CHARACTERISTICS OF DRY POULTRY MEAT SAUSAGES WITH AND WITHOUT STARTER CULTURES

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SUMMARY

The characteristics of dry sausages made of poultry meat and poultry or pork fat tissue (proportion 80:20) have been examined. On the basis of physicochemical, microbiological and sensory examination results, it has been concluded that the production of a new sort of dry poultry sausages having specific sensorial characteristics by adding starter cultures is possible. The starter cultures used also caused the shortening of dry sausage aging period, as well as a characteristic microflora forming and the total bacteria reduction.

INTRODUCTION

Starter microorganisms are used in dry poultry meat sausage production in order to avoid mistakes during sausage ripening and to shorten the processing.

According to Coretti (1971) the following cultures are used: *Pediococcus cerevisiae*, *Lactobacillus plantarum*, *Streptococcus lactis*, *Micrococcus aurantiacus* and *Micrococcus lactis* and others. Holley et al. (1988) point out that in this case pathogenic microorganisms (*Staphylococcus aureus* and *Salmonella typhimurium*) are eliminated at the end of dry poultry meat sausage fermenting process.

Keller and Acton (1974) used liofilised and frozen cultures of *Pediococcus cerevisiae* in production of semi-dry fermented sausages and they found out that

Indicators of physico-chemical changes in dry poultry sausages

Table 1.

Mark of product	Examination time	With starter cultures water %	fat %	proteins %	pH	a_w	Without starter cultures water %	fat %	proteins %	pH	a_w
A	0 day	63,46	12,48	19,62	5,22	0,95	64,89	11,10	20,60	5,25	0,93
	7 days	44,00	20,93	27,66	4,95	0,92	44,69	22,07	27,83	4,98	0,91
	14 days	26,64	27,62	37,57	4,98	0,85	29,89	33,82	32,40	5,07	0,84
B	0 day	59,15	18,51	18,41	5,43	0,90	55,83	19,11	19,47	5,43	0,91
	7 days	42,84	31,79	18,71	4,88	0,88	40,67	31,42	20,10	4,83	0,88
	14 days	26,59	36,75	24,39	4,89	0,80	26,86	36,86	25,19	4,96	0,81
C	0 day	62,47	10,95	20,24	5,24	0,94	62,86	11,65	20,93	5,20	0,94
	7 days	43,59	20,91	27,98	4,83	0,89	45,92	22,78	25,34	4,98	0,88
	14 days	22,44	25,83	39,30	5,10	0,80	21,63	25,99	39,20	5,00	0,79
D	0 day	60,87	17,51	19,24	5,62	0,92	61,70	16,46	20,20	5,58	0,93
	7 days	44,16	30,47	22,01	4,94	0,90	43.35	28,19	22,65	4,86	0,91
	14 days	26,05	41,38	30,05	5,12	0,86	24,56	36,70	31,82	5,10	0,85

