Table 1. Mean values ± standard deviation of the measurements on the fresh legs upon arrival at the plant according to quality group

	QMsm < 9.0 (n=46)	QMsm > 13.0 (n=47)	(+)
QMsm	7.2 ± 1.1	13.8 ± .7	***
QMgl	9.2 ± 2.6	13.8 ± 1.8	***
pHsm	5.67 ± .13	5.56 ± .09	***
pHgl	5.64 ± .10	5.55 ± .06	***
FOPsm	50.9 ± 10.9	59.9 ± 13.2	**
FOPgl	47.5 ± 8.9	53.9 ± 12.3	**

(+) Significance of the difference : **, p<.01; ***, p<.001

Table 2. Mean values ± standard deviation of cooking losses and measurements on slices of the cooked hams according to quality group

	QMsm < 9.0 (n=38/23)(++)	QMsm > 13.0 (n=37/24)(++)	(+)
Cooking losses (g)	651 ± 165	738 ± 138	*
Cooking losses (%)	9.98 ± 2.42	11.25 ± 2.06	*
CIELAB L*	64.46 ± 3.39	65.35 ± 2.67	ns
CIELAB a*	10.46 ± 1.14	10.30 ± .88	ns
CIELAB b*	11.96 ± .35	12.20 ± .47	~
Dry matter content	27.75 ± 1.44	28.36 ± 1.13	ns
Shear force (N)	14.20 ± 3.06	13.50 ± 2.10	ns

(+) Significance of the difference : ns, not significant; ~, p<.10; *, p<.05

(++) Number of observations for cooking losses / other parameters

Table 3. Number of cooked hams with a hole at the cut surfaces according to quality group

Holes	QMsm < 9.0	QMsm > 13.0	Total
Present	3 (13)	16 (66)	19
Absent	20 (87)	8 (33)	28
Total	23 (100)	24 (100)	47

Table 4. Distribution of the cooked hams according to panel score and quality group

Panel score	QMsm < 9.0	QMsm > 13.0	Total
1	0 (0.0)	3 (12.5)	3
2	1 (4.4)	8 (33.3)	9
3	4 (17.4)	6 (25.0)	10
4	11 (47.8)	4 (16.7)	15
5	7 (30.4)	3 (12.5)	10
Total	23 (100)	24 (100)	47

Tables

Table 1 - Technological yield (%) by sire breed and pH24 class, in two plants (960 hams)

pH class \ Sire breed	Synthetic containing Hampshire	Pietrain	Large White x Pietrain
< 5.5	86.2	92.5	91.6
5.5 - 5.75	92.7	92.9	97.2
5.75 - 6.0	100.7	96.6	98.8
≥ 6.0	-	99.9	101.5

Table 2 - Slicing losses (%) by sire breed and pH24 class, in two plants (960 hams)

pH class \ Sire breed	Synthetic containing Hampshire	Pietrain	Large White x Pietrain
< 5.5	55.1	24.6	25.3
5.5 - 5.75	21.4	18.1	14.7
5.75 - 6.0	12.3	17.5	12.9
≥ 6.0	-	11.1	11.5

Table 3 - Detailed slicing losses (%) by sire breed and pH24 class in one plant (591 hams)

Sire breed	pH24 class	Losses linked to the process	Losses related to raw material	Total losses
Synthetic containing Hampshire	< 5.5	4.4	53.3	57.7
	5.5 - 5.75	6.6	20.2	26.9
	5.75 - 6.0	5.5	7.9	13.3
	≥ 6.0	-	-	-
Pietrain	< 5.5	5.8	16.2	23.0
	5.5 - 5.75	5.7	10.1	15.8
	5.75 - 6.0	5.5	11.2	16.7
	≥ 6.0	5.6	4.7	10.2
Large White x Pietrain	< 5.5	6.5	14.3	20.8
	5.5 - 5.75	5.5	5.8	11.3
	5.75 - 6.0	5.3	3.9	9.2
	≥ 6.0	5.8	4.4	10.3

Table 4 - Details of defects related to raw material (% of total slicing losses) by breed and pH24 class, in one plant (591 hams).

Sire breed	pH24 class	Separation of the muscles	Holes	Pastiness
Synthetic containing Hampshire	< 5.5 5.5 - 5.75 5.75 - 6.0 ≥ 6.0	18.8 9.4 2.8 -	10.9 7.0 0.8 -	23.6 3.9 4.4 -
Pietrain	< 5.5 5.5 - 5.75 5.75 - 6.0 ≥ 6.0	6.9 4.9 7.0 2.2	4.7 3.8 3.0 1.4	4.6 1.4 1.2 1.0
Large White x Pietrain	< 5.5 5.5 - 5.75 5.75 - 6.0 ≥ 6.0	5.8 1.8 2.4 3.0	2.7 1.4 1.1 1.0	5.8 2.6 0.5 0.5

Table 1. Experimental design.

Number of cycle	10			20			30		
Working time (min)	2	4	6	2	4	6	2	4	6
Experiment	A	B	C	D	E	F	G	H	I

Table 2. Instrumental data.

Experiment	a/b	% exudate proteins	Yield
A	2.1	10.6	104.2
B	1.8	12.5	107.4
C	1.4	12.5	107.8
D	2.3	11.9	108.0
E	1.7	12.4	108.9
F	1.6	11.3	109.8
G	1.7	14.0	106.8
H	1.7	14.5	110.6
I	1.2	11.6	107.8

Table 3. Eight-member sensory panel evaluation.

Experiment	Cohesiveness	Tenderness	Juiciness	Flavour	Colour	Defects
A	3.1	3.4	3.0	3.3	3.7	3.8
B	3.5	3.1	3.0	4.0	3.5	3.9
C	4.3	4.1	3.6	3.7	3.2	4.2
D	3.5	3.7	3.8	3.9	3.8	4.0
E	3.6	3.5	3.5	4.0	3.5	4.1
F	3.9	3.3	3.7	4.0	3.5	4.3
G	3.6	3.2	2.7	4.0	3.4	4.0
H	3.7	3.3	3.9	4.1	3.1	4.2
I	3.9	3.8	2.8	4.3	3.5	4.4

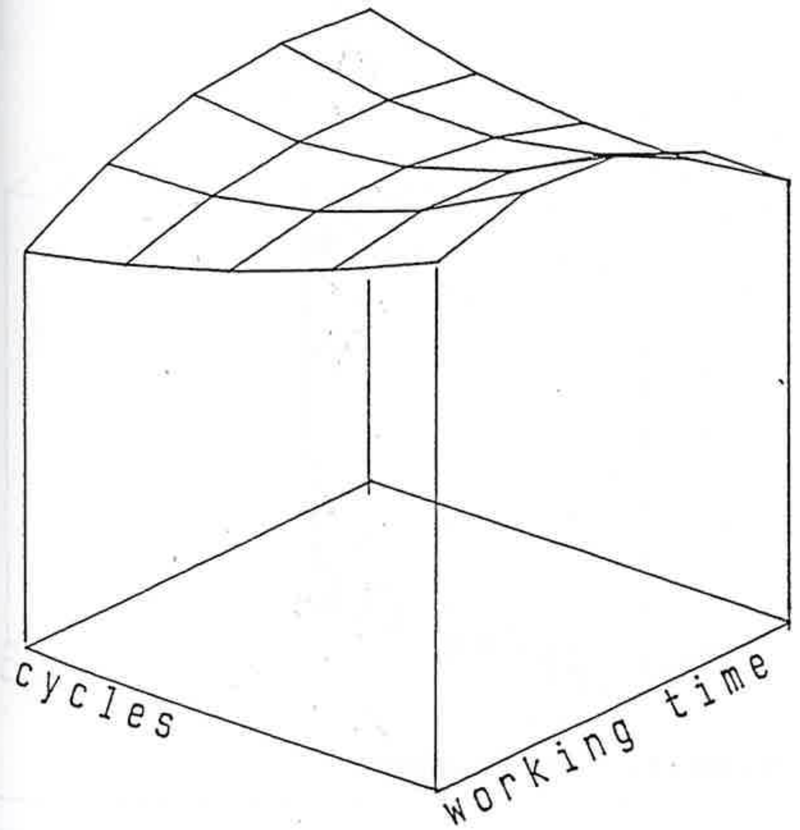


Figure 1. Response surface of proteins extracted at the end of tumbling phase.

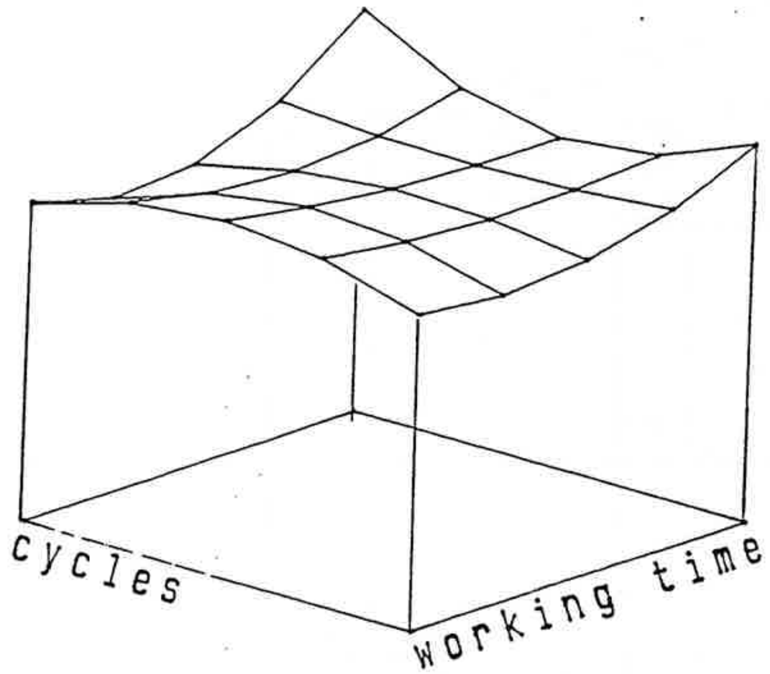


Figure 2. Response surface of product tenderness.

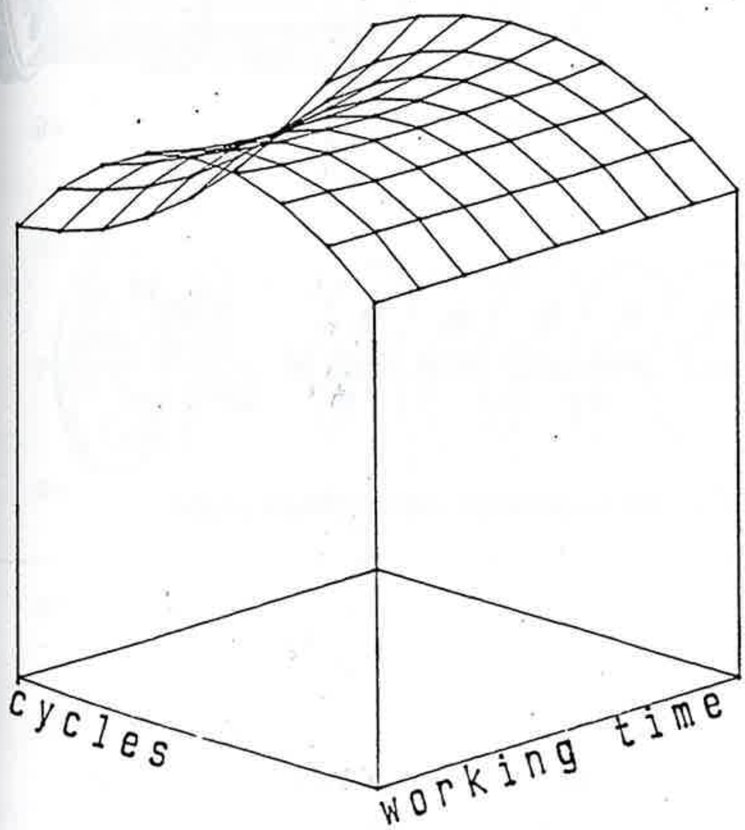
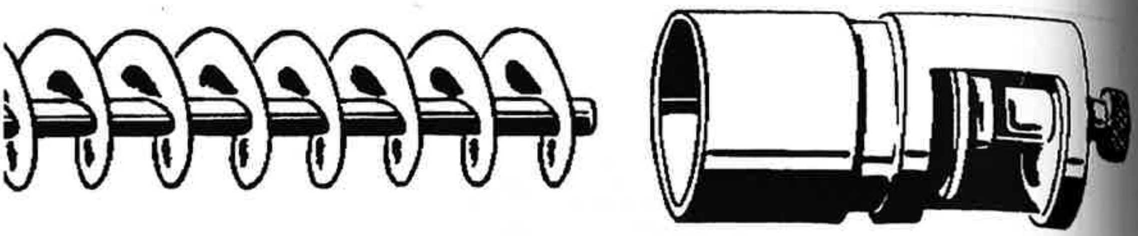
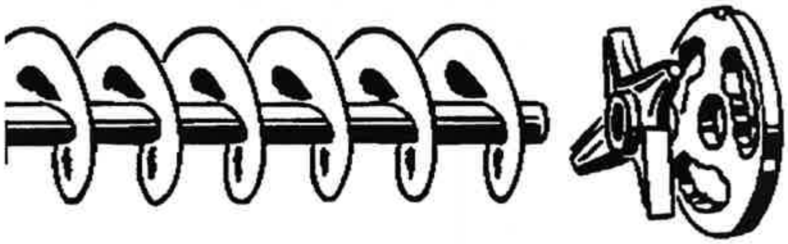


Figure 3. Response surface of product juiciness

Fig. 1 Tenderizers



A - Meat activator



B - Meat grinder with kidney plate

Fig. 2 Changes of the shear value of ham-like meat product during massaging

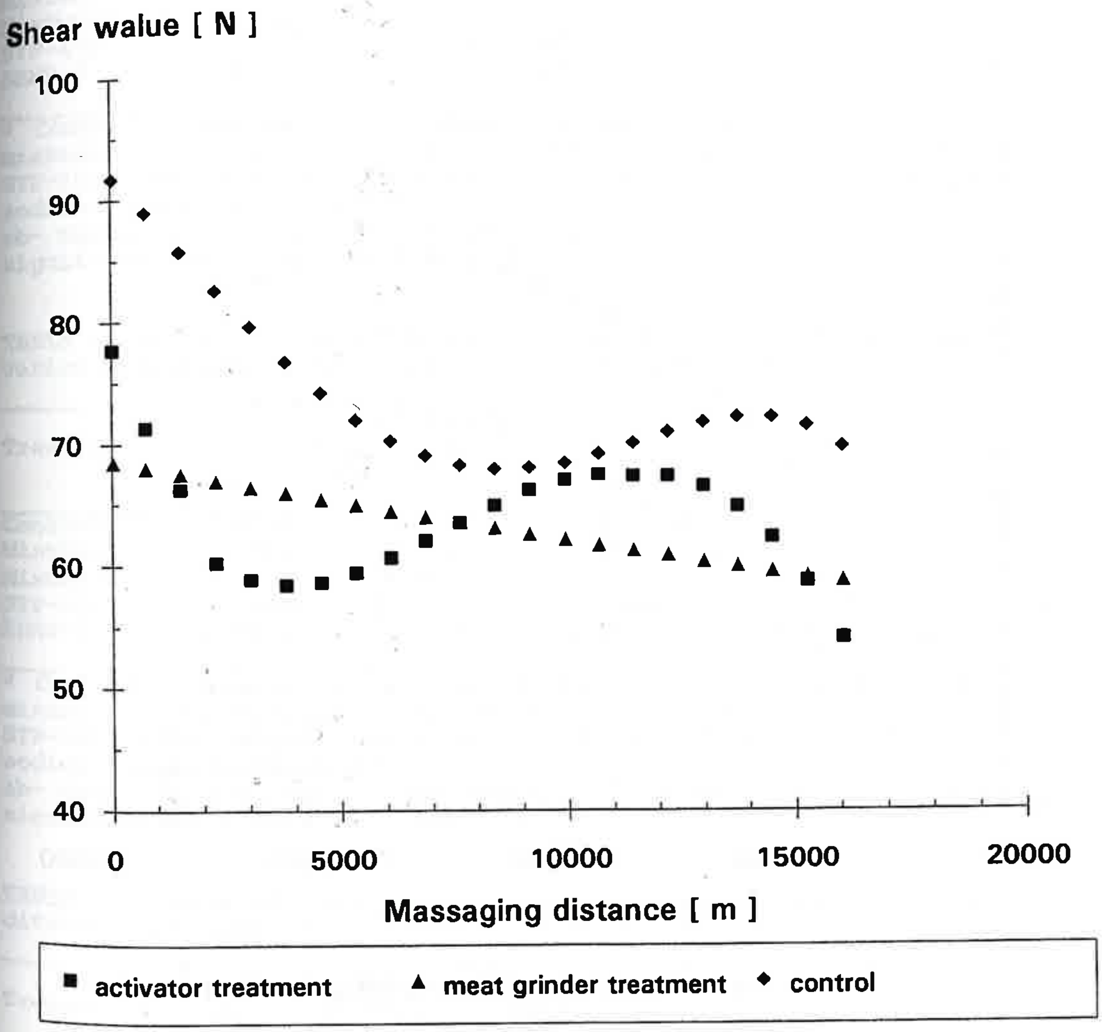


Fig. 3 Changes of slice-binding value of ham-like meat product during massaging

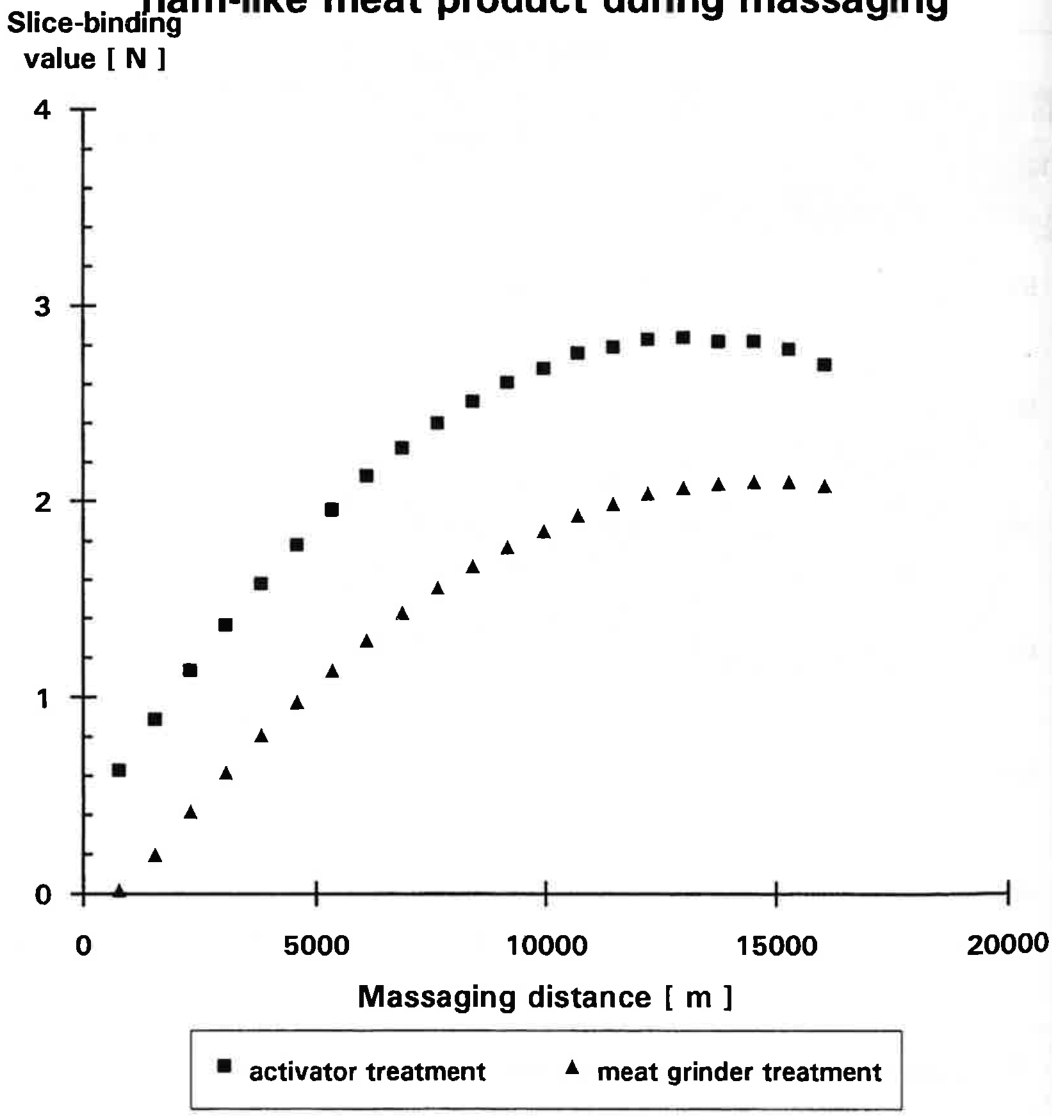


TABLE 1- Means of the variable pH of the treatments with different phosphates in the processing of the "cook-in" ham.

