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CARCASS QUALITY OF BROILER CHICKENS OF TWO HYBRID LINE SLAUGHTERED IN DIFFERENT AGE

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The evaluation of carcass quality of broiler chickens is a very important segment in production, manufacture and marketing of poultry products, which depends of many factors. The aim of this experiment was to determine some criterions of carcass quality (carcass mass, dressing percentage and their variances) of fattening chickens in dependence on the following factors: hybrid, sex, age and mixture composition. Forty male and forty female chickens of two hybrid lines Cobb 500 and Hubbard Classic at the fifth, sixth and seventh weeks of age were selected for slaughter by the random selection method. Chickens were fed with two different mixtures which contented different level of protein and energy and different values of the E : P rate. The dressing percentage was represented by three kinds of dressings: basic or traditional dressing, "ready for roasting" and "ready for grilling". The obtained results showed statistically significant ($P < 0.05$) influence of age and sex on the carcass mass. Namely, the broiler chickens slaughtered at the seventh age of week as well as the male chickens had the biggest carcass mass in all kind of dressing. The factor age had statistically significant ($P < 0.05$) influence on the dressing percentage in general, while the factor hybrid had a significant ($P < 0.05$) influence only on the dressing "ready for grilling". Female broiler chickens in comparison with male chickens had a better dressing percentage at all kinds of dressing, but those differences were not statistically significant. Differences in carcass mass and dressing percentage under the influence of mixture composition were almost insignificant.

Key words: broiler chickens; carcass mass; dressing percentage; hybrid; sex; age; mixture composition

КВАЛИТЕТ НА ТРУПОТ КАЈ БРОЈЛЕРСКИ ПИЛИЊА ОД ДВЕ ХИБРИДНИ ЛИНИИ ЗАКЛАНИ НА РАЗЛИЧНА ВОЗРАСТ

Оцената на квалитетот на трупот кај бројлерските пилиња е многу важен сегмент во производството, преработката и продажбата на живински производи и зависи од повеќе фактори. Целта на овој експеримент беше да се утврди одреден квалитет на трупот (маса, рандман и варијанси) кај гоени пилиња во зависност од хибридот, полот, возраста и составот на смеските. На возраст од 5, 6 и 7 недели, по методот на случаен избор, беа одвоени и заклани по 40 машки и 40 женски бројлерски пилиња од хибридните линии Cobb 500 и Hubbard Classic, кои користеа смески со различен енергетско-протеински состав и различен однос на E : P. Рандманот беше прикажан преку три обработки на трупот: основна или класична обработка, „готово за печење" и „готово за ражен". Резултатите покажаа статистички значајно ($P<0,05$) влијание на возраста и полот врз масата на трупот. Имено, пилињата заклани во седмата недела на живот, како и машките пилиња имаа најголема маса на трупот во сите три обработки. Врз рандманот статистички значајно ($P<0,05$) влијание во целина имаше факторот возраст, додека хибридот влијаеше ($P<0,05$) единствено кај рандманот „готово за ражен". Женските бројлерски пилиња во однос на машките имаа подобар рандман во сите три обработки, но тие разлики не беа статистички значајни. Разлики во масата и рандманот на трупот под влијание на исхраната речиси и да немаше.

Клучни зборови: бројлерски пилиња; маса на труп; рандман; хибрид; пол; возраст; состав на смеска

1. INTRODUCTION

The main goal of broiler rearing is production of quality broiler carcasses that will be acceptable from the consumers. Acceptability depends on the quality and quantity of edible parts of carcasses, and the amount of muscle mass in carcass. Broilers carcasses are evaluated mainly through yield edible parts of which are expressed by dressing percentage (slaughter yields) and the quality of edible parts of carcass. All quality characteristics of carcass are inherent in the hybrids (genotype) and are therefore conditionally hereditary characteristics with precisely defined heritability proposed values. In the event of certain properties and their connections, environmental conditions play an important role.

