

Study on quality of Polish meat products

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Introduction

In the recent dozen years the food production in Poland has undergone dynamic changes. The changes are determined by three major factors: harmonisation of Polish law with the European Union law, changes in the scope of application of additional substances in food production and changes in the nutrition trends of Polish society.

During many years, very detailed quality standards of meat products were in force in Poland (Branch Standards, Polish Standards). The obligatory character of standards was cancelled in 1993, though the possibility of their obligatory application in certain cases was maintained. Since 2002 the standards have changed their character to the non-obligatory one (Tyszkiewicz 2005). In spite of the elimination of the obligatory application of Polish Standards, the majority of the manufacturers continued to make products according to the requirements contained therein. The basic standard applicable by the manufacturers of meat products was the Polish Standard PN-82007, which determined, among others, the chemical requirements, i.e. the contents of protein, water, fat and sodium chloride in particular kinds of meat products (PN-82007). Since the Poland's accession to the European Union (2004) the gradual departure from the application of Polish Standards has been noted. The growing number of manufacturers decide to make meat products according to their own factory quality requirements. The process of harmonisation of the Polish law led also to the changes in the regulations as regards the application of the permissible additives in meat processing.

In Poland the level of additions of the majority of permissible substances was limited (e.g. carrageen, agar, guar rubber, modified starches), certain additions were allowed for use with selected groups of meat products only (e.g. polyphosphates allowed for application for production of smoked products only) (Rozporządzenie..., 2000). The Poland's accession to the European Union resulted in the change in the regulations as regards application of additives to food, usually allowing the manufacturers to apply them according to the *quantum satis* principle (Rozporządzenie..., 2004).

Recently, the growing consumers' interest in foodstuffs has been noted. It is applicable, in particular, to the ecologic food and to food containing limited volume of components considered unfavourable from the nutritive or health points of view, among others fats, salt and phosphates (Troeger and others 2005; Arihara 2006). In order to meet the consumers' expectations, Polish manufacturers often take actions in order to develop and placed in the market meat products of the reduced contents of the above mentioned components (Szymański 2006).

The aim of the study was to evaluate the quality of selected meat products made in Poland within recent eight years.

Materials and methods

The experimental material was 648 samples of market meat products. The following groups of products were analysed: 285 samples of smoked products (smoked scalded hams), 130 samples of dry sausages (medium and coarse ground), 233 samples of non-dry sausages (finely and medium ground). Samples were tested for content of total protein (P), water (W), fat (F), sodium chloride (S) and added phosphorus (PA). The following analytic methods were applied: content of total protein – Kjeldahl's method, water content – drying method, fat content – Soxhlet's method, sodium chloride content – Mohr's method and added phosphorus content – weight method. All the analytic methods applied were in conformity with the ISO standard requirements. The so-called derivative parameters of an invariable character were also calculated: Feder Number $FN=W/P$, Protein Fat Free PFF= $P/100-F$, and Brine Concentration $BC=S/(W+S)$.

Results and discussion

The results of the analysis i.e. mean content of protein (x_P), water (x_W), fat (x_F), sodium chloride (x_S), added phosphates (x_{PA}) and mean values of the calculated discriminates: Feder Number (x_{FN}), Protein Fat Free (x_{PFF}), Brine Concentration (x_{BC}) have been presented in Table 1.

The test results show that within the recent eight years the mean content of sodium chloride in the tested smoked products and no-dry sausages has decreased to a different extent. For smoked products the salt content decreased by 0,4g/100g of product and for no-dry sausages – by 0,3g/100g of product. The salt content in dry sausages has been maintained on a similar level, within the limits of 2,7-3,1%. The mean

contents of protein and fat in the tested non-dry sausages has been maintained on a similar level. Brine Concentration (BC) determines the concentration of salt in the product. It is an index of salinity and it may affect the durability of the product. As it results from the data contained in Table 1, the mean values of Brine Concentration (x_{BC}) calculated for no-dry sausages has been lowered. In other groups of smoked meat products no downward trends for the value of BC were stated. The Feder Number (FN) shows the degree of protein hydration in the products. While analysing the obtained results, the fall in mean FN values for the tested smoked meat products has been noted what testifies to the increase of protein contents in these products.

