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REGULAR ARTICLE

THE EFFECT OF ADDITION BEE POLLEN TO FEED MIXTURES ON INTERNAL FAT OF BROILER ROSS 308

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ABSTRACT

The aim of the study was to investigate to the influences of addition bee pollen with different levels on internal fat of broiler chicken Ross 308. In the experiment were added bee pollen extract (group E1 - 400mg. kg^{-1} and group E2 - 800 mg. kg^{-1}) in feed mixtures for feeding broiler chickens Ross 308 in 42 days which were divided according to the gender. The experiment enrolled 60 pieces of one day-old chicks, and then were created 3 groups: control (C) and experimental (E1, E2) groups each group have 10 pieces of chicks. The carcass body weight on both gender (female, male) were little bit higher in control group (♀-1573.2 g, ♂-1605.4 g) than experiment groups E1 (♀-1510.4 g, ♂-1646.4 g), E2 (♀-1599.2 g, ♂-1679.4 g) and there was significant different ($P \leq 0.05$) between (E1) and (E2) in female group but there no significant different in male group. The study shown that the proportion of total internal fat in female groups to carcass were little bit higher in control group (2.64 %) than experiment groups E1 (2.30%), E2 (2.33%) but the proportion of the total internal fat to carcass BW in male group were a lower in control group (2.03%) than E1(2.13%), E2 (2.29%), there was significant different ($P \leq 0.05$) between (E1) and (E2) in proportion of gastric to carcass body weight.

Keywords: internal fat, Ross 308, bee pollen

INTRODUCTION

Continuous attempts to increase growth rate of meat-type chickens in poultry industry have been accompanied by excessive fatness which is not desired by most of consumers **(Aho, 2001; Oyedeji and Atteh, 2005)** mainly because coronary heart diseases and arteriosclerosis are strongly related to the dietary intake of cholesterol. Saturated fatty acids and are among the most important causes of human mortalities **(Sacks, 2002).** Currently, dietary recommendations favour the consumption of less saturated fat **(Hrdinka *et al*., 1996).** According to **Wrick (1995)**, the expectation of the consumer for meat is that it should be healthy, rich in protein, low in fat, tender and have a typical flavour. For this reason, an increase in the production of lean broiler chicken meat as well as reduction in juiciness would be of direct nutritional benefit to the consumers. Hence, in this regard, appetite control in poultry could be of importance in reducing fat deposition. *Garcinia cambogia* a plant native to Southeast Asia containing hydroxycitric acid (HCA) as the primary acid in the fruit rind has been shown to be active in suppressing appetite and body fat accumulation in experimental animals **(Vasselli *et al*., 1998; Ishihara *et al*., 2000; Ohia *et al*., 2002; Shara *et al*., 2003)**. Therefore, it may be of value to supplement male Ross 308 broiler chickens with HCA-containing *Garcinia cambogia* leaf meal as an appetite suppressing supplement to reduce fatness as well as juiciness of poultry meat thereby leading to improved meat quality. However, the use of *Garcinia cambogia* leaf meal for reducing fatness and improving juiciness of broiler chickens meat is not known. Such information would be very beneficial to poultry farmers in South Africa and elsewhere. The main objective of this study was, therefore, to determine the effect ofGarcinia cambogia leaf meal supplementation level on productivity and juiciness of male Ross 308 broiler chickens. Pollen contains proteins, carbohydrates, lipids, vitamins and minerals, moreover it is a rich source of free amino acids and, therefore, is appreciated even in human nutrition. In some countries the bee pollen has been recognized as a medicine, e.g. by the German Federal Board of Health pollen as food and medicine is traditionally used in Far East region – especially in China **(Brindza *et al*., 2010).** Bee Pollen contains at least 22 amino acids, 18 vitamins, 25 minerals, 59 trace elements, 11 enzymes or coenzymes, 14 fatty acids, 11 carbohydrates and approximately 25% protein. Bee pollen is extremely rich in carotenes, which are metabolic precursors of vitamin A. It is also high In B complex and vitamins C, D, E and lecithin. Bee pollen contains over 50% more protein than beef, yet its fat content is very low. **Khojasteh and Shivazad (2006)** and **Wang *et al*. (2007)** reported that bee pollen contains digestive enzymes from the bees.