Chen et al. (1987) examined the mass and slaughter yields of male and female carcass of Arbor Acres, Hubbard, Indian River and Ross × Arbor Acres hybrids at different ages. The genotype had no significant influence on the examined properties, as opposed to sex and age. Namely, males had significantly bigger carcasses than females at all ages. Slaughter yields were higher in the males in all age groups, and the reason was significantly greater slaughter mass of male broiler chickens. Feijen (1997) in four experiments examined slaughter properties of broiler carcass in ten genotypes. The highest dressing percentage of "ready for the grill" had Cobb 500 chickens, while Hybro was the fourth in the range of chickens. Elwinger (1981) in two experiments examined the influence of the level of energy in the meals on the dressing percentage of different genotypes. In the first experiment were Ross and Hybro chickens and in the second Hybro and Hubbard chickens. The hybro genotype had a greater dressing percentage than Ross and Hubbard. Between the genotypes Hybro and Ross there were no statistically significant differences in the slaughter yield “ready for the grill”. Renden et al. (1992) and Acar et al. (1991) have not found significant differences in comparison with the dressing percentage “ready for the grill” at two commercial genotypes of broiler chickens. Acar et al. (1991), Holsheimer and Veerkamp (1992), Bartov and Plavnik (1998) found that the mass of carcass was not under the influence of the energy-protein level of food in the 43rd day of age, while on the 53rd day of age the carcass mass increased significantly in chickens fed with meals with low energy-protein ratio as well as in the chickens fed with high energy-protein meals.

The aim of this experiment was to determine some criterions of carcass quality (carcass mass, dressing percentage and their variances) of fattening chickens in dependence on the following factors: hybrid, sex, age and mixture composition.

2. MATERIAL AND METHODS

The research was taking place on the farm for the intensive rearing of the broiler chickens or in the production conditions. One-day chickens of the hybrids Cobb 500 and Hubbard Classic in the amount of 2400 in number were taken as a material. They were grown in 16 separate stalls that included 4 different treatments (two genotypes × two mixtures.) The chickens were fed with two different mixtures, which contained various quantities of energy and protein as well as the ratio E : P.

Table 1

Chemical composition and nutritive value of mixture 1 and mixture 2 for broiler nutrition

Chemical composition	Starter (1-2 wk.)	Grower (3 wk.)	Finisher 1 (4-5 wk.)	Finisher 2 (6-7 wk.)
Mixture 1				
ME. kcal/kg	3069.08	3197.20	3225.20	3212.30
Crude protein, %	23.03	22.04	21.06	19.20
Energy : Protein ratio	133.27	145.04	153.14	167.35
Mixture 2				
ME, kcal/kg	3047.38	3107.70	3099.52	3100.58
Crude protein, %	23.54	22.55	22.02	21.95
Energy : Protein ratio	129.47	137.83	140.76	141.24

Chickens were reared to the age of 7 weeks. At the end of 5, 6 and 7 weeks 40 male and 40 female chickens with the average weight by the method of random selection were selected and slaughtered. The processing of 240 carcasses was based on the Regulation on quality of poultry meat (1981), when three kinds of dressing percentage: classic processing, “ready for cooking” and “ready for grill”, were received. The results obtained were the masses and slaughter yields of carcasses and variance for all processing.

Data were collected in computer and analyzed using the method of variance analysis and F-test (Stat. Soft. Inc. Statistic, version 6).

3. RESULTS AND DISCUSSION

The masses of chicken carcass of different genotype, sex, age and feeding system are shown in Table 2.

The biggest carcasses were measured of chickens with the age of 49 days at all processing (2102.52 g classic processing, 1939.16 g "ready for cook" and 1762.01 g "ready for grill"). These carcasses were significantly ($P < 0.005$) bigger than carcasses of broiler chickens in 42nd and 35th day of age.

Table 2

Mass of chicken carcasses at different genotype, sex, age and feeding system

Factor	Classic processing, g	S.D.	Ready for cook, g	S.D.	Ready for grill, g	S.D.
Age						
35 days	1313.55	161.20	1205.15	149.43	1073.80	140.51
42 days	1711.55	160.85	1584.52	146.26	1424.82	131.65
49 days	2102.52	225.47	1939.16	191.77	1762.01	176.52
Genotype						
Cobb 500	1711.95	394.81	1578.59	358.27	1429.67	334.12
Hubbard Classic	1706.46	348.61	1573.97	325.95	1410.76	304.48
Sex						
Male	1833.47	364.25	1690.75	341.74	1522.69	318.75
Female	1568.00	327.80	1445.45	292.43	1303.10	277.57
Feeding system						
Mixture 1	1722.87	379.62	1594.24	358.14	1434.73	337.62
Mixture 2	1695.42	364.60	1558.32	325.11	1405.69	300.19
Signicifant (F-test)						
Age	*		*		*	
Genotype	N.S.		N.S.		N.S.	
Sex	*		*		*	
Feeding system	N.S.		N.S.		N.S.	