Table 1. Mean content of water (x_W), protein (x_B), fat (x_F), sodium chloride (x_S), added phosphates (x_{PA}) and value of discriminates, Feder Number (x_{FN}) Protein Fat Free (x_{PFF}) Brine Concentration (x_{BC}) in tested meat products

Products	Year	n	x_W [%]	x_B [%]	x_F [%]	x_S [%]	x_{PA} P_2O_5 [g/kg]	x_{FN} [-]	x_{PFF} [-]	x_{BC} [-]
Smoked hams	2000	48	73,6	17,4	4,8	2,6	1,1	4,230	0,183	0,034
	2002	49	75,6	16,8	3,7	2,1	2,7	4,500	0,174	0,027
	2003	38	73,2	17,4	5,0	2,4	2,4	4,207	0,183	0,032
	2004	47	73,6	18,1	3,5	2,5	2,3	4,066	0,188	0,033
	2005	31	73,3	19,4	3,6	2,2	1,9	3,778	0,201	0,029
	2006	39	69,8	18,8	6,6	2,1	1,7	3,713	0,201	0,029
	2007	33	70,3	18,8	6,5	2,2	1,7	3,739	0,201	0,030
Dry sausages	2000	25	47,0	25,4	22,1	3,1	-	1,850	0,326	0,062
	2002	19	50,3	23,2	19,9	2,7	-	2,168	0,290	0,051
	2003	18	51,8	24,6	17,8	2,7	-	2,106	0,299	0,050
	2004	14	48,6	25,5	20,4	2,9	-	1,906	0,320	0,056
	2005	20	45,6	28,1	21,3	3,0	-	1,623	0,357	0,062
	2006	18	46,9	24,7	25,2	2,7	-	1,899	0,330	0,054
	2007	16	49,2	25,4	19,4	2,7	-	1,937	0,315	0,052
No-dry sausages	2001	88	60,6	15,9	18,4	2,2	-	3,811	0,195	0,035
	2003	35	60,8	16,5	18,5	2,0	-	3,685	0,202	0,032
	2005	36	61,8	16,1	17,5	2,0	1,4	3,839	0,195	0,031
	2006	32	59,4	16,7	18,8	1,9	1,4	3,557	0,206	0,031
	2007	42	60,0	16,1	19,7	1,9	1,1	3,727	0,200	0,031

The performed analysis of results showed the downward trend of contents of added phosphates determined as P_2O_5 in the tested smoked product samples. Within the recent six years the contents of this additive has been reduced from 2,7g/kg to 1,7g/kg of finished product. In 2000 the lowest mean content of added phosphates in this group of smoked products was noted. It was, most probably, connected with the regulations, then in force, allowing for application of polyphosphates to hams in the amount of up to 1,5g/kg of finished product. In the years 2005-2006 the mean contents of added phosphates determined as P_2O_5 in no-dry sausages were on a similar level of about 1,4g/kg of finished product. In 2007 the mean content of this additive decreased substantially to 1,1 g/kg of finished product. At present, the national regulations allow for phosphate addition up to the level of 5g/kg of product to all processed meat products.

The performed study has not shown any explicit trends in changes of contents of protein, water and fat in the tested groups of products. However, the analysis of particular kinds of products in the tested groups of smoked meat products indicated a substantial decrease in fat content in dry, coarse ground sausages (*krakowska sucha*). Within the recent eight years the fat contents in these products failed from the mean value of 16,0% to 11,0 %, i.e. by 5 percentage points (Table 2).

Table 2. Mean content of water (x_W), protein (x_P), fat (x_F), sodium chloride (x_S), added phosphates (x_{PA}) and value of discriminates, Feder Number (x_{FN}) Protein Fat Free (x_{PFF}) Brine Concentration (x_{BC}) in coarse ground dry sausages (*krakowska sucha*)

Products	Year	n	x_W [%]	x_P [%]	x_F [%]	x_S [%]	x_{PA} P_2O_5 [g/kg]	x_{FN} [-]	x_{PFF} [-]	x_{BC} [-]
Coarse ground dry sausages	2000	11	54,0	25,5	16,0	3,0	-	2,118	0,304	0,053
	2002	10	57,9	22,5	14,9	2,6	-	2,573	0,264	0,043
	2003	9	57,2	24,9	12,6	2,7	-	2,297	0,285	0,045
	2004	7	56,7	26,1	12,0	3,1	-	2,172	0,297	0,055
	2005	5	57,2	28,2	10,6	3,0	-	2,028	0,315	0,050
	2006	7	58,4	24,5	11,0	2,6	-	2,384	0,275	0,043
	2007	7	58,7	24,9	11,0	2,7	-	2,357	0,280	0,044

Conclusions

The results of the performed studies on meat products made in the years 2000-2007 show that the sodium chloride content has been decreased by 0,4g/100g on average in smoked meat products and by 0,3g/100g in no-dry sausages. The content of added phosphorus in smoked meat products has been decreased by 37% on average. For coarse ground dry sausages the fall in content of fat by 5 percentage points on average has been noted. The increase in protein content of smoked meat products (smoked scalded hams) has been noted. The presented results show that the quality of Polish meat products has improved and the decrease in the level of content of sodium chloride and added phosphorus in smoked meat products and no-dry sausages has contributed to the improvement of health benefits of these products.

References

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