

THE QUANTITY OF ABDOMINAL FAT IN BROILER CHICKEN OF DIFFERENT GENOTYPES FROM FIFTH TO SEVENTH WEEK OF AGE**

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Abstract: In this work quantity of abdominal fat (weight and portion) was examined in broilers of two genotypes in the fifth, sixth and seventh week of their growth. The examination was carried out in production conditions, in the facility for commercial fattening of broilers chickens, so all technical recommendations related to intensive rearing of chickens were provided. Broilers Cobb 500 and Hubbard Classic which were housed in separate boxes (8 boxes for each genotype) were used as a material. Forty male chickens and forty female chickens at the 5, 6 and 7 weeks of age were selected for slaughtering by random selection, so 240 all together sacrificed chickens were prepared for further treatment. By cutting of the carcasses, abdominal fat was removed and measured, and it was put in proportion to the body mass before slaughtering and in this way the share of abdominal fat was obtained. All data was statistically processed by the subprogram Basic Statistic and Anova. The chickens of the genotype Hubbard had significantly higher share (0,96%) and insignificantly higher weight (19,47g) of abdominal fat than Cobb 500 (0,83% and 17,16g). Female chickens of both genotypes in the examination had significantly higher weight (19,84g) and share (0,96%) of abdominal fat in carcass then male broilers. Chickens at the age of 49 days had statistically significantly higher abdominal fat than the chick at the age of 42 and 35 days in absolute (25,35g) and relative values (1,06%). This confirms the importance of the examined factors on the amount of abdominal fat in carcass of broiler chickens.

Key words: abdominal fat, age, genotype, broiler chickens.

Introduction

Special problem of the modern broiler hybrids is their fat load. In the past, poultry belonged to the category of diet victuals with small amount of fat, because the quantity of fat in their carcass ranged from 8% to maximum 15%. However, intensive selection has induced increase of fat in broilers which nowadays amounts to more than 18% fat in their carcass. Abdominal fat is a characteristic which is related to the total amount of fat in the body (Ricard, 1988). Crawford (1992) has concluded that the differences in weight of abdominal fat in chicken of various races and genotypes are result of the differences in body weight, so that abdominal fat should be determined for the chicken with similar weight. Sex and age have great influence on fat. Female chicken tend to be fatter than male and the older chicken have greater fat quantity than the younger ones. Hopic *et al.* (1996) did not find any significant influence of the genotype on the abdominal fat in broiler chicken carcasses. Male chicken Arbor Acres had less abdominal fat (1,21%) and female chickens with the lowest amount of abdominal fat was genotype Hybro (1,39%). Ristic (2005) stated that the amount of abdominal fat in broilers of Cobb 500 genotype was significantly smaller for 0,4% compared to Ross genotype. Ehiner and Seeman (1982) defined the weight and its influence on abdominal fat by survey of the male and female chicken of Lohman, Hybro, Ross and Hubbard hybrid lines. Hubbard chickens had greatly higher and Ross chicken significantly lower amount of abdominal fat compared to other hybrid lines. Sonaiya and Benyi (1983) conducted a research on the influence of the line, age and sex on the quantity and weight of abdominal fat in broiler chicken 12 - 16 weeks old, from which they concluded that sex and age had significant influence, but not equally, sex had greater influence than age. Female chickens produced more abdominal fat than male chicken.

Materials and methods

This research was carried out in the facility for intensive fattening of commercial chickens - Poultry farm "Gica" in Ohrid, the Republic of Macedonia. The facility was supplied with special equipment, so that the microclimatic conditions were satisfied. There were 1200 chickens in 300m² space, hybrid line Cobb 500 and 1200 one-day chickens of hybrid line Hubbard Classic, divided in 16 separate and marked boxes. All chickens were measured and weighed and than distributed by random selection so that

in each box there were 150 one-day chickens, and all production parameters were recorded. Chickens which were 5, 6 and 7 weeks old were registered and measured according to their sex, on their regular body weight controls. Chickens 5, 6 and 7 weeks old were randomly selected from each treatment, first they were weighed then marked with stamps on their wing and left without food for 12 hours. Subsequently, chickens were weighed again, slaughtered and frozen. From each treatment 10 male and 10 female chickens were chosen all with average body weight, so that the total number of sacrificed chickens was 40 males and 40 females or, in total for three weeks 240 chickens sacrificed for further manipulation. During the dissection, the abdominal fat was extracted and weighed, as well as body weight and put in proportion to the body weight before slaughtering, and yield of cooled carcasses and share of abdominal fat were obtained. Data was processed using computer program Statistic, where in the subprogram Basic Statistic and Anova average values and variability measures were defined. Age influence for slaughter characteristics was examined on three treatments (35, 42 and 49 days old) and for those characteristics with statistically significant differences in the analysis LSD test was done on 0,01% level of possibility.

