

1.CONTEXT OF THE STUDY

Lörtsy is a half-moon-shaped meat pie with a wheat dough crust, originating from Savonlinna, a town in Eastern Finland. Its conventional recipe, made with refined wheat flour, rice, and ground beef and prepared by deep-frying, is associated with nutritional and environmental challenges.

The nutritional challenges include low fiber intake and high intakes of salt and saturated fat, which are among the main concerns in the Finnish diet.

The environmental challenges arise from both ground beef and rice being associated with a relatively high nature footprint. A nature footprint measures how much damage a product, company, municipality, or consumer causes to biodiversity.

This study examines how selected raw materials affect biodiversity, while also evaluating the health effects of the innovation in relation to Finnish dietary recommendations. The objective was to reformulate a traditional recipe to improve its nutritional profile and reduce its environmental impact.

2. SCIENTIFIC METHODOLOGY

Dough modification: Partial replacement of refined wheat flour with whole-grain wheat flour (10% and 30%).

Filling modification: Replacement of the beef-and-rice filling with a plant-based oat-and-soy-protein filling.

Processing modification: Deep-frying was replaced with baking followed by steaming to retain the traditional texture.

Analytical Methods

- Nutritional comparisons were based on the Fineli food composition database.
- Biodiversity impact was assessed using nature footprint (PDN.year) calculations.
- An informal sensory evaluation was conducted by the study team.
- Cultural impact was assessed through an anonymous survey of Savonlinna residents (n = 30).

3.INNOVATIONS LEVERS

Ingredient Innovation

- Partial replacement of refined wheat flour with whole-grain wheat flour to increase fiber content.
- Substitution of beef and rice with plant-based ingredients to reduce saturated fat intake and biodiversity footprint.

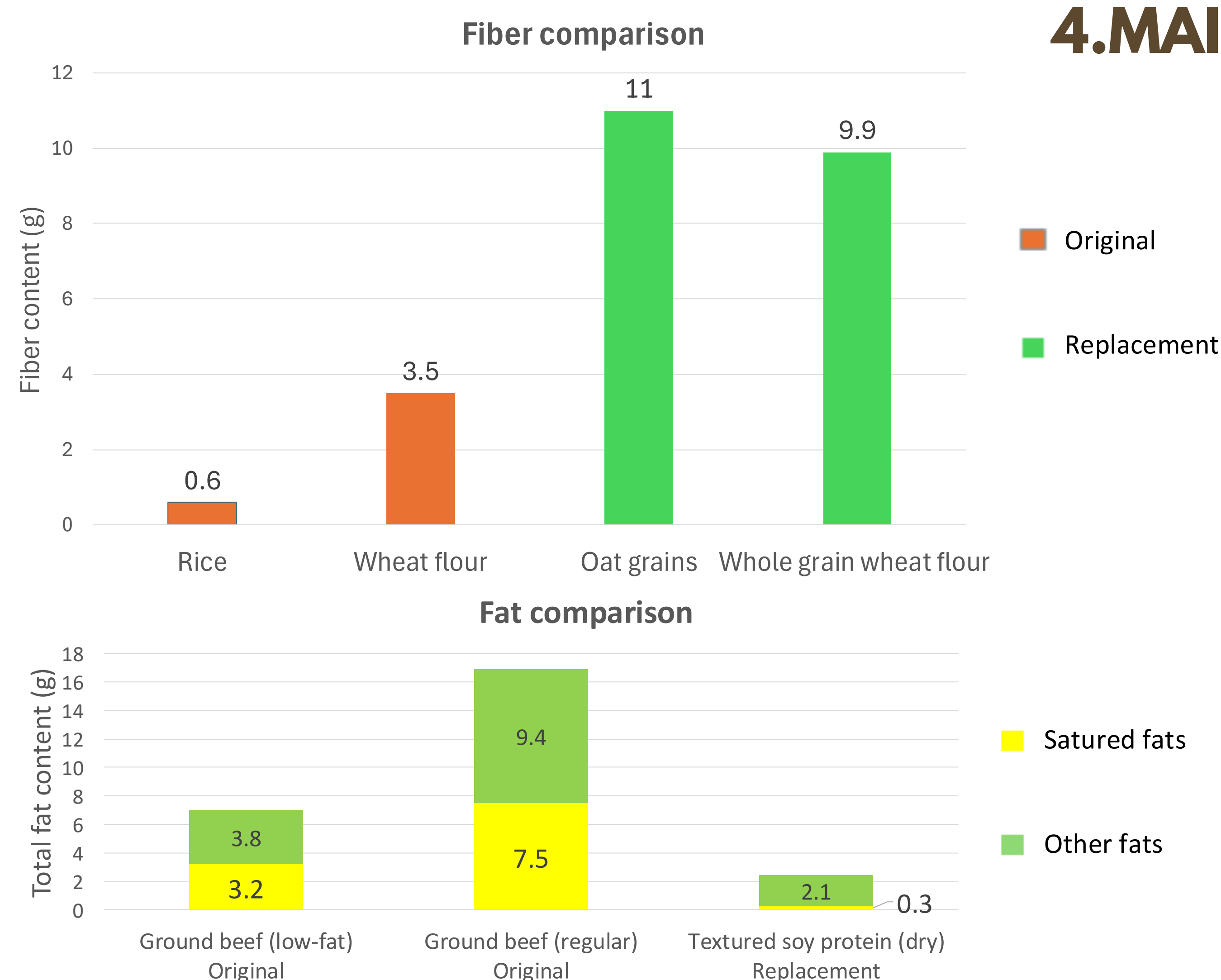
Process Innovation

- Replacement of deep-frying with baking and steaming to lower fat content while maintaining the characteristic soft texture of *lörtsy*.

