STUDY OF THE DYNAMICS OF BROILER MEAT AGEING

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ern industrial technology of poultry processing and the use of poultry meat for semi-pared and ready foods imply the use of mainly chilled poultry meat, though there is tain interest in using of hot-boned meat, however, data on this subject are contradic-y.

course of studies it was established that hot-boned meat has lower cooking losses, but gher consistency and lower viscosity as compared to meat, aged during 24 hrs.The obtained a evidence about inexpediency of use of hot meat, namely of pectoral cuts for manufactu-g of frozen semi-prepared foods.

RODUCTION

-boning of beef and pork and utilization of meat during 2-3 hrs post mortem for manufac-ing of sausages, cured meats and semi-prepared foods allow to create continuous line pro-tion of meat products, to improve their quality and yield, to save cooling areas and to rten technological process. This method of meat utilization is the most effective one, during the first 2-3 hours post mortem meat has good consistency and possesses the high-water-binding ability (Shishkina et al.,1989).

ing of poultry meat takes place after other processing operations (slaughter, defeather-, evisceration,chilling). This traditional technology has certain drawbacks: cross-con-ination of carcasses during water-chilling, excessive costs on chilling of non-primary s for further mechanical deboning, weight losses during air chilling etc.

king into account growing consumer demand in poultry breast meat in the system of fast d services, some changes in the technology of poultry processing are to take place, ely - boning of breasts and thighs prior to evisceration (D.L.Kress, 1985).

us, the aim of the present study was to investigate dynamics of broiler meat ageing and determine technological parameters of this meat.

TERIALS AND METHODS

namics of meat ageing was studied by microstructural method. As object of research served pectoralis major and M.quadriceps femoris taken 15,30 and 1,2,4,24 hrs post mortem of days old broiler chicken. Muscle samples were fixed in formalin, dehydrated and put to celloidin by common method. Media were dyed by hematoxylin-eosine.

dices, characterizing physico-chemical and technological parameters of broiler meat at erent post mortem times were determined by the following methods: pH was measured side M. Pectoralis major with a portable pH-meter; cooking losses - by the amount of ce extracted during cooking, expressed in % to green weight; structuro-mechanical pro-rties (shear force and cutting performance) - by universal "Instron-1422" with the at-

tachment "Kramer Shear Press", rheological properties - by special device (Brobender Co) equipped with monitoring rotatable rheometer with measuring mixer.

RESULTS AND DISCUSSION

Boning of non-eviscerated broiler carcasses 15 min and 24 hrs post mortem resulted in yield of meat 27.9 and 26.9 % of liveweight, accordingly. The difference is non-significant, however, tendency towards increase of yield is observed in case of hot boning.

It is known that post mortem changes in muscle tissue are connected with post mortem catabolism. pH-drop in this case reliably demonstrates the process of glycolysis, responsible for technological and consumer properties of meat.

Conditions of feeding, catching, transportation, pre-slaughter physical stresses influence greatly processes, taking place in muscle tissue.

Poultry placed in cages has no opportunity for physical exercise which negatively effects levels of sugar in blood and of glycogen in liver; after pre-slaughter stress glycogen stores are easily exhausted. All this causes availability of poultry meat with high pH either in hot condition or after 24 hours (Table 1).

Changes in cooking losses as dependent on time post mortem are shown in Table 2.

The difference was significant in case of decrease of cooking losses of hot meat as compared to meat aged during 24 hours. The difference constituted 4.9%, $P < 0.01$. Results of tests on intact eviscerated carcasses confirmed this tendency.

Losses during cooking of frozen meat as dependent on time from slaughter to freezing are shown in Table 3.

TABLE 1 Dynamics of pH-change in broiler meat after slaughter

	Time post mortem (min.)					n = 20
	15	30	60	120	240	24 hrs
$\bar{x} \pm m$	6.38±0.05	6.27±0.04	6.23±0.03	6.18±0.03	6.37±0.02	6.40±0.03

TABLE 2 Cooking losses of hot and chilled broiler meat

	Thermal condition of meat	
	hot meat n=20	chilled meat n=20
$\bar{x} \pm m$	30.5 ± 0.72	35.4 ± 0.94

TABLE 3 Cooking losses of frozen broiler chicken (Time of storage 5 days at -18°C)

	hot meat (15 min. p.m.)	cold meat (60 min. p.m.)	chilled meat (24 hrs p.m.)
	n = 15	n = 18	n = 15
$\bar{x} \pm m$	34.77 ± 0.64	29.26 ± 0.65	31.86 ± 0.51

These data evidence about significant difference in favour of meat, frozen in chilled condition.

Evaluation of muscle tissue consistency as dependent on time post mortem is presented in Table 4. Shear force of hot muscles is higher than that of chilled ones. The same tendency

observed when this indice is determined in muscles in hot and chilled condition. These lts agree with earlier received data (Sams et al., 1990).