Results and discussion

Weight (g) and share (%) of abdominal fat in chicken carcasses of different age, genotype and sex are shown in table 1. Chickens 49 days old had significant greater weight (25,45g) and share (1,06%) of abdominal fat than chicken at the age of 42, and 35 days.

Chickens at the age of 49 days had statistically more abdominal fat than 42 and 35 days old chickens in absolute and relative values. Chickens at the age of 42 days had more abdominal fat than 35 days old chickens. Results are in accordance to data from *Deaton and Lotto* (1985) where the increase of the share of abdominal fat with the increase of age of chickens was stated. *Bartov and Plavnik* (1998) concluded that older chickens prior to slaughtering had increased weight of abdominal fat, but not share of abdominal fat. *Albuquerque et al* (2003) concluded that there is significant increase of share of abdominal fat in chickens at the age of 49 and 35 days compared to 42 days old chickens.

On the diagram 1 graphically is shown the influence of age and sex on the weight of abdominal fats for genotype Cobb500 and Hubbard.

Table 1. Mass (g) and portion (%) of abdominal fat at chickens by different genotype, age and sex

Trait	Carcass fat			
	Abdominal fat, g		Abdominal fat, %	
	X	S.D.	X	S.D.
Age				
35. day	11,43 ^c	5,85	0,73 ^c	0,35
42. day	18,08 ^b	6,78	0,90 ^b	0,35
49. day	25,45 ^a	9,70	1,06 ^a	0,40
Genotype				
Cobb 500	17,16	9,53	0,83	0,38
Hubbard	19,47	9,40	0,96	0,40
Sex				
Males	16,79	8,21	0,83	0,35
Females	19,84	10,48	0,96	0,42
Signifikance (F test)				
Genotype	NS		*	
Sex	*		*	

* ($p < 0,05$), *S.S.D.*-Statistically Significant Difference ($p < 0,05$)

NS –No *S.S.D.*

a-c - average values of significant different on level of 5%

Hubbard chickens (19,47g) had more abdominal fat in their carcasses than Cobb 500 (17,16g), but this difference was not statistically significant. The share of abdominal fat in Cobb 500 and Hubbard chickens was significantly different and it was greater in Hubbard chickens (0,96%). Hubbard chickens in this experiment had considerably greater share of abdominal fat than Cobb 500. Because of high variability of examined characteristic and approximately similar body weight before slaughtering the differences can be explained only by influence of different genotype. *Acar et al.* (1991) recorded differences in accumulation of abdominal fat in chickens of different genotypes which indicated great influence of genetic factor. Significant differences in share of abdominal fat in chicken carcasses of different genotype is in accordance to results by *Bilgili et al.* (1992), *Ristic* (1993) and *Hopic et al.* (2000). *Smith and Pesti* (1998) confirmed the information that genotype has significant influence on weight and portion of abdominal fat.

