TURKEY DRUMSTICK MEAT AS PROCESSING RAW MATERIAL

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Key words: turkey, meat, drumsticks, drumstick meat, hydration ability, pigment

Background

Turkey drumsticks, due to their peculiar anatomic structure (the presence of sinews and lamellar bones), require especially accurate decisions as to their utilisation method.

Objective

Within the course of industrial turkey carcass partition, the meat yield from turkey drumsticks was determined and the quality assessment of meat obtained as the result of mechanical desinewing process was completed.

Methods

BiG-6 heavy slaughterable turkey drumsticks (approx. 100 kg of each sex, in 5 batches - 20 kg each) were the material for the experiment. The turkey drumsticks were obtained during manual carcass partition in industrial conditions. Analysed elements were skinned and de-fatted, bones were separated and the remaining material (muscles with sinews) was directed into the BAADER machine for desinewing. The sinews were separated on a ϕ5 mm sieve. The remains after the first step were re-circulated for further desinewing, on a ϕ3 mm sieve. Samples were taken from the desinewed meat.

The ability to bond native water (run off surface)(Hamm 1972) and bonding the added water – water absorption (Wierbiecki 1962) were determined. Emulsion stability (Pikul 1993) and total pigment content (Pikul 1988, Trout 1989) were also determined. Hydrolysates for hydroxyproline determination were prepared according to the Reich (1970) method and the hydroxyproline determination was completed according to Blomfield, Farrar (1964), applying a hydroxyproline to collagen content ratio = 7,25.

Results and discussion

Total turkey drumstick meat yield from the BAADER machine after desinewing was 83.7-88.1%. The largest amount of meat was obtained during the first separation step (75-77%). The turkey drumstick yield from males was approximately 4.4% higher than from the females.

Table 1. Chemical composition of turkey drumstick meat after desinewing in the BAADER machine.

		water (%)	protein (%)	W/P	collagen (mg/%)	collagen/protein (%)	fat (%)
♀	ϕ 5	74,16±0,67	18,94±0,31	3,92±0,03	468,94±39,89	2,47±0,19	5,93±1,03
	ϕ 3	71,37±0,39	17,43±0,10	4,10±0,02	656,80±42,64	3,76±0,22	10,16±0,53
♂	ϕ 5	76,14±0,25	18,44±0,19	4,13±0,05	439,77±20,65	2,38±0,10	4,11±0,20
	ϕ 3	74,38±0,62	17,09±0,24	4,36±0,08	510,36±67,35	2,98±0,39	7,08±0,68

The protein content in the meat desinewed in a ϕ5mm barrel was in each case higher than in the meat desinewed in a ϕ3mm barrel (Table 1). The protein concentration in turkey drumsticks (including skin), determined by Honikel et al. (1997) ranged from 18.25 to 21.65%. The water to protein ratio (W/P), which is the measure of muscle physiological maturity, in turkey drumstick meat, was higher in the meat desinewed in a ϕ3 mm barrel. The obtained values were also higher in comparison to the results reported by other authors. It could be related, to a larger extent, to the applied method of carcass cooling than to the degree of meat physiological maturity. Schmidt (after: Ohlrogge et al. 1992) showed that the minimum W/P value in thigh meat could be 3.4 and the maximum 3.9. The W/P ratio in a skinless thigh reported by Honikel et al. (1997) was 3.4, whereas in a drumstick with skin it was 3.56. The female turkey meat obtained in the first step of desinewing (φ5) contained less collagen (468.94 mg%) than the meat obtained in the second step of the process (φ3 – 656.80 mg%). Similar co-relations were found for male turkey drumstick meat. The significant differences in collagen contents between the meat obtained in the first step of desinewing in a ϕ 5mm barrel and those obtained in a ϕ3mm barrel resulted from the process of meat production. Raw material forwarded to desinewing in a ϕ3mm barrel constituted the remains after desinewing in a ϕ5mm barrel. The application of higher pressure (19 bar) for second step of desinewing caused some sinews to be passed through the barrel along with meat. Bojarska et al. (1994) showed that the average collagen content in turkey thigh muscles ranged from 636.4mg% to 837.7 mg%. The collagen amount in muscle tissue is not as accurate meat quality factor as collagen content in total protein (C/P). This indicator for female turkey drumstick meat after desinewing in a ϕ5mm barrel was 2.47 %, whereas for meat desinewed in a second step was higher and was 3.76 %. Similar co-relations were found for male turkey drumstick meat. The muscle fat was significantly lower in meat desinewed in a ϕ5mm barrel than in meat processed in a ϕ3mm barrel. Honikel et al. (1997) showed that fat content in boneless drumsticks with skin ranged from 2.75 to 10.2 %, whereas in a boneless skinned thigh it ranged from 1.5 to 6.65%.

