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EVALUATION OF POTATO PROTEIN ISOLATE IN THE MANUFACTURING OF HYBRID EMULSIFIED COOKED SAUSAGES

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I. INTRODUCTION

Alternative protein sources are sought to underpin the protein transition and cope with the sustainable future feeding of the world population. Mixing meat and alternative proteins is an easy-to-implement solution to become more sustainable. A hybrid product is such that the alternative protein added to the product is a source of protein to reduce the animal protein content for nutritional and environmental reasons [1]. Hybrid products can deliver many advantages compared to purely plant-based meat analogues concerning superior nutrition, sensory product quality, and lower costs [2]. Potato, *Solanum tuberosum*, with 375 million tonnes in 2022 (up 16% since 2000), ranked fourth amongst world staple crops after wheat, rice and maise (corn) [3]. Harnessing the underutilised potato side streams from feed to food could bring abundant protein to our plates. In addition to the economic site, potato protein delivers a well-balanced amino acid composition. This work evaluated the suitability of incorporating potato protein isolate into hybrid emulsified cooked sausage concerning product quality.

II. MATERIALS AND METHODS

Emulsified cooked sausages were manufactured following standard industry recipes (Table 1) and procedures. A preliminary trial was carried out to ponder the amount of potato protein powder (0.1-10%) that this meat system could uptake without negatively disrupting product quality. Based on this pre-experiment, emulsified cooked sausages incorporated with 0 (control) and 1, 2 and 3% of potato protein powder were conducted in the main trial. The corresponding recipe was adjusted according to the amount of potato protein added to have an equivalent protein amount in the final product by reducing meat and increasing water proportions. Protein concentration was assumed to be 79% and 19% (w/w) for potato protein isolate (Protafy product specifications, KMC, Denmark) and pork meat (GEHA Standards, PIII category), respectively. The result was a substitution of 4.2, 8.3 and 12.5% of meat with 1, 2 and 3 % of potato protein isolate. Colour (L, a and b), texture and sensory properties were evaluated. The sensory evaluation was done using a 9-point hedonic scale (from 0 ‘not good’ to 9 ‘very good’) for the attributes: appearance, texture, taste, odour and overall impression [4]. Panellists were a group of regular-meat-product-eating consumers (n=18) assessing meat products usually (i.e. 10-20 times per year).

Table 1 – Recipe of emulsified cooked sausage and percentage of meat substituted.

		Potato protein isolate		
	Control (0%)	1%	2%	3%
Pork meat (%)	53.6	49.4	45.3	41.1
Pork fat (%)	24.0	24.0	24.0	24.0
Ice (%)	20.0	23.2	26.3	29.5
Potato protein isolate (%)	0.0	1.0	2.0	3.0
Curing salt (0.5 % nitrite) (%)	1.8	1.8	1.8	1.8
Phosphate (%)	0.2	0.2	0.2	0.2
Ascorbate (%)	0.0	0.0	0.0	0.0
Spices (%)	0.4	0.4	0.4	0.4
Meat substitution (%)	0.0	4.2	8.3	12.5

III. RESULTS AND DISCUSSION

The colour of the hybrid sausages was less red and more greenish compared to a conventional meat-based cooked sausage and was therefore rated worse. The calculations of the total colour difference ΔE*ab showed that all colour differences of the individual batches were above 2.0 and were, hence, clearly perceptible visually.

Table 2. Colour analysis of the sausages from the main test (1-3 % potato protein) (n = 4) (mean ± standard error)

	Control	1 %	2 %	3 %
L*-value	72.6 ± 0.3 a	73.3 ± 0.2 b	72.9 ± 0.2 b	73.1 ± 0.2 b
a*-value	12.3 ± 0.1 a	10.8 ± 0.1 b	10.1 ± 0.1 b	8.9 ± 0.1 c
b*-value	10.4 ± 0.1 a	11.5 ± 0.1 b	13.3 ± 0.1 c	13.3 ± 0.1 c
ΔE*ab	-	2.0 ± 0.1	2.5 ± 0.1	4.5 ± 0.1

Different letters indicate significant differences ($p < 0.05$) between the batches and within a measured variable.

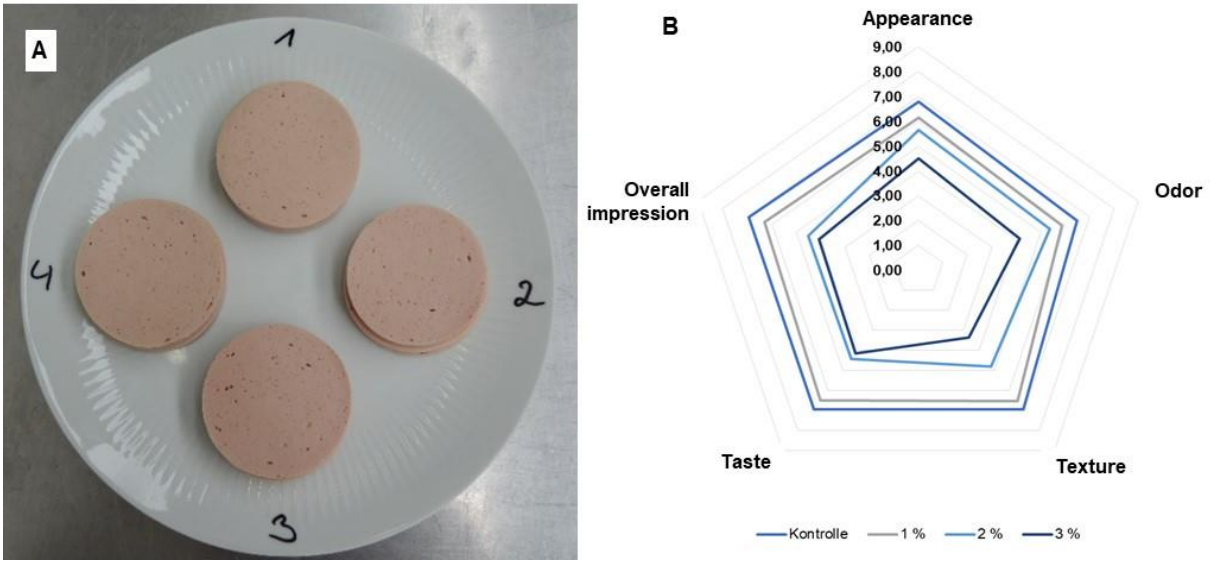


Figure 1. A: Appearance and presentation of the potato-protein-containing hybrid emulsified cooked sausages (1: 3 % potato protein; 2: 1 %; 3: control; 4: 2 %); B: Results of the sensory evaluation of the potato-protein-containing hybrid emulsified cooked sausages (control; 1 - 3 % potato protein) using a 9-point scale (in ascending order from 0 'not good' to 9 'very good', the categories appearance, texture, taste, odor and overall impression were evaluated (n = 18).

Analyses of the texture, both instrumentally and by tasting, showed that the sausages became softer and easier to chew with increasing potato protein content, which did not correspond to consumer expectations of a cooked sausage. The taste and the overall impression were also less convincing than a conventional cooked sausage (Fig 1B).

IV. CONCLUSION

Further improvements are needed to optimise the acceptance of hybrid meat products containing a significant amount of potato protein isolate (> 1%), particularly in the desirable taste- and texture-conferring properties of potato-derived proteins as food ingredients.

ACKNOWLEDGEMENTS

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