THE QUALITY OF MEAT OF TURKEY-COCKS RECEIVING DL-METHIONINE SUPPLEMENTED FEEDING

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Summary. Studies were carried out on Big 6 turkey-cocks divided into 3 feeding groups. Birds of group I (control) were received feed mixes without DL-methionine supplement. Birds of group II were fed on feed mixes with 0.13% supplement, whereas those of group III on 0.24% DL-methionine supplemented feed mixes. Their rearing lasted for 17 weeks. The obtained carcasses were cooled after slaughter for 24 hours at +6°C. The one half of pectoral muscles was assigned for basic chemical composition measurements on fresh meat, as well as for physic-chemical measurements. The second half of muscles was packed and stored for 4 months at -18°C. Thereafter, the muscles were defrosted and physic-chemical measurements were made again, with additional sensory examination. Moreover, when applying both DL-methionine supplements in the feeding of turkey-cocks, tendencies occurred for changes in physic-chemical traits towards lower acidification, darkening of meat color and better water-binding capacity, both in fresh meat and in that after 4 month storage at -18°C. In sensory examination of cooked meat faded tenderness and juiciness was observed.

Keywords: turkey-cocks, supplemented feed, methionine, meat.

KALAKUTŲ, LESINTŲ SU DL-METIONINO PRIEDU, SKERDENOS VERTĖ IR MĖSOS KOKYBĖ

Santrauka. Bandymas buvo atliktas su Big 6 linijų derinio kalakutų patinais, suskirstytais į 3 lesinimo grupes. Kontrolinės grupės (I) paukščiai buvo lesinti lesalais, nepapildytais DL-metionino priedu. Tuo tarpu II ir III tiriamųjų grupių paukščiai lesinti lesalais, papildytais DL-metionino priedu atitinkamai 0,13% ir 0,24%. Kalakutai auginti iki 17 savaičių amžiaus. Bandymo pabaigoje gautos skerdenos 24 valandas vėsintos +6°C temperatūroje. Tada nuo jų buvo atskirti krūtinės raumenys su filė, filė, šlaunų raumenys, blauzdos raumenys ir atsidėję riebalai. Remiantis gautais duomenimis, procentais buvo apskaičiuotas jų santykis su priešskerdimine mase. Viena krūtinės raumenų dalis buvo atiduota pagrindinei cheminei sudėčiai šviežioje mėsoje nustatyti, taip pat fizikiniams ir cheminiams rodikliams nustatyti. Antroji krūtinės raumenų dalis buvo supokuota ir 4 mėnesius laikyta –18°C temperatūroje. Vėliau mėginiai buvo atšildyti, atlikti jų fizikiniai ir cheminiai matavimai bei sensorinė analizė. Bandymo rezultatai parodė, kad DL-metionino priedas lesaluose darė neigiamą poveikį galutiniam 17 savaitės amžiaus kalakutų patinų svoriui, taip pat ir jų skerdenų svoriui. Abiejų kalakutų grupių, kurių lesalai buvo papildyti DL-metioninu, pastebėti skerdenos fizikinių ir cheminių rodiklių pokyčiai: sumažėjęs rūgštingumas, tamsesnė mėsos spalva ir geresnės vandens rišlumo savybės. Šios tendencijos nustatytos tiek šviežioje mėsoje, tiek ir mėsoje, 4 mėnesius laikytoje –18°C temperatūroje. Sensorinės analizės tyrimai parodė, kad mėsa tapo blankesnė ir mažiau sultinga.

Raktažodžiai: kalakutai patinai, papildyti lesalai, metioninas, mėsa.

Introduction. Minimizing feed protein quantity is very important due to high cost of protein and necessity of limiting the amount of nitrogen expelled in poultry feces, in particular in broilers that are reared in large flocks on farms not connected with acreage. When lowering feed protein level, however, it is required to secure an adequate level of all exogenous amino acids as they limit the level of protein synthesis (Kamińska, 2002). Fancher (1989) and Koreleski (1999, 2001) set methionine in the first position among amino acids limiting chicken growth. Basing on methionine, organism produces indispensable quantities of semi-exogenous amino acid – cystine, and then both amino acids participate in protein synthesis. The overabundance of methionine methyl groups may be used in synthesis of other endogenous amino acids Koreleski (2001). Schutte and Pack (1995) and Huyghebaert and Pack (1996) found that higher content of sulfur amino acids in the feed affected broiler pectoral muscle weight increase and carcass fat content. On the other hand, Fancher and Jensen (1989) state that chickens fed on feed mix containing smaller amount of protein deposited more fat despite methionine and lysine supplement.

Since indispensable amino acids participate in protein synthesis, they can affect muscle protein functional traits, which may be reflected in meat chemical, physical and sensory attributes. Therefore, the aim of the present experiment was to examine whether synthetic DL-methionine applied in different amounts affected turkey-cock the qualitative traits of their fresh and defrosted meat.

