THE EFFECT OF GENOTYPE AND REARING SYSTEM ON THE SELECTED QUALITY PARAMETERES OF BROILER MEAT

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Introduction

Modern poultry production, which has all the traits of the industrial one, has substantially pushed out the traditional production of poultry meat and eggs. This trend resulted in poorer product quality, higher production costs and unnatural way of poultry rearing. Therefore, in recent years there has been a growing trend of 'return to nature' in poultry rearing, primarliy aimed at the production of biologically valuable food.

Bearing this in mind, the topic of our research within this theme was the analysis of certain parameters of broiler chicken meat, reared in two different ways (intensive and semi-intensive fattening). Besides, the subject of this paper was to study the effect of different genotypes on the analyzed parameters of meat quality. Thus, the paper aimed at considering the justification of applying one mode of semi-intensive system of rearing broiler chickens from the aspect of producing better quality meat.

Material and Methods

The initial material in this experiment involved a total of 800 one-day chicken of line hybrids Hybro and Ross 208. A half of the total chicken number belonged to the former, and the other half to the latter hybrid studied.

Studies were conducted in two stages. The first stage implied broiler fattening from the 1st to the 49th day of age, and the second involved testing qualitative meat characteristics of experimental chicken.

Rearing chicken during the first two weeks was done within the same facility on the floor with a deep covering. After that, i.e. on the 14th day of age, the experimental chicken were divided into 4 groups (two of each hybrid) and displaced. Namely, before the onset of the trial, two boxes were made within the facility. One box was housed with a group of Hybro chicken, and the other with the Ross 208 group. The housing stand in these boxes was 18 fowls per square metre, and the fattening was carried out under conditions adequate to modern production. The boxes were also prepared for the fowls of other two groups within the facility, but they were also provided with outlets, i.e. one mode of semi-intensive rearing system.

Following fattening, to study qualitative properties of broiler meat reared in the first part of the experiment, 30 fowls were slaughtered from each experimental group (15 male and 15 female) selected by the random design. The processed and cooled carcasses were then dissected into main parts (breast, drumsticks, thighs, wings, pelvis and back). After dissection, to assess the yield and share of basic tissues (muscle, bones and skin), dissection of breasts, drumsticks and thighs was carried out. Concurrently, the samples of muscle tissue from the mentioned major parts of carcass were taken for chemical analyses.

The analysis of data obtained from this study was carried out by applying common methods of variation statistics. Testing of the significance of differences shown was done by the following mathematical model of analysis of variance:

$$Y_{ijk} = \mu + (G)_i + (SG)_{ij} + e_{ijk}$$

i.e. the model which was suited to the plan of two-factorial experiment 2 x 2 (2genotypes, G and 2 rearing systems, SG).

Study results and discussion

As major quality parameters within results obtained with this study, the stress was laid on the share of individual meat categories in processed carcasses of broiler chicken, the share of basic tissues in main carcass parts, and meat chemical composition.

Data on the share of the individual meat categories are presented in table 1.

Tab.1. The share of particular meat categories in prepared carcasses (%)

Genotype	Rearing system		Meat categories		
			I	II	III
Hybro	In	$\bar{x}$	59.73	12.82	26.88
		Cv (%)	3.19	6.22	7.21
	Pi	$\bar{x}$	60.27	12.57	26.51
		Cv (%)	3.34	5.86	7.77
Ross 208	In	$\bar{x}$	59.57	12.70	27.09
		Cv (%)	3.35	6.29	7.15
	Pi	$\bar{x}$	60.68	12.45	26.32
		Cv (%)	4.06	6.88	8.96

The table 1 shows that broiler chicken from both hybrids studied, reared in outlets, had a higher share of the first class meat category as compared to the fowls from intensive fattening, which, therefore, had somewhat higher share of the second and the third meat categories, respectively. Besides, test results also revealed that in terms of the share of the first class meat, statistically very significant differences were found in favour of semi-intensively reared broilers. On the other hand, as for the share of the second, i.e. the third class meat, as well as the results obtained by rearing different genotypes, differences were nonsignificant.

For further evaluation of quality, the results of dissection of basic tissues of breasts, drumsticks and thighs (table 2) were discussed.

Tab.2. The share of basic tissues in better carcass parts (%)

Genotype	Rearing system		Basic tissue		
			Muscles	Bones	Skin
Hybro	In	$\bar{x}$	65.73	23.43	9.72
	Pi	$\bar{x}$	67.63	22.26	8.93
Ross 208	In	$\bar{x}$	66.70	22.77	9.50
	Pi	$\bar{x}$	67.02	22.31	9.47

On the basis of the data given in Table 2, it may be inferred that broilers reared in outlets as compared to the fowls from intensive production had at average for 1.11% higher share of muscle tissue (the difference was statistically significant), and for 0.81%, i.e. 0.41%, lower share of bones, i.e. skin in the total breast, drumsticks and thighs mass. In terms of bone and skin share, the differences observed, coupled with those between genotypes studied, were not statistically justified in that respect.

The stated results can be accounted for by the fact that the broiler production in two ways, i.e. under closed conditions, limited space and controlled microclimate annd by rearing in outlets, i.e. in natural environment, respectively, also resulted in differences in biochemical processes in metabolism, and indirectly in physiological and structural manifestation of tissues and organs.

Besides reduced opportunities for comparisons with data from the literature available, it may be inferred that the study results presented in this paper are in accordance with those reported by Ristić (1977), Varga (1981), as well as Bogosavljević-Bošković (1996).

Chemical meat composition is certainly a significant quality parameter. Table 3 presents the study results of the basic chemical composition of breast, drumstick and thigh muscles.

The analysis of these data reveals that a lower lipid and somewhat protein contents were typical of the muscles of the major carcass parts of broiler chicken from semi-intensive fattening as compared to those reared intensively.

Tab.3. The contens of lipids (L) and proteins (P) in better carcass parts muscles

Genotype	Rearing system		Breasts	Thighs	Drumsticks
Hybro	In	L	2.64	8.18	5.21
		P	22.84	18.62	20.70
	Pi	L	2.27	7.08	4.86
		P	23.56	19.21	21.75
Ross 208	In	L	2.42	8.44	5.52
		P	23.13	18.77	20.42
	Pi	L	2.38	7.92	5.02
		P	23.38	18.90	21.12

The observed differences of the chemical meat composition may result from the accelerated metabolism of lipids and carbohydrates, induced by rearing in outlets, as also reported by Ricardo (1989), who found a low lipid content in the carcasses of broilers reared in groups at lower stocking density per m^2 of floor space.

Conclusion

On the basis of the study results of the effect of the genotype and rearing system on some parameters of meat quality in broiler chicken, it can be concluded that semi-intensive fattening was superior in that sense to the intensive one. Namely, a higher share of the I class meat, as well as larger share of muscle tissue in major carcass parts was found in broiler chicken reared in outlets. Besides, the muscle tissue of these chicken was distinguished by a lower lipid and a somewhat higher protein content. In this respect, the differences between the genotypes studied were small and statistically non-significant.

Pertinent literature

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