Treatment	pH Meat	Processed Meat	Ham
Control	6.0575ª	6.4975ª	6.5100ª
Mixture2	6.1125ª	6.2750ª	6.4500ª
Mixture3	6.2250ª	6.5650ª	6.5000ª
STP-100	6.0700ª	6.4100ª	6.5400ª
SHMP-5	6.0575ª	6.4200ª	6.5250ª

* Control - commercial mixture 1 (Kraki, SP); Mixture 2 - commercial mixture 2 (Cosmoquimica, SP); Mixture 3 - commercial mixture 3 (France); STP-100 (100% tripoliphosphate) and SHMP-5 (95% tripoliphosphate and 5% sodium hexametaphosphate)
ab- Means in the same column sharing the same subscribed letter are not significatively different (P<0.05).

TABLE 2- Means of the variables loss and efficiency of the treatments with various phosphates in the processing of the "cook-in" ham.

Treatment	Loss (%) Tumbling	Cooking	Total	Efficiency (%)
Control	4.8280ª	0.5986ᵇ	4.8980ª	114.123ª
Mixture2	3.2280ª	3.2203ª	6.3530ª	112.377ª
Mixture3	3.3980ª	0.0734ᵇ	3.9790ª	115.225ª
STP-100	4.5180ª	0.1935ᵇ	4.7080ª	114.351ª
SHMP-5	4.8400ª	1.6307ᵃᵇ	6.3940ª	112.327ª

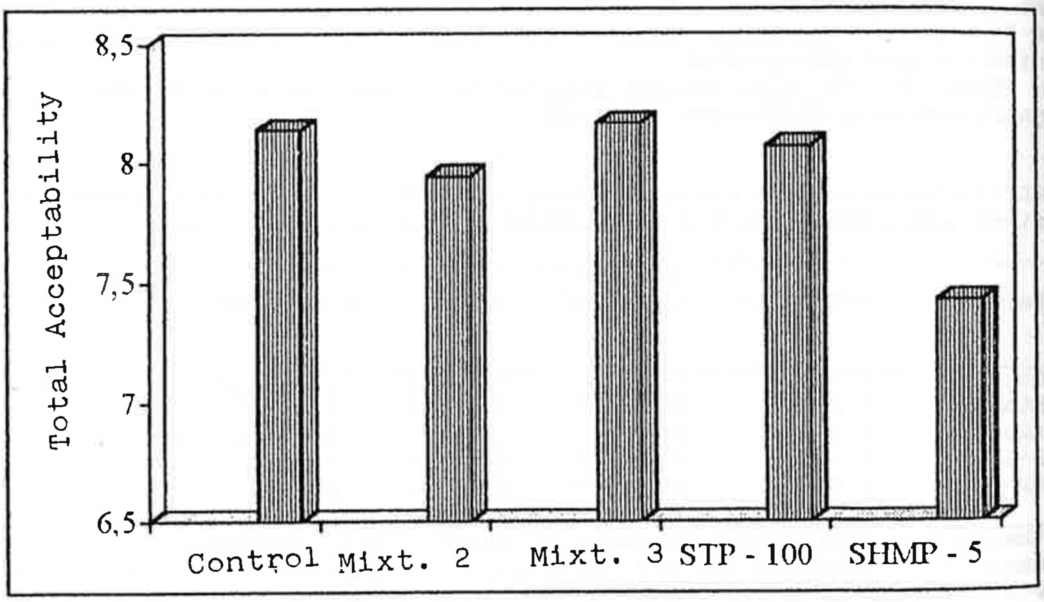
* Control - commercial mixture 1 (Kraki, SP); Mixture 2 - commercial mixture 2 (Cosmoquimica, SP); Mixture 3 - commercial mixture 3 (France); STP-100 (100% tripoliphosphate) and SHMP-5 (95% tripoliphosphate and 5% sodium hexametaphosphate)
ab- Means in the same column sharing the same subscribed letter are not significatively different (P<0.05).

TABLE 3- Means of the sensorial properties of the hams treated with different phosphates.

Treatments	color	Sensorial properties Smell	Cohesivity	Slicing	Flavor	Texture
Control	7.9150ª	7.9150ᵃᵇ	8.0800ᵃᵇ	8.4950ᵃᵇ	7.9950ᵃᵇ	8.1358ª
Mixture2	7.3300ª	8.1600ª	7.7450ᵇ	7.9950ᵇ	8.2450ª	8.1650ª
Mixture3	8.1650ª	7.7450ᵇᶜ	8.2450ᵃᵇ	8.1650ᵃᵇ	8.3300ª	8.3300ª
STP-100	8.9950ª	7.4150ᶜ	8.3300ª	8.7450ª	7.8300ª	8.0658ª
SHMP-5	7.1600ª	7.3300ᵈ	7.7450ᵇ	8.1650ᵃᵇ	6.9150ᵇ	7.4267ᵇ

9.0 - excellent softness, juice, flavor and color; more acceptable product.
1.0 - extremely hard, dry, with undesirable flavor and color; less acceptable product.
* Control - commercial mixture 1 (Kraki, SP); Mixture 2 - commercial mixture 2 (Cosmoquimica, SP); Mixture 3 - commercial mixture 3 (France); STP-100 (100% tripoliphosphate) and SHMP-5 (95% tripoliphosphate and 5% sodium hexametaphosphate)
ab- Means in the same column sharing the same subscribed letter are not significatively different (P<0.05).

FIGURE 1 - Relation of the total acceptability of the sensorial atributes and the treatments with different phosphates of the "cook-in" ham.



URE 2 - Relation between the punctuatuion of sensorial atributes and the loss by cooking, of the treatments with different phosphates of the "cook-in" ham.

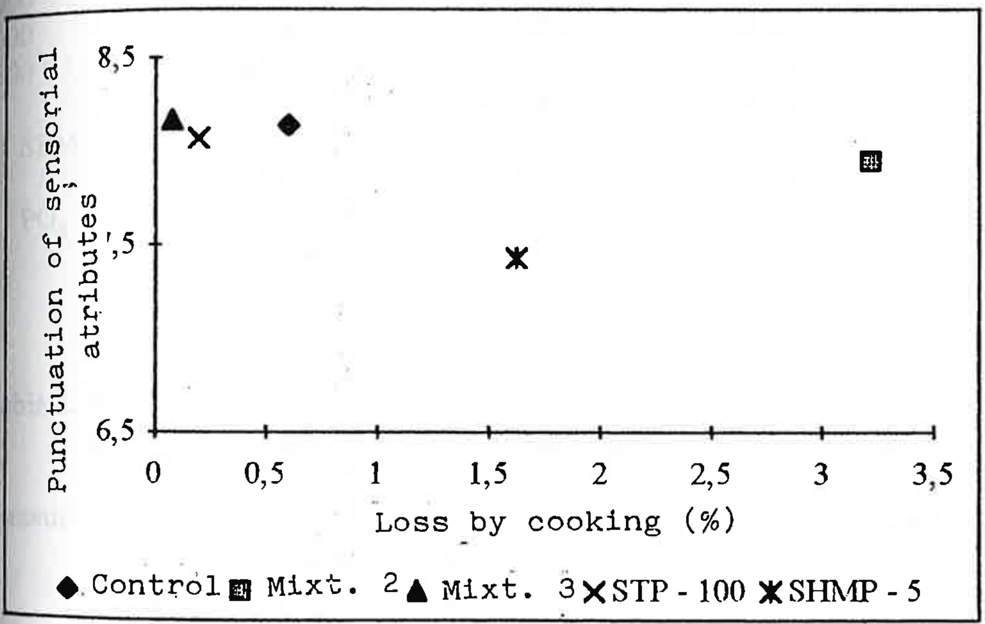


Table 1. Effect of high pressure on pH values of raw meat batter, and protein extractability of raw meat batter and meat.

Pressure (bar/5 min)	pH	Protein extractability (%)	
		Meat batter	Meat
0	5.97	27.58	31.68
500	5.97	25.93	31.37
750	5.96	25.97	32.16
1000	5.98	26.63	32.21
2000	6.15	24.45	29.41
3000	6.19	23.88	27.88
3800	6.25	21.20	22.60
SEM	0.125	2.12	3.48

Table 2. Effect of high pressure on denaturation enthalpy values of meat batters.

Pressure (bar / 5 min)	Enthalpy (J/g)
0	1.27
1000	1.42
2000	1.25
3000	0.87
3800	0.77
SEM	0.28

Table 3. Effect of pressurisation on cooking yields and shear force values of full-fat, low-salt sausages cooked with program 1.

Pressure (bar/5 min)	Cooking yield (%)		WB shear force (N)	
	Low PO_4	High PO_4	Low PO_4	High PO_4
0	82.27	89.24	10.58	18.49
500	82.28	89.50	12.95	19.67
750	82.78	89.62	13.78	20.70
1000	83.46	89.29	15.44	18.60
2000	84.31	89.00	17.80	15.75
3000	83.54	88.87	16.50	14.05
3800	83.32	88.85	15.23	13.38
SEM	0.74	0.30	2.40	2.84

PO_4 = phosphate

Table 4. Effect of pressurisation on cooking yields and shear force values of low-fat, low-salt sausages cooked with program 1.

Pressure (bar/5 min)	Cooking yield (%)			WB shear force (N)		
	No PO_4	Low PO_4	Normal PO_4	No PO_4	Low PO_4	Normal PO_4
0	75.11	73.49	85.04	9.60	8.91	16.50
500	76.00	74.25	85.65	10.50	10.30	17.90
750	78.39	78.57	85.71	10.88	10.90	17.85
1000	79.24	79.09	85.53	13.40	12.85	19.85
2000	82.98	83.92	83.99	16.70	16.30	18.25
3000	81.30	80.85	81.97	14.30	14.45	17.50
3800	80.80	80.91	81.56	14.26	14.40	17.15
SEM	2.85	3.74	1.77	2.56	2.65	1.05

PO_4 = phosphate

Table 5. Effect of pressurisation on cooking yields and shear force values of low-fat, normal-salt sausages cooked with program 1.

Pressure (bar/5 min)	Cooking yield (%)			WB shear force (N)		
	No PO_4	Low PO_4	Normal PO_4	No PO_4	Low PO_4	Normal PO_4
0	83.30	80.95	87.50	9.80	9.42	17.85
500	83.35	81.52	87.21	10.45	9.95	18.27
750	83.99	81.77	87.44	11.15	10.63	18.31
1000	83.46	83.91	87.72	14.83	13.20	19.55
2000	83.03	83.95	87.59	15.30	13.85	19.98
3000	81.26	79.99	84.02	13.80	12.85	18.45
3800	81.27	79.82	84.34	13.62	12.87	18.16
SEM	1.09	1.68	1.63	2.21	1.77	0.79

PO_4 = phosphate

Table 6. Effect of pressurisation on cooking yields and shear force values of low- and full-fat sausages with low levels of salt and phosphate and cooked with program 2.

Pressure (bar/5 min)	Cooking yield (%)		WB shear force (N)	
	Low-fat	Full-fat	Low-fat	full-fat
0	83.39	90.60	10.27	13.35
1000	87.63	91.52	18.85	14.96
2000	88.71	91.86	19.60	15.20
SEM	2.81	0.65	5.18	1.00

Table 1. Proximate composition and HunterLab analysis of control and extruded pork chops.

Variable	Control	Extruded	S.E.[a]
Proximate Composition			
Raw			
Moisture (%)	69.25*	72.17	0.66
Fat (%)	4.71	6.28	0.84
Protein (%)	16.54*	21.50	2.46
Ash (%)	0.76*	1.45	0.13
Cooked			
Moisture (%)	59.02*	62.37	0.66
Fat (%)	10.28*	8.10	0.47
Protein (%)	31.87*	29.60	0.59
Ash (%)	1.11*	1.82	0.04
HunterLab Analysis			
Raw			
L	41.29*	36.79	0.79
a	11.41*	18.51	0.56
b	3.06*	5.18	0.18
Cooked			
L	39.02*	34.07	1.15
a	20.10*	15.98	0.45
b	10.33*	8.27	0.23

[a] S.E.=Standard Error
L: Lightness scale, 100=white, 0=black
a: Red-green, a larger number indicates more red
b: Yellow-blue, a larger number indicates more yellow
*Control different from extruded chops (P<.01)

Table 2. Instron compression, Kramer shear and sensory analysis of control and extruded pork chops.

Variable	Control	Extrude	S.E.[a]
Instron			
Hardness[b]	374.83**	243.57	19.29
Cohesiveness[c]	0.41**	0.36	0.01
Springiness[d]	13.67**	17.21	0.49
Chewiness[e]	2145.43**	1493.53	142.85
Lee Kramer			
AUC/gram[f]	16.14*	20.46	1.63
Peak/gram[g]	10.17**	6.55	0.43
Sensory Analysis[h]			
Juiciness	5.14	5.67	0.24
Texture	4.79**	5.80	0.23
Flavor	5.11**	6.11	0.24
Acceptability	4.88**	5.84	0.23

[a]S.E.=Standard Error
[b]Peak force of compression cycle 1 [CC1] (kg/g)
[c]Area under the curve [AUC] of compression cycle 2 [CC2]/AUC of CC1
[d]Width of CC2 (mm)
[e]Hardness*cohesiveness*springiness (kg*mm/g of sample)
[f]AUC per gram of chop (cm^2/g of sample)
[g]Peak force per gram of chop (kg force/g of sample)
[h]Sensory scale: 1=extremely undesirable, 8=extremely desirable
*Control different from extruded chops (P<.05)
**Control different from extruded chops (P<.01)

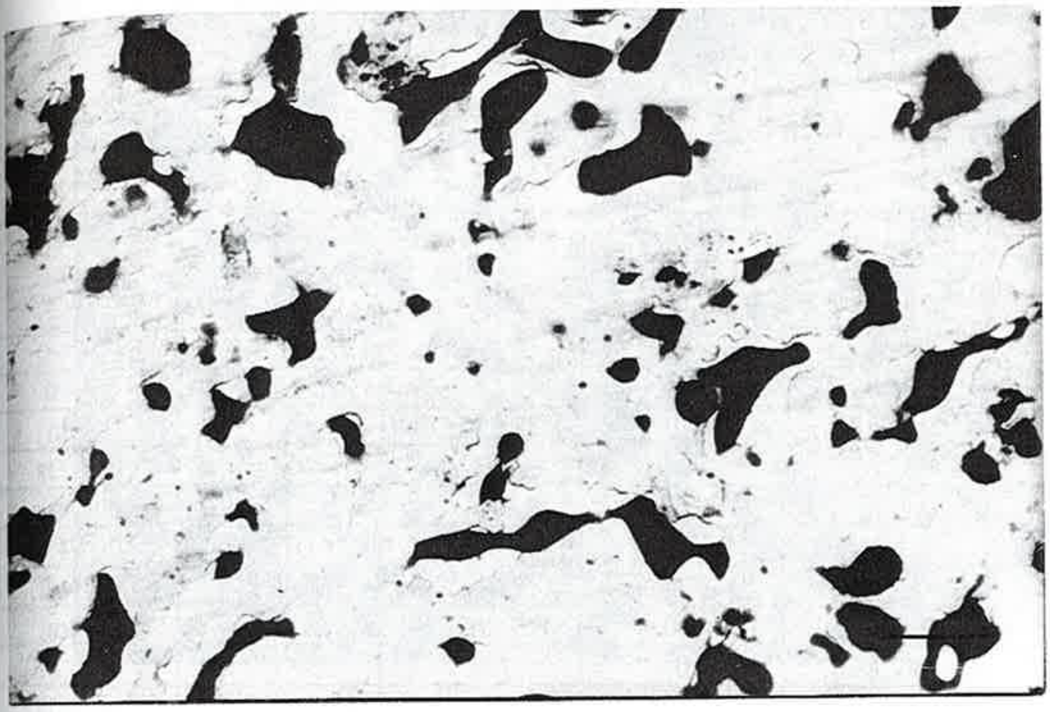


Fig.1 Meat emulsion 0-100

Fig.2. Meat emulsion 0-70

Fig. 1 , 2. Microstructure of the meat emulsion. Preparation stained by Red Oil O. Dark stained fat areas. Bar = 100 µm.

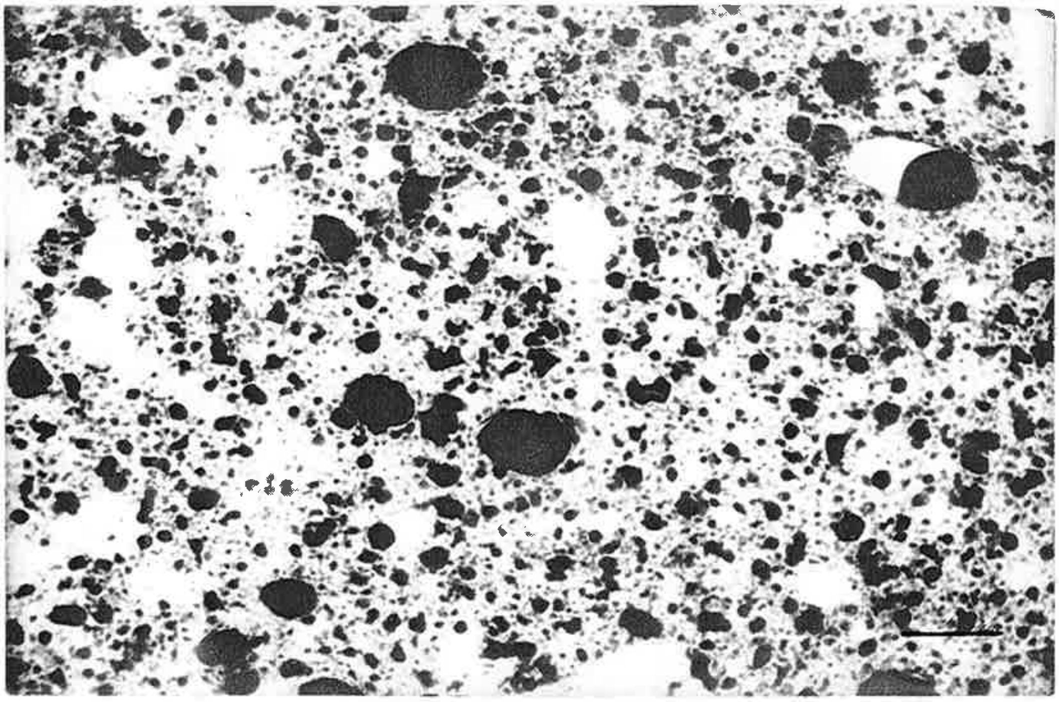


Fig 3. Meat emulsion 3-100

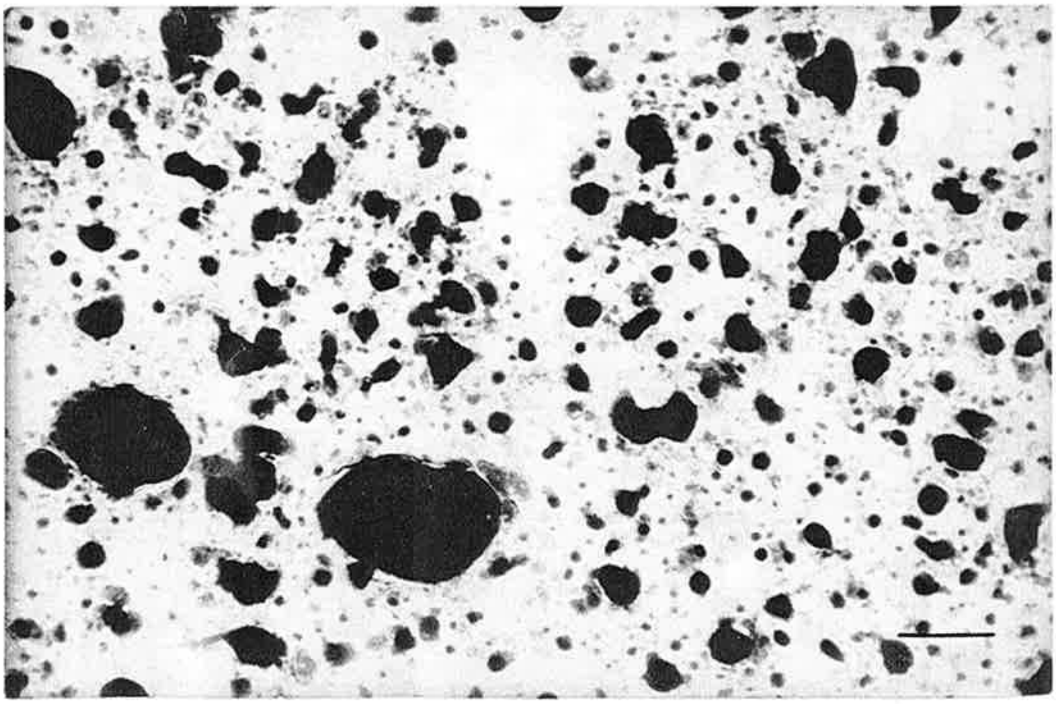


Fig. 4 Meat emulsion 3-70

Fig 3, 4 . Microstructure of the meat emulsion. Preparations stained by Red Oil O. Dark stained fat areas. Bar = 100 μm.