The present study was conducted to determine the the effect of addition bee pollen to feed mixtures of broiler Ross 308 on abdominal fat.

MATERIAL AND METHODS

The experiment was implemented in test poultry station of Slovak University of Agriculture in Nitra. The tested chicken was broiler chickens Ross 308. The experiment enrolled 60 of one day-old chicks, which were divided into 3 groups: control (C) and experimental (E1, E2) in each were 10 pieces of chicks .The chickens were breeding in a cage conditions. Each cage was equipped with feed disperser and water intake was ensured ad libitum through a self feed-pump. The heating was provided by central heater. The temperature was at the first day 33 °C and every week was reduced about 2 °C and finally temperature was 19 °C. The lighting during the feeding period was continuous. Chickens were fed an *ad libitum*, each group was fed by same starter complete feed mixture (CFM) (loose structure) until to 21st day of their age and from the 22nd to 42nd day of their age. The feed mixtures starter and grower had been produced without antibiotic preparations and coccidiostatics. However, they added pollen extract to (CFM) starter and grower in amount 400 mg. kg^{-1} for (E1) and 800 mg. kg^{-1} for (E2). Average nutritional value of feed mixtures used during the fattening was the same in both gender. Pollen extract was prepared from minced bee pollen (150 g) in the conditions of the 80% ethanol in the 500 cm^3 flask **(Krell, 1996).** Extraction was carried out in a water bath at 80 °C for 1 hour. Consequently the extract was cooled and centrifuged. The obtained supernatant was evaporated in a rotary vacuum evaporator at bath temperature 40-50 °C and then weighed. Residue in an amount of 40 g and 80 g were dissolved in 1000 cm^3 of 80% ethanol and applied for 100 kg of feed mixtures.

At the end of the fattening (42 days) from each group were chosen 60 chickens for slaughter, to determined the carcass body weight (g), proportion of abdominal, gastrict, heart and total internal fats to carcass body weight (%). The experimental analysis was evaluated at Department for evaluation and processing of animal products at Faculty of Biotechnology and Food Sciences SUA Nitra, Slovakia.

The results of (arithmetic mean) were processed by the statistic program Statgraphics version 5.0. For the determination of significant differences between the tested groups was used analysis of variance.

RESULTS AND DISCUSSION

The table (1) shown the female averatge of internal fats to carcass body weight of broiler Ross 308. The chicken carcass body weights in control group was (1573.2 g) and carcass body weight in (E1) was (1510.4 g) and in (E2) was (1599.2g) , there were significant different ($P \leq 0.05$) between (E1) and (E2) but there were no significant different ($P \geq 0.05$) between control and experimental (E1, E2) groups. And the proportion of the abdominal fat in control group was 1.90% and in E1group was

1.67% and in E2 group was 1.65% and there were no significant different ($P \geq 0.05$) between the groups. On other hand the proportion of gastric fat to carcass body weight were in C (0.69%), E1 (0.57%), E2 (0.62%) groups and there no significant different ($P \geq 0.05$) between the groups. Also the proportion of heart fat to carcass body weight were in C (0.046%), E1 (0.047%), E2 (0.049%) groups and there no significant different ($P \geq 0.05$) between the groups. The proportion of total internal fat to carcass body weight were in C (2.64%), E1 (2.30%), E2 (2.33%) groups and there no significant different ($P \geq 0.05$) between the groups.

