QUALITY CHARACTERISTICS OF PIG MEAT OBTAINED BY INTENSIVE TECHNOLOGIES OF GROWING AND FEEDING

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INTRODUCTION: Final meat products quality and production efficiency are highly related with meat raw material quality which is determined by a range of factors, including growth and feeding conditions.

The aim of the present study is to define possible deviations in meat quality of pigs, grown by intensive technologies.

MATERIALS AND METHODS: Research was conducted on pig carcasses delivered from industrial complexes of the Leningrad region (I) and of Moldavian Republik (II), situated in different raw material zones of the country and having a closed production cycle: group keeping of animals in pens, restricted motion and concentrate-type feeding. Four series of experiments were conducted on 7964 pigs.

Animals were delivered to meat-packing plants in a truck that covered distance up to 100 km, approximately. Pre-slaughter rest took 12 hours, after that pigs were slaughtered and processed during 6 hours. Animals were electrically stunned with industrial-type current : Frequency - 50 Hz, voltage - 65-100 V, duration 6-8 sec.

pH-value of meat was determined after 45-60 min. of slaughter (pH_1) and after 24 hours of carcass chilling at 0-2°C (pH_{24}).

In earlier studies of our institute it was established that dynamics of glycolytic changes of meat is not identical for different animals, delivered from industrial complexes. With the account of pH_1 and pH_{24} (determined after 24 hours) the limits of raw material grading into quality groups were defined (Tatulov 1984, Hofmann, 1988).

	N	PSE	DFD
pH_1	$> 6,2$	$\leq 6,2$	$\geqslant 6,3$
pH_{24}	5,6-5,8	$\leq 6,2$	$\geqslant 6,3$

To confirm raw material quality variation closely after slaughter and after ripening, as judged by pH, analysis of pig carcasses distribution by quality groups was performed as result of control processing.

It was established that potential PSE quality lies within the range of $pH_1 = 6,2$ and lower. From the total amount, per-

Table 1. - Dynamics of pH-change during post-mortem glycolysis n=538

pH_1	pH_{24}																	Total
	5,4	5,5	5,6	5,7	5,8	5,9	6,0	6,1	6,2	6,3	6,4	6,5	6,6	6,7	6,8	7,0	7,1	
7,4																1		1
7,2																1	1	2
7,0				1														1
6,9														1				1
6,8			1	2								1	1		1			6
6,7	1			3	2	1	1	1		3	2	3	1	1	1			20
6,6			5	1	4		2		1	2	2	4		1		2		24
6,5		1	4	7	7	5	2	7	6	6	3	2	2					52
6,4			6	13	8	1	7	6	7	9	4		2	1				64
6,3		2	2	9	6	1o	7	6	3	4	3							52
6,2		1	4	24	6	8	16	10	4	5	1	1						80
6,1		1	5	11	12	10	13	7	4	1								64
6,0	1		5	16	11	10	6	3				1	1					54
5,9		2	2	11	10	10	2											37
5,8		3	4	15	11	2	1		2									38
5,7		5	8	10	10	1	1											35
5,6		1	2	3			1											7
Total	2	16	48	126	87	58	59	40	27	30	15	12	7	4	2	4	1	538

centage of carcasses, showing pH_1 6,2 is the highest - 13,1%.

Data on pH-change during hot meat chilling are given in Table 1, being subdivided into groups according to their pH_1 values.

As it can be seen from the driven data pH-value of hot meat has wide range of variability: 7,4-5,6. According to Solovyov V.I. (1966) and Sokolov et al., during the autolysis of normal meat the process of post mortem glycolysis lasts 12-18 hours, pH,being close to 7,0, lowers down to 5,8-5,7. From the total number of the assessed carcasses more than 50% have sufficiently low pH-value of fresh meat - 6,2 and even less. In carcasses, having such abnormally low pH_1-values,as a rule,during chilling significant pH-changes are not observed, this value lowering only by 0,2-0,4 units.

Thus, closely after slaughter, before carcasses are chilled, some probability already exists of relating them to PSE quality grade.

Carcasses, having pH of hot meat >6,2 further can develop DFD or normal quality.