Table 1.

Characteristic of the structure of meat emulsions

Batch	Number of fat areas in 10 windows	Area tested [μm 2]	Fat area min [μm2]	Fat area max [μm 2]	Fat area mean [μm 2]
0 - 100	330	63362,25	1,0	14401,6	380,72
0 - 70	265	63362,25	0,7	12616,4	402,31
mean		63362,25	0,85	13509,0	391,52
st. dev.		0	0.21	262,3	15,27
variability		0	24,96	9,34	3,90
3 - 100	1270	63362,25	0,7	5174,0	71,92
3 - 70	1508	63362,25	0,7	5034,0	52,45
mean		63362,25	0,7	5104,0	62,19
st. dev.		0	0	98,99	13,77
variability		0	0	1,94	22,14

Table 1. Compositions of the sausages.

Raw materials, inclusions and species, kg	"Kamchia"	"Vial"	"Srednogorska"
Pork - grade I	50		
Pork - grade II	50	50	30
Vial - grade I		50	
Beef - grade II			40
Beef - grade III			20
Fat (semisolid)			10
Salt	2,200	2,200	2,200
Sodium nitrite	0,007	0,010	0,007
Sodium tripolyphosphate	0,200	0,200	0,200
Sucrosa	0,100	0,100	0,250
Blak pepper	0,400	0,400	
Red pepper		0,250	0,550
Garlic	0,250		0,220
Coriander			0,150

Table 2. General proximate composition of nadenitsa "Srednogorska"

Parameter the basis of total weight)	Control sample	Treated samples with 2 % preparation	with 6 % preparation	with 10 % preparation
Moisture content	62,27 + 0,99	62,73 + 1,01	63,04 + 0,94	63,45 + 0,91
Dry matter	37,73 + 0,93	37,27 + 0,96	36,96 + 0,87	36,55 + 0,98
Total protein	12,05 + 1,12	12,27 + 1,04	12,46 + 1,11	12,69 + 0,98
Connective tissue protein	3,84 + 0,11	4,26 + 0,19	4,41 + 0,11	4,72 + 0,33
Total Fat	21,77 + 1,26	21,93 + 1,17	22,01 + 1,07	22,21 + 1,21
Total ash	2,73 + 0,41	2,76 + 0,44	2,80 + 0,45	2,83 + 0,39
Salt	2,17 + 0,33	2,14 + 0,26	2,16 + 0,31	2,16 + 0,37

Table 3. General proximate composition of sausage "Kamchia"

Parameter (on the basis of total weight)	Control sample	Treated samples with 2 % preparation	with 6 % preparation	with 10 % preparation
% Moisture content	61,44 + 0,87	61,79 + 0,89	62,01 + 0,93	62,72 + 0,90
% Dry matter	38,56 + 0,97	38,30 + 0,90	37,99 + 0,89	37,28 + 0,93
% Total protein	16,38 + 1,04	17,39 + 1,19	18,08 + 1,21	18,34 + 1,33
% Connective tissue protein	1,58 + 0,14	1,38 + 0,21	1,57 + 0,17	1,92 + 0,20
% Total Fat	20,50 + 1,25	19,12 + 0,98	18,07 + 1,13	17,03 + 1,20
% Total ash	1,68 + 0,45	1,79 + 0,41	1,84 + 0,46	1,91 + 0,50
% Salt	1,40 + 0,34	1,45 + 0,32	1,61 + 0,38	1,70 + 0,41

Table 4. General proximate composition of sausage "Vial"

Parameter (on the basis of total weight)	Control sample	Treated samples with 2 % preparation	with 6 % preparation	with 10 % preparation
% Moisture content	61,44 + 0,93	61,81 + 0,87	62,72 + 0,95	62,95 + 0,89
% Dry matter	38,56 + 0,94	38,19 + 0,88	37,28 + 0,91	37,05 + 0,90
% Total protein	19,46 + 1,02	20,08 + 0,99	20,68 + 1,03	20,94 + 1,05
% Connective tissue protein	2,81 + 0,11	2,68 + 0,20	2,89 + 0,17	3,20 + 0,16
% Total Fat	17,78 + 1,24	16,19 + 1,16	14,62 + 1,31	13,87 + 0,99
% Total ash	1,32 + 0,36	1,92 + 0,39	1,98 + 0,31	2,24 + 0,48
% Salt	1,05 + 0,30	1,32 + 0,29	1,35 + 0,36	2,02 + 0,39

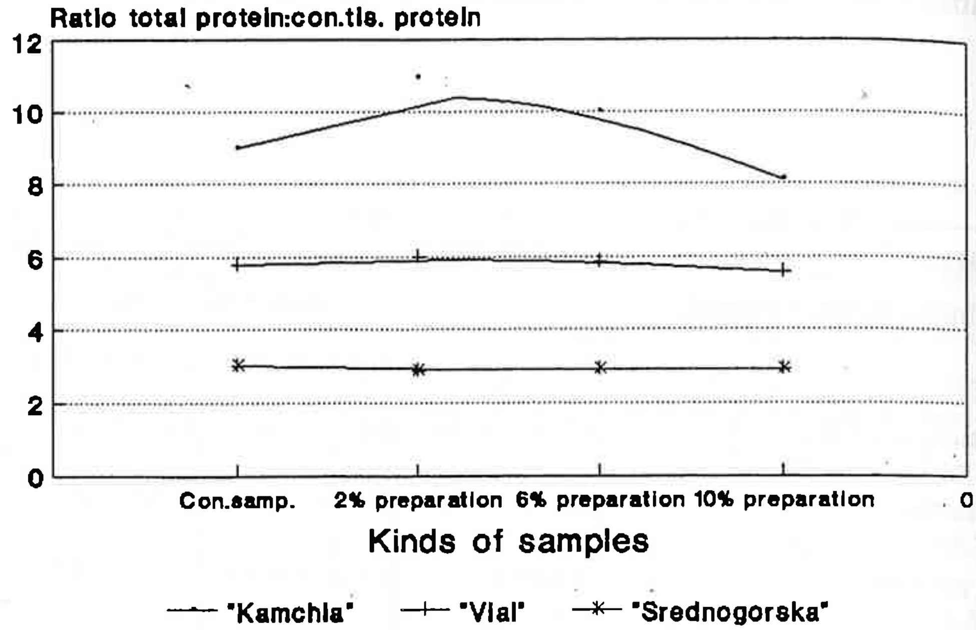


Figure 1. Influence of the addition of scalded swine rind preparation on the changes of ratio total protein : connective tissue protein in the experimental sausages.

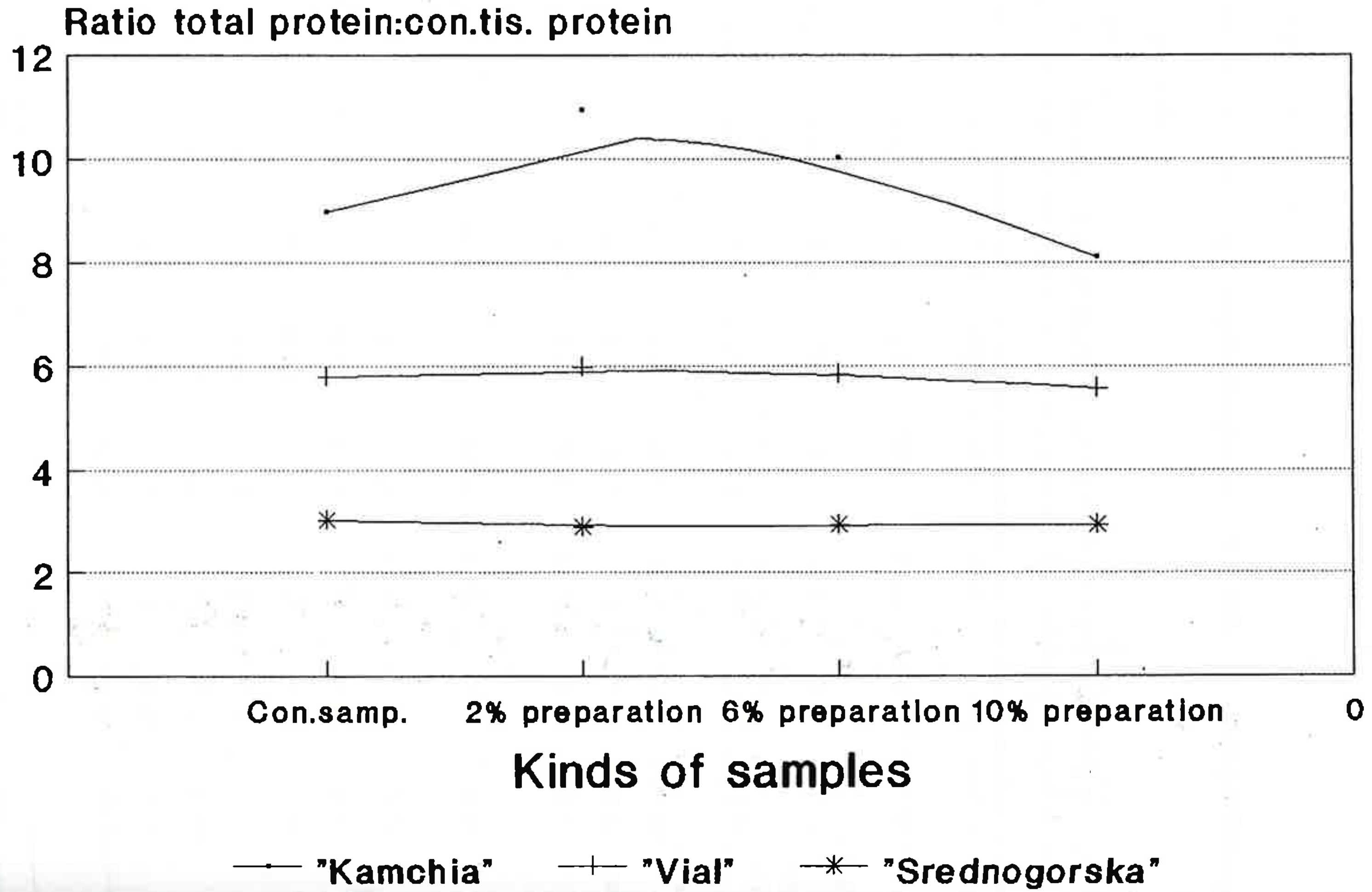


Figure 1. Influence of the addition of scalded swine rind preparation on the changes of ratio total protein : connective tissue protein in the experimental sausages.

Table 1: Proximate composition, pH, color, expressible moisture and collagen values.

Variable	15% Fat Control	10% Fat Control	1st Pass MCT Level[1] 8%	1st Pass MCT Level[1] 16%	1st Pass MCT Level[1] 24%	2nd Pass MCT Level[1] 8%	2nd Pass MCT Level[1] 16%	2nd Pass MCT Level[1] 24%	LSD[2]
Raw pattie--									
Moisture %**	65.93	70.67	69.40	69.80	68.63	68.76	67.33	66.38	0.75
Fat %**	14.73	8.61	9.67	8.93	10.04	10.20	11.84	12.13	0.85
Protein %**	19.39	20.79	20.97	21.31	21.21	21.55	21.20	21.53	0.75
pH**	5.66	5.78	5.77	5.71	5.77	5.72	5.79	5.82	0.07
HunterLab[3] L**	41.66	36.41	40.98	41.95	44.21	41.69	44.60	46.96	1.28
HunterLab a**	15.23	16.94	19.82	20.31	20.85	19.89	20.53	21.09	1.57
HunterLab b	24.20	10.50	17.12	14.75	15.94	18.87	23.31	20.27	11.52
Expressible Moisture %**	11.48	10.05	10.81	11.09	11.13	11.00	10.68	10.94	0.47
Cooked pattie--									
HunterLab L**	35.18	32.20	30.56	31.00	28.97	32.33	31.45	31.77	2.26
HunterLab a	8.13	7.84	9.10	8.51	8.18	7.42	8.01	9.01	1.88
HunterLab b	13.90	20.97	7.50	19.36	8.34	22.54	14.40	11.19	11.66
Soluble Collagen mg/g**	2.10	1.75	3.02	3.64	4.34	3.85	5.06	5.98	0.66
Insoluble Collagen mg/g**	4.05	3.37	5.82	7.01	8.36	7.42	9.75	11.53	1.27
Total Collagen mg/g**	6.15	5.12	8.84	10.65	12.69	11.27	14.81	17.52	1.93
Expressible Moisture %**	8.38	8.15	7.06	5.15	3.26	4.78	3.73	2.15	2.43

[1]1st pass MCT=modified beef connective tissue obtained from one pass through desinewing machine. 2nd pass MCT=modified beef connective tissue obtained from two passes through desinewing machine. Target fat level for these formulations=10%.

[2]Least significant difference.

[3]HunterLab colorimeter L, a and b values indicate product lightness, redness and yellowness, respectively.

**Significant treatment effect, P<.01.

Table 2: Sensory, Kramer shear and Instron textural profile analysis.

Variable	15% Fat Control	10% Fat Control	1st Pass MCT Level[1]			2nd Pass MCT Level[1]			LSD[2]
			8%	16%	24%	8%	16%	24%	
Juiciness[3]	5.17	5.20	4.70	5.14	5.06	5.08	4.95	4.98	0.85
Tenderness**	5.38	5.06	5.23	5.62	5.94	5.46	5.74	6.21	0.62
Flavor*	4.36	5.17	5.02	5.32	4.89	5.09	5.07	4.85	0.45
Acceptability	4.70	5.04	4.84	5.21	5.17	5.14	5.10	5.11	0.63
Kramer Shear Peak Force kg**	106.92	144.17	140.00	124.58	110.67	116.17	117.42	98.67	14.99
Kramer Shear AUC cm[4]**	41.15	55.43	54.20	55.85	50.00	51.39	54.77	46.91	7.46
Hardness kg**	111.46	126.04	159.38	202.50	196.25	172.92	208.13	226.25	30.02
Chewiness kg x mm**	2816	3220	5510	9078	8396	6467	9668	11637	1676
Springiness mm**	33.33	32.83	44.33	55.97	55.17	48.11	60.00	68.58	5.07
Cohesiveness	0.76	0.78	0.78	0.81	0.77	0.78	0.77	0.75	0.07

[1]1st pass MCT=modified beef connective tissue obtained from one pass through desinewing machine. 2nd pass MCT=modified beef connective tissue obtained from two passes through desinewing machine. Target fat level for these formulations=10%.

[2]Least significant difference.

[3]Sensory scale: 1=extremely undesirable, 8=extremely desirable.

[4]AUC=area under curve, an indicator of total energy required to shear sample.

**Significant treatment effect, P<.01.

*Significant treatment effect, P<.05.

Variables	Group 1 Mean	Group 1 St. Dev.	Group 2 Mean	Group 2 St. Dev.	Group 3 Mean	Group 3 St. Dev.
Pr_T %	14.00	0.65	13.33	0.60	12.86	0.74
Cl_T %	2.14	0.64	2.20	0.63	2.88	0.75
Gr_T %	27.07	1.95	27.91	1.17	29.77	2.58
U_T %	54.60	1.79	54.47	1.50	52.56	2.33
Ce_T %	3.45	0.21	3.50	0.32	3.75	0.30
(PM_T % / Pr_T %) x 100	84.74	4.42	83.30	5.30	77.35	6.93
Gr_T % / Pr_T %	1.94	0.20	2.10	0.15	2.33	0.27
U_T % / Pr_T %	3.90	0.17	4.09	0.23	4.09	0.24
Pr_M %	16.28	0.70	15.53	0.86	15.18	0.76
Cl_M %	2.36	0.66	2.52	0.61	3.27	0.94
Gr_M %	15.85	1.59	17.18	1.91	17.68	1.97
U_M %	62.96	1.94	62.17	2.00	61.73	2.27
Ce_M %	4.00	0.25	4.09	0.30	4.30	0.31
(PM_M % / Pr_M %) x 100	85.42	4.27	83.59	4.63	78.27	6.81
Gr_M % / Pr_M %	0.98	0.11	1.11	0.15	1.17	0.14
U_M % / Pr_M %	3.87	0.24	4.02	0.28	4.08	0.28

Table 1 - Means and standard deviations of T and M variables for the three commercial classes of Italian typical mortadella .

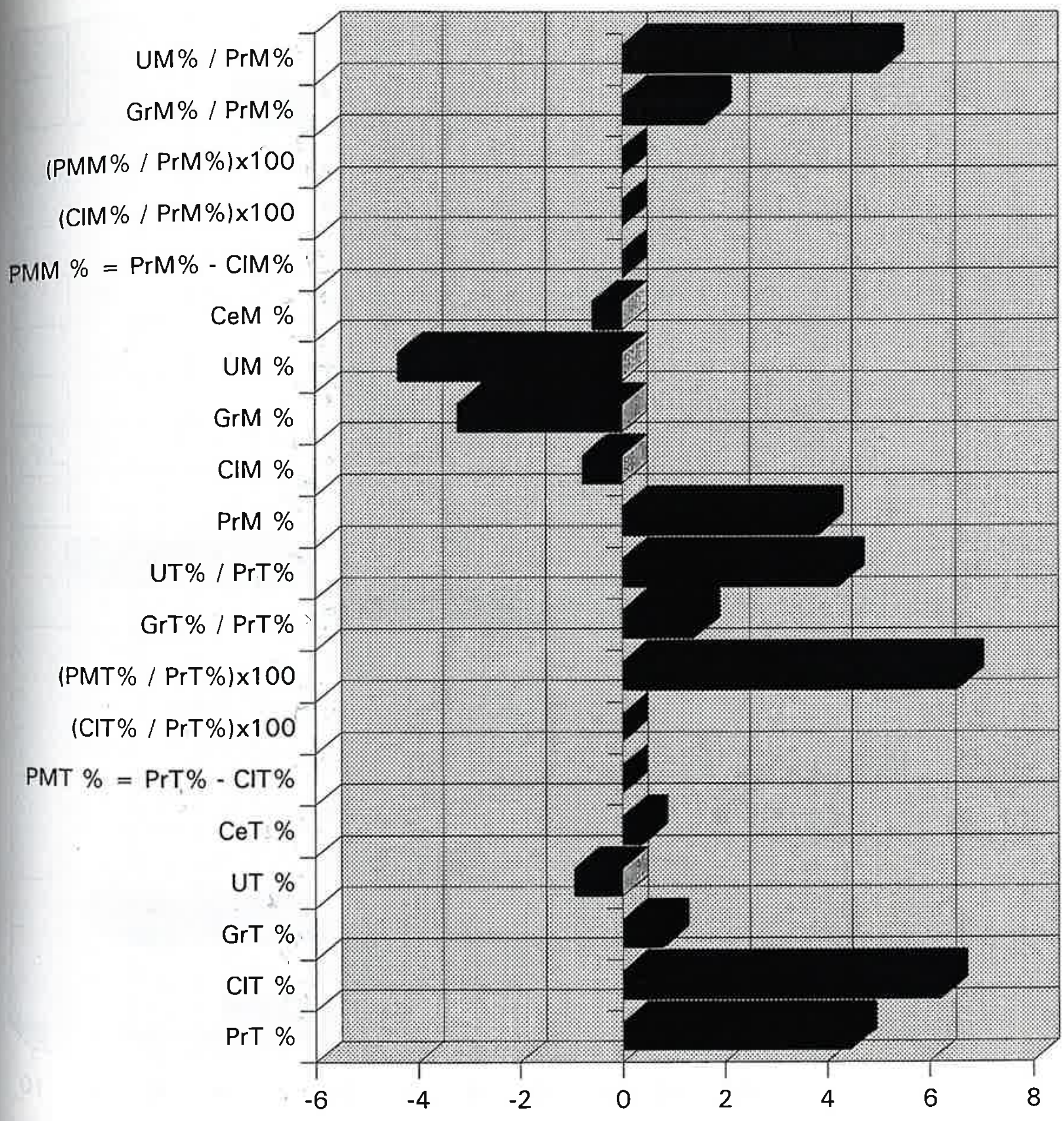


Fig. 1 - Standardized coefficients of analytical variables on the first canonical function .