LE 4 Structuro-mechanical indices of pectoral broiler muscles n=3

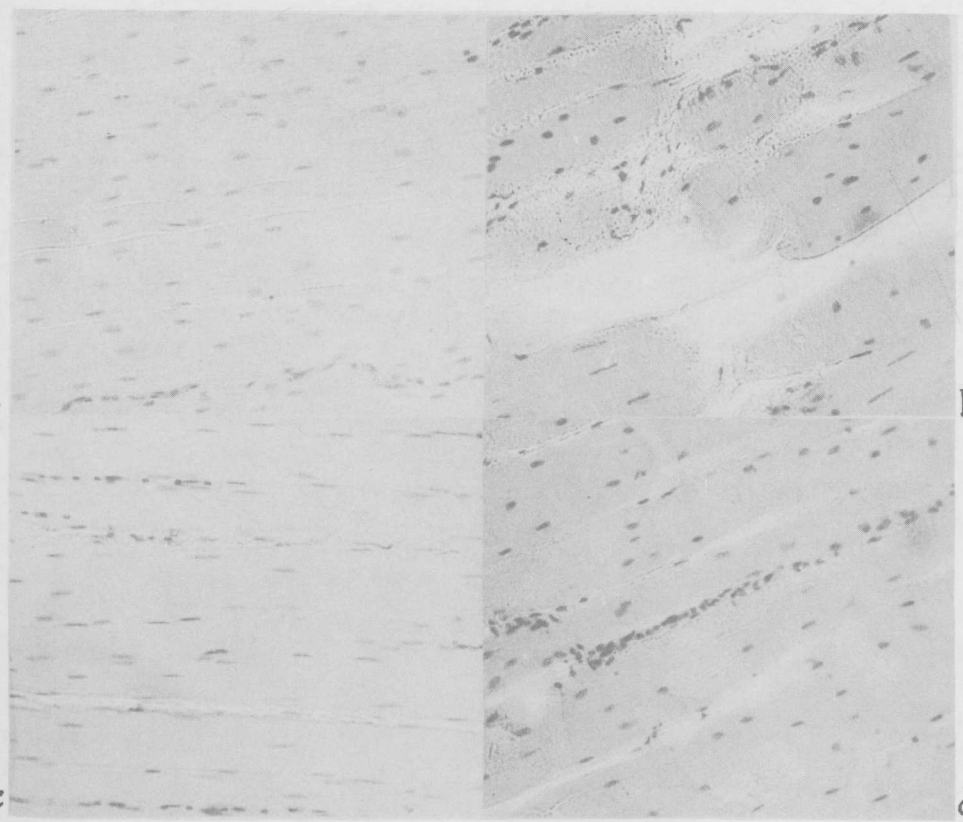
acteristics of muscle	Shear force $Q_{shear} \times 10^3$, Pa, n=5	Cutting performance $A_{cutting} \times 10^3$ J/m^2 n=5
in. post mortem	1.43±0.09	0.77±0.06
s. post mortem	1.07±0.19	0.61±0.10
rs post mortem	1.24±0.09	0.64±0.07
er freezing in hot state	1.11±0.07	0.56±0.10
er chilling in chilled state	0.90±0.08	0.51±0.09

lts of research on determination of viscosity of broiler meat (leg calf muscles) are m in Table 5.

LE 5 Viscosity of broiler muscle tissue as dependent on post mortem time (meter-gram-force)

ex	Characteristics of the tested sample				
ating moment	hot 15 min. p.m.	chilled 24 hrs p.m.	frozen in hot condit.	frozen 1 hr p.m.	frozen 24 hrs p.m.
	26	45	30	40	55

e. 1 Microstructure of broiler meat. Magn. x 250
a) M.pectoralis major,30 min. b) M. pectoralis major, 24 hrs,
c) M.quadriceps femoris, 30 min., d) M.quadriceps femoris, 24 hrs.



During study of muscle microstructure it was established that in pectoral muscles rigor mortis starts to develop 15 min. after slaughter of poultry and reaches its maximum in 30 min. (fig. 1a). After 2 hours first evidence of the rigor accomplishment is observed along with relaxation of muscle fibers and initiation of meat ageing. After 4 hours autolytical processes take place in pectoral meat, which are expressed in discontinuity and sarcolemma disruptures, local destruction of myofibrils and in crosswise damage of muscle fibers integrity. During further storage of poultry carcasses the amount of such changes increases due to destructive processes in the main portion of muscle fibers (fig. 1b), these being fragmented to total decay of cellular structures and to formation of granular mass between sites of muscle fibers which still preserve their integrity.

In muscle tissue of quadriceps femoris, post mortem shortage of actomyosin complex takes place later, first signs of this process appearing only 30 min. post mortem (fig. 1c). Accomplishment of rigor mortis takes place after 4 hours. However, even 24 hrs post mortem only initial signs of meat ageing were seen, being characterized by local destructive changes in microstructure (fig.1d).

It is worth noting that the processes of shortening, relaxation and autolysis in meat fibers during ageing of meat develop unevenly and do not spread through the whole muscle tissue. In one sample fibers on different stages of ageing could be seen. However, in pectoral muscle autolytical processes are more intensive than in femoral ones.

CONCLUSION

The obtained data prove that boneless broiler meat frozen in hot state show higher cooking loss, greater shear force and lower viscosity as compared to meat, frozen 24 hours after slaughter of poultry. Taking this into account, it is not recommended to freeze hot-boned meat during 15-20 min. post mortem (it especially concerns meat from pectoral parts) without additional processing.

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