Gelated and cryogenically dehydrated and structured blood plasma used in fermented sausage

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SUMMARY: The possibility of substitution of cryogenically dehydrated and structured white livex i.e.thermally gelated pig blood plasma for 10% and 15% of meat /pork and beef/ in the processing of salami type fermented sausage was investigated.The substitute influenced the dynamics of fermentation and resulted in 27-31% increase in lactic acid and decrease in volatile low fatty acid contents.Diminishing of protein contents by 1.2-1.5% was observed. Slight reduction in overall organoleptic desirability of the final product was noticed.

INTRODUCTION: Manufacturing technology of fermented sausage,differentiation of raw material and additives used /VELIC at al.1988,LIEPE at al.1990/,influence of individual processing operation /STIEBING and RÖDEL,1990,VERPLAETSE at al.1990/,determination of various products accumulated /VERPLAETSE at al.1989,TSCHABRUN at.al.1990/ etc.are permanently investigated. Commonly used pork and beef could be partly replaceable by plant protein /BECK at al.1989/ or animal protein substitute /PYRCZ at al.1989/.The objective of this study was to determine the influence of meat substitution for cryogenically partly dehydrated and structured, thermally gelated pig blood plasma i.e.white livex /POLISH PAT.1990/ on the pattern of fermentation process and organoleptic quality of salami type sausage.

MATERIALS and METHODS: The composition of the experimental sausage mixture is given in TAB.1

Table 1 Formulation of the experimental sausage mixture / % w/w /

INGREDIENTS	TREATMENT		
	A /control/	B	C
Lean pork	40.00	35.00	32.50
Lean beef	30.00	25.00	22.50
Pork backfat	30.00	30.00	30.00
Nitrite salt	2.50	2.50	2.50
Saccharose	0.25	0.25	0.25
Pepper	0.15	0.15	0.15
Meat substitute /Livex/	0.00	10.00	15.00

The white livex i.e. thermally gelated pig blood plasma processed from destabilized blood according to the patented technology was used as meat substitute at 10% and 15% w/w level and replaced pork and beef in 1:1 proportion.Preparation of the substitute:After pasteurization and chilling fresh white livex was cut into cubes approx.5x5x5 cm and was cryogenically partly dehydrated.During this process also specific structure develops.Freezing-out of the moisture was at $-6^{o}C \pm 1^{o}C$ for 48 h.The surface layer of ice and visible bean shaped ice inclussions were removed and the remained ice was thawed at $4^{o}C$ for 12 h.The determined amount of protein in substitute was 13.70% and was over twice the content in fresh livex.The sub-

stitute was comminuted in a bowl cutter into pieces of approx.3 mm prior to blending with meat and other ingredients.Lean pork and beef was purchased from the local slaughterhouse after 24 h.of carcass chilling.Meat was cut into 150-200 g pieces and frozen at -2°C for 2 days.Back fat was cut in cubes approx.2x2x2 cm and frozen at -20°C.The sausage mixture was prepared using a bowl cutter for final comminution and mixing with the ingredients.The resulting mixture was stuffed into protein casings 60 mm in diameter.The sausages /approx. 500-550g/ were subjected to preliminary fermentation in a laboratory climatized chamber at 18-19°C and 85-90% relative humidity /RH%/ for 5 days,followed by 2 days´smoking in cold smoke at 20°C.Thereafter,sausage was fermented for 23 days at 15-16°C and 75-85RH%.The samples for analysis were collected at 0,5,10,20 and 30 days after stuffing.A sufficient amount of the sausage was ground in a laboratory grinder after removing the casing and well mixed. Ground and mixed sample was analyzed for:lactic acid /HOMOLKA 1971/,total amount of volatile low fatty acids expressed as acetic acid /HALVARSON 1973/,protein content /ANON.1975/and pH. The organoleptic analysis was carried out using a 5 point scale /BARYŁKO-PIKIELNA 1975/. The desirability of: colour,taste,aroma and consistency was assessed and overall acceptance was calculated.The experiment was repeated 3 times using another batch of meat and newly prepared experimental substitute i.e.white livex.

