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Original Article

Effects of Slaughter house Waste Products and Herbal Fats on Fat Levels of Japanese Quail

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Abstract

Background: Approx. 25% of the total farm animal weigh slaughtered is not used for food consumption. During the last 50-60 years, slaughterhouse waste products, rich in proteins and lipids, has been treated and used for production of animal fodder.

Objective: The main aim of the current study was to investigate the effects of slaughterhouse waste products and herbal fats on fat levels of Japanese quail.

Methods: Three hundred quail pieces were studied in a completely randomized design with six treatments and fivereplications (10 quails for each replication). Treatments were control (no-fat diet), control plus (no-fat diet plus lecithin emulsifiers), 20% slaughterhouse waste products fat plus 80% herbal fat, 40% slaughterhouse waste products fat plus 60% herbal fat, 60% slaughterhouse waste products fat plus 40% herbal fat, and 80% slaughterhouse waste products fat plus 20% herbal fat. Finally, blood samples were taken in two replications from wing vein to measure high density lipoprotein (**HD**L), low density lipoprotein (LDL), triglyceride and total cholesterol by Spectrophotometry methods.

Results: Results showed that 20 slaughterhouse waste-80 herbal fat had the highest HDL amount, whereas80 slaughterhouse waste-20 herbal fat had the highest cholesterol and LDL amounts when compare with other groups.

Conclusion: In conclusion, based on the results present study by using of cheaper fat resources, economical diets can be prepared without reduction in quails yield.

Key words: Fat, Herbal fat, Lecithin quail, Slaughterhouse waste products

INTRODUCTION

The increase in intensive poultry productions has raised the public concern about poultry industry and its efficiency of nutrient utilization.The entire activity from production of hatching eggs to the slaughter and packaging is done in a complex. During recent decade, in the intensive feeding system of poultry production, slaughterhouse waste products and herbal fats have commonly been used as energy sources (Abedpour et al. 2016). Because of their typically high protein and lipid content.

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Waste in the food industry is characterized by a high ratio of product-specific waste. Not only does this mean that the generation of this waste is unavoidable, but also that the amount and kind of waste produced, which consists primarily of the organic residue of processed raw materials, can scarcely be altered if the quality of the finished product is to remain consistent (Russ and Meyer-Pittroff, 2010).

Vegetable oilshave more digestibility, absorption and produce higher metabolic energy in spite of their higher prices in Iran. On the other hand, using cheaper resourcessuch as slaughterhouse waste products' fats in place of expensive resources including soybean oil, corn oil and canola oil can reduce diet costs (Fernandez and West, 2005).Nowadays, poultries have high growth rate and improved conversion ratio because of geneticselections, management and good nutrition.Such features lead to increased work of modified birds' cardiovascular system which puts the birds at risk of metabolic disorders.High amounts ofslaughterhouse waste products are thrown

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away annually which can be a considerable fat resource for poultry diet by appropriate processing.

The utilization and disposal of product-specific waste is difficult, due to its inadequate biological stability, potentially pathogenic nature, high water content, potential for rapid autoxidation, and high level of enzymatic activity (Russ and Meyer-Pittroff, 2010). On the other hand, processing these waste products is a brand new industry in Iran which needs institutional cooperation, including breeders of livestock and poultry. Lecithin has been used lately in diets as an emulsifier. This is an energizer material which prevents cholesterol accumulation in body. Therefore, adding lecithin emulsifier to diet can improve fat digestibility in quail chickens (Veldkamp and Bosch, 2015).

The main aim of the current study was to investigate the effects of slaughterhouse waste products and herbal fats on fat levels of Japanese quail.

MATERIALS AND METHODS

The experiment was carried out in 2016 summer in a 10'000 quail housethat this farm located in Isfahan**province (**32°39'N and 51°43'E**).**Three hundred quail pieces were studied in a completely randomized design with six treatments and five replications (10 quails for each replication). Treatments were control (no-fat diet), control plus (no-fat diet plus lecithin emulsifiers), 20% slaughterhouse waste products fat plus 80% herbal fat, 40% slaughterhouse waste products fat plus 60% herbal fat, 60% slaughterhouse waste products fat plus 40% herbal fat, and 80% slaughterhouse waste products fat plus 20% herbal fat. Fat level was 3% in all fat having diets. Herbal fats were bought from A'alaRoghanSepahan Company. This fat which was obtained from industrial slaughter houses was used in this study for first time as fat for poultry feed Instead of edible oil such as soybean (Table 1). Diet was prepared by UFFDA software according to national researches association recommendation, separately for beginning and terminal stages. Finally, blood samples were taken in two replications from wing vein to measure high density lipoprotein (HDL), low density lipoprotein (LDL), triglyceride and total cholesterol by Spectrophotometry methods.

Statistical Analysis

Statistical analyses of the data were done with SAS software (2003) in a completely randomized design. Means were compared using LSD test. Significance between means was tested using Duncan's multiple range tests. Statistical significance was defined as $P<0.05$.

