

Use of blood plasma and globin in cooked sausage.

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Summary

Studies were made of the applicability of ultrafiltered and spray-dried globin and plasma protein preparates as food additive for cooked sausages. Globin was compared with skim milk powder and plasma with commercially available freeze-dried blood plasma. Sausages with globin had better consistency (measured by Instron) than those with milk powder. Sausages made with 2-4 % globin had brownish red colour, they had no off taste. When cooking plasma sausages the temperature should increase from 75°C to 80°C. The respective taste threshold for plasma protein proved to be 1 %. Sausages containing 1-1,5 % globin protein showed no appreciable change in the usual sensory characteristics. The cooking temperature was 75°C with globin.

Introduction

Utilization of slaughter by-products could be more effective for human consumption and their upgrading could be enhanced. E.g. in Finland the collected amount of blood for food could technically increase from 50 % to 80 % from total amount. A prerequisite for utilization of blood in foods is a hygienic collecting procedure which not only ensures protection against bacterial contamination in the slaughterhouse, but also guarantees that only blood from veterinarian-approved animals is used. The use of protein fractions isolated from blood has been suggested as a source of high quality dietary proteins (1,2). Additionally these protein preparations are valued for their functional characteristics such

as gelling ability, emulsification and swelling capacity (3).

Blood plasma and globin were used in sausage preparation (sausages were hot smoked and then scalded in steam). The purpose of this study was to investigate the effect of these protein preparates on sensory quality, chemical composition and processing properties of cooked sausage.

#### Material and methods

The sausage emulsions were prepared according to recipes in table 1 and 2. "A ground emulsion" weighing 10 kg was first prepared. After chopping (Seydelmann) 1 kg aliquots were taken from the emulsion for preparation a series of six sausages containing various amounts of water (table 1 and 2). Water was added in a laboratory cutter (Robot 2) and during homogenisation (1 min) the content of additives (salt, fosfate, nitrite, robiol and spices) and protein preparates were held constant in recipe. The chopped emulsion was stuffed into a Naturing casing, predried, smoked and cooked for 45 minutes at 75°C or 80°C (Tables 1 and 2). The final consistency of the sausages was measured by using an Instron consistometer (pressing at the sides of sausage without casing). Sausages were served to trained panelists for sensory evaluation. The chemical composition of sausages with the smallest amount of water added was analysed.

Table 1. Recipe for the sausage emulsion ("ground emulsion") and the amounts of water added. Test 1. Protein preparates: milk powder, spray-dried globin and plasma. The protein content of preparates varied from 0,7 % to 1,9 % in recipe. The cooking temperature was 75°C.

	%		%
beef	27,3	salt	1,7
pork	41,0	phosphate	0,23
water <sup>1</sup>	27,3	nitrite	0,15
protein preparate	2,0	robiol	0,20
		spices	0,20
† added water, %	27,3	30,9	34,4
		37,9	41,5
			44,9

Table 2. Recipe for the sausage emulsion ("ground emulsion") and the amounts of added water. Test 2. Pork skin emulsion = pork skin : water 1:1. Protein preparates: spray-dried or freeze-dried plasma; milk powder and spray-dried globin. The protein content of preparates varied from 1,1 to 1,5 % in recipe. The cooking temperature was 75°C for globin and milk powder and 80°C for plasma.

	%		%
beef	25,2	salt	1,7
pork	35,3	phosphate	0,23
pork skin emulsion	3,5	nitrite	0,15
potato flour	6,0	robiol	0,20
water <sup>1</sup>	25,4	spices	0,20
protein preparate	2,1		
† added water, %	25,4	29,3	33,1
		36,8	40,4
			43,8

## Results and discussion

Comparisons were made in the consistency of sausages between globin and milk powder and between spray-dried and freeze-dried plasma. Sausages made with globin were firmer than those with milk powder (fig.1). The amount of added water corresponding to acceptable consistency (11,8 N) was 5 percentage points higher for sausage prepared with globin than for sausage made with milk powder. Addition of potato starch (4,8 %) improved the firmness of sausages in both cases (fig.1).