From the chemical composition of the analysed meat, the meat desinewed in the first stage (ϕ 5mm) has higher protein content, lower collagen content, lower percentage content of collagen in protein and lower fat content. Male turkey meat had less collagen and fat than meat from female drumsticks. This has been confirmed by the results of Lewczuk et al. (1993), who observed that lower fat

content is caused by an intensive increase in fat contents in female turkey leg muscles between week 12 and 16. In male turkeys, however, from week 20 until the end of rearing, the fat content in leg muscles decreases.

Table 2. Physical properties and pigment contents in meat obtained from turkey drumsticks after desinewing in a BAADER machine.

		run off surface (cm^2)	free water %	water absorption (%)	I_{instab}*	TPC	myoglobin mg/g	% myoglobin in TPC	% haemoglobin in TPC
♀	ϕ5	5,41±0,25	11,14±0,51	39,76±1,72	30,13±0,57	4,71±0,13	2,99±0,04	63,65±1,06	36,35±1,06
	ϕ3	4,50±0,27	9,33±0,58	35,29±1,36	30,57±1,31	4,78±0,11	2,94±0,05	61,55±0,55	38,45±0,55
♂	ϕ5	5,34±0,41	10,86±0,78	44,47±2,18	34,64±1,73	4,40±0,08	2,82±0,05	64,15±1,08	35,85±1,08
	ϕ3	5,33±0,46	11,29±0,92	37,24±2,12	32,14±0,82	4,47±0,09	2,85±0,07	63,73±0,95	36,27±0,95

* I_{instab} – emulsion instability co-efficient, $cm^3/100g$ of emulsion

Native water bonding ability was determined by measuring the water run off (Table 2). Female turkey drumstick meat desinewed in a ϕ5mm barrel had a larger run off surface (5.41 cm^2) than the meat desinewed in a ϕ3mm barrel. It was relative to the free water amount in meat, which was 11.14 % and 9.33 %, respectively. Male turkey drumstick meat desinewed in a ϕ5mm barrel had the same water run off surface as (5.34 cm^2) the meat desinewed in a ϕ3mm barrel. It was relative to the free water amount in meat, which was 10.86 % and 11.29 %. Added water bonding and maintaining ability is an important feature for the meat processing technology. Female turkey drumstick meat desinewed in a ϕ5mm barrel showed slightly higher water absorption than the meat desinewed in a ϕ3mm barrel. Similar results were obtained for male turkey meat. Emulsifying ability of raw meat and especially stability of the emulsion obtained in a production process is an important factor in the production of the disintegrated products. Meat obtained in both steps of desinewing did not vary in this respect.

Total pigment content (TPC) was similar in the analysed meat. The values ranged from 4.40 to 4.78 mg/g. Myoglobin content was 2.82 – 2.99 mg/g and myoglobin percent content in TPC was 61.55 – 64.15%. The percentage contents of haemoglobin in total haemo-pigment contents was calculated as the difference between TPC and percentage contents of myoglobin in TPC. The values ranged from 35.85 to 38.45%. The results obtained in this experiment are higher than the results of Niewiarowicz et al. (1986), who reported that total pigment content in turkey thigh meat ranged from 2.72 mg/g, including 97.7% constituted by myoglobin and haemoglobin. The amount of myoglobin in turkey thigh muscles was 1.64 mg/g (61.6% in TPC).

Conclusions

1. The mechanical desinewing process yield was 84.7 %. The meat yield in the 1st step (ϕ5mm) was 75.5%, and in the 2nd step (ϕ3mm) approx. 9.2 %.
2. Drumstick meat desinewed (in a ϕ5mm barrel) turned out to be better material than the meat desinewed in a ϕ3mm barrel (2nd step). It contained more protein, less fat, less collagen, had lower percentage collagen content in total protein than the meat desinewed in a ϕ3mm barrel.
3. Total pigment content, myoglobin and haemoglobin remained at the same level irrespective of the applied barrel hole diameter.
4. Male turkey drumstick meat is better material for processing because it contains less collagen and less fat than the female turkey meat.

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