Statistical model of this study was:

$$Y_{ij} = \mu + \alpha_{jkl} + e_{ijkl}$$

Which

Y_{ij} = The amount of each observation
μ = population average
α_{jikl} = treatments effects
e_{jikl} = Experimental error effect

RESULTS AND DISCUSSION

The values concerning blood parameters are presented in Table 2. Results showed that he highest HDL amount was obtained from third treatment (20-80SH) which was different from other treatments significantly ($p<0.05$). The lowest HDL amount was obtained from sixth treatment (80-20SH) which was also different from other treatments significantly ($p<0.05$). Sixth treatment produced the highest LDL amount which was significantly ($p<0.05$) different from other treatments and third treatment had the lowest LDL amount.Cholesterol amount of sixth treatment (80-20 SH) was higher than other treatments significantly ($p<0.05$) whereas the lowestcholesterol amount was obtained from first treatment (control group). Fourth treatment (40-60SH) showed the highest triglyceride amount which was statistically different from other treatments ($p<0.05$) but first and second treatments (control and control plus emulsifier) had the lowest triglycerides.

Some studies have reported that increased excretion of bile acids from the intestine makes liver cells to convert morecholesterol to these acids to replace them.Therefore, liver

Table 1: Composition and nutrient content of starter and grower

Item	Starter (1-3 week)	Grower (4-5 week)
Ingredient %		
Corn	46.3	50.1
Soya bean meal	45.2	39.8
Fish powder	5.5	3
Wheat bran	-	3.8
Oil	3	3
D-L Methionine 99%	0.1	0.1
Lysine	0.05	0.05
Salt	0.2	0.2
Vitamin and mineral premix[1]	0.25	0.25
Mineral	0.25	0.25
Oyster powder	1.5	1.7
Nutrient value		
Metabolisable energy[2], MJ/kg	2800	2800
Crude protein[3], %	27	24
Calcium[3], %	1.2	1.1
Available phosphorus[2], %	0.48	0.47
Methionine+cystine[3], %	0.92	0.83
Lysine[3], %	1.7	1.5

[1]Premix provided per 1 kg compound feed: vitamin A – 9000 IU, vitamin D3 – 2000 IU, vitamin E –1800 IU, 4 mg, K3-0.015 mg, B12– 0.15 mg, biotin – 1mg, 0.14 mg, folic acid – 30 mg, Niacin – 25 mg, Ca-panthotenate – 2.9 mg, pyridoxine – 6.6 mg, riboflavin – 1.8 mg, thiamine. Mn – 100 mg, Fe – 50 mg, Zn – 100 mg, Cu – 10 mg, I – 1 mg, Se – 0.2 mg, [2]Calculated analysis; [3]Proximate analysis

Table 2: Values concerning blood fat parameters in Japanese quail that treatment with slaughterhouse waste products and herbal fat

Treatment	HDL	LDL	Cholesterol	Triglyceride
1	73/6^{e}	68/1^{d}	154/8^{f}	162/3^{e}
2	75/8^{d}	66/4^{e}	156/2^{e}	166/4^{e}
3	98/1^{a}	64/8^{f}	162/2^{d}	192/6^{b}
4	86^{b}	70/7^{c}	174/4^{c}	196/4^{a}
5	81/9^{c}	73/8^{b}	186/8^{b}	184/4^{c}
6	71^{f}	76^{a}	194/4^{a}	178/2^{d}
SEM	0/38	0/31	0/77	0/47

Control (no-fat diet) 2. Control plus (no-fat diet plus lecithin emulsifiers) 3. 20% slaughterhouse waste products fat plus 80% herbal fat 4. 40% slaughterhouse waste products fat plus 60% herbal fat 5. 60% slaughterhouse waste products fat plus 40% herbal fat 6. 80% slaughterhouse waste products fat plus 20% herbal fat. High density lipoprotein (HDL), low density lipoprotein (LDL). There is no significant difference between the numbers of each column with at least one similar letter (P<0.05)

cells will require more cholesterol and then the expression of LDL-c genes will be increased in these cells which is followed by increase in the number of LDL- C receptors on liver cells surfaces (Rumpold and Schlüter, 2013; Park et al. 2014).

At this time, more LDL_C lipoproteins will be collected from blood by these receptors and enter liver cells to be analyzed and extant cholesterol in them will be used in synthesis of bile acids. So,the concentration of LDL-C and total cholesterol in the blood will be reduced. These subjects are in agreement with results of this study (Mendoca and Jensen, 2009).Herbal oils including diets are rich of linoleic and linolenic acids which play roles in reducingcholesterol (Dietschy, 1998). Dietary fatty acids and the regulation of plasma low density lipoprotein Cholesterol concentrations. J. Nutr. 128: 444-448.); this is in agreement with our results.

Results showed that using of waste products and herbal fats could the steady increase in poultry production has also created an increase in the production of poultry waste which could be a source of menace to the environment if not handled properly.These poultry wastes have been documented to contain all essential nutrients including micronutrients such as nitrogen, phosphorus which provides a valuable source of plant nutrients (Chan et al., 2008; Harmel et al., 2009), it also contains other excreted substances such as hormones, antibiotics, pathogens and heavy metals which are introduced through feed (FAO, 2006), especially for organic growers (Preusch et al., 2002).

There is no significant difference between the numbers of each column with at least one similar letter ($p<0.05$).

CONCLUSION

Based on the results of present study, it seems that by using cheaper fat resources (poultry waste products) moreeconomical diets can be prepared without reduction in quail yield.Poultry farmers are advised to include the cost of poultry waste disposal in their production budget.

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