Fig. 1. Effect of addition of water on the consistency of cooked sausage prepared with milk powder (I = test 1 and II = test 2) and globin (III = test 1 and IV = test 2).

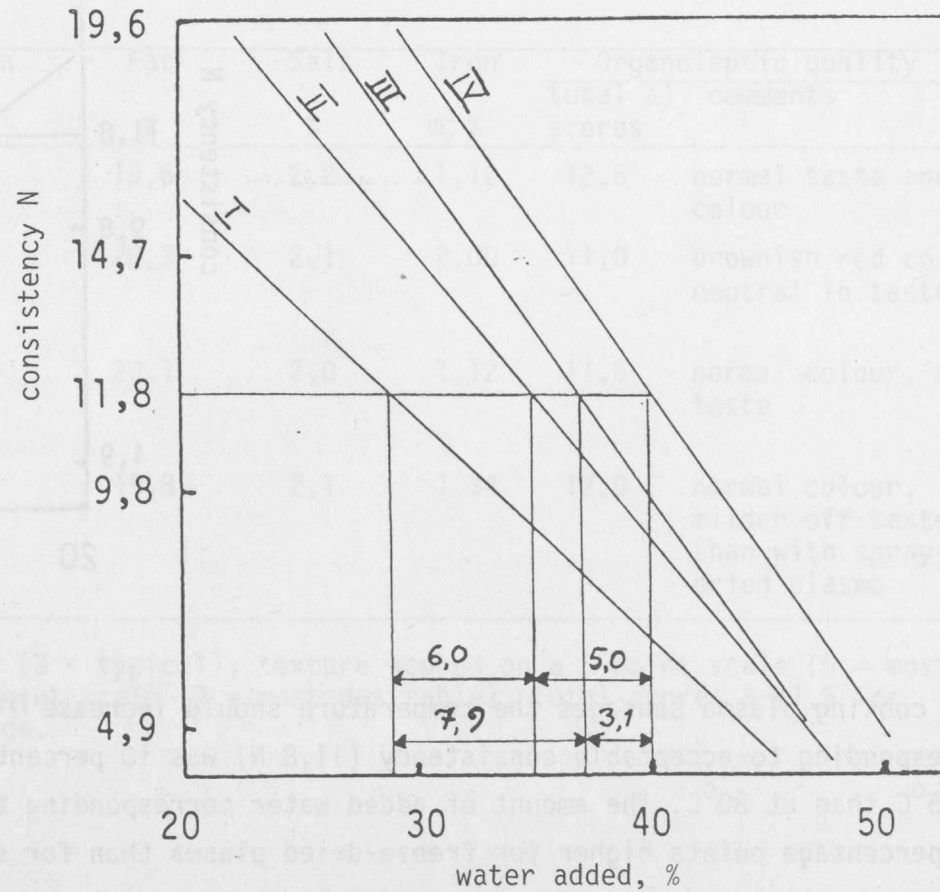
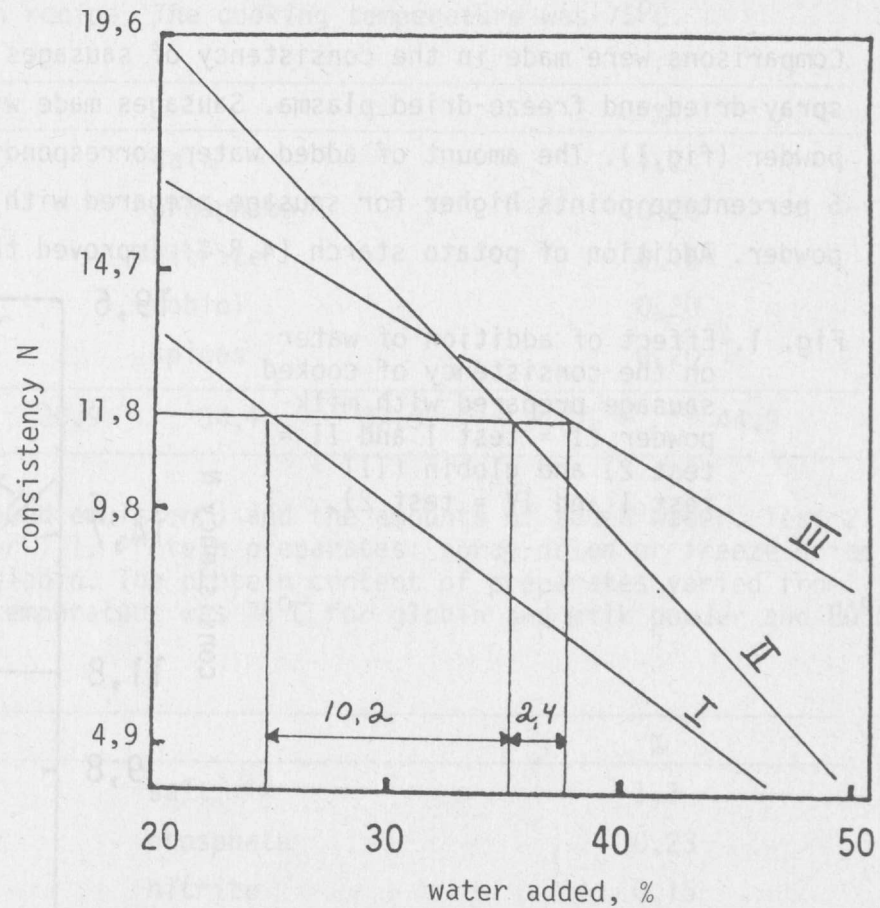


