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Inulin-induced fat reduction in lyoner sausages

R. Hadorn , P. Piccinali, D. Guggisberg, M. Suter

Agroscope Liebefeld-Posieux Research Station ALP, Bern, Switzerland (ruedi.hadorn@alp.admin.ch)

1. Introduction

- Malnutrition and lack of exercise in Western societies ↑
  → overweight and obesity are already a severe problem
- Meat / meat products contribute ~ 20% to fat consumption
- Fat content is often overestimated in nutrient databases
  (→ animal breeding, changes in cuts, preparation and recipes)
- Inulin (a water-soluble fructane) may act as fat replacer by keeping flavour and texture → additional effects: prebiotic effect, no influence on blood sugar, also flatulance possible

Can boiled sausages be produced by reducing their fat content with inulin without any adverse effects on flavour and texture?
→ of interest: sensory characteristics, nutritive value, physico-chemical features and economic aspects

2. Material & Methods

- Production of different plain lyoners (→ fat reduction by 40%)
  (0.5 kg per lyoner, 50 mm diameter, A = control)

	A	B	C	D	E
Veal V-II [%]	15.0	15.0	15.0	15.0	19.0
Pork P-III [%]	31.0	31.0	31.0	31.0	40.0
Neck fat P-V [%]	12.0	7.0	7.0	7.0	-
Shoulder fat P-VI [%]	10.0	-	-	-	-
Calf-head rind [%]	10.0	10.0	10.0	10.0	13.0
Ice water [%]	22.0	22.0	29.5	31.5	28.0
Inulin gel, supplier 1[1] [%]	-	15.0	-	-	-
Inulin powder, supplier 2 [%]	-	-	7.5	-	-
Inulin powder, supplier 3 [%]	-	-	-	4.5	-
Wheat fibre, supplier 3 [%]	-	-	-	1.0	-
Other ingredients [pro kg]	Nitrite curing salt: 19 g; phosphate: 3 g; ascorbic acid / sodium ascorbate: 0.5 g; spices: 5 g				

[1] *The inulin gel was roughen up by a cutter using 7.5% inulin powder and 7.5% water*

- Chemical analyses: main nutrients
- Physico-chemical analyses: fracturability, pH, jelly percentage, colour (CIE L*a*b*)
- Sensory tests: - hedonic (n = 147)
  - trained panel (n = 8)
- Economic aspects

Lyoner production

3. Results

Tab. 1: Main nutrient content in lyoners *(g/kg fresh matter)*

	A	B	C	D	E
Dry matter	371	339	322	339	276
Crude ash	32	31	31	31	34
Crude fat	190	93	108	102	92
Crude protein	131	118	116	116	140
Sugar	3	36	6	28	3
Crude fibre	0	0	0	3	0
Soluble dietary fibre[1]	15	61	61	59	7

[1] *Calculated by difference*

Tab. 2: Physico-chemical and technological parameters

	A	B	C	D	E	Sign.
pH	5.98	5.95	6.02	6.01	6.03	-
Fracturability [N]	13.0^{a}	9.7^{b}	9.0^{b}	9.0^{b}	10.7^{ab}	*
WB total work [mJ]	597^{a}	449^{c}	440^{c}	489^{bc}	551^{ab}	*
Jelly percentage [%]	0.08	0.11	0.14	0.16	0.06	-
L* (lightness)	74.8^{ab}	73.3^{b}	74.4^{ab}	74.9^{a}	73.7^{b}	*
a* (redness)	7.0^{a}	7.2^{a}	6.1^{b}	6.6^{ab}	7.1^{a}	*
b* (yellowness)	10.9	11.3	11.2	11.0	10.8	n.s.

** = p ≤ 0.05 (n = 3); n.s. = not significant; - = no statistical analysis; significant differences are denoted by different letters (P ≤ 0.05)*

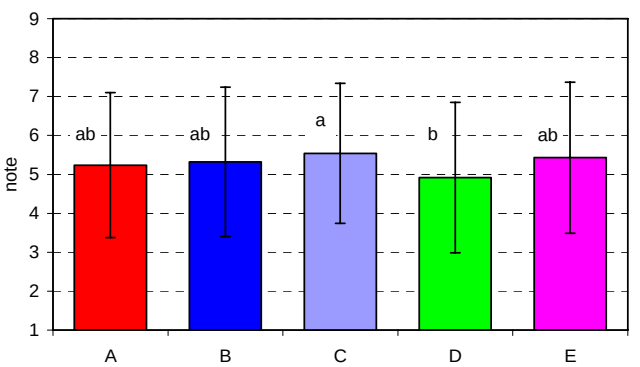

Fig. 1: Hedonic evaluation of lyoners (n = 147)
(1 = dislike extremely, 5 = neither like or dislike, 9 = like extremely significant differences are denoted by different letters (P ≤ 0.05)

Sensory panel:
- Significant differences in aroma (fatty note) and/or texture (firm, crunchy, juicy and sandy notes) characteristics
- Control lyoners: salty, fatty and slight soapy notes and a firm and slight sandy texture
- D-Lyoners: less rose, fattier note, juicier and less firm

Production costs:
- increased by 1.4 to 2.6% for the three inulin-treatments (B, C, D)
- increased by 4.8% for the E-lyoners

Presentation of the different lyoners during the hedonic test

4. Conclusions

Fat reduction in lyoners by 40% was followed by:
- No adverse effects in hedonic evaluation
- Softer texture (instrumental, panel), differences in fatty notes
- Slightly increased production costs by max. 5%