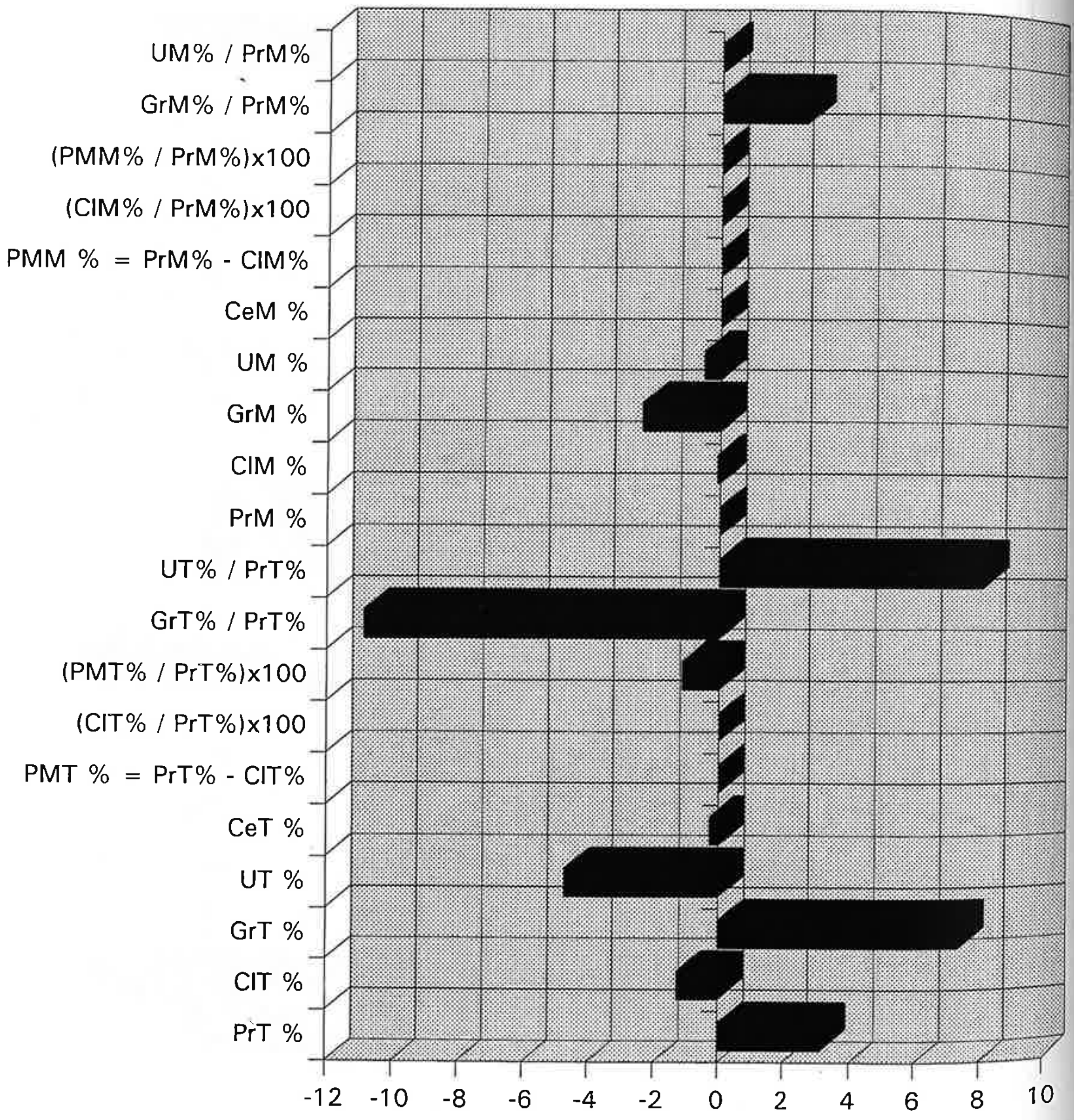


Fig. 2 - Standardized coefficients of analytical variables on the second canonical function.

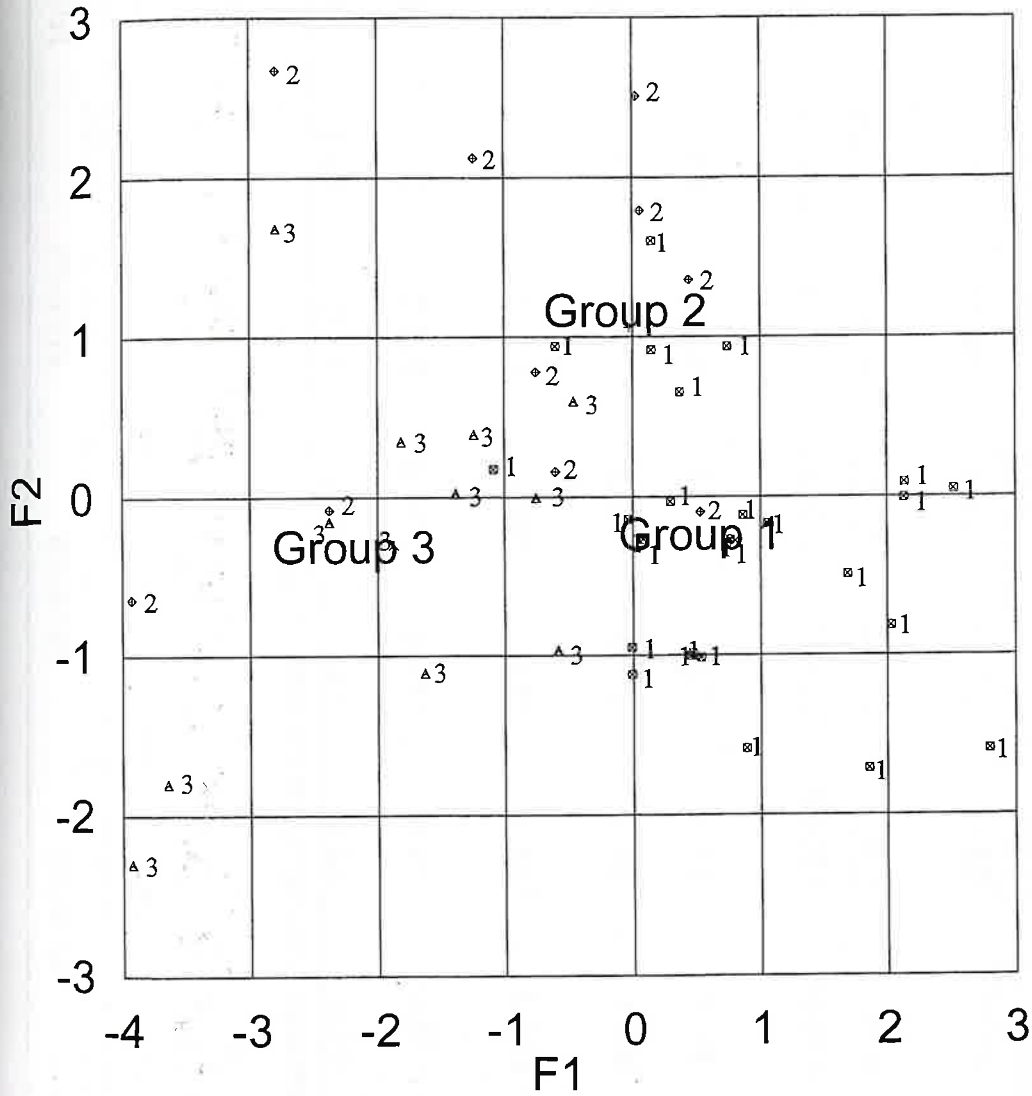


Fig. 3 - Scatter plot of data on the plane defined by the two discriminant functions

Table 1 - Evidence that properties of native starches were modified by phosphorylation

Trait	Waxy Maize	Modified W-maize	Corn	Modified corn	Potato	Modified potato	Wheat	Modified wheat
Gelatinization[1] temperature, °C	65.5[b]	61.5[c]	66.0[a]	59.4[d]	59.3[d]	49.2[g]	55.5[e]	51.5[f]
Phosphorus, %	0.007	0.107	0.021	0.135	0.072	0.162	0.059	0.110
Phosphorus substitution, degree	0.0004	0.0056	0.0010	0.0071	0.0040	0.0085	0.0030	0.0060
Pasting[2] temperature, °C	71.5	65.6	86.2	67.7	65.3	49.8	90.6	62.7
Temperature peak[2] viscosity, °C	81.0	79.5	94.3	80.3	73.2	70.0	94.4	84.6
Peak viscosity[2]	168.0	262.5	95.0	251.5	503.5	543.5	77.0	234.0
Breakdown viscosity[2]	84.5	143.0	19.5	151.5	354.5	359.0	14.5	136.0
Setback viscosity[2]	10.0	44.0	32.5	89.0	41.0	44.0	43.5	76.0

[a-g]Means in a row with a different superscript letter differ ($P<0.05$).

[1]Differential Scanning Calorimetry.

[2]Rapid Visco Analysis.

Table 2 - Effect of native and phosphorylated starch on properties of low-fat, high added-water beef sausages cooked to 70 and 80°C

Trait	Temp °C	Control 5/35	Waxy Maize	Modified W-maize	Corn	Modified corn	Potato	Modified potato	Wheat	Modified wheat
pH, raw		6.07^{a}	5.74^{b}	5.76^{b}	5.73^{b}	5.76^{b}	5.74^{b}	5.77^{b}	5.73^{b}	5.75^{b}
Moisture, %	70	79.8^{a}	74.8^{ef}	75.2^{de}	74.1^{f}	75.1^{def}	77.1^{c}	78.3^{ab}	75.4^{de}	75.8^{d}
Fat, %	70	4.7^{a}	5.3^{a}	5.5^{a}	5.9^{a}	5.4^{a}	4.9^{a}	4.1^{a}	5.1^{a}	5.4^{a}
% Added water	70	33.6^{bc}	27.9^{ef}	29.4^{de}	26.4^{f}	29.3^{de}	34.1^{b}	37.8^{a}	30.2^{d}	31.6^{cd}
40% Rule	70	38.3^{bc}	33.2^{fg}	34.9^{ef}	32.3^{g}	34.7^{ef}	38.9^{b}	41.9^{a}	35.4^{de}	37.0^{cd}
Cooking loss	70	$_{x}14.8^{d}$	$_{x}25.1^{a}$	22.0^{b}	$_{x}26.0^{a}$	22.1^{b}	$_{x}14.0^{d}$	$_{x}7.1^{e}$	$_{x}20.2^{b}$	$_{x}17.2^{c}$
	80	28.3^{a}	26.8^{a}	21.9^{c}	27.8^{a}	22.8^{bc}	17.5^{d}	12.2^{e}	24.2^{b}	21.8^{c}
Reheat loss	70	$_{x}10.8^{a}$	$_{x}3.7^{f}$	3.3^{f}	$_{x}5.0^{de}$	4.7^{ef}	$_{x}5.8^{cd}$	$_{x}5.8^{cd}$	$_{x}6.6^{bc}$	$_{x}7.2^{b}$
	80	6.8^{a}	2.9^{e}	3.1^{e}	3.3^{de}	4.3^{bcd}	4.7^{bc}	4.1^{cd}	5.1^{b}	5.1^{b}
Kramer shear	70	$_{x}0.40^{a}$	0.40^{a}	0.35^{a}	$_{x}0.40^{a}$	$_{x}0.30^{a}$	$_{x}0.34^{a}$	0.33^{a}	0.37^{a}	0.33^{a}
	80	0.59^{a}	0.39^{bc}	0.35^{c}	0.50^{ab}	0.43^{bc}	0.39^{bc}	0.35^{c}	0.40^{bc}	0.35^{c}
Hardness	70	$_{x}3.0^{a}$	$_{x}3.1^{a}$	$_{x}3.0^{a}$	$_{x}3.3^{a}$	3.3^{a}	3.2^{a}	2.9^{a}	$_{x}3.0^{a}$	2.9^{a}
	80	3.9^{a}	2.6^{ef}	2.3^{f}	3.7^{ab}	3.4^{bc}	3.4^{bc}	3.1^{cd}	3.4^{bc}	2.8^{de}
Cohesiveness	Both	0.12^{a}	0.09^{b}	0.09^{b}	0.14^{a}	0.13^{a}	0.14^{a}	0.11^{ab}	0.11^{ab}	0.11^{ab}
Chewiness	Both	21.7^{a}	8.5^{c}	8.0^{c}	16.7^{ab}	18.5^{ab}	16.2^{ab}	11.1^{bc}	12.1^{bc}	11.2^{bc}

$^{a-g}$Means in a row with a different superscript letter differ ($P<0.05$).

$_{x}$ Within a starch source and trait, means differ between 70 and 80°C ($P<0.05$).

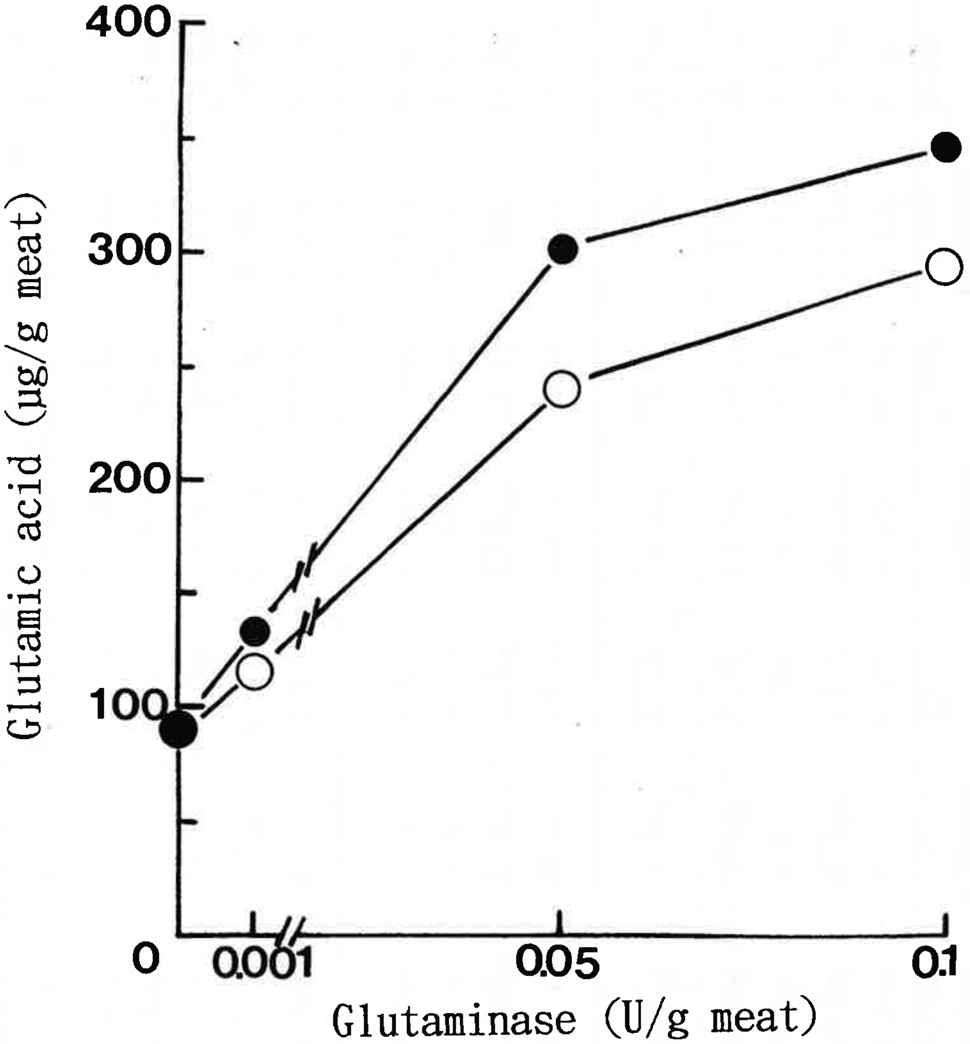


Fig. 1. Effect of addition of glutaminase preparation on glutamic acid content in pork sausage. ○—○ : Curing 0 day sample ; ●—● : Curing 3 days sample.

Table 1. Sensory evaluation of pork sausage

- Curing 0 day sample -

Panelist	Control	0.001U	0.05U	0.1U
P1	4	3	1	2
P2	3	4	1	2
P3	4	3	1	2
P4	3	4	2	1
P5	3	4	2	1
P6	2	4	3	1
P7	3	4	2	1
P8	3	4	1	2
P9	2	4	3	1
Rank sums	27	34*	16	13*

* $P < 0.05$

Table 2. Sensory evaluation of pork sausage

- Curing 3 days sample -

Panelist	Control	0.001U	0.05U	0.1U
P1	3	2	1	4
P2	4	1	3	2
P3	4	1	2	3
P4	3	2	1	4
P5	4	3	1	2
P6	4	3	1	2
P7	4	3	1	2
P8	2	4	1	3
P9	3	4	1	2
Rank sums	31*	23	12*	24

* $P < 0.05$

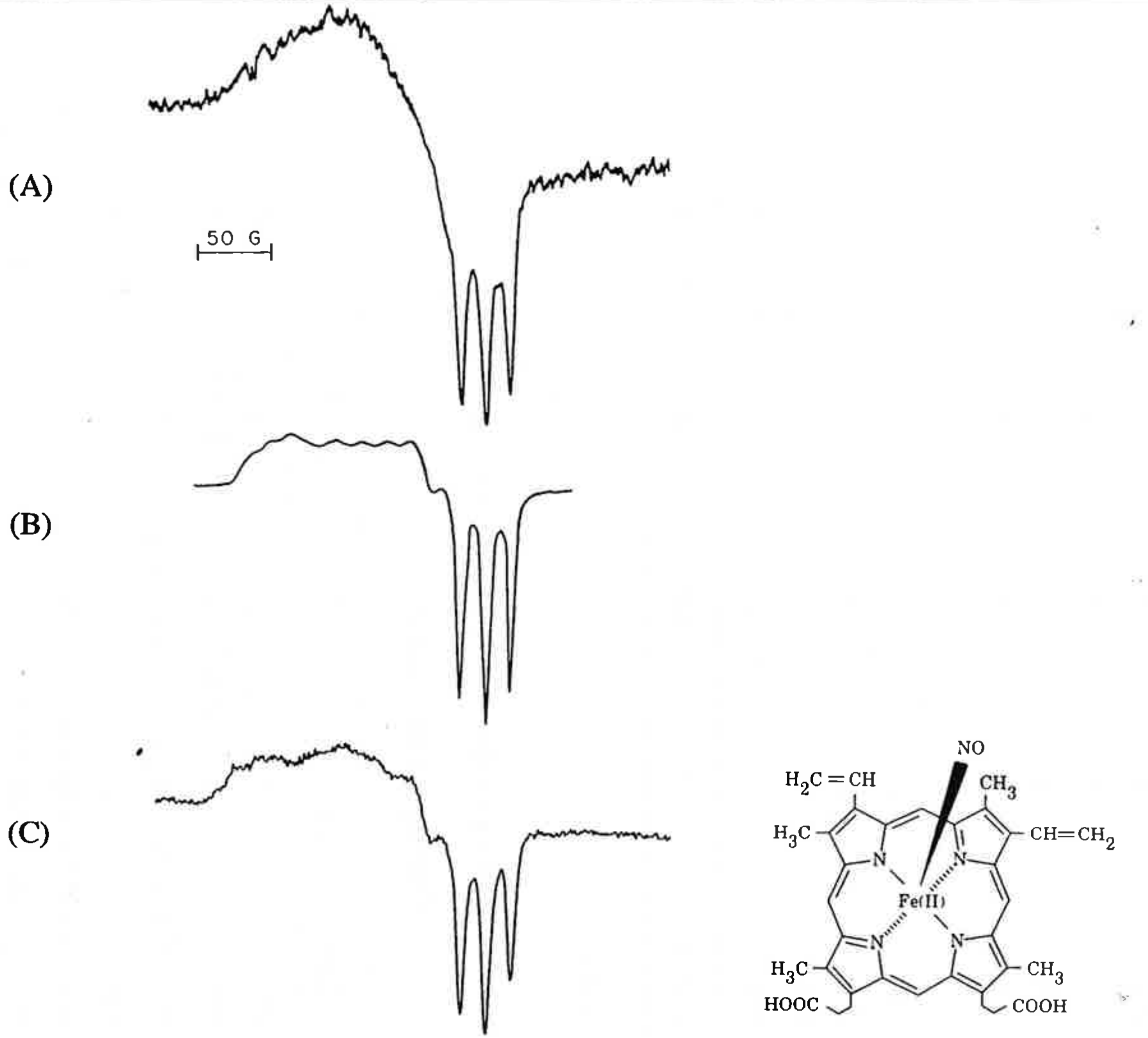


Figure 1. Typical ESR spectra of pentacoordinate nitrosylprotohaems.
(A) Nitrosylprotohaem dimethyl ester in acetone at 77 K, (B) Fe^{II}TPP(NO) in toluene at 120 K, (C) Lyophilized CCMP (see chemical structure at right) in acetone at 77 K.

Table 1: Regression equations for different parameters under study.