Material and methods. The experiment was carried out on Big 6 turkey-cocks which were divided into 3 feeding groups. All birds were fed on the same feed mixes in 5 stage system. The experimental factor was different level of synthetic DL-methionine added in the third (5th – 9th week of life) and the fifth stage (13th -17th week of life). Group I (control) birds were given feed mixes without DL-methionine supplement. Birds of group II and

III were given feed mixes with an addition of 0.13% and 0.24% methionine, respectively. After finishing the rearing on the 17th week of life, 6 birds with a weight approximating the group average were selected of each group and slaughtered after 12 hour fasting. After gutting their carcasses were cooled for 24 hours at +6°C. The one half of pectoral muscles was assigned for basic chemical composition measurements on fresh meat, as well as for physic-chemical measurements. Within the latter, pH was determined – measured with pX-processor PM-600 pH-meter with combined glass electrode ESAgP-307, as well as free water content (Grau and Hamm, 1953) and color – measured with Miniscan XE Plus apparatus applying CIEL*a*b scale, D65 light source and 10° observer. Texture (toughness) was also determined, with INSTRON 5542 apparatus. The second half of muscles was packed and stored for 4 months at -18°C. Thereafter, the muscles were defrosted and physic-chemical measurements were made again, with additional sensory examination. Within the former, the color of raw muscles was determined as well (assuming 1 point for the lightest meat and 5 points for the darkest meat). Sensory examination of muscles and bullion was carried out after seasoning-free cooking of meat with an addition of water (1:3) at 85°C until soft. Basing on the difference between sample weight before and after cooking, the cooking losses were calculated. When examining meat and bullion sensory attributes, 5 point scale was used, with 1 point being the worst score and 5 points being the best.

The obtained numerical data were analyzed statistically with one-factor analysis of variance and Duncan's test using Statistica 6.1 software package.

Results and discussion. From amongst physic-chemical measurements of pectoral muscles, only those were carried out which determine their cooking and processing values (table 1). These are pH, free water content, texture, and color. The obtained results for these physic-chemical traits of meat point to its good quality in all groups (Sams et al., 1999). No statistically significant differences were found between groups. It should be stressed, however, that the feeding applied caused a certain modification of meat traits examined. This refers in particular the meat traits of group III birds, in which higher pH (5.76) was found when compared to control group (5.66) and group II (5.60). Higher meat pH in group III, thus lower muscle acidification, is correlated with lower free water quantity – 6.34%, higher meat toughness (texture) – 35.55%, darker meat color – 54.35%, and higher participation of red and yellow colors – 5.41 and 11.42%, respectively. Thus, the meat of turkey-cocks of group III, receiving 0.24% DL-methionine supplement, was less acidified, darker and tougher than that of group I. This is in conformity with reference literature data (Kortz, 2001). In group II, larger quantity of free water was found (6.86%), as well as lower texture values (28.96N). Both results point to larger drip of meat juice and lower toughness of that meat.

Table 1. **Physic-chemical traits of fresh larger pectoral muscles**

Specification		Groups		
		I	**II**	**III**
pH	**x**	5,66	5,70	5,76
	v	1,44	1,57	2,10
Free water, %	**x**	6,57	6,86	6,34
	v	19,82	12,10	23,83
Texture, N	**x**	33,4	28,96	35,55
	v	18,88	27,02	29,38
Lightness, L^*	**x**	56,26	55,22	54,35
	v	3,18	2,78	4,24
Redness, a*	**x**	4,84	5,18	5,41
	v	18,72	15,82	15,60
Yellowness, b*	**x**	8,70	8,50	11,42
	v	17,54	8,25	65,99

The examination of meat physic-chemical traits carried out after its 4 month storage showed slight differences when compared to those obtained on fresh meat (table 2). In case of frozen meat, alike as in fresh meat, group III was found to have the highest pH – 5.87, the darkest meat – L* = 46.69%, and the highest percentage of red color – a = 7.20%. Compared to other two groups, in group III were also observed changes in yellow color. This is correlated with redness, which was clearly larger in that group. As concerns free water quantity, the results obtained in group II and III were similar – 7.12 and 7.16%, respectively. Sensory examination of defrosted and thermally processed meat did not show significant differences between respective groups of turkey-cocks. However, a decrease was observed in tenderness and juiciness of meat from birds receiving DL-methionine supplement (table 3). In case of bullion, such a tendency was observed when examining its flavor. The best flavor was found in bullion from meat of turkey-cocks of group I (control).

Conclusions. When applying both DL-methionine supplements in the feeding of turkey-cocks, tendencies occurred for changes in physic-chemical traits towards lower acidification, darkening of meat color and better water-binding capacity, both in fresh meat and in that after 4 month storage at -18°C. In sensory examination of cooked meat faded tenderness and juiciness was observed.

Table 2. **Physic-chemical traits of larger pectoral muscle after month storage at -18^{0}C**

Specification		Groups		
		I	**II**	**III**
pH	**x**	5,80	5,84	5,87
	v	0,83	1,02	1,44
Free water, %	**x**	8,89	7,12	7,16
	v	22,22	31,08	47,87
Lightness, L*	**x**	50,12	48,00	46,69
	v	3,98	3,57	4,89
Redness, a*	**x**	6,46	6,47	7,20
	v	15,18	16,15	16,15
Yellowness, b*	**x**	11,80	11,48	9,76
	v	15,54	10,85	36,59

Table 3. **Sensory attributes of cooked larger pectoral muscle and bullion after 4 month storage at -18^{0}C (point score)**

Specification			Groups		
			I	II	III
meat	aroma	**x**	5,00	5,00	5,00
		v	0,00	0,00	0,00
	tenderness	**x**	4,58	4,30	3,75
		v	22,27	15,60	23,48
	juiciness	**x**	4,41	3,90	3,66
		x	27,19	31,92	23,88
	flavour	**x**	5,00	5,00	5,00
		v	0,00	0,00	0,00
bullion	colour	**x**	5,00	5,00	5,00
		v	0,00	0,00	0,00
	aroma	**x**	5,00	5,00	5,00
		v	0,00	0,00	0,00
	clarity	**x**	5,00	5,00	5,00
		v	0,00	0,00	0,00
	flvour	**x**	4,42	3,60	4,08
		x	9,01	8,43	8,23

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