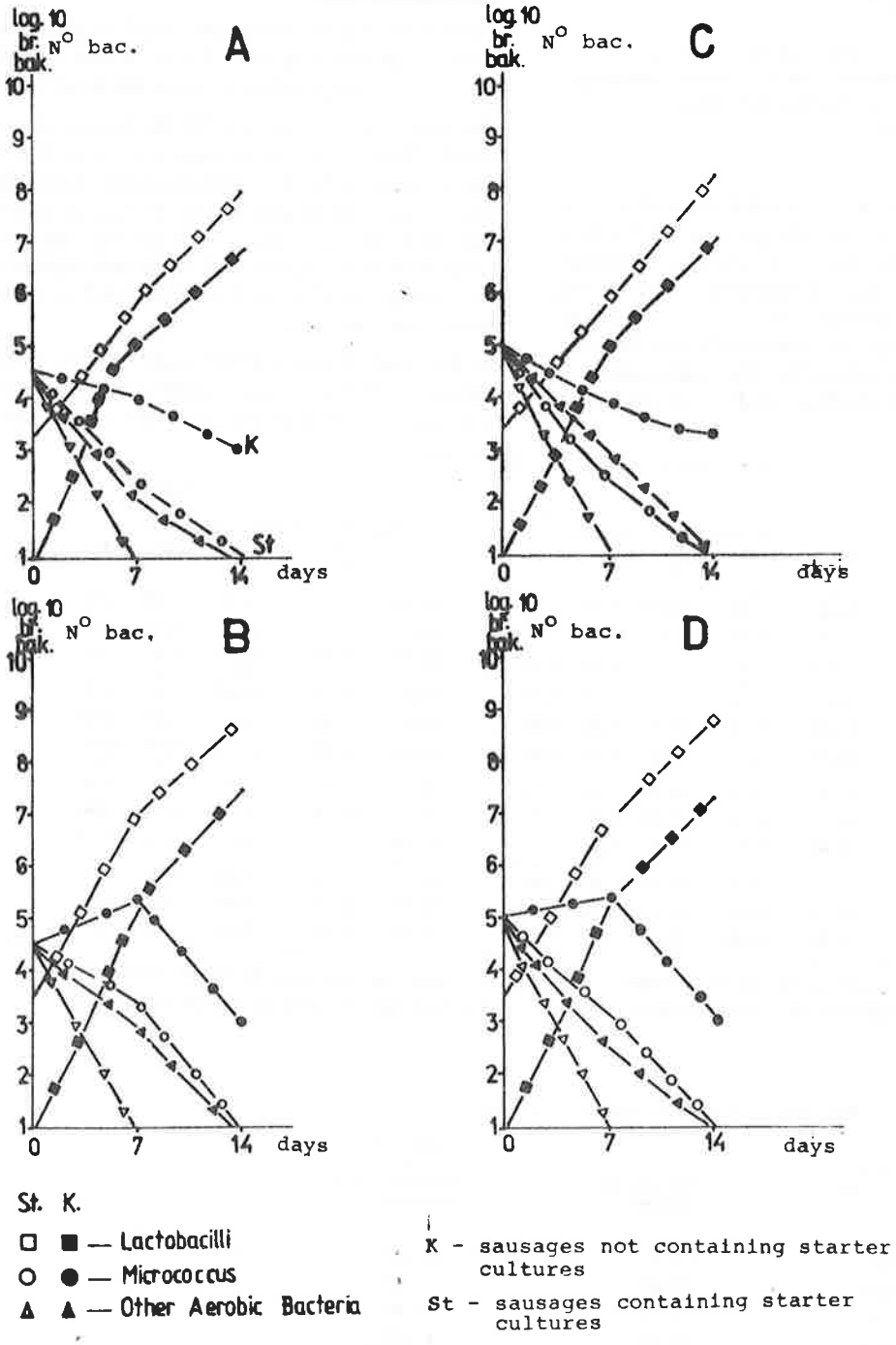
A - breast meat and poultry fat tissue sausages
b - thigh meat and poultry fat tissue sausages
C - breast mest and pork fat tissue sausages
D - thigh meat and pork fat tissue sausages

Weight loss (%) during dry poultry sausage production

Table 2.

Mark of product	Examination time	With starter cultures	Without starter cultures
A	3 days	21,43	16,67
	6 days	33,67	30,56
	9 days	41,84	39,44
	14 days	46,53	45,00
B	3 days	17,14	20,37
	6 days	27,68	27,78
	9 days	35,36	34,26
	14 days	41,25	38,89
C	3 days	20,93	23,53
	6 days	34,42	36,47
	9 days	42,56	44,71
	14 days	48,37	49,41
D	3 days	21,57	21,00
	6 days	33,33	32,00
	9 days	40,78	40,67
	14 days	46,08	45,00

Graph.1. DRY POULTRY SAUSAGE MICROFLORA DURING AGING



total bacteria counts was up to 10^3 and weight loss was 20-25% for 10-12 days drying period; water content was from 43.8% to 47.8%, protein content 34%.

Nedeljkovic et al. (1987) examined and pointed out the possibility of production of poultry sausages with poultry and pork fat tissue added, and they underlined some of their quality characteristics. They concluded that dry sausages of satisfying organoleptic characteristics are made by using these materials and the corresponding technology. As a continuation of the research, this work deals with starter cultures which are used for dry sausages made from poultry meat as well as poultry and pork fat tissue.

MATERIAL AND METHODS

Dry sausages are made of frozen poultry breast or broiler thigh, poultry fat or, pork fat (proportion between meat and fat was 80:20), with salt, sugar, sodium nitrite and spices added. Each of these was produced by adding the starter culture L_2 (combination of two Lactobacillus species). Control groups of the same ingredient combination were made without starter cultures. Usual procedure was performed to cut and, mix materials, then pigs small intestines were stuffed with the ingredients and paired on 12 cm length. After leaking sausages were smoked for two days at 18°C and 88% relative humidity; drying lasted 12 days at 18°C and 86-72% relative humidity.