PARAMETER	TREAT	EQUATION	r	P(TAIL)	Nº
MOISTURE (%)	W.ASC	$M=47,33-2\times10^{-3}UD+3,7\times10^{-6}U^{2}$	0,87	0,000	1
	ASC	$M=46,30-11\times10^{-4}UD$	0,88	0,000	2
pH	W.ASC	$pH=6,88-0,46Z$	0,69	0,134	3
	ASC	$pH=6,9$	0,72	0,088	4
T.B.A. (mg malon/ kg pate)	W.ASC	$T=5,4\times10^{-2}+1\times10^{-3}U+4\times10^{-4}UD-4\times10^{-7}U^{2}$	0,97	0,000	5
	ASC	$T=67\times10^{-2}+17\times10^{-5}UD$	0,96	0,000	6
RESIDUAL NITRITE (ppm)	W.ASC	$N=49,41-2,6\times10^{-2}U-0,61D+12\times10^{-6}U^{2}-16,97Z+3,87ZD$	0,90	0,000	7
	ASC	$N=9,77-0,48D+4,64Z$	0,95	0,000	8
IODINE NUMBER	W.ASC	$I=67,94$	0,81	0,016	9
	ASC	$I=67,84$	0,61	0,338	10
L*	W.ASC	$L*=58,79-2,43ZD$	0,98	0,000	11
	ASC	$L*=55,13-1,56ZD$	0,97	0,000	12
a*	W.ASC	$a*=5,8-3,7\times10^{-3}U+1,5\times10^{-6}U^{2}-2,04Z$	0,96	0,000	13
	ASC	$a*=7,9-2,23Z$	0,81	0,015	14
b*	W.ASC	$b*=13,92+6,08\times10^{-7}U^{2}+2,8Z+0,47ZD$	0,99	0,000	15
	ASC	$b*=12,86-5,4\times10^{-4}UD+4,01Z$	0,98	0,000	16

Treat: treatment; r: correlation coeficient;
Nº: equation number; W.ASC: without ascorbate;
ASC: with ascorbate; U: lux; D: days;
Z: 0 (darkness), 1 (light)

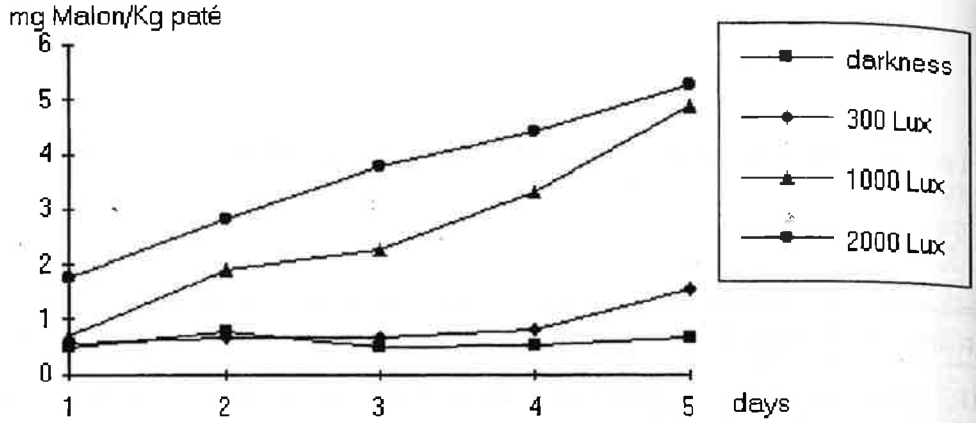


Figure 1: TBA values (mg malonaldehyde/Kg paté) in "paté" without ascorbate, exposed in the dark and 300, 1000, 2000 lux

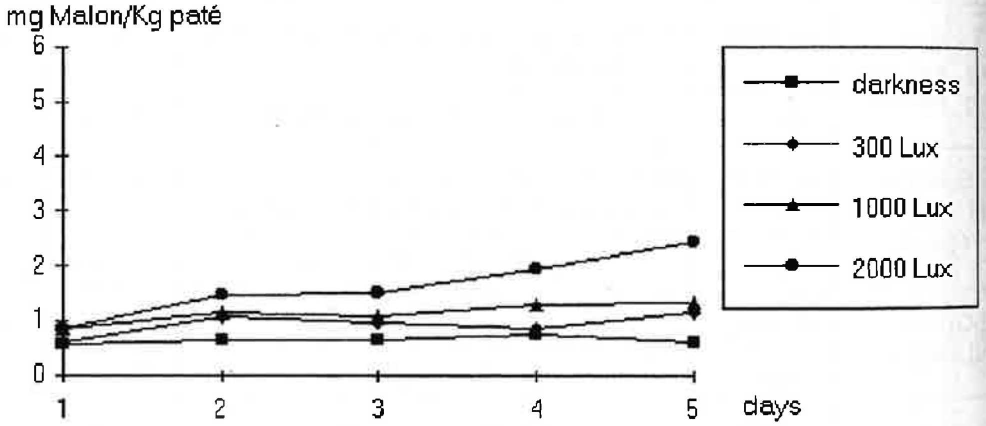


Figure 2: TBA values (mg malonaldehyde/Kg paté) in "paté" with ascorbate, exposed in the dark and 300, 1000, 2000 lux

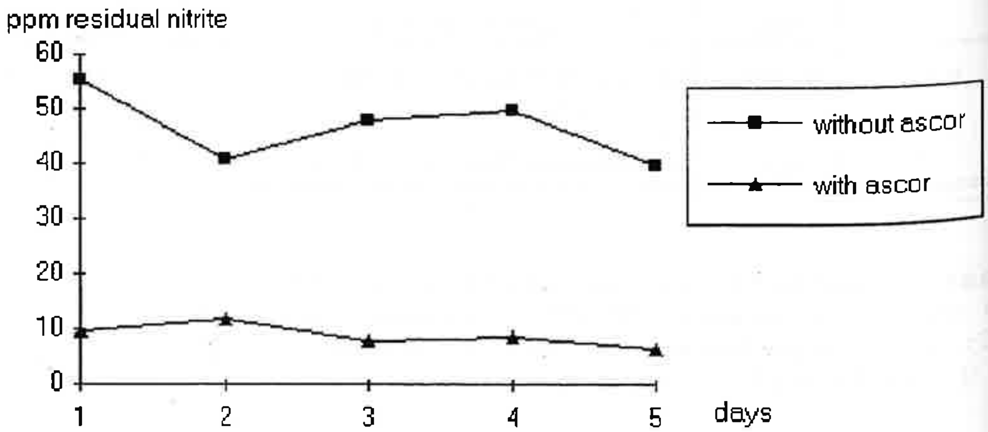


Figure 3: Residual nitrite level in "paté" without and with ascorbate in the dark

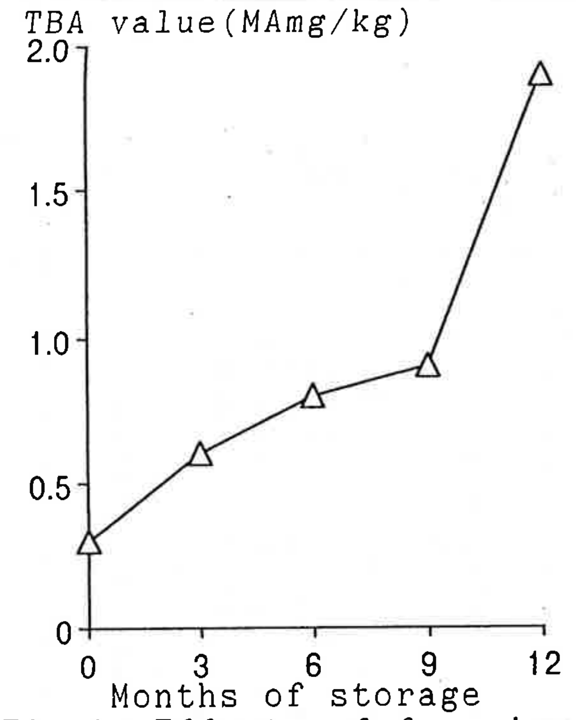


Fig.1. Effect of freezing period on TBA value of pork(-19 ± 1 ℃).

Normal porcine skeletal muscle
(*m. longissimus thoracis*)

↓

Mince twice through a perforated plate

↓

Add NaCl(2%), $NaNO_2$(100ppm) and AsA(1%)

↓

Cure aerobically[1] or anaerobically[2]

[1] flattened thinly in the mortar

[2] vacuum packed in barrier multilayer film (Diamiron M, Mitsubishi Ind. Ltd.)

↓

Analyze CFR and residual nitrite content
Until 7 days of curing

↓

Freeze under the anaerobic conditions
(-20 ± 2 ℃)

↓

Thaw periodically until 6 months and analyze CFR, residual nitrite content and TBA value

Fig.2. Flow-chart of the method for preparing cured meat sample.

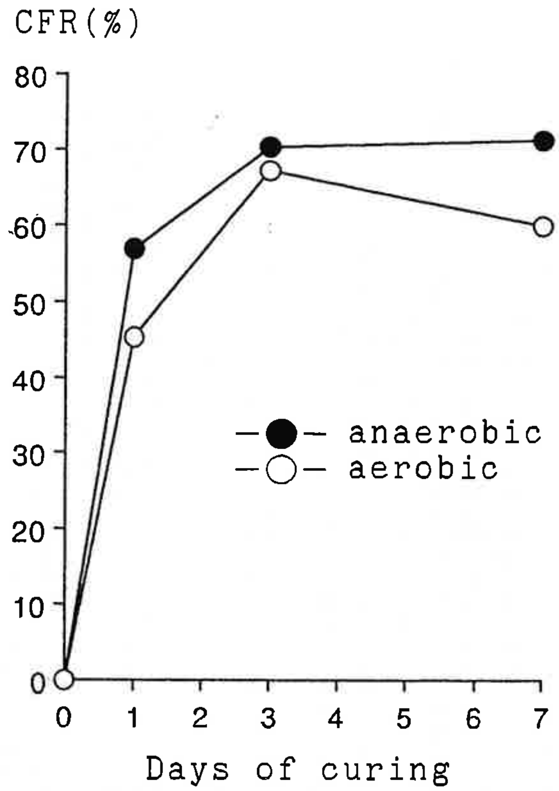


Fig.3. Effect of aerobic and anaerobic curing on the CFR of cured meat.

Table 1. Colour analysis at 7 days of curing

Curing	Hunter-L	-a	-b
Aerobic	41.0 (48.1)*	20.0 (23.6)	10.7 (15.9)
Anaerobic	39.0 (45.9)	27.1 (31.3)	10.8 (16.4)

( ): L, a * and b * value.

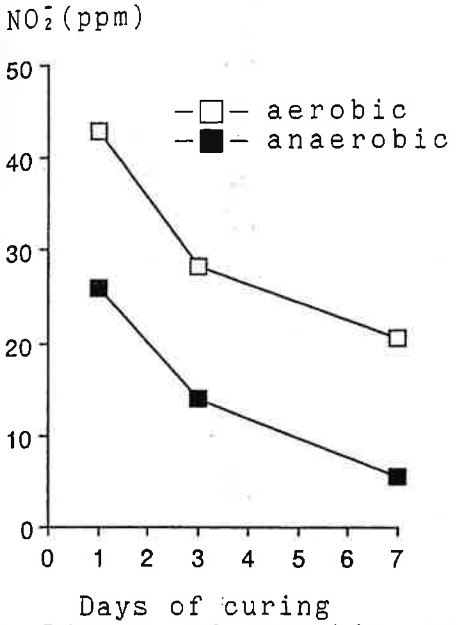


Fig.4. Effect of aerobic and anaerobic curing on the residual nitrite content of cured meat.

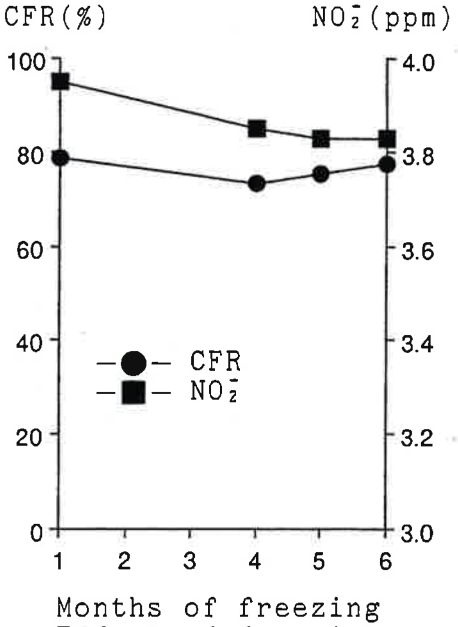


Fig.5. Effect of freezing period on CFR and residual nitrite content of cured meat.

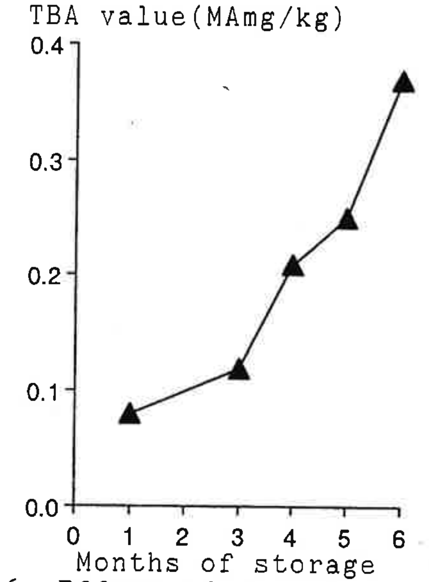


Fig.6. Effect of freezing period on TBA value of the cured meat.

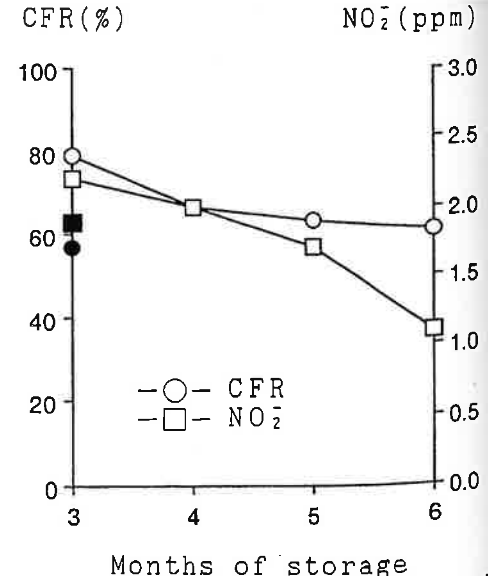
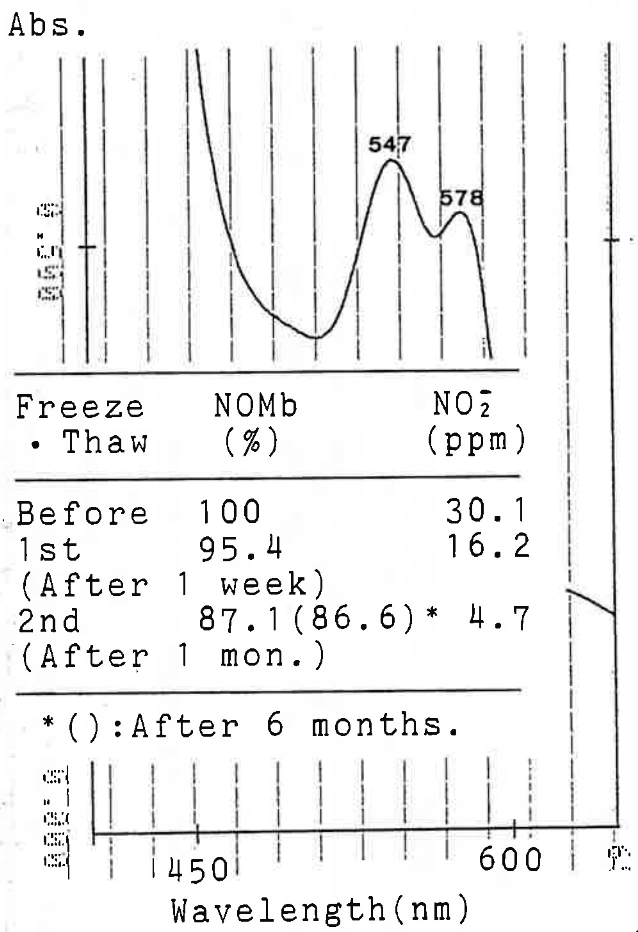


Fig.7. Effect of freezing period on CFR and residual nitrite content of cooked cured meat.



Freeze • Thaw	NOMb (%)	NO_2^- (ppm)
Before	100	30.1
1st (After 1 week)	95.4	16.2
2nd (After 1 mon.)	87.1(86.6)*	4.7

*():After 6 months.

Fig.8. Absorption spectrum of diluted reaction mixture after 2nd freezing and thawing.

Table 1 - Interaction means and standard errors (SE) for cooked internal appearance characteristics of normal (NRM) and premature brown (PMB) ground beef patties cooked to 55, 65, and 75°C

	55°C		65°C		75°C		
Trait	NRM	PMB	NRM	PMB	NRM	PMB	SE
Visual color[1]	2.3^{d}	4.6^{b}	3.6^{c}	4.9^{ab}	4.6^{b}	5.0^{a}	0.12
a* value	25.3^{a}	15.2^{c}	22.9^{b}	12.8^{d}	16.0^{c}	11.6^{d}	0.67
Saturation index[2]	31.4^{a}	22.7^{c}	29.1^{b}	19.8^{d}	22.5^{c}	18.8^{d}	0.67
Hue angle[2]	36.4^{d}	47.8^{b}	38.2^{d}	49.9^{ab}	45.0^{c}	51.7^{a}	0.74

[1] Visual color scores for internal cooked color: 1 = very dark red to purple, uncooked appearance; 2 = bright red; 3 = very pink; 4 = slightly pink; 5 = tan, no evidence of pink.

[2] Saturation index = $(a^2 + b^2)^{-1/2}$; Hue angle = $(b/a)^{tan-1}$.

[a-d] Means within a trait without a common superscript letter differ ($P<0.05$).

Table 2 - Main effect means and standard errors (SE) for chemical traits of ground beef patties with normal (NRM) and premature brown (PMB) cooked color raw and cooked to 55°C

Trait	NRM	PMB	SE
Thiobarbituric acid reactive substance (raw), µg/g (fat free)	0.50^{b}	1.11^{a}	0.05
Total reducing activity (raw)	0.53^{a}	0.36^{b}	0.01
Oxidative-reducing potential (raw), mv	-128^{a}	-91^{b}	3.09
Heme iron, (raw), µg/g patty(fat free)	15.29	14.14	0.45
Heme iron (55°C), µg/g patty (fat free)	5.81	4.76	0.87
Non-heme iron (raw), µg/g patty (fat free)	6.57	6.33	0.28
Non-heme iron (55°C), µg/g patty (fat free)[1]	9.57	10.15	0.28
Total pigment (raw), µg/g patty (fat free)	9.92	9.62	0.29
Total pigment (55°C), µg/g patty (fat free)	3.73	2.94	0.74

[1] Non-heme iron endpoint temperature ($P<0.05$) 55°C = 8.09^{c}; 65°C = 9.56^{b}; 75°C = 11.92^{a} µg/g patty (fat free).

[ab] Means for a trait within a main effect bearing superscripts without a common letter differ ($P<0.05$)

Table 3 - Characteristics of ground beef with normal and premature brown cooked internal color at 55°C

Trait	Meat color group	Pigment chemical modification		
		None	Reduced	Oxidized
Total reducing activity, raw	Summed over both	0.55^{a}	0.52^{a}	-10.0^{b}
External visual color, raw[1]	Normal	2.8^{b}	2.1^{c}	4.5^{a}
	Premature brown	4.3^{a}	3.0^{b}	4.0^{a}
External a* values, raw	Summed over both	12.9^{b}	24.0^{a}	9.9^{c}
Internal visual color, raw[1]	Normal	1.9^{c}	1.5^{c}	4.7^{ab}
	Premature brown	4.2^{b}	2.0^{c}	5.0^{a}
Internal a* values, raw	Summed over both	15.1^{b}	25.9^{a}	10.2^{c}
Internal visual color, cooked[2]	Normal	2.4^{b}	1.7^{c}	4.8^{a}
	Premature brown	4.7^{a}	2.1^{b}	5.0^{a}
Internal a* values, cooked	Normal	24.9^{b}	30.8^{a}	15.7^{c}
	Premature brown	15.1^{c}	29.7^{a}	10.8^{d}
Expressible juice visual color[3]	Normal	2.2^{a}	2.0^{a}	2.2^{a}
	Premature brown	2.0^{a}	2.0^{a}	2.3^{a}

[1] Visual color scores for raw external and internal color: 1 = purple red, 2 = dark reddish purple, 3 = bright red, 4 = brownish red, 5 = very brown.
[2] Visual color scores for internal cooked color: 1 = very dark red to purple, uncooked appearance; 2 = bright red; 3 = very pink; 4 = slightly pink; 5 = tan, no evidence of pink.
[3] Expressible juice color: 1 = dark, dull red; 2 = red; 3 = pink; 4 = pinkish tan; 5 = yellow, no pink).
[ac] Means within a trait without a common superscript letter differ ($P<0.05$).