The table (2) shown the male average of internal fats to carcass body weight of broiler 308. The body weight of the carcass were in C (1605.4 g), E1 (1646.4 g), E2 (1679.4 g) groups and there were no significant different ($P \geq 0.05$) among the groups. On other hand the proportion of the abdominal fat to carcass body weight were in C (1.50%), E1 (1.62%), E2 (1.61%) groups. Also the proportion of gastric fat to carcass body weight were in C (0.51%), E1 (0.46%), E2 (0.61%) groups and there were significant different ($P \leq 0.05$) between (E1) and (E2). Also the proportion of heart fat to carcas body weight were in C (0.028%), E1 (0.039%), E2 (0.059%) groups and there no significant different ($P \geq 0.05$) between the groups. In the proportion of total internal fat to carcas BW were in C (2.03%), E1 (2.13%), E2 (2.29%) groups. Our study found that the body weight was increase in experiment the groups than the control group in both gender and there were significat different ($P<0.05$) between (E1) and (E2) groups in the male groups this result confirmed the studies which made by **Simeonovová and Ingr (2000); Benková *et al.* (2002), Straková *et al.* (2002); Angelovičová *et al.* (2005); Haščík *et al.* (2005a,b)** and **Seven et al. (2008)** whose added propolis to chickens broiler Ross 308 feed mixture they found that the body weight were higher in experiment groups than control group. The proportion of abdominal fat, heart fat and total internal fat to carcass body weight were little bit higher in the experiment groups than control group in both gender and there were significant different ($P<0.05$) between (E1) and (E2) groups in female groups this result support the result which were made by **Santos *et al.* (1995); Jin *et al.* (1998); Ashayerizadeh *et al.* (2009) Haščík *et al.* (2010)** whose were added the probiotic to chickens broiler Ross 308 feed mixture they were found that the all internal fats (abdominal fat, gastric fat, heart fat and total internal fat) in experiment groups were higher than control group in both gender. In all present studies despite addition different material which were added to chickens feed mixture were increased the body weight and internal fats. So why the bee pollen are increase the carcass body weight and internal fats because the bee pollen have many of enzyme which support the digestive system to increase the efficiency of feed conversion, and also bee pollen gives food flavor which increases the rate of feed intake.

Table 1 The proportion of internal fats of broiler Ross 308 to carcass body weight (female) (%)

Indicator	Groups		
	C	E1	E2
	10	10	10
carcass body weight (g)	1573.2^{ab}±83.63	1510.4^{a}±29.91	1599.2^{b}±50.29
proportion of abdominal fat to carcass BW (%)	1.90±0.25	1.67±0.31	1.65±0.38
proportion of gastric to carcass BW (%)	0.69±0.25	0.57±0.14	0.62±0.37
proportion of heart fatto carcass BW (%)	0.046±0,015	0.047±0.016	0.049±0.022
proportion of total internal fat to carcass BW (%)	2.64±0.42	2.30±0.25	2.33±0.58

Legend: C: control group, E1: first experimental group, E2: the second experimental group note: $^{a, b}$ average values in the row which are followed by different letters are conclusive at ($P \leq 0.05$).

Table 2 The proportion of internal fats of broiler Ross 308 to carcass body weight (male) (%)

Indicator	Groups		
	C	E1	E2
	10	**10**	**10**
carcass body weight (g)	1605.4±91.41	1646.4±46.75	1679.4±81.32
proportion of abdominal fat to carcass BW (%)	1.50±0.37	1.62±0.34	1.61±0.33
proportion of gastric to carcass fat BW (%)	0.51^{ab}±0.21	0.46^{a}±0.05	0.61^{b}±0.09
proportion of heart to carcass BW (%)	0.028±0.026	0.039±0.021	0.059±0.020
proportion of total internal fat to carcass BW (%)	2.03±0.52	2.13±0.37	2.29±0.40

Legend: C: control group, E1: first experimental group, E2: the second experimental group note: $^{a, b}$ average values in the row which are followed by different letters are conclusive at ($P \leq 0.05$).

CONCLUSION

The present study found that the addition of bee pollen to complete feed mixture of chickens broiler Ross 308 as supplement diet to broiler feed have small impact on internal fats (abdominal fat, gastric fat, heart fat and total internal fats) to carcass body weight, but althuogh the internal fats in control group at female group were higher than experimental groups, the internal fat in experimental at male groups were higher than conrol groups. However the body in experimental groups was higher in both gender than conrol group.

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