RESULTS and DISCUSSION: Substitution at both levels /10% and 15%/ of meat for cryogenically partly dehydrated livex markedly accelerate the fermentation process.This resulted,during the first 10 days of fermentation,in 45% increase of lactic acid accumulation in the sausage processed with the substitute /in comparison with control batch/,while during the next 20 days by 25%,on average.In comparison with the initial amount,the lactic acid content in the control batch was doubled while in the experimental batches,after 10 and 20 days of ripening it was tripled.Fig.1.The observation sugests that the substitute strongly influences the type of fermentation towards more desirable homofermentative pattern of fermentation.The mechanism of this phenomenon is unknown and requires further investigation.Smaller amount of volatile low fatty acids determined in the sausage manufactured with the substitute also indicates that the substitute influences this type of fermentation.Fig.1.Most probably due to the strong buffering effect of the sausage mixture,no difference in pH development and final pH between the batches was observed despite greater amount of lactic acid content in the sausage processed with the substitute was determined.Similarly,protein content of the final product,both control and experimental,does not differ significantly and therefore cannot adversely influence the sausage quality.Fig.1.This is in agreement with the observations of /AMBROSIADIS 1981/.No significant difference in any 4 indices of the organoleptic characteristics between the sausage processed with 10% and 15% substitution of meat by partly cryogenically dehydrated livex was observed.Sensory characteristics of sausage were only slightly influenced by the substitute and both the control sausage and that processed with livex had good sensory characteristics.The sausage manufactured with the substitute differed from the control batch,/particularly after 20 days of ripening/ in colour,aroma und consistency and were scored 0.1-0.4 point lower.However,after 30 days of fermentation,in overall organo-

leptic acceptability the experimental batches was practically indistinguishable from the control batch.It could,therefore,be concluded that at the experimental level the substitute used does not adversely influence the palatability of salami type sausage.

CONCLUSIONS:

1.Cryogenical dehydration and structuring of thermally gelated pig blood plasma /white liver/ is an acceptable method of substitute processing used for fermented sausage manufacturing.

2.The substitute form discussed above could be used at 10-15% level /w/w/ with no adverse influence on the final product palatability.

3.The substitute desirably influences the pattern of fermentation i.e.towards the homofermentative type.

