

CORRELATION BETWEEN SOME INDICATORS OF BROILER CARCASS FAT

Z. Pavlovski^{1*}, Z. Škrbić¹, D. Vitorović², M. Lukić¹, V. Petričević¹, A. Stanojković¹, M. Petričević¹

¹Institute for Animal Husbandry, Autoput 16, 11080, Beograd-Zemun, Republic of Serbia

²University of Belgrade, Faculty of Agriculture, Nemanjina 6, 11080, Belgrade-Zemun, Republic of Serbia

Corresponding author: zlaticapav@yahoo.com

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Abstract: Fifty-two (26 males and 26 females) week old broilers were examined for carcass fat characteristic. The phenotypic correlation coefficients between abdominal fat and other traits were: 0.65 – left external sartorial; 0.51 – right external sartorial fat; 0.65 – total external sartorial fat; 0.51 – left internal sartorial fat; 0.46 total internal sartorial fat; 0.66 – total left sartorial fat; 0.49 – total right sartorial fat; 0.63 – total sartorial fat; 0.37 – back skin pinch thickness (under wings).

Key words: broiler, carcass fat, correlation

Introduction

The increased fat content in carcass of broilers, as a result of long-term selection for rapid weight increase, represented, and still represents one of the biggest problems of this type in poultry production (*Lin, 1981; Soller and Eiten, 1984; Leclercq and Guy, 1991; Leenstra, 1986*). Increased fat content is not favorable both for producers (chickens have poor utilization of food) and for consumers (negative attitude to animal fats in the human diet).

Numerous tests were performed in order to establish criteria for assessing the amount of carcass fat tissue. Most of them paid special attention to measuring the presence of abdominal fat (*Pym and Thompson, 1980; Miroch and Becker, 1984; Sonaiya, 1985; Milošević et al., 1987*). In contrast, there are few studies that use some other indirect methods as an indicator of carcass fat (*Miroch et al., 1981; Burgener et al., 1981; Antonijević et al., 1988*). *Zerehdaran et al. (2004)* have found high genetic correlation between abdominal fat amount/mass and skin mass (0.54), whereas the genetic correlation between abdominal and percentage of fat within the muscle (intramuscular fat) is very low, almost zero (0.02). A positive genetic correlation was determined between weight gain (7 weeks) and indicators

of fat of broiler chickens, which was high for the percentage of intramuscular fat (0.87), medium for the percentage of skin (0.17) and share of abdominal fat (0.13).

Kleczek et al. (2010) indicate that the determination of the best indicators of fat tissue and the share of meat in carcass of broiler chickens have been the subject of numerous studies. The most accurate data are obtained by dissection of certain body parts. In this study, the authors have used mass of different muscles of the carcass as indicators in the assessment.

With this in mind we felt justified to investigate the correlation between some indicators of broiler carcass fat and the amount of abdominal fat.

Materials and Methods

In comparative testing of broilers, which lasted 6 weeks (42 days) and carried out with three hybrids, and between which no significant differences in the amount of abdominal fat were established, a random sample of carcasses of 26 males and 26 females, i.e. 52 chickens of both sexes was taken. On each carcass characteristics were measured as indicators of the presence of fat tissue. The following properties were measured on each carcass:

- Abdominal fat, g,
- External sartorial fat, g (mast extracted from the surface of *m. sartorius*),
- Internal sartorial fat, g (fat extracted below the caudal edge of *m. sartorius*),
- Sartorial fat, total, g (calculated based on previous two measures),
- Back skin pinch, mm (measured using the caliper over the first dorsal vertebra with accuracy 0.1 mm),
- Wingweb thickness, mm (measured using the slide rule on the inner side of the elbow joint with accuracy 0.1 mm),
- Caudal skin pinch (under wing) thickness, mm (measured using the slide rule on the inside in front of the shoulder joint with accuracy 0.1 mm).

All results were processed using conventional variation-statistical methods, while phenotypic correlation coefficient was calculated between the abdominal fat and other studied parameters.

Results and Discussion

The results of measurements of selected indicators of broiler carcass fat are shown in Table 1.

It can be seen from the presented data that the highest amount of fat tissue is deposited in the abdominal cavity, which was in average of 18.25 g, and in a rather wide range of 5.86 to 37.05 g. Other indicators of carcass fat expressed through internal and external sartorial fat on the left and right limb (thigh) had significantly lower average values. External sartorial fat, both from the right side (1.46 g) and the left (1.48 g) and total (2.92 g) was significantly higher than the internal (1.09 g; 1.10 g; 2.20 g). Between sartorial fat from the left and right sides of the body there were no significant differences. Thus the total sartorial fat from the left thigh was 2.58 g, and 2.53 g from the right.

