

PH CHANGES OF OFFAL DURING STORAGE E.K.PROST, E.PELCZYŃSKA and K.LIBELT

Institute of Food Hygiene, Agricultural Academy of Lublin, ul.Akademicka 12,
20-033 Lublin, Poland

SUMMARY: In the offal of pigs and cattle a fast although low decrease of pH after slaughtering was noticed and after 24 hours even the increase of pH was found. Only in the heart and muscle the proper pH decrease after 24 h was stated. All organs differ significantly in pH level during their storage. The age of animals did not influence the pH of offal. Significant differences in pH level of offal between pigs and cattle were found.

INTRODUCTION: pH level of edible organs and especially their changes during storage are closely connected with the shelf-life and technological usability of these products. - The aim of this study was to determine pH changes in offal of pigs and cattle, in comparison to the muscle tissue, during post-mortem storage at 2°C, in relation to the time of storage, and to the species and age of the animals.

MATERIALS AND METHODS: The pH examination was carried out on liver, heart, kidney, spleen and brain of 60 pigs and 60 cattle. Two body weights of pigs - 80 kg and 140 kg and two age groups of cattle - 4 years and 10 years, were taken into the consideration - 30 animals in each group. pH values of tissues were determined 30 minutes after slaughtering and after 1, 4, 12, 24 and 48 hours of storage at 2°C. In offal pH determination was carried out in six different places of each organ, and the mean of these measurements was taken as a final result. At the same time and in the same conditions the pH in m.semimembranosus was determined. For significance of differences the T-Tukey test was used at $p<0,05$ and $p<0,01$.

RESULTS AND DISCUSSION: pH changes of offal and muscle tissue during the storage are presented in Table 1. In the majority of organs, with exception

Table 1. - pH of offal and muscle tissue during storage (\bar{x} ; n=60)

Species	Time-h	Liver	Heart	Kidney	Lungs	Spleen	Brain	M.semi-membranosus
Pigs	0,5	6,14a	5,82a	6,32a	7,05a	6,07a	6,48a	6,78a
	1	6,07b	5,73b	6,30a	6,81a	5,92a	6,48a	6,50b
	4	6,04b	5,76b	6,34a	6,85a	5,94a	6,50a	6,19c
	12	6,06b	5,76b	6,31a	7,01a	5,90a	6,45a	5,93d
	24	6,06b	5,71b	6,40b	7,02a	5,99a	6,66b	5,78e
	48	6,07b	5,77b	6,42b	6,97a	6,01a	6,77c	5,74e
Cattle	0,5	6,41a	5,79a	6,37a	6,68a	6,17a	6,05a	6,95a
	1	6,32b	5,70a	6,43a	6,64a	6,10a	6,08a	6,88a
	4	6,38b	5,71a	6,41a	6,66a	6,09a	6,02a	6,55b
	12	6,35b	5,72a	6,38a	6,67a	6,07a	6,09a	6,11c
	24	6,28c	5,75a	6,58b	6,69a	6,19a	6,24b	5,78d
	48	6,23c	5,78a	6,60b	6,78a	6,21a	6,36c	5,73d

a,b,c,d,e - mean values without letter in common differ at $p<0,01$

of heart, pH remained at the same level or even increased after 24 hours. Only in heart it came to pH fall immediately after slaughtering and later

remained at the same level during 48 hours. The progressive lowering of pH with the time was stated only in muscle tissue. No relations between the age or body weight of animals and the pH level in organs and muscle tissue was found. Differences in pH level among the organs and muscle tissue are presented in Table 2. The significant differences among all the organs of pigs and

Table 2.-Differences of pH level among the organs and muscle tissue (\bar{x} ; n=60)

Species	Organs	Time - h					
		0,5	1	4	12	24	48
Pigs	Liver	6,14a	6,07a	6,04a	6,06a	6,06a	6,07a
	Heart	5,82b	5,73b	5,76b	5,76b	5,81b	5,87b
	Kidney	6,32c	6,30c	6,34c	6,31c	6,40c	6,42c
	Lungs	7,05d	6,81d	6,85d	7,01e	7,02d	6,97d
	Spleen	6,07a	5,92e	5,94a	5,90b	5,99a	6,01a
	Brain	6,48e	6,48f	6,50e	6,45c	6,66e	6,77e
	Muscle tissue	6,78f	6,50f	*6,19f	5,93b	5,78b	5,74b
Cattle	Liver	6,41a	6,32a	6,38a	6,35a	6,28a	6,23a
	Heart	5,79b	5,70b	5,71b	5,72b	5,75b	5,78b
	Kidney	6,37c	6,43a	6,41a	6,38a	6,58c	6,60c
	Lungs	6,68d	6,64c	6,66c	6,67c	6,69c	6,78d
	Spleen	6,17e	6,10d	6,09d	6,07d	6,19a	6,21a
	Brain	6,05e	6,08d	6,02d	6,09d	6,24a	6,36a
	Muscle tissue	6,95f	6,88e	6,55ac	6,11d	5,78b	5,73b

Explanation as in Table 1

cattle in all the periods of storage, although in different relations, were found. In general evaluation the lungs were characterized by the highest and the heart by the lowest pH level. After 24 hours and later the pH in the heart and muscle tissue was at the same level. In Table 3 the differences

Table 3. - Differences between pigs and cattle in pH of organs and muscle tissue (\bar{x} ; n=60)

Organs	Species	Time - h					
		0,5	1	4	12	24	48
Liver	P	6,14xx	6,07xx	6,04xx	6,06xx	6,06xx	6,07xx
	C	6,41	6,32	6,38	6,35	6,28	6,23
Heart	P	5,82	5,73	5,76	5,76	5,81	5,87
	C	5,79	5,70	5,71	5,72	5,75	5,78
Kidney	P	6,22x	6,30xx	6,34x	6,31	6,40xx	6,42xx
	C	6,37	6,43	6,41	6,38	6,58	6,60
Lungs	P	7,05xx	6,81x	6,85xx	7,01xx	7,02xx	6,97xx
	C	6,68	6,64	6,66	6,67	6,69	6,64
Spleen	P	6,07x	5,92xx	5,94xx	5,90xx	5,99xx	6,01xx
	C	6,17	6,10	6,09	6,07	6,19	6,21
Brain	P	6,48xx	6,48xx	6,50xx	6,45xx	6,66xx	6,77xx
	C	6,05	6,08	6,07	6,09	6,24	6,36
Muscle tissue	P	6,78xx	6,50xx	6,19xx	5,93x	5,78	5,74
	C	6,95	6,88	6,55	6,11	5,78	5,73

Explanations: P = pigs, C = cattle, x = p<0,05, xx = p<0,01

between pigs and cattle in pH level of the same organs are presented. In all organs, with the exception of heart only, the pH level differed significantly. Lungs and brain were characterized by the higher pH and kidneys and spleen of pigs by the lower pH, in comparison to the cattle. pH of muscle tissue of pigs was significantly lower than of cattle.

CONCLUSIONS:

- 1/ a fast although low decrease of pH of offal was noticed immediately after slaughtering and it was on the same level or even increased within 48 hours of storage at 2°C; in the muscle tissue and heart only a proper deep pH fall was found,
- 2/ among individual organs there were significant and variable differences in the pH level during their storage,
- 3/ the age of animals did not influence the pH of internal organs and muscle tissue,
- 4/ pH of the organs and muscle tissue of pigs, with the exception of heart, differ significantly from the same of cattle.

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