Table 1 Weight loss of different meat products after heating (with or without use of Fibrimex) Series 1

Product	Deep-fat-frying weight loss (%)		Frying weight loss (%)	
	Average	Standard Deviation	Average	Standard Deviation
Neck (with)	34,3	1,7	33,0	1,3
Neck (without)	52,0	2,0	40,9	1,6
Mix (with)	33,0	1,0	30,5	2,5
Mix (without)	46,9	3,1	37,7	2,0
Shoulder (with)	33,0	2,2	28,6	2,5
Shoulder (without)	50,3	4,4	31,9	1,5
Belly (with)	30,8	1,6	28,8	0,7
Belly (without)	36,1	1,2	37,9	2,4
Rib (with)	33,5	4,7	30,3	1,3
Rib (without)	42,1	5,9	33,7	1,8

Table 2 Sensoric evaluation of heated meat products (with or without use of Fibrimex) Series 1

	Taste		Juiciness	
	Ranksum	Average Appreciation	Ranksum	Average Appreciation
Deep-fat-frying				
Neck (with)	6	8,0	7,5	7,6
Neck (without)	9	7,5	7,5	7,3
Mix (with)	8	7,7	6	7,7
Mix (without)	7	8,0	9	7,0
Shoulder (with)	5,5	7,9	6,5	7,7
Shoulder (without)	9,5	7,2	8,5	7,1
Belly (with)	6,5	7,7	9,5	7,2
Belly (without)	8,5	7,4	5,5	7,7
Rib (with)	7,5	7,6	8,5	6,8
Rib (without)	7,5	7,6	6,5	7,5
Frying				
Neck (with)	5,5	7,9	5	8,0
Neck (without)	9,5	7,1	10	7,1
Mix (with)	6,5	7,6	7	7,2
Mix (without)	8,5	7,3	8	7,1
Shoulder (with)	7,5	7,7	7,5	7,6
Shoulder (without)	7,5	7,7	7,5	7,3
Belly (with)	8	7,5	7,5	7,3
Belly (without)	7	7,6	7,5	7,3
Rib (with)	7,5	7,2	9	6,8
Rib (without)	7,5	7,1	6	7,5

Table 3 Weight loss of different meat products after heating (with or without use of Fibrimex) Series 2

Product	Deep-fat-frying weight loss (%)		Frying weight loss (%)	
	Average	Standard Deviation	Average	Standard Deviation
Neck (with)	52,5	3,1	35,8	1,8
Neck (without)	51,5	1,9	40,6	0,3
Mix (with)	27,3	0,5	35,8	1,1
Mix (without)	45,4	3,6	43,9	3,8
Shoulder (with)	43,1	1,3	35,7	4,7
Shoulder (without)	55,1	1,7	45,6	3,9
Belly (with)	37,8	1,6	29,0	0,9
Belly (without)	41,4	2,3	32,6	3,2
Rib (with)	28,8	0,8	30,2	1,8
Rib (without)	33,9	2,7	36,7	1,6

Table 4 Sensoric evaluation of heated meat products (with or without use of Fibrimex) Series 2

Deep-fat-frying

	Taste		Juiciness	
	Ranksum	Average Appreciation	Ranksum	Average Appreciation
Neck (with)	8,5	7,0	9	7,0
Neck (without)	6,5	7,4	6	7,3
Mix (with)	9	6,9	7	7,4
Mix (without)	6	7,3	8	7,1
Shoulder (with)	8	7,2	5	7,6
Shoulder (without)	7	7,3	10	6,5
Belly (with)	9	6,8	6	7,2
Belly (without)	6	7,3	9	7,0
Rib (with)	8,5	6,6	6,5	7,0
Rib (without)	6,5	7,0	8,5	6,7

Frying

	Taste		Juiciness	
	Ranksum	Average Appreciation	Ranksum	Average Appreciation
Neck (with)	8	7,5	7	7,4
Neck (without)	7	7,7	8	7,5
Mix (with)	7	7,6	9	7,5
Mix (without)	8	7,3	9	6,5
Shoulder (with)	9	7,2	5	8,0
Shoulder (without)	6	7,8	10	6,5
Belly (with)	6	7,8	8,5	7,2
Belly (without)	9	7,1	6,5	7,8
Rib (with)	6	7,7	5	7,3
Rib (without)	9	7,2	10	5,9

Table 1

Meat product	Starch added (%)	Water added (%)	Cooking yield (%)	Cooked product bind (N)
All beef	---	0	73.2[e]	11.1[d]
	---	10	74.0[e]	8.4[d]
AC-beef	---	0	80.2[d]	15.2[c]
	---	10	90.2[c]	9.9[d]
SP-beef	---	0	94.5[b]	42.3[a]
	---	10	103.3[a]	27.7[b]

AC: algin/calcium product; SP: salt/phosphate product.
[abc] Means with the same letter in each column are not significantly ($P>0.05$) different.

Table 1. Effect of meat type and water added (no starch added) on cooking yields and cooked product binding strengths

Table 2

Type of cook-up starch	Cooking yield (%)	Cooked product bind (N)
Granular	99.4[a]	17.2[a]
Waxy maize	97.2[ab]	15.4[ab]
Tapioca	96.1[b]	14.5[ab]
Potato	95.8[b]	12.6[b]
Rice	89.3[c]	8.6[c]

[ab] Means with the same superscript letter in the same column are not significantly ($P>0.05$) different. N: Newtons.

Table 2. Effect of addition of cook-up starches on cooking yields and cooked product binding strength of algin/calcium restructured beef products

Table 3

Starch type	Water added (%)	Control treatment			
		AC/0	AC/10	SP/0	SP/10
Granular	0	17.6*	7.7*	0.8	-6.8*
	10	23.5*	13.6*	6.6*	-0.9
Waxy maize	0	15.7*	5.8*	-1.2	-8.7
	10	21.0*	11.1*	4.2	-3.4
Tapioca	0	14.1*	4.2	-2.7	-10.2*
	10	20.3*	10.4*	3.4	-4.1‘
Potato	0	14.7*	4.8	-2.1	-9.7*
	10	19.1*	9.2*	2.2	-5.3*
Rice	0	9.3*	-0.6	-7.6*	-15.1*
	10	11.6*	1.7	-5.3*	-12.8*

*Starch treatment is significantly ($P<0.05$) different than the control.
AC/0, AC/10: algin/calcium beef (no starch added) with no or 10% added water, respectively.
SP/0, SP/10: salt/phosphate beef (no starch added) with no or 10% added water, respectively.

Table 3. Differences in percentage points of cooking yields between algin/calcium restructured beef with added cook-up starches and control algin/calcium and salt/phosphate beef treatments (Dunnet's statistical test)

Table 4

Starch type	Water added (%)	Control treatment			
		AC/0	AC/10	SP/0	SP/10
Granular	0	5.9*	12.6*	-18.1*	-6.2
	10	-3.0	3.7	-27.0*	15.0*
Waxy maize	0	3.8	10.4*	-20.2*	-8.3*
	10	-6.3*	0.4	-30.3*	-18.3*
Tapioca	0	3.9	10.6*	-20.1*	-8.2*
	10	-4.7	2.0	-28.7*	-16.8*
Potato	0	0.7	7.4*	-23.3*	-11.4*
	10	-7.0*	-0.3	-31.0*	-19.1*
Rice	0	-5.4	1.2	-29.5*	-17.5*
	10	-8.8*	-2.2	-32.8*	-20.9*

*Starch treatment is significantly ($P<0.05$) different than the control.
AC/0, AC/10: algin/calcium beef (no starch added) with no or 10% added water, respectively.
SP/0, SP/10: salt/phosphate beef (no starch added) with no or 10% added water, respectively.

Table 4. Differences in cooked product bind values (Newtons) between algin/calcium restructured beef with added cook-up starches and control algin/calcium and salt/phosphate beef treatments (Dunnet's statistical test)

Starch type	Water added (%)	Control treatment			
		AC/0	AC/10	SP/0	SP/10
Granular	0	-0.9	-11.1*	-12.6*	-22.7*
	10	6.5*	-3.7	-5.2	-15.3*
Waxy maize	0	6.0*	-4.2	-5.8	-15.8*
	10	11.7*	1.5	0.0	-10.1*
Tapioca	0	7.6*	-2.6	-4.1	-14.2*
	10	10.3*	0.1	-1.5	-11.6
Potato	0	3.1	-7.1*	-8.6*	-18.7*
	10	5.2*	-5.0*	-6.6*	-16.7*
Rice	0	4.0	-6.2*	-7.7*	-17.8*
	10	8.2*	-1.9	-3.5	-13.6*

*Starch treatment is significantly ($P<0.05$) different than the control.
AC/0, AC/10: algin/calcium beef (no starch added) with no or 10% added water, respectively.
SP/0, SP/10: salt/phosphate beef (no starch added) with no or 10% added water, respectively.

Table 5. Differences in percentage points of cooking yields between algin/calcium restructured beef with added instant (i.e., pregelatinized) starches and control algin/calcium and salt/phosphate beef treatments (Dunnet's statistical test)

Table 1.
The effects of hydrocolloid and level of added water on functional and technological properties of sausages and their basic chemical composition.

Variable	n	Unit	Experimental variants						LSD
			A_1 60	A_2 60	C 60	A_1 70	A_2 70	C 70	
Yield	3	%	153.00^{ab}	154.00^{b}	151.00^{a}	161.00^{cd}	162.00^{d}	159.00^{c}	2.37
Thermal drip	15	%	4.15^{a}	4.10^{a}	6.40^{c}	5.00^{b}	4.84^{b}	7.94^{d}	0.63
W H C	15	%	63.8^{cd}	67.20^{e}	58.00^{b}	62.70^{c}	64.30^{d}	54.10^{a}	1.33
Protein	12	%	10.22^{b}	10.28^{b}	10.33^{b}	9.32^{a}	9.27^{a}	9.24^{a}	0.21
Fat	12	%	16.56^{b}	16.47^{b}	16.73^{b}	15.48^{a}	15.65^{a}	15.72^{a}	0.42
Dry matter	12	%	31.32^{b}	31.44^{b}	31.18^{b}	29.72^{a}	29.81^{a}	29.68^{a}	0.73

^{a,b,c,d,e} Means in a row with different superscripts differ (P<0.05).

Table 2.
The effects hydrocolloid and level of added water on texture profile.

Variable	n	Unit	Experimental variants						LSD
			A_1 60	A_2 60	C 60	A_1 70	A_2 70	C 70	
Fracturability	18	N	34.80^{bc}	35.70^{c}	33.40^{bc}	30.00^{a}	29.60^{a}	31.60^{ab}	3.21
Hardness	18	N	26.20^{ab}	32.30^{c}	28.80^{b}	24.30^{a}	27.50^{b}	26.10^{ab}	2.84
Springiness	18	-	0.83^{ab}	0.84^{ab}	0.88^{c}	0.84^{ab}	0.82^{a}	0.86^{bc}	0.03
Cohesiveness	18	-	0.26^{a}	0.26^{a}	0.29^{ab}	0.29^{ab}	0.31^{b}	0.32^{b}	0.03
Gumminess	18	kN/m²	29.40^{a}	30.50^{ab}	33.10^{b}	28.40^{a}	29.00^{a}	32.90^{b}	3.11
Chewiness	18	kN/m²	24.30^{a}	25.60^{ab}	29.30^{c}	23.90^{a}	24.00^{a}	28.30^{bc}	2.71

^{a,b,c} Means in a row with different superscripts differ (P<0.05).

Table 3.
The effects of hydrocolloid and level of added water on physical colour parameters of experimental sausages.

Variable	n	Experimental variants						LSD
		A_1 60	A_2 60	C 60	A_1 70	A_2 70	C 70	
L*	6	64.86^{cd}	65.15^{d}	64.38^{bc}	63.92^{ab}	64.10^{ab}	63.72^{a}	0.63
a*	6	13.82^{bc}	14.08^{c}	13.42^{ab}	13.15^{a}	13.32^{ab}	12.96^{a}	0.53
b*	6	10.09^{d}	10.15^{d}	9.92^{cd}	9.48^{ab}	9.67^{bc}	9.25^{a}	0.32
Hue	6	36.15^{a}	35.70^{a}	36.52^{a}	35.78^{a}	35.92^{a}	35.51^{a}	1.72
Chroma	6	17.11^{d}	17.35^{d}	16.68^{c}	16.22^{b}	16.45^{bc}	15.92^{a}	0.24

^{a,b,c,d} Means in a row with different superscripts differ (P<0.05).

Table 4.
The effects of hydrocolloid and level of added water on organoleptic features of experimental sausages.

Variable	n	Experimental variants						LSD
		A_1 60	A_2 60	C 60	A_1 70	A_2 70	C 70	
Colour	21	4.6^{c}	4.6^{c}	4.4^{ab}	4.5^{bc}	4.6^{c}	4.3^{a}	0.16
Odour	21	4.4^{b}	4.3^{ab}	4.4^{b}	4.2^{a}	4.2^{a}	4.3^{ab}	0.14
Juiciness	21	3.9^{b}	3.7^{a}	4.2^{c}	3.9^{b}	3.8^{ab}	4.4^{d}	0.15
Tenderness	21	4.3^{cd}	4.5^{e}	4.1^{b}	4.2^{bc}	4.4^{de}	3.3^{a}	0.18
Palatability	21	4.1^{b}	3.7^{a}	4.8^{d}	4.0^{b}	4.3^{c}	3.6^{a}	0.15
Saltiness	21	4.2^{ab}	4.1^{ab}	4.3^{bc}	4.0^{a}	4.2^{ab}	4.5^{c}	0.21
Average	X	4.3^{ab}	4.2^{a}	4.4^{b}	4.2^{a}	4.2^{a}	4.3^{ab}	0.14

^{a,b,c,d,e} Means in a row with different superscripts differ (P<0.05).

Table 1. Effect of alginate type (Sobalg Fd 155, 176 and 275) on raw breaking strength, cooking loss and raw pH in finely ground (4.5 mm) restructured beef.

Alginate type	Breaking strength (N)	Cooking loss (%)	pH
155	28.7[b]	17.2[b]	5.43[a]
176	36.9[a]	15.5[a]	5.42[a]
275	26.6[b]	18.3[b]	5.41[a]

[a,b] Means in the same colomns with different superscripts are different ($P<0.05$).
Values are averaged across levels of alginate and $CaCO_3$.

Table 2. Effect of levels of alginate and $CaCO_3$ on cooking loss and raw pH in finely ground (4.5 mm) restructured beef.

Alginate level (%)	Cooking loss (%)	pH	$CaCO_3$-level (%)	Cooking loss (%)	pH
0.50	22.4[a]	5.41[a]	0.10	19.8[a]	5.28[a]
0.75	18.4[b]	5.42[a]	0.15	16.5[b]	5.40[b]
1.00	15.6[c]	5.44[a]	0.20	16.1[b]	5.47[c]
1.25	11.6[d]	5.42[a]	0.25	15.5[b]	5.54[d]

[a,b,c,d] Means in the same colomns with different superscripts are different ($P<0.05$).
All values are averaged across the three alginate types Sobalg Fd 155, 176 and 275. Furthermore, values on the left side are averaged across $CaCO_3$-levels, and values on the right side are averaged across alginate levels.

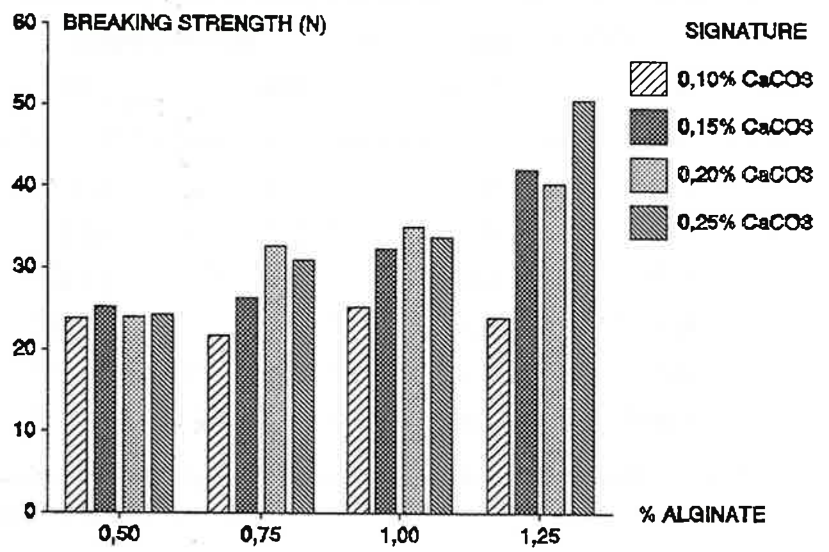


Fig. 1. Raw breaking strengths in finely ground (4.5 mm) restructured beef. Values are averaged across the three alginate types Sobalg Fd 155, 176 and 275.

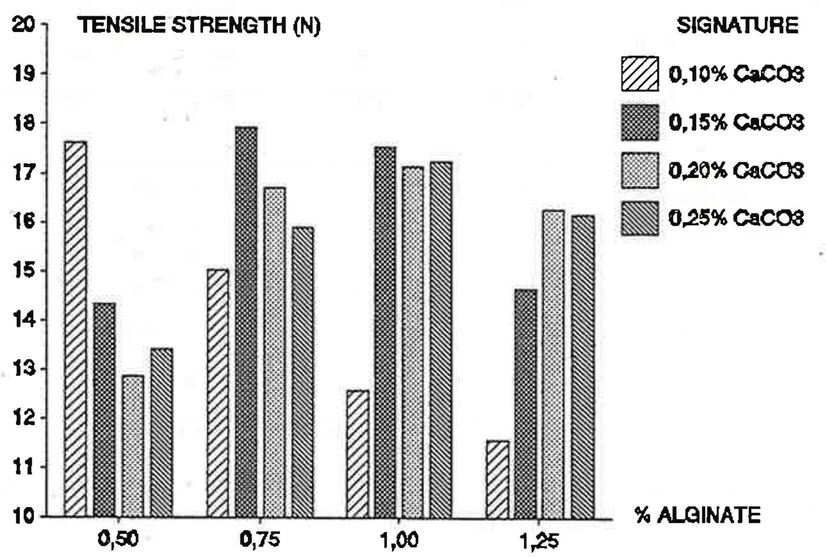


Fig. 2. Cooked tensile strengths in coarsely ground (kidney plate) restructured beef.