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Fig.1. CHANGES OF PHYSICOCHEMICAL INDICES OF EXPERIMENTAL SAUSAGES

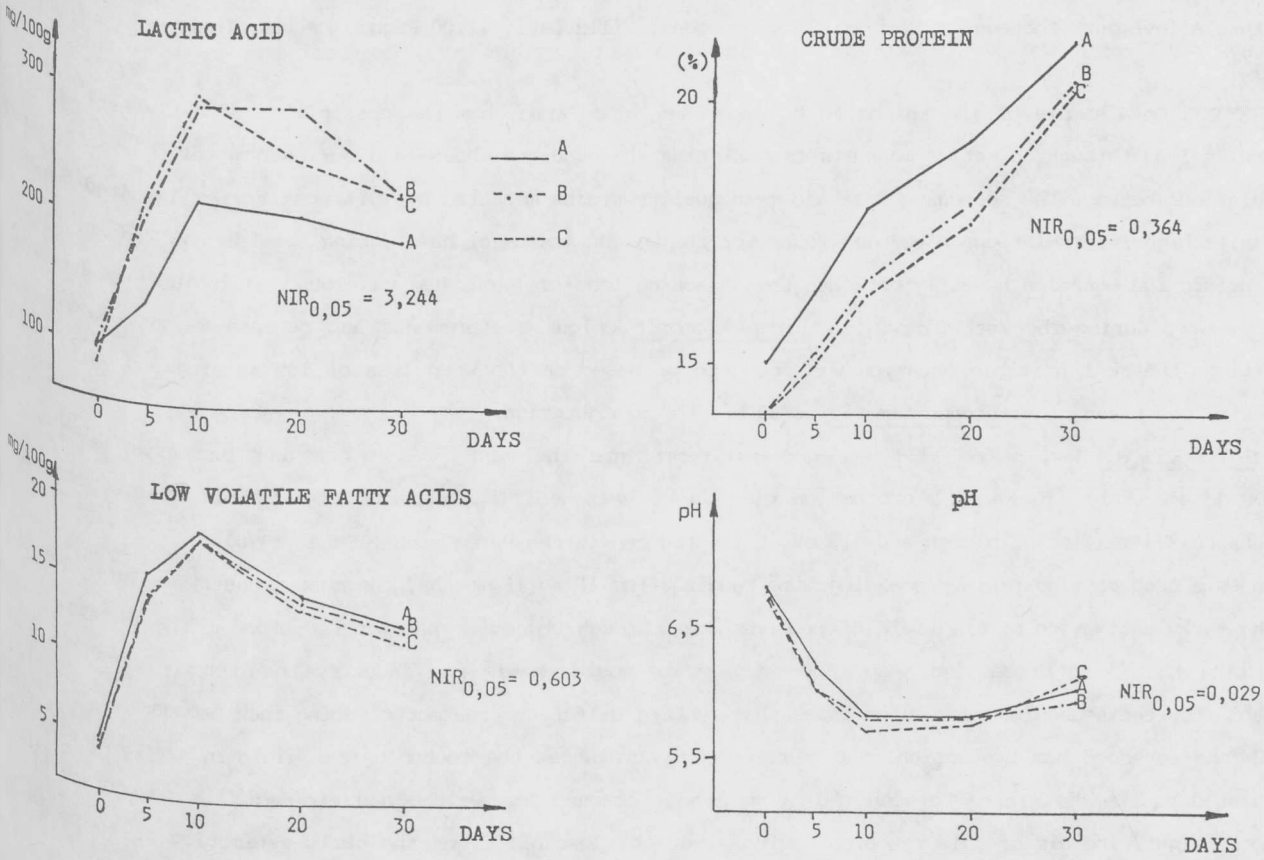
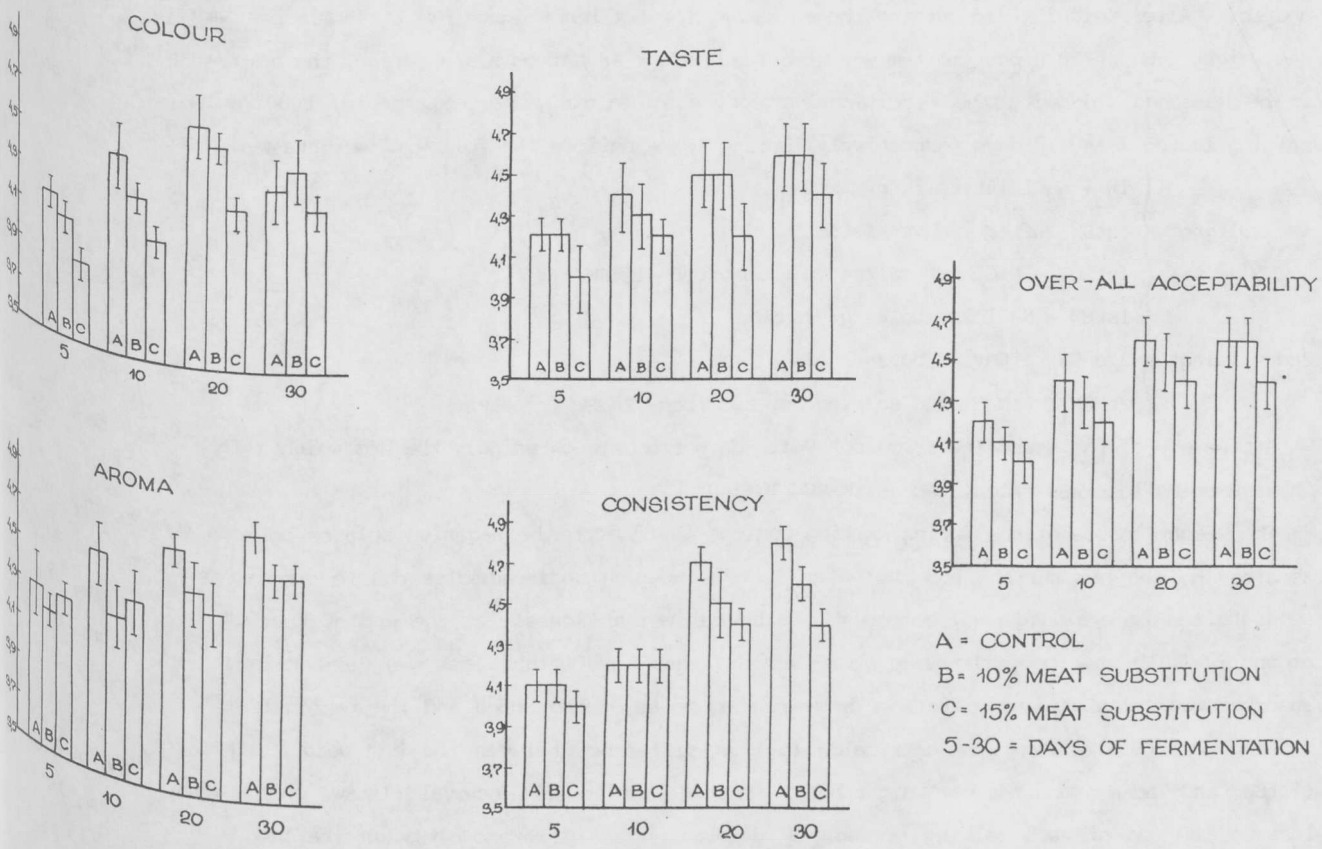


FIG.2. RESULTS OF ORGANOLEPTIC ANALYSIS



A = CONTROL
B = 10% MEAT SUBSTITUTION
C = 15% MEAT SUBSTITUTION
5-30 = DAYS OF FERMENTATION