Foods 2025 Conference

The 6th International Electronic Conference on Foods

28–30 October 2025 | Online

MDPI

Impact of Sodium and Starch Reduction on the Mineral Profile and Bioaccessibility of *Mortadella* Enriched with *Agaricus bisporus* and *Pleurotus ostreatus* By-Products

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Introduction

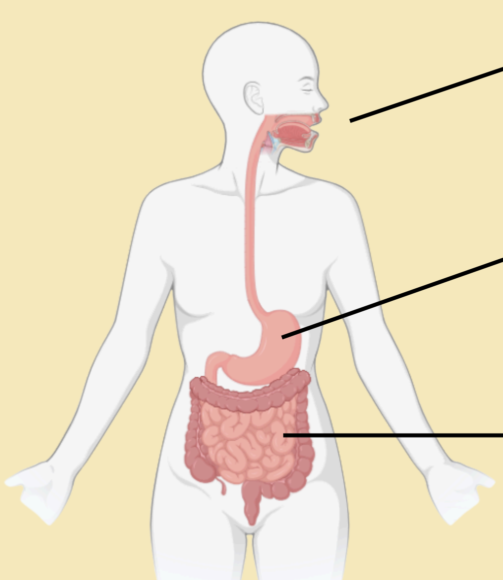
Stems of *Agaricus bisporus* (AB) and *Pleurotus ostreatus* (PO) represent around **20% of total mushroom production yield**. Stems have a high content of **umami compounds**. Considering the public health concerns associated with **excessive sodium intake** and the **technological challenges** of salt reduction in meat systems, these by-products have gained attention as **natural flavor enhancers**. This study investigates the application of edible flours obtained by dehydrating the stems of *Agaricus bisporus* (ABSF) and *Pleurotus ostreatus* (POSF) as partial replacements for sodium and potato starch in **mortadella reformulation.**

Methodology

5 prototypes

- Control: Traditional recipe*
- 50% sodium (salt and sodium trypolyphosphate) and potato starch substitution by the addition of 2.75% of ABSF or POSF
- 50 % sodium (salt and sodium trypolyphosphate) substitution and 100% replacement of potato starch by the addition of 4.25% of ABSF or POSF

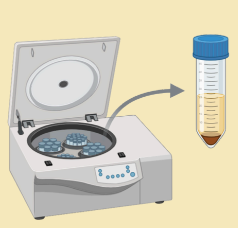
*Traditional recipe: 65% lean meat, 25% pork dewlap, 10% pork backfat, 2.5% salt, 12.5% ice, 3% potato starch, 0.1% pepper, 0.05% nutmeg, 0.2 garlic powder, 0.05% sodium ascorbate, 0.03% sodium trypolyphosphate, 0.015% sodium nitrite

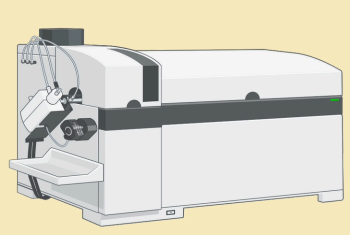


Mortadella with SSF (1:1 wt/wt), CaCl2 (1.5 mM), 2 min, 37 °C

Oral bolus with SGF (1:1 v/v), CaCl2 (0.15 mM), pepsin, 2h, 37 °C, pH 3

Gastric chyme with SIF (1:1 v/v), 10 mM biles salts, CaCl2 (0.6 mM), pancreatin, 2h, 37 °C, pH 7





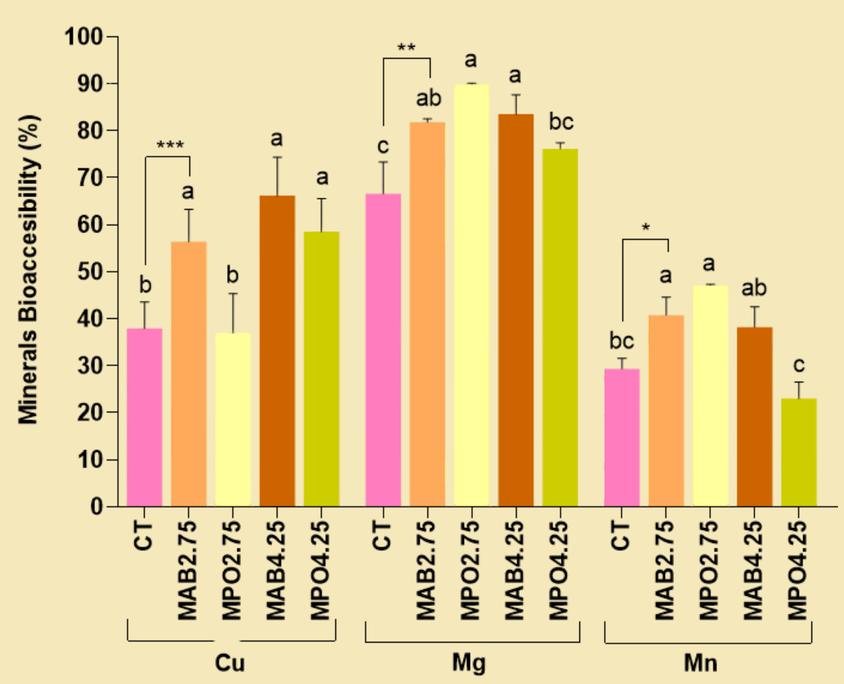
Mineral analysis was conducted on *mortadella* before digestion and in the intestinal phase samples using ICP-MS

Results

Table 1. The minerals profile of reformulated mortadella by the addition of *Agaricus bisporus* stem flour (ABSF) and *Pleurotus ostreatus* stem flour (POSF).

Mineral	Control	MAB2.75	MPO2.75	MAB4.25	MPO4.25
Calcium	13.22c ±0.77	19.61b ±0.89	7.14d ±0.10	**37.71a ±0.89**	8.98d ±0.25
Cupper	31.57d ±0.73	70.79b ±3.08	50.07c ±2.74	90.46a ±2.47	57.88c ±0.01
Magnesium	22.32a ±0.47	23.22a ±0.84	21.19a ±0.24	22.81a ±0.31	22.32a ±0.26
Manganese	40.01d ±2.01	54.09b ±1.11	47.40c ±1.30	64.93a ±1.01	50.93bc ±0.24
Sodium	884.97a ±3.05	444.03b ±0.22	421.39b ±0.32	427.39b ±3.26	438.16b ±0.11
Zinc	1.52a ±0.04	1.24b ±0.06	1.13b ±0.01	1.47a ±0.06	1.05b ±0.04

Figure 1. Bioaccessibility of minerals of the reformulated mortadella by the addition of *Agaricus bisporus* stem flour (ABSF) and *Pleurotus ostreatus* stem flour (POSF).



Ca and Zn bioaccessibility remained below quantification limits in all samples.

Conclusion

These results highlight the promising role of **mushroom stem flours** as **sustainable ingredients** for the **reformulation** of **processed meat products**. Their incorporation into mortadella for **sodium reduction** not only lowered its concentration but also **enhanced** the **bioaccessibility** of other essential **minerals.**

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Acknowledgements: The present work was supported by the Grants for Industrial Doctorates from the Autonomous Community of La Rioja, Spain.