Amino acid composition of albumen products

TABLE 1

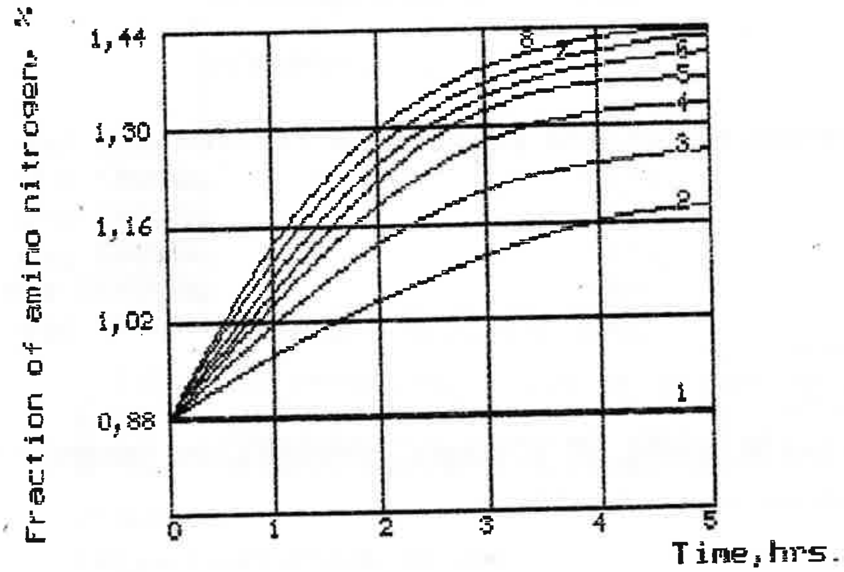
AMINO ACIDS	Fraction of total mass, percentage in respect of albumen		
	Beef	Soya bean preparation	Albumen composition (AC)
Aspartic acid	1,77	8,8	9,523
Treonine	0,8	3,1	4,954
Serine	0,78	4,6	4,832
Glutanic acid	3,07	10,1	13,193
Proline	0,68	2,1	4,312
Glycine	0,93	2,01	2,04
Alanine	1,08	2,8	4,210
Valyne	1,03	2,9	3,368
Methionine + cystine	0,73	2,2	2,242
Isoleucine	0,78	4,0	3,648
Leucine	1,47	6,2	7,540
Phenylalamine + tyrosine	1,47	5,8	8,606
Gistidine	0,71	2,8	2,692
Lysine	1,59	5,2	6,332
Arginine	1,04	4,8	5,542
TOTAL	17,9	74	83,034

TABLE 3

Indices,%	MAC
Moisture	5,00
Albumen	81,1
Fat	1,2
Carbonhydrates	3,2-4,0
Ashes	2,00-3,00

TABLE 2

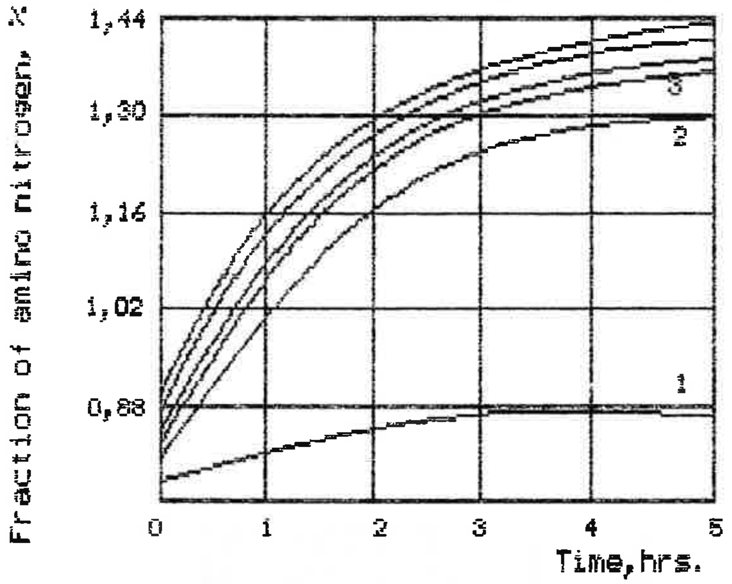
Object of investigation	Fractional composition, percentage with respect to total mass		
	water-soluble	salt-soluble	alkali-soluble
AC	43	32	24
MAC	58	24	17



1 – test sample
2 – ferment/substrate proportion (E/S)=0,001 g/g
3 – -¦- =0,002 g/g
4 – -¦- =0,004 g/g
5 – -¦- =0,005 g/g
6 – -¦- =0,009 g/g
7 – -¦- =0,010 g/g
8 – -¦- =0,020 g/g

Figure 1

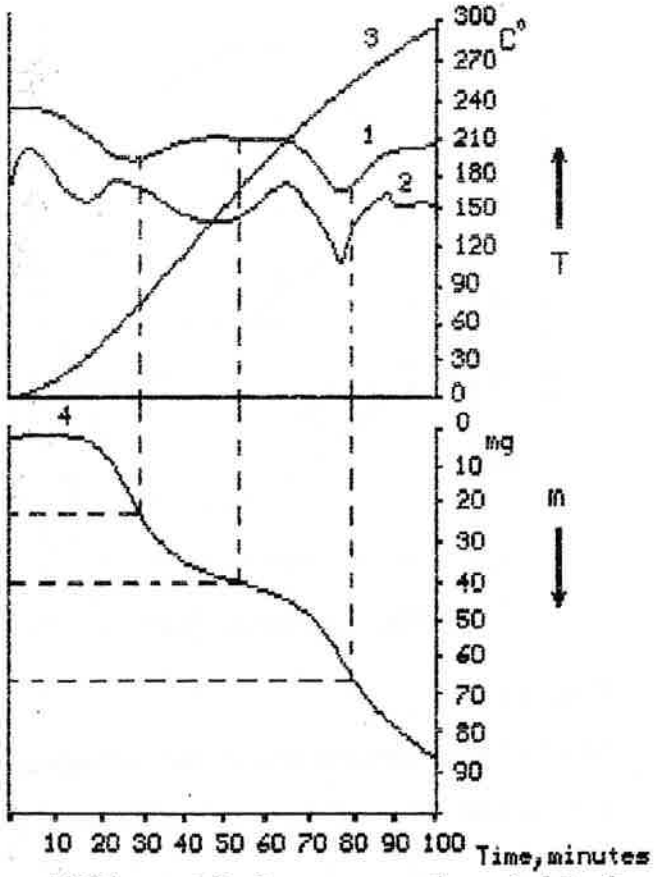
Proteolysis speed of albumen composition depending on substrate concentration.



1 – ferment/substrate proportion (E/S)=0,010 g/g
2 – -!- =0.007 g/g
3 – -!- =0,005 g/g
4 – -!- =0,003 g/g
5 – -!- =0,0025 g/g
6 – -!- =0,002 g/g

Figure 2

Proteolysis speed of albumen composition depending on ferment concentration.



1 DTG - differential curve of weight loss
2 DTA - differential curve of body heating
3 T - temperature curve of heating
4 TG - simple curve of weight loss

Figure 3
Derivation graph of MAC

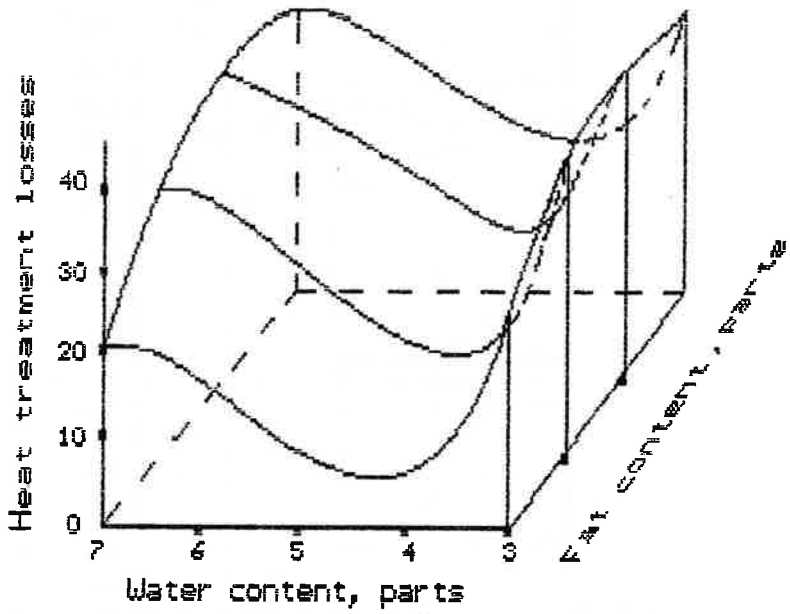


Figure 4

Stability dependence of albumen fat emultion on ratios of albumen fat and water.

Table 1: Gel strength of non meat proteinates (N/m^2)

Protein	20°C x15 min		80°C x15 min	
	9 %	15%	9%	15%
TMP	0.0	0.7	0.0	6.5
WPC 70%	0.0	0.0	2.2	45,2
SI	0.7	16,4	1.1	37.6
HVC1	0.0	6.6	1.7	26.6
HVC2	0.0	3.6	1.0	20.7
LVC3	0.0	2.1	0.0	3.4

Table 2: The effect of cooking method and preformed emulsion ratio on fat losses (% of added fatty tissue)

Protein	Pasteurisation		Sterilisation		Frying	
	5:5:1	8:8:1	5:5:1	8:8:1	5:5:1	8:8:1
TMP	0.1	EC	6.5	EC	EC	EC
WPC 70%	2.0	EC	2.0	EC	EC	EC
SI	0.1	5.5	0.5	20	4.0	8.0
VWG	12	EC	33	EC	44	EC
HVC1	0.0	1.9	0.0	EC	EC	EC
LVC3	0.0	8.1	0.7	EC	EC	EC

*EC = Emulsion collapsed

Table 3: The effect of cooking method and preformed emulsion ratio on moisture losses (% of added water)

Protein	Pasteurisation		Sterilisation		Frying	
	5:5:1	8:8:1	5:5:1	8:8:1	5:5:1	8:8:1
TMP	2.0	EC	18	EC	82	EC
WPC 70%	0.0	EC	1.5	EC	58	EC
SI	0.0	3.2	1.0	23	22.5	25
VWG	32	EC	26	EC	49	EC
HVC1	0.0	49	0.4	EC	85	88
LVC3	0.4	67	44	EC	90	95

*EC = Emulsion collapsed

Table 4: Effect of increasing concentration of WPC (HG, 35% protein) on waterholding capacity and cook yield of cooked hams.

Residual Powder %	Sample	Waterholding Capacity		Cook Yield	
		+ Phos.	- Phos.	+Phos	-Phos
2.5	Test	22.4	17.8	100.9	88.2
	Control	21.6	16.6	100.4	86.5
	Δ (C-T)	0.8	1.2	0.5	1.7
3.0	Test	22.8	17.5	102.2	91.2
	Control	22.2	16.5	101.8	88.2
	Δ (C-T)	0.6	1.0	0.4	3.0
3.5	Test	25.3	18.0	102	92.5
	Control	23.7	16.9	100	87.5
	Δ (C-T)	1.6	1.1	2.0	5.0
4.0	Test	26.6	18.9	104.4	96.4
	Control	23.2	17.4	97.3	91.7
	Δ (C-T)	3.4	1.5	7.1	4.7

Table 5: Effect of various protein powders at 3.5 % residual protein on cook yield and on water holding capacity of cooked hams

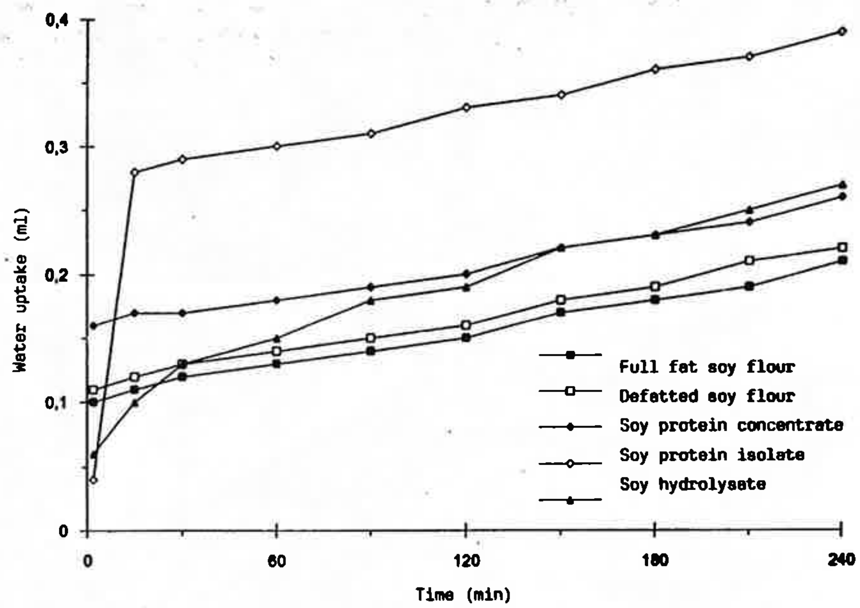
Protein	Sample	Waterholding Capacity		Cook Yield	
		+ Phos.	- Phos.	+Phos	-Phos
WPC (75%)	Test	25.3	20.2	98.0	91.2
	Control	20.9	17.9	91.9	86.5
	Δ (C-T)	4.4	2.3	6.1	4.7
WPC (35%) HG	Test	25.3	18.0	102	92.5
	Control	23.7	16.9	100	87.5
	Δ (C-T)	1.6	1.1	2.0	5.0
WPC (35%) LG	Test	23.0	16.9	99.8	88.2
	Control	22.2	16.3	99.3	88.0
	(C-T)	0.8	0.6	0.5	0.2
Egg albumin (78%)	Test	27.9	19.3	102.1	93.6
	Control	21.3	17.1	97.9	88.2
	Δ (C-T)	6.6	2.2	4.2	5.4
Soya (90%) (1% Res.)	Test	26.9	20.2	102.9	91.9
	Control	20.8	16.9	98.1	87.7
	(C-T)	6.1	3.3	4.8	4.2
55% Lactose (4 % Res.)	Test	24.4	----	103.6	----
	Control	23.3	----	101.5	----
	(C-T)	1.1	----	2.1	----

HG = High Gelling
LG = Low Gelling

Table 1: Investigated Soy Protein products

Protein raw materials	Code
Full-fat soy flour (Törökszentmiklós, Hungary)	
Defatted soy flour (State farm Bolyi AG, Hungary)	
Soy protein hydrolysate (KEKI, Hungary)	
Soy protein concentrate Central Soja Co. Inc., USA	Procon 2000
Soy protein isolate (Protein Technologies International, Belgien)	PP 500 E

Fig. 1: Swelling capacity of soy protein products



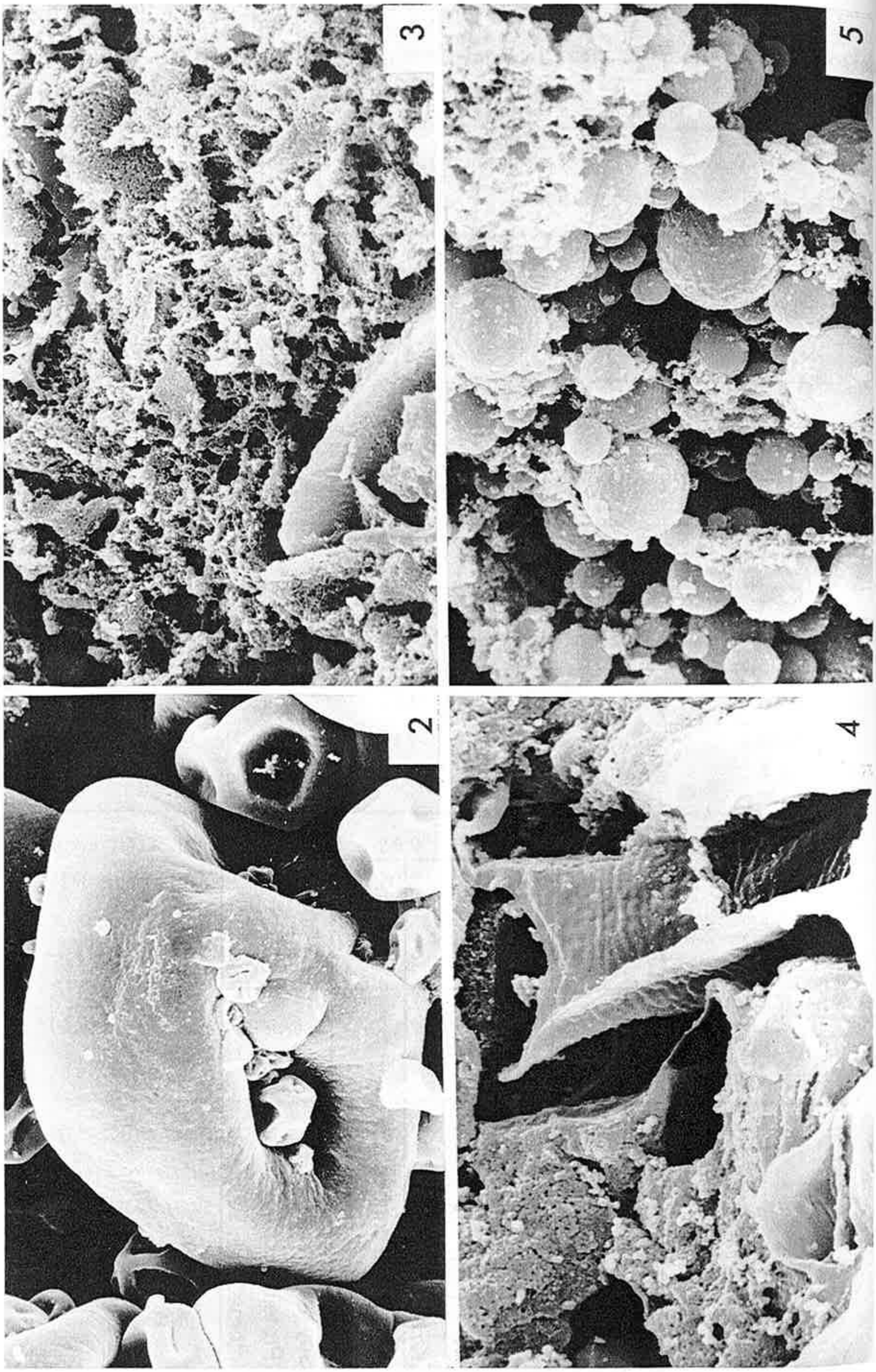
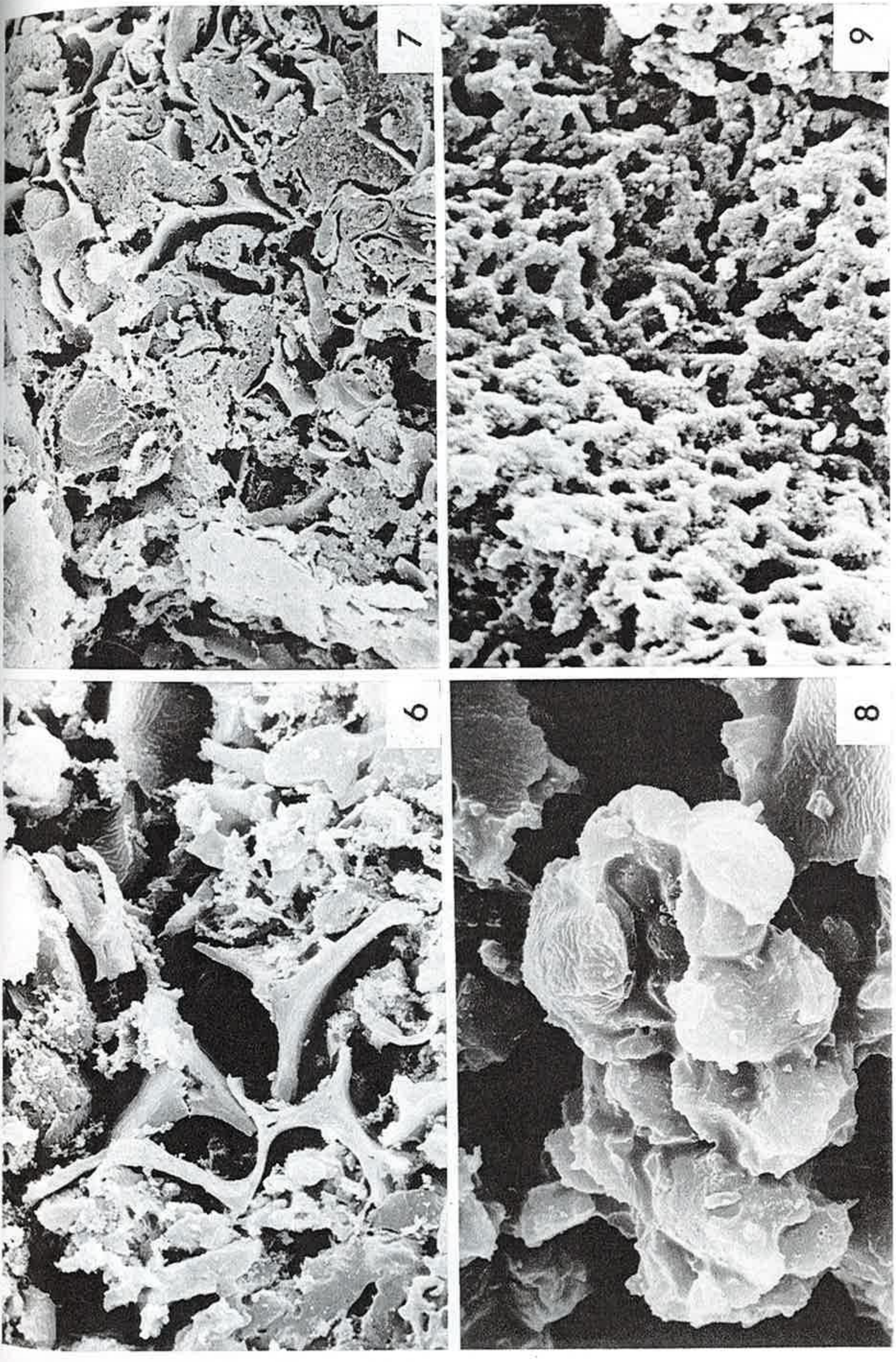


Fig. 2: Swollen soy protein isolate (SEM, 2 000 x); **Fig. 3:** Swollen soy hydrolysate (SEM, 2 000 x); **Fig. 4:** Full fat soy flour suspension (SEM, 5 000 x); ***Fig. 5:*** Full fat soy flour suspension (SEM, 4 000 x)



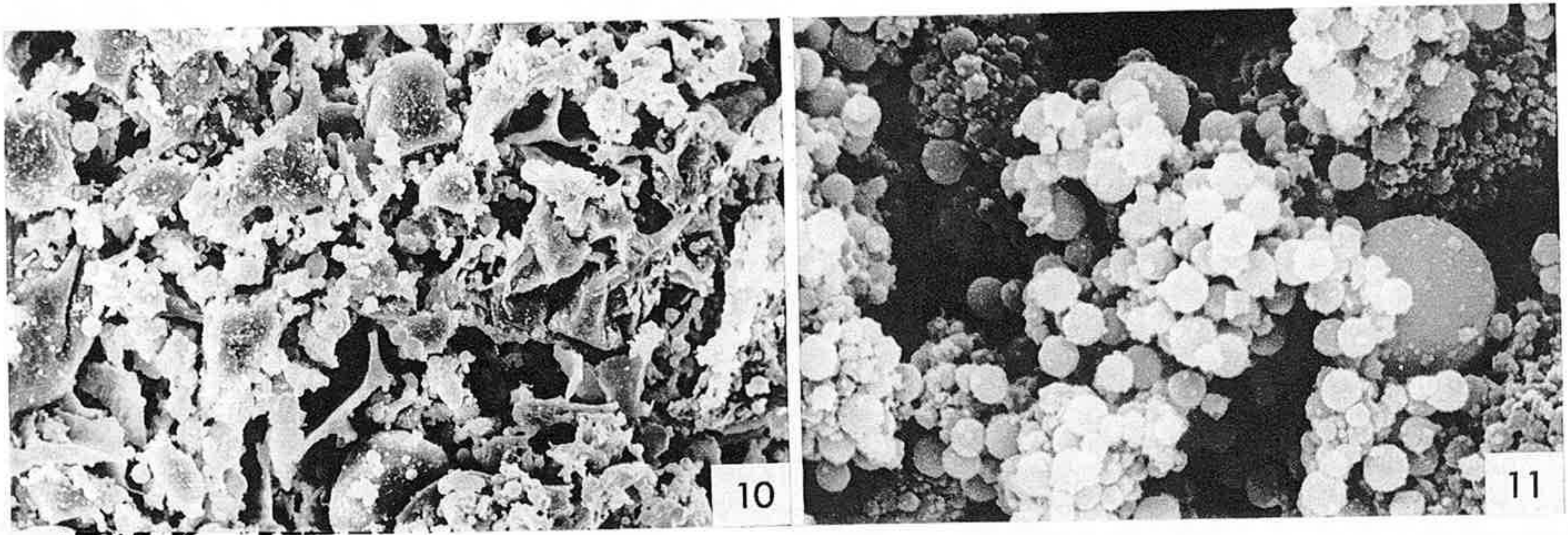


Fig. 6: Defatted soy flour suspension (SEM, 2 000 x); **Fig. 7:** Soy hydrolysate suspension (SEM, 500 x); **Fig. 8:** Soy protein concentrate suspension (SEM, 2 000 x); **Fig. 9:** Soy protein isolate suspension (SEM, 10 000 x); **Fig. 10:** Soy flour emulsion (SEM, 500 x); **Fig. 11:** Soy isolate emulsion (SEM 12 000 x)

Table 1. Formulation and proximate analysis (%) of the different bolognas assayed[1].