Fig. 2. Effect of addition of water on the consistency of cooked sausage prepared with spray-dried plasma (I = test 1 and II = test 2) and freeze-dried plasma (III = test 2).



When cooking plasma sausages the temperature should increase from 75°C to 80°C. The added water content corresponding to acceptable consistency (11,8 N) was 10 percentage points lower for cooking sausages at 75°C than at 80°C. The amount of added water corresponding to acceptable consistency at 80°C was 2,4 percentage points higher for freeze-dried plasma than for spray-dried (fig. 2).

Differences in chemical composition were not significant as shown in Table 3. The amount of added water was about one percentage point higher in sausages with plasma than in sausages with globin and milk powder. Iron content in globin sausage (2 %) was twice as much as in other sausages. The iron content in globin prepartate was 3,3 % and in plasma prepartate 0,4 %.

Table 3. Chemical composition and sensorily evaluated quality of cooked sausages (test 2). The amount of added water was 25 % in sausages made with globin and milk powder and 26 % in sausages made with plasma.

Protein prepartate used in sausage (added protein %)	Water %	Protein %	Fat %	Salt %	Iron mg %	Organoleptic quality	
						total a) scores	comments
Milk powder (1,5)	60,8	12,5	19,6	2,2	1,12	12,5	normal taste and colour
Globin (1,5)	60,4	12,2	20,3	2,1	2,00	11,0	brownish red colour neutral in taste
Spray-dried plasma (1,4)	62,1	12,1	20,1	2,0	1,12	11,5	normal colour, off taste
Freeze-dried plasma (1,1)	62,3	11,8	19,8	2,1	1,34	12,0	normal colour, milder off taste than with spray-dried plasma

a) Appearance scored on a 3-point scale (3 = typical), texture scored on a 5-point scale (5 = most desirable) and taste scored on a 7-point scale (7 = most desirable). Total scores 9-11,5 for satisfactory and 12-15 for good sausage.

Sausages made with globin had brownish red colour and were judged by sensory evaluation slightly poorer than those with milk powder (Table 3). Globin had no off taste, it was neutral in taste. Based on this "colorless" globin should add 1-2 % in cooked sausages. Nevertheless globin should be used in such kind of food products which have no colour problems. The sausages prepared with freeze-dried plasma were sensorily evaluated to be slightly better in taste (milder) than those with spray-dried plasma (Table 3). In both the respective taste threshold for plasma protein content proved to be 1 %.

### References

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