The average value of the back skin pinch the back was 3.40 mm, wingweb thickness of 1.72 mm, a caudal skin pinch thickness under wings of 0.58 mm.

All investigated parameters showed a high variability (CV 30 - 40%).

Table 1. Indicators of broilers carcass fat

Trait	x	Sx	CV
Abdominal fat, g	18.25	1.00	39.34
Left external sartorial fat, g	1.48	0.01	37.84
Right external sartorial fat, g	1.46	0.07	37.00
Total external sartorial fat, g	2.92	0.15	36.30
Left internal sartorial fat, g	1.10	0.04	29.09
Right internal sartorial fat, g	1.09	0.05	30.27
Total internal sartorial fat, g	2.20	0.09	28.64
Total left sartorial fat, g	2.58	0.11	31.01
Total right sartorial fat, g	2.53	0.11	30.43
Total sartorial fat, g	5.12	0.21	29.87
Back skin pinch thickness, mm	3.40	0.14	29.52
Wingweb thickness, mm	1.72	0.07	28.23
Caudal skin pinch (under wing) thickness, mm	0.58	0.03	41.03

Coefficients of phenotypic correlations between selected indicators of carcass fat and abdominal fat are shown in Table 2.

According to Roemer - Orphal classification for the strength of correlation between characteristics, established correlation coefficients (Table 2) showed mainly medium and strong link between abdominal fat and sartorial fat. This is in line with the results of *Burgener et al. (1981)*, who point out that, given that the external sartorial fat can be separated on live chickens through biopsy, this analysis provides an opportunity for assessing the amount of abdominal fat without slaughtering chickens. On the other hand, based on such analysis, it may be possible at an earlier age to estimate the amount of abdominal fat that will be deposited at a later age.

Table 2. Correlations between abdominal fat and selected indicators of broiler carcass fat

Trait	xy
Abdominal fat, g	1.00
Left external sartorial fat, g	0.65
Right external sartorial fat, g	0.51
Total external sartorial fat, g	0.65
Left internal sartorial fat, g	0.51
Right internal sartorial fat, g	0.34
Total internal sartorial fat, g	0.46
Total left sartorial fat, g	0.66
Total right sartorial fat, g	0.49
Total sartorial fat, g	0.63
Back skin pinch thickness, mm	0.37
Wingweb thickness, mm	0.11
Caudal skin pinch (under wing) thickness, mm	-0.01

It is particularly interesting, as our results show, that in this respect it may be sufficiently reliable to extract external sartorial fat from only one side of the body, in this case the left side.

The relatively good correlation (0.37) between the back skin pinch thickness and amount of abdominal fat is in accordance with the results of *Petersen and Horst (1983)*. In contrast, the correlation between abdominal fat and wing skin pinch thickness and skin pinch thickness under the wings was not established, as confirmed by the results of *Miroch et al. (1981)*. The fact that the problem of broiler carcass fat still has not been resolved, is proven by research of *Bosho et al. (2013)*. According to this group of researchers, until today, numerous studies have been carried out in order to determine the most accurate indicator of the share of meat and fat in the carcass of broilers. They have made a modification of the method of removing the skin with subcutaneous fat on the carcass. They found that the weight of the removed skin, with the subcutaneous fat from the whole carcass (without the parts of the wings and legs) are highly significantly correlated with the total subcutaneous and intramuscular fat of broiler chickens. Carcass weight without (removed) skin is a good indicator of total meat in the carcass.

Conclusion

Based on the results obtained the following can be concluded:

- Between the amount of abdominal and sartorial fat and thickness of the skin on the back there is a medium and strong correlation.

- Between the amount of abdominal fat and thickness of the skin on the wings and under the wings there is no correlation.
- All indicators of carcass fat of broiler chickens belong to the group with high variability.

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Korelacije između nekih pokazatelja masnoće trupa brojlera

Z. Pavlovski, Z. Škrbić, D. Vitorović, M. Lukić, V. Petričević, A. Stanojković, M. Petričević

Rezime

Ispitivanja osobina masnoće trupa obavljena su na 52 pileta (26 petlića i 26 kokica) u uzrastu 42 dana. Koeficijent fenotipske korelacije između abdominalne masti i ostalih osobina bili su: 0,65 leva spoljašnja sartorijalna mast; 0,51 – desna spoljašnja sartorijalna mast; 0,65 – ukupna spoljašnja sartorijalna mast; 0,51 – leva unutrašnja sartorijalna mast; 0,34 - desna unutrašnja sartorijalna mast; 0,46 - ukupna unutrašnja sartorijalna mast; 0,66 - ukupna leva sartorijalna mast; 0,49 – ukupna desna sartorijalna mast; 0,63 – ukupna sartorijalna mast; 0,37 – leđni kožni nabor; 0,11 – krilni nabor i 0,01 - kožni nabor ispod krila.

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