Certain interest caused the tendency of carcass group, having $pH_1 > 6,3$ to change this value after 24 hours (pH_{24}) to 5,8-5,6 and $pH_{24} > 5,8$, i.e. the tendency of non-signiffcant decrease.

Table 2 gives data on pH change after 24 hours of slaughter for carcass group exhibiting $pH_1 > 6,2$.

Table 2. - Dynamics of pH_1 change in group of carcasses, exhibiting > 6,2

Total number of carcasses, heads	pH_1 (initial value)	Amount of carcasses with pH_{24} of different value, %	
		5,6 - 5,8	more than 5,8
6	6,8	50	50
20	6,7	25	75
24	6,6	41	59
52	6,5	36	64
64	6,4	42	58
52	6,3	36	64

From the driven data it can be concluded, that 62% of carcasses with $pH_1 > 6,2$ had the tendency of slight pH decrease by 0,2-0,4 units, which is characteristic of DFD-meat.

Only 38% of carcasses showed pH_1 decrease to less than 5,8, this being indicative of normal meat.

Thus, the performed analysis supported conclusion about the possibility of raw material grading according to pH_1 - value for PSE meat and subgrading it according to pH_{24}-value for normal and DFD-meat.

Having established certain ranges for grading pig carcasses into N, PSE and DFD further experimental data were analysed

to reveal the effect of various factors on carcass quality deviation ratio. The influence of season of animal processing on quality deviation development is given in table 3.

Table 3. - Relative number of carcasses, exhibiting quality deviations depending on the season of animal processing

n = 7486

Number of carcasses, heads	Number of carcasses with quality deviations					
	N		PSE		DFD	
	heads	%	heads	%	heads	%
	Spring - summer					
5381	446	8,3	4136	76,9	767	14,3
	Autumn - winter					
2105	271	12,9	1422	67,2	412	19,5

Analyzing results, given in table 3, one can notice that during spring and summer the number of carcasses with PSE quality deviation is higher than in autumn and winter, which can be explained by elevated stress-susceptibility of animals during delivery and pre-slaughter period. At the same time, autumn and winter cause high percentage of DFD carcasses in this period.

It appeared interesting to analyse quality dependance on fatness category of carcasses (table 4).

Table 4. - Relative number of carcasses with different quality traits depending on fatness category

Fatness category	Actual weight of carcasses, kg, range	Number of carcasses, heads	carcass quality					
			PSE		N		DFD	
			heads	%	heads	%	heads	%
		Complex I						
II (meat)	36,0-90,0	1984	1707	86,0	123	6,2	154	7,8
III(fat)	43, 0-120,0	433	341	78,8	46	10,6	46	10,6
		Complex II						
II (meat)	49,5-89,5	1410	1293	91,7	69	4,9	48	3,4
III(fat)	60,5-146,5	134	115	85,5	10	7,5	9	6,7

After evaluation of the obtained data the following dependance of rise in PSE-carcass number of II fatness category

as compared to III category, can be established.

An attempt was made to group carcasses according to their quality categories with the account of their weight and backfat thickness.

Table 5 . - Mean values of carcass weight and backfat thickness according to quality groups

n=482

Quality groups	Number of carcasses, heads	Mean value	
		Carcass weight, kg	Backfat thickness, mm
N	54	76,7	38,0
PSE	336	78,4	36,0
dfd	92	76,3	37,0

As it can be seen from table 5, mean carcass weight of all quality groups is more than 75 kg, however, there is a tendency of carcass weight increase and backfat thickness decrease for PSE group, which supports conclusions of earlier publications that increase of the share of muscle tissue in a carcass leads to PSE meat quality.

The received data show heterogeneity of pig meat quality. Normal pork quality as a rule does not exceed 10% from the whole amount of slaughtered animals, while PSE class stands for more than 85%. In general, negative deviations in pig meat quality constitute for nearly 90 %.

CONCLUSIONS: Results of the present investigation confirm the necessity to improve quality of the raw material through alterations and reconstruction in the field of animal growing and feeding, as well as in the processing sector of the meat industry.

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