recommended to decrease the triglyceride amount.

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