Several researchers have found a significant influence of the slaughter age on the carcass mass of chickens (Brake et al., 1993, Nunes, 1994; Rabello, 1996) in contrast to Reddy et al. (1990) who did not determine the influence of age on this slaughter property. Chen et al. (1987) examined the mass and slaughter yields of carcass in males and females of different genotypes at several different ages. The genotype had no significant influence on the examined properties, as opposed to sex and age.

Cobb 500 hybrid had some bigger carcasses than chickens of Hubbard hybrid, but the obtained differences were not statistically significant. Hopic et al. (1996) have not recorded significant differences between genotypes. Farran et al. (2000) have not found significant differences in processing "ready for cook" of different genotypes, but there was a difference in the dressing percentage between sexes of different genotypes. The investigations of Shanin and Elazeem (2005) showed that the carcass mass was not under a significant influence of the genotype, of the possible reasons that the investigated hybrids (Hubbard and Anak) were not much genetically different and were in the same physiological development.

Carcasses of male chickens were significantly ($P < 0.005$) bigger (for 220–260 g) at all processing in comparison with the carcasses of female chickens. Carcass masses in the investigations of Ristić (1991, 1993, 1995) and Hopić (1996), were significantly higher in the male chickens in relation to the female, which resulted on large differences in the body weight.

Chickens which were fed with mixture 1 had some larger carcasses than chickens fed with mixture 2, but differences in the mass of carcass statistically significant.

The carcass mass was in connection with a high correlation of chicken's body mass before the slaughtering, which caused chickens in different genotypes and different systems of nutrition not to approve statistically significant differences.

The age of chickens in slaughter processing had a significant ($P < 0.005$) influence on the obtained values of dressing percentage (Table 2). The biggest slaughter yields of carcasses were established in chickens at the age of 49 days. The slaughter yields of this group of chickens were extremely high and amounted 87.35% at "classic processing", with 80.52% at "ready for cook", and 73.16% in "ready for grill". Chickens 42 days of age had significantly higher slaughter yields "ready for grill" (70.05%) than chickens 35 days of age (68.44%).

Hubbard chickens had some higher dressing percentage of "classic processing" than Cobb 500 chickens, while the slightly bigger "ready for cook" had carcasses of Cobb 500 broilers but these differences were not statistically significant. However, Cobb 500 chickens had significantly ($P < 0.005$) "ready for grill" (71.20%) dressing percentage opposed to chickens Hubbard (69.70%). Pavlovski et al. (1992) determined high impact of the slaughter body mass of chickens on the carcass dressing percentage of different genotypes. Significantly, differences in terms of percentage shares of dressing percentage in different genotypes were found by Orr et al. (1984) and Pescatore et al. (1992), which was the result of different body masses before the slaughter. Szalkowska and Meller (1997) have found a significant influence of the genotype on the carcass mass of broiler chickens, but it was not connected with the influence of the body mass.

Females in the study had greater slaughter yields than males. Differences between sexes were small (0.20–0.22%). Statistically significant differences are not confirmed. In this paper, sex had no influence on the obtained values of slaughter yields, which was in accordance with the results of authors Ristić (1981) and Hopić (1996). Significant differences in the carcass mass between sexes and the genetic line were recorded by Rondelli et al. (2003).

Chickens fed with different mixtures had the same dressing percentage "classic processing" (85.08%) of carcass. Slightly higher slaughter yields "ready for cook" (78.65%) and "ready for grill" (70.63%) had chickens fed with mixture 1, but the established differences were not statistically significant. Pavlovski et al. (1992a) found that under the diet of chickens with energy meals, males had significantly higher dressing percentage "classic processing" and "ready for cook", than females. Sex was not affected on processing "ready for grill" in other diets or other mixtures.