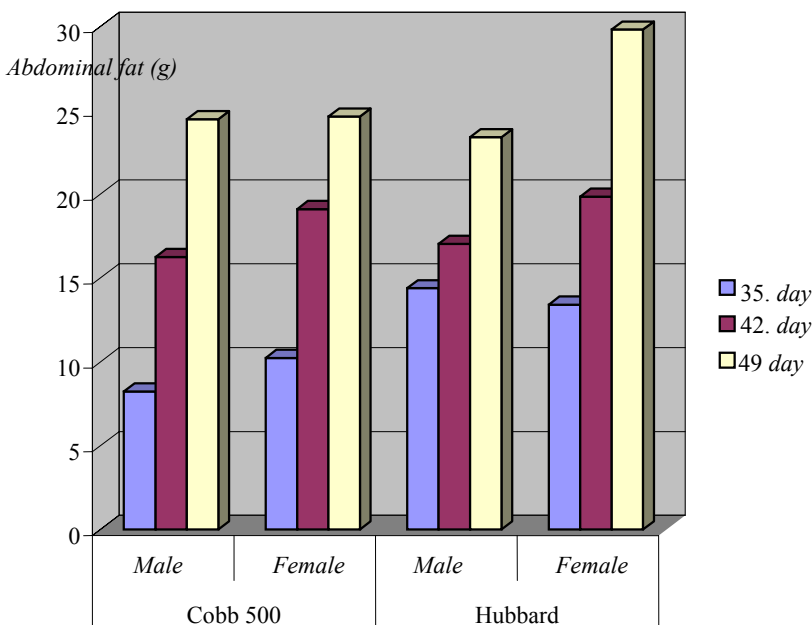


diagram 1

Female chickens had significantly greater weight (19,84g) and share (0,96%) of abdominal fat in carcasses than male chickens. Male chickens in this survey had less abdominal fat in their carcasses than female chickens and probably these differences were result of different metabolism and different capacities for fat accumulation. This is in accordance to *Corzo et al.* (2005) who defined higher percentage of abdominal fat and share of breast in female chickens than in males. *Sonaiy and Benyie* (1983) found that there is greater amount of abdominal fat in female chicken bodies which was result of later defined amount of abdominal fat. This greater amount of abdominal fat in female chicken carcasses compared to males was also established by *Milosevic et al.* (1989) and *Hopic et al.*(1996) but differences were not statistically important. Females had higher share of abdominal fat than males in *Pavlovski et al.* (1992) survey, but the influence of sex was established only for nutrition of chickens with energetically richest diets. Influence of sex of chickens on abdominal fat was important in researches of *Jackson et al.* (1982) so that females had significantly greater absolute value of abdominal fat compared to male chickens.

Abdominal fat is characteristic with high variability, which is in accordance with many results published in our country and abroad. Standard deviations of weight of abdominal fat varied from 5,85-10,48, while standard deviations of rate of abdominal fat were from 0,35-0,42 (tab.1).

The greatest variance in analysis of variance of weight (67,71) of abdominal fat was defined in the effect of age. Other variances of the weight of abdominal fat were very lower and they varied from 3,59-6,29 (tab. 2).

Table 2 Variance of age, genotype and sex in absolute and relative various of abdominal fat

Trait	Variance		
	Age	Genotype	Sex
Abdominal fat, g	67,71	3,59	6,29
Abdominal fat, %	16,09	6,77	6,62

Greater variances were observed in rate of abdominal fat which were from 6,62 (sex) to 16,09 (age).

Conclusions

Main aim of this study was to confirm the effect of genotype and sex on broiler carcasses of different ages. After completion of experiment and statistically calculated results the following conclusions can be derived:

- Abdominal fat in broiler carcasses increased significantly with the age of chickens. Chickens at the age of 49 days had significantly more abdominal fat than chickens that were 42 and 35 days old.
- Chickens of Hubbard line had significantly greater share of abdominal fat than Cobb 500 line chicken.
- Female chickens had significantly more abdominal fat, weight and share, in their carcasses than male chicken.

KOLIČINA ABDOMINALNE MASTI KOD BROJLERSKIH PILIĆA RAZLIČITOG GENOTIPA OD PETE DO SEDME NEDELJE UZRASTA

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Rezime

Glavni zadatak ovog rada bio je ispitati uticaj genotipa, uzrasta i pola na količinu abdominalne masti u trupu brojlerskih pilića. Pri tome su kao materijal korišćeni pilići dve hibridne linije Cobb 500 i Hubbard Classic, kojima se masa i udeo abdominalne masti u trupu ispitivala na 35., 42. i 49.dana starosti.

Pilići genotipa Hubbard imali su značajno veći udeo (0,96 %) abdominalne masti u odnosu na piliće genotipa Cobb (0,83 %) i neznajno veću masu (19,47 g) abdominalne masti od pilića Cobb (17,16 g). Kokice oba genotipa su u istraživanju imale značajno veće mase (19,84g) i udeo (0,96%) abdominalne masti u trupu od petlića. Pilići uzrasta 49.dana imali su statistički značajno više abdominalne masti od pilića 42. i 35. dana u apsolutnim (25,35g) i relativnim vrednostima (1,06%). Pilići uyrasta 42. dana su imali značajno više abdominalne masti (masa i udeo) u trupu od pilića 35. dana starosti. Ovim se dokazuje značajnost uticaja ispitivanih faktora na količinu abdominalne masti u trupovima brojlerskih pilića. Velika varijabilnost mase abdominalne masti zajedno sa visokom naslednošću nudi povoljne izgleda ka selekciji ove osobine u smislu njezinog umanjivanja u trupovima brojlerskih pilića.

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