Before smoking, after 7 th and 14 th days, water, fat and proteins were investigated by AOAC methods; pH (pH-meter Ma 5722) and a_w values (a_w-Wert Messer "Lufft"). Total bacteria count, the presence of *E.coli*, *Proteus* species, coagulasa positive *Staphylococcus* and sulfite reducing Clostridiae, as well as the number of *Lactobacillus* and *Micrococcus* were also determined.

Sensorial examination including colour, cross section, consistency, smell and flavour was performed by experts. Weight loss during aging was determined before and after every phase of production.

RESULTS AND DISCUSSION

Average values of physical and chemical examinations are presented on Table 1. Water and protein content is higher and fat content is lower in dry sausages made from breast meat comparing them with sausages made from broiler thigh meat, not depending on fat tissue used.

Water:protein proportion was not significantly different from that of control sausages. Water:protein proportion was different according to the sort of meat; it was higher in thigh meat sausages and that is in compliance with results of Acton and Dick (1976), it was 0.80 in completely dry sausages containing water 25-30%.

Water content was bellow 30% on 14 th day (at the end of drying) while the fat content was 25-41% which is in compliance with results of Acton et al. (1978). Adding of starter cultures did not influence pH which could be expected in sausages of small diameter (∅ about 32 mm).

Significant differences in a_w were not noticed according to the sort of meat used.

Results of microbiological examinations (Graph.l) show that total aerobic count bacteria in stuffing, no matter the ingredient combination, is 10^4-10^5/g. Dominant microflora of control samples (without starter cultures) was represented by *Micrococcus*, *Bacillus* and Gram negative microorganisms (*Pseudomonas* and *Achromobacter*). Lactobacilli were determined only by technique of enriching. Number of lactobacilli was above 10^3/g in the sausages containing starter cultures. After the aging period of seven days, the number of lactobacilli rapidly increased in all examined sausages (no matter the sort of meat and fat tissue). Total count of aerobic bacteria was reduced within this period; in the sausages containing starter cultures it was either below lO/g or not identified at all. The number of total aerobic bacteria was 10^2-10^3/g in control sausages; dominant flora in them were lactobacilli, while a smaller number of micrococci was found. Thigh meat sausages, however, had a greater number of micrococci than the breast meat ones.

On 14 th days control groups had 10^3/g of micrococci; they were not any longer determined in sausages containing starter cultures. The only microflora in them was represented by lactobacilli. The results of other authors Hofmann and Scharmen (1980) and Holley et al. (1986) also show that lactobacilli are the dominant microflora in the last week of dry sausage fermentation.

Microbiological differences among the sausages containing poultry fat tissue or the ones containing pork fat tissue are not noticed.

Pathogenic microorganisms are not found in any group of sausages during the whole period of examination.

Weight loss during the drying period is presented in Table 2. The results show that there are no significant differences between the sausages containing starter cultures and the control ones in weight loss after straining, smoking and drying. The total weight loss was bigger with the breast meat sausages than with thigh meat ones, no matter the kind of fat used. The weight loss results obtained are bigger than the previous ones obtained by Nedeljkovic et al. (1987) but approximate to the ones by Keller et al. (1974) which show that weight loss is 35-40%.

Sensory characteristics of sausages were influenced by starter cultures added. Both control and starter cultures containing sausages had good sensory characteristics. The starter cultures containing sausages, however, differed from the control ones in taste and smell. The most important fact is that starter cultures containing sausages had those characteristics even on the ninth processing day. Weight loss was 35-41% in that phase, i.e. the ripening of starter cultures containing sausages was over completed on the ninth processing day. According to these results, the aging period with this new sort of sausages (containing starter cultures) is 5 days shorter than with the control ones. Colour differences are caused by the sort of meat and fat used:breast meat sausages are light-pink while the thigh meat sausages are dark-red.

Everson et al. (1970) obtained the similar results which showed that the sausage fermentation period could be shortened 32-40 hours by using liofilised starter cultures. 24 hour bouillon cultures were used in this work and that could explain the aging phase being shortened to a greater extent.

CONCLUSION

On the basis of the results obtained it could be concluded that there are possibilities for the production of a new kind of dry sausages having specific sensorial characteristics, made from poultry meat, poultry and pork fat tissue, and by adding starter cultures. Dry sausage ripening period is significantly shorter because of the presence of starter cultures; it has on prominent economic importance. As for hygienic features, starter cultures cause the total bacteria reduction.

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