Samples	Protein	Moisture	Fat	Ash
5/0;5/6.5;5/13	12.0[a]	74.7[a]	4.9[a]	3.3[a]
10/0;10/6.5;5/13	11.3[b]	69.5[b]	10.7[b]	3.3[a]

1.- The first number in each sample denomination indicates the fat content (%) in the product and the second the proportion of surimi (%) added to the target formula.
Each number represents the average value of each parameter for the samples formulated with equal fat content.
Different letters in the same column indicate significant differences (P<0.05).

Table 2. Influence of fat and surimi levels and of different thermal treatments on cooking loss and expressible fluids[1].

	CL(%)	TEF(%)	EF(%)	EM(%)
Thermal treatment[2]				
A	7.26[a]	1.59[a]	0.36[a]	1.24[a]
B	8.11[b]	1.54[a]	0.31[b]	1.22[a]
C[3]	7.25[a]	2.21[b]	0.35[ab]	1.86[b]
SEM	0.07	0.04	0.01	0.04
Fat level (%)[4]				
5	7.90[a]	1.53[a]	0.21[a]	1.32[a]
10	7.47[b]	1.60[a]	0.46[b]	1.14[b]
SEM	0.11	0.04	0.01	0.03
Surimi level (%)[5]				
0	8.16[a]	1.64[a]	0.35[a]	1.29[a]
6.5	8.03[a]	1.59[ab]	0.34[a]	1.25[a,b]
13	6.87[b]	1.47[b]	0.32[a]	1.15[b]
SEM	0.14	0.04	0.01	0.04

1. CL = cooking loss; TEF = total expressible fluid; EM = expressible moisture; EF = expressible fat. Different letters in the same column, within each of the three factors, indicate significant differences ($P<0.05$). SEM = standard error of the mean.

2. Each number represents the average value of each parameter for the samples formulated with equal thermal treatment.
A: 30 min at 40°C, then cooking at 90°C up to 70°C internal temperature; B: 24 h at 4°C then cooking at 90°C up to 70°C internal temperature.

3. Thermal treatment C consisted of heating the product at 90°C up to an internal temperature of 70°C. These data are taken from Cavestany et al. (1994).

4. Each number represents the average value of each parameter for the samples formulated with equal fat content.

5. Each number represents the average value of each parameter for the samples formulated with equal surimi content.

Table 3. Influence of fat and surimi levels and of different thermal treatments on objective texture determination[1].

	SF	PF	D	WPx10^{-3}
Thermal treatment[2]				
A	8.28^a	2.49^a	6.51^a	7.87^a
B	9.00^b	2.64^b	6.67^a	8.71^b
C[3]	6.96^c	2.27^c	6.17^b	6.84^c
SEM	0.07	0.04	0.08	0.19
Fat level (%)[4]				
5	8.45^a	2.51^a	6.89^a	8.32^a
10	8.84^b	2.63^a	6.29^b	8.26^a
SEM	0.08	0.04	0.08	0.21
Surimi level (%)[5]				
0	8.90^a	2.64^a	6.59^a	8.62^a
6.5	8.93^a	2.55^a	6.57^a	8.10^a
13	8.09^b	2.52^a	6.62^a	8.17^a
SEM	0.10	0.05	0.10	0.26

1. SF = shear force (N/g); PF = penetration force (N); D = displacement (mm); WP = work of penetration (J). Different letters in the same column, within each of the three factors, indicate significant differences ($P<0.05$). SEM = standard error of the mean.

2,3,4,5. See footnotes to table 2.

Table 1. Ingredient composition of chicken salami containing mechanically separated seal meat (MSSM) and seal protein hydrolyzate (SPH).

Ingredients	Control	SPH-1	SPH-2	MSSM-10	MSSM-20
Chicken meat	30.0	29.7	29.4	22.0	24.0
MSSM	0	0	0	3.0	6.0
SPH	0	0.3	0.6	0	0
Chicken skin	4.25	4.25	4.25	4.25	4.25
Water	3.3	3.3	3.3	3.3	3.3
Binder	4.065	4.065	4.065	4.065	4.065
Curing Mixture	0.25	0.25	0.25	0.25	0.25

Symbols denote: SPH-1, 1% SPH, SPH-2, 2% SPH, MSSM-10, 10% MSSM and MSSM-20, 20% MSSM. Curing mixture provided for 600 ppm sodium ascorbate and 200 ppm sodium nitrite.

40th ICoMST 1994, The Hague, Netherlands

Table 2. Hunter **L, a, b** colour parameters of exterior surfaces of salami products.[a]

Samples	L	a	b
Control	43.8 ± 0.4 (39.0 ± 1.5)	15.1 ± 0.6 (18.3 ± 0.6)	18.3 ± 0.6 (21.9 ± 0.9)
SPH-1	41.2 ± 1.4 (39.1 ± 1.0)	19.1 ± 1.5 (19.8 ± 0.6)	20.1 ± 1.5 (22.6 ± 1.3)
SPH-2	40.0 ± 1.5 (36.7 ± 1.9)	18.6 ± 1.5 (20.9 ± 1.6)	20.3 ± 1.7 (23.2 ± 0.8)
MSSM-10	27.9 ± 2.9 (26.5 ± 2.5)	20.7 ± 2.4 (23.1 ± 1.1)	18.5 ± 0.9 (19.7 ± 0.9)
MSSM-20	23.8 ± 3.1 (20.9 ± 1.3)	20.1 ± 1.3 (20.7 ± 1.7)	15.2 ± 1.1 (15.8 ± 0.8)

[a]Results are for unsmoked and smoked (in parentheses) samples are provided.

Table 3. Mean sensory scores of salami products.[a]

Sample	Unsmoked	Smoked
Control	6.70[a]	7.30[a,b]
SPH-1	6.56[a,b]	6.87[a]
SPH-2	6.53[a,b]	6.57[a,b]
SM-10	6.43[a,b]	6.73[a,b]
SM-20	5.66[b,c]	4.90[c]

[a]Values in each column carrying the same superscript are not significantly different ($P > 0.05$) from one another.

Table 1 Comparison of the amount of phenols penetrating into meat product in dependance on surface area and RSF dose

Meat product	Phenols content [mg/kg]	
	RSF dose 20g/m^3	RSF dose 50g/m^3
frankfurters	235	381
Hunter sausage	271	358
Cracow sausage	180	243
butt	278	328

* The surface areas per weight unit (m^2/kg) were as follows:
frankfurters - 0,21; Hunter sausage - 0,12; Cracow sausage - 0,08; butt - 0,05

Table 2 Phenols contents in tested sausages in relation to RSF dose

Phenol	Frankfurters		Hunter sausage		Cracow sausage		Butt	
	A	B	A	B	A	B	A	B
cyclotene	13,4	24,4	7,6	8,8	1,5	1,7	1,8	2,6
guaiacol	5,0	10,4	2,8	2,8	1,1	1,2	1,3	1,4
phenol	7,1	16,0	5,1	5,2	1,8	2,4	1,5	1,6
4-methyl guaiacol	4,2	8,7	2,4	2,3	1,9	3,3	1,0	1,8
m-, p-cresol	3,4	6,7	2,0	2,4	1,3	1,8	1,1	1,2
4-ethyl guaiacol	2,3	3,0	1,3	1,4	0,3	0,4	0,8	0,6
syringol	10,0	17,3	4,5	5,6	4,2	5,5	4,1	4,8
4-methyl syringol	3,4	6,5	1,3	2,9	1,8	2,3	1,6	2,0
4-ethyl syringol	1,0	2,1	0,5	0,9	0,5	0,8	0,7	0,8
Total	49,5	80,1	32,6	43,0	14,4	19,4	13,9	16,8

A - RSF dose 20 g/m^3 of chamber capacity
B - RSF dose 50 g/m^3 of chamber capacity

Fig. 1 The influence of drying time on amount of phenols penetrating into the frankfurters

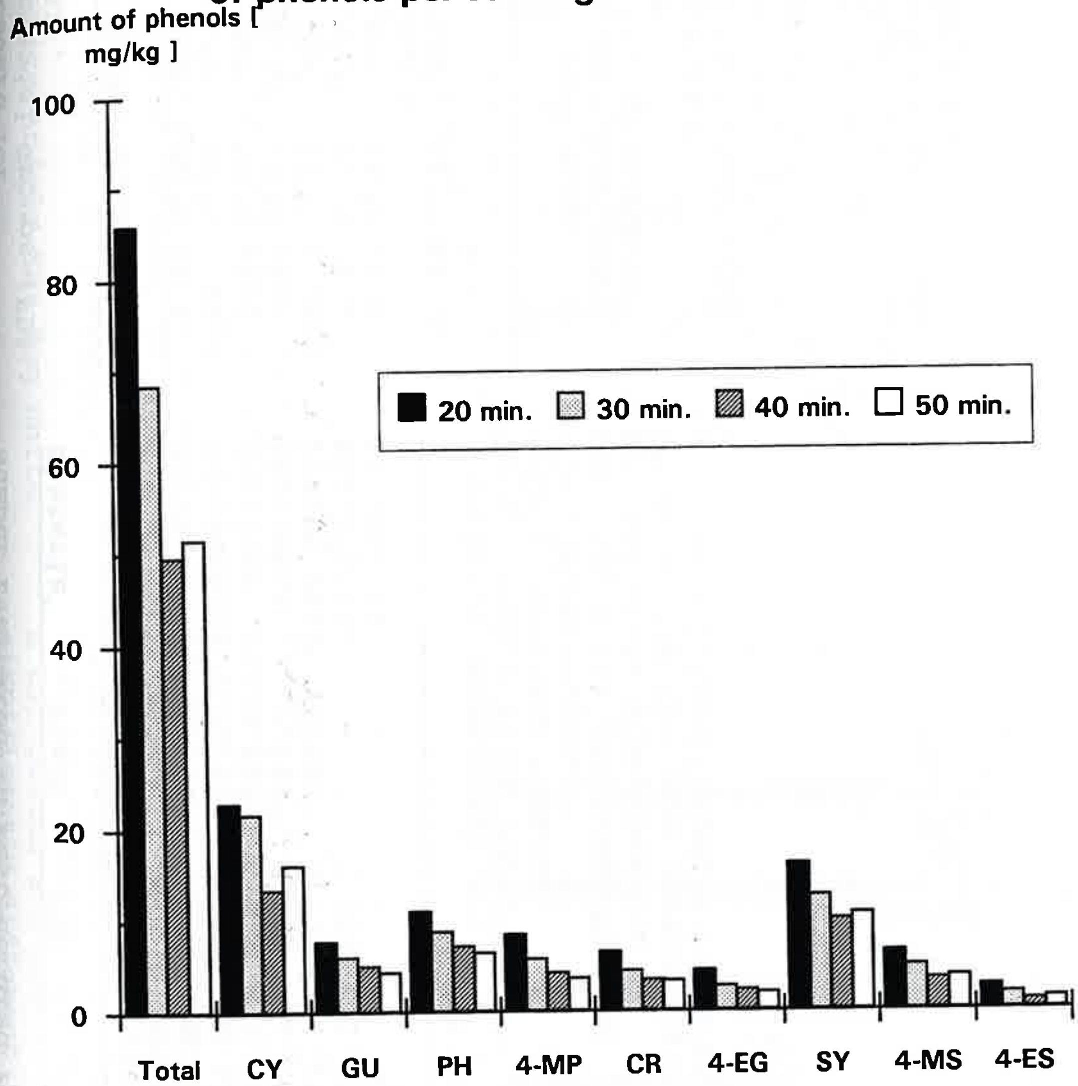


Table 1. The Plating Media and Incubation Procedure for Enumerating Bacterial Groups (FDA, 1984; APHA, 1992).

Bacteria	Media	Incubation
Total Aerobic	APC[1]	35 °C 48 h
Psychrophilic	APC	07 °C 7 days
Pseudomonas	PAB[2]	25 °C 48 h
Coliforms	VRBA[3]	35 °C 48 h
Lipolytic	VBA[4]	25 °C 4 days
Proteolytic	APC[5]	21 °C 72 h
Thermophile	APC	35 °C 48 h
Salmonella	XLD & BSA[6]	35 °C 24-48 h

1: Aerobic Plate Count Agar
2: CFC Selective Agar Supplement was added to PAB (Pseudomonas Agar Base)
3: Violet Red Bile Agar
4: Victoria Blue Agar containing Tributyrin supplement
5: APC plus 10% skim milk supplement
6: Xylose Lysine Dextrose and Bismuth Sulphite Agar which were streaked after 24 h enrichment period in Selenit Cysteine broth.

Table 2. Least Square Means (Log_{10}) of the Bacteria Number Evaluated in Restructured Fish Product.

Bacteria*	Fresh	CNT	CT	ENT	ET
APC	6.597^{a}	6.494^{ab}	6.302^{b}	6.449^{ab}	6.289^{b}
Psychrophiles	6.211^{b}	6.439^{ab}	6.294^{b}	6.567^{a}	6.276^{b}
Pseudomonas	5.743^{a}	5.700^{a}	5.623^{b}	5.675^{ab}	5.615^{b}
Coliform	3.685^{b}	4.042^{a}	3.967^{a}	3.923^{a}	3.948^{a}
Lipolytic	3.780^{ab}	3.720^{ab}	3.644^{b}	3.895^{a}	3.665^{b}
Proteolytic	4.695^{b}	4.759^{ab}	4.671^{b}	4.838^{a}	4.680^{b}
Thermophile	-	1.253	1.337	1.516	1.292
Salmonella	-	-	-	-	-

* Bacteria enumerated, APC
Total Aerobic Plate Count
CNT: Control-Non-Tumbled
CT: Control-Tumbled
ENT: Egg White Added-Non-Tumbled
ET: Egg White Added-Tumbled
^{a,b} Means with the same superscript letters in a row are not significantly different (P>0.05).

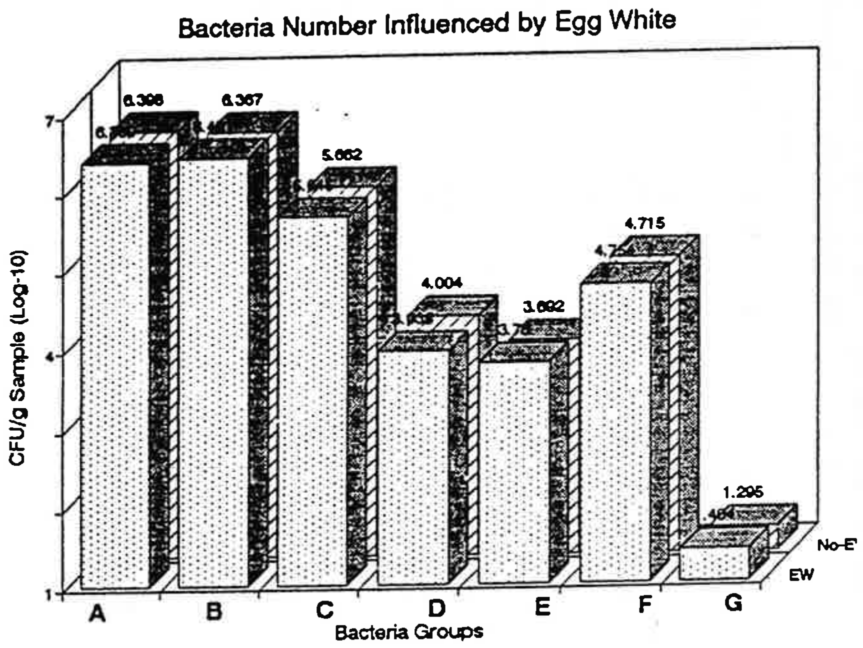


Figure 1. The influence of egg white on bacteriological quality of restructured fish product.
A: Total Aerobic Plate Count, B: Total psychrophiles, C: Pseudomonas, D: Total coliforms, E: Lypolitic bacteria,
F: Proteolitic bacteria, G: Thermophilic bacteria number.
No-EW: No-Egg White Added, EW: Egg White Added

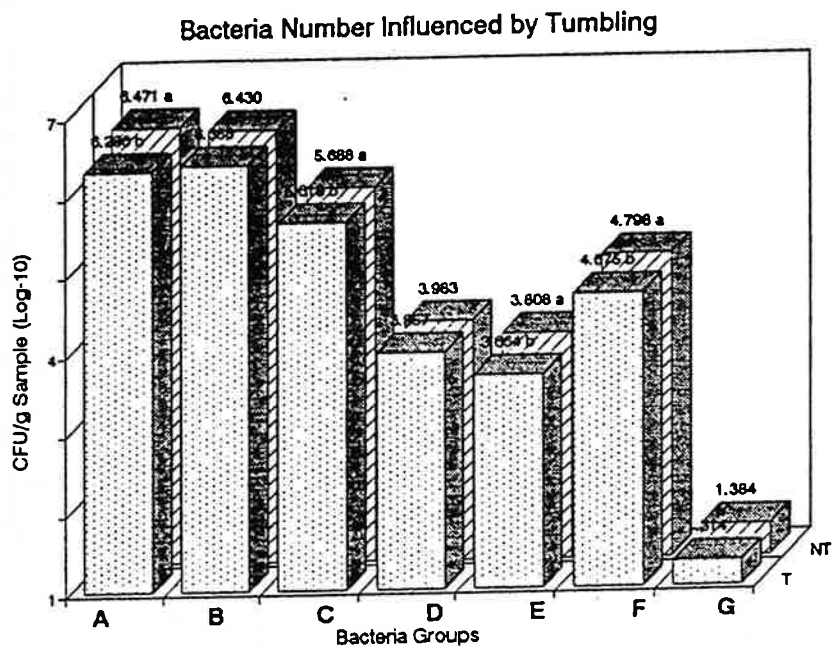


Figure 2. The influence of tumbling on bacteriological quality of restructured fish product. A: Total Aerobic Plate Count, B: Total psychrophiles, C: Pseudomonas, D: Total coliforms, E: Lypolitic bacteria, F: Proteolitic bacteria, G: Thermophilic bacteria number. NT: Non-Tumbled, T: Tumbled. [a,b] Means with the same letters on a bar column are not significantly different *(P>0.05)*.