Table 3

Slaughter yields of chicken carcasses at different genotype, sex, age and feeding system

Factor	Classic processing %	S.D.	„Ready for cook" %	S.D.	„Ready for grill" %	S.D.
			Age			
35 days	83.77	2.84	76.85	2.61	68.44	2.83
42 days	84.12	1.75	77.89	1.65	70.05	2.13
49 days	87.35	5.22	80.52	1.19	73.16	1.48
			Genotype			
Cobb 500	85.40	5.06	78.71	2.65	71.20	3.09
Hubbard	85.75	2.22	78.12	2.20	69.70	2.67
			Sex			
Male	84.99	2.26	78.32	2.25	70.45	2.61
Female	85.19	5.21	78.53	2.67	70.67	3.31
			Feeding system			
Mixture 1	85.08	2.36	78.65	2.44	70.63	3.05
Mixture 2	85.08	5.01	78.19	2.45	70.47	2.86
			Significant (F-test)			
Age	*		*		*	
Genotype	N.S.		N.S.		*	
Sex	N.S.		N.S.		N.S.	
Feeding system	N.S.		N.S.		N.S.	

In the presented paper, different mixtures in diet of chickens had no significant influence on the carcass mass and dressing percentage of broiler chickens. The paper of Plavnik and Bartov (1998) determined the influence of diet with lower values of energy: protein ratio than the recommended on increasing the carcass share to 0.6% and increasing the breast meat yield to 2.4%, which could be attributed to the sensitivity of the carcass meat composition on manipulations with diet. This rela-

tionship of diet is also recommended when left to slaughter chickens in a relatively higher age.

Dressing percentage is characteristic of the low variability. Low variability within the group makes it easier to manifest statistically significant differences.

In analyzing variances of testing factors, the greatest influence on the carcass mass had chickens at slaughter age. Variance from the age ranged from 363.69 at the dressing percentage "classic processing" to 416.54 at "ready to cook" carcass (Table 4). Sex of chickens had considerably lower effect on the mass of carcass. The genotype chickens and feeding system had very low influence on the carcass mass. Obtained variances of diet varied from 0.32–0.66, while in genotype were lower and varied from 0.01–0.21.

Table 4

Variances of carcass mass and dressing percentage of chickens of different age, genotype, sex and feeding system (g)

Factor	*Variance*			
	Age	Genotype	Sex	Feeding system
Carcass mass				
„Classic processing"	363.69	0.01	35.02	0.32
„Ready for cook"	401.71	0.01	35.16	0.66
„Ready for grill"	416.54	0.21	31.95	0.49
Randman				
„Classic processing"	24.23	1.63	0.15	0.00
„Ready for cook"	78.49	3.55	0.46	2.14
„Ready for grill"	94.10	12.09	0.32	0.16

As with the carcass mass, the highest variances of dressing percentage were established at the influence of age. Variances from age were ranged from 24.23 in "classic processing" to 94.10 "ready for grill". The genotype had a great impact on processing "ready to grill", and the variance was 12.09. Other variances were significantly lower and varied from 0.00 in the feeding system for "classic processing" to 3.55 at the genotype for dressing percentage "ready for cook".

4. CONCLUSIONS

On the basis of arranged data from this experiment some important conclusions were drawn:

– Broiler chickens at 49th day of age had significantly ($P < 0.05$) greater mass of carcasses than chickens aged 42nd and 35th day, such as carcasses of chickens aged 42nd were significantly bigger than carcasses of chickens aged 35 days.

– The biggest dressing percentages were established in chickens grown to 49 days and they were statistically significant ($P < 0.05$). Dressing percentage of chickens aged 42 and 35 days were significantly lower.

– The genotype in the analysis of carcass mass did not show a significant influence while in dressing percentage testing had a statistically significant ($P<0.005$) effect only with the processing "ready for grill". Namely, Cobb 500 chickens had significantly greater carcass "ready for grill' in relation to the Hubbard chickens.

– The mass of carcass of male chickens were significantly higher than the mass of female chickens, while differences in dressing percentage between sexes were not statistically significant, although females had insignificantly higher slaughter yields.

– The feeding system had not a statistically significant influence on the mass and slaughter yields of carcass of broiler chickens.

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