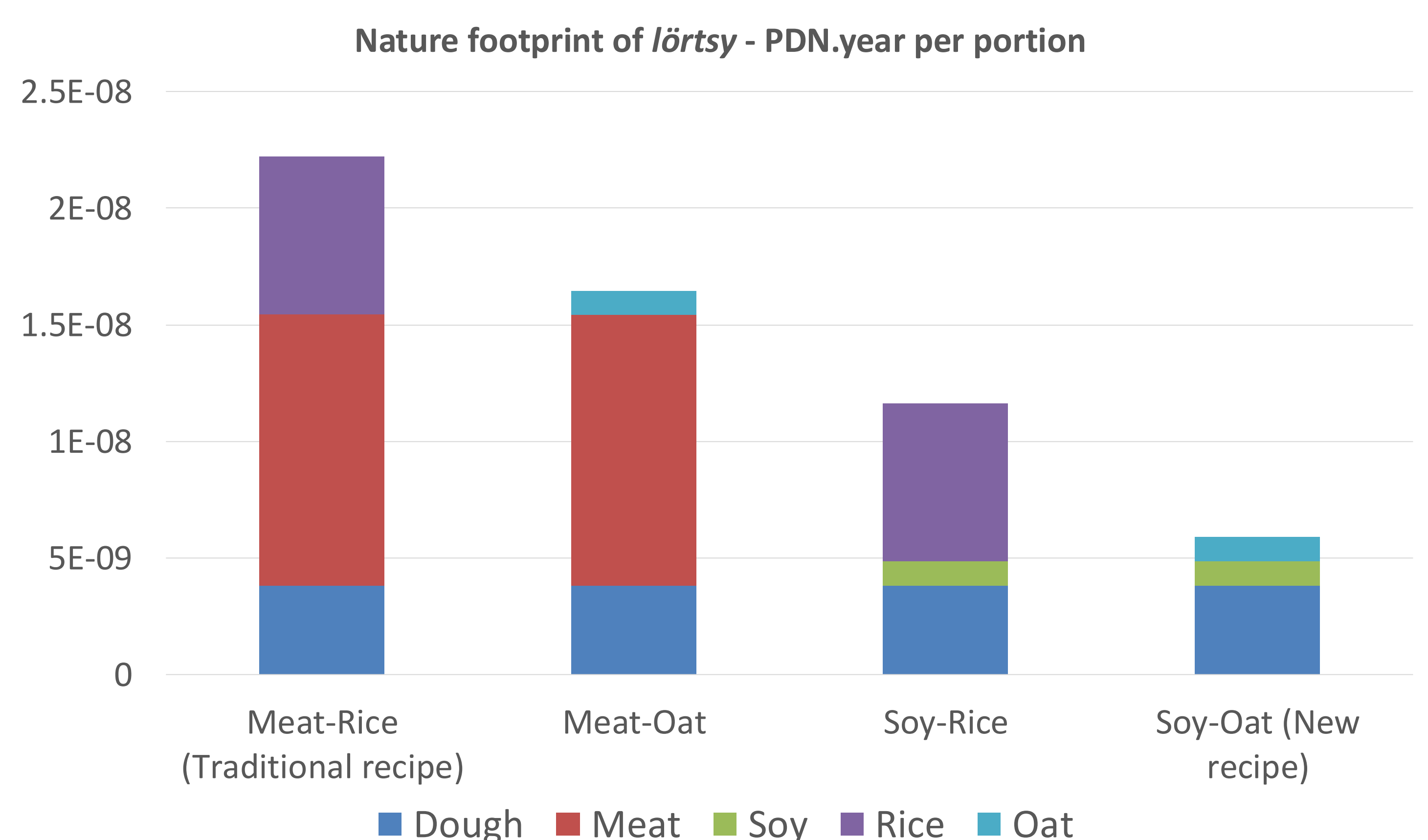
Nutritional Levers

- Increased dietary fiber content compared with the traditional recipe.
- Reduced saturated fat content through the elimination of the beef-based filling.

4.MAIN RESULTS



- Fiber content increased by up to 94% when oat was used instead of rice, and by 64% when whole-grain wheat flour was used instead of refined wheat flour.
- Saturated fat content was reduced by 96%.



- The nature footprint decreased by 73% compared with the traditional deep-fried beef-and-rice version.
- PDN.year expresses the potential long-term contribution to global species loss associated with producing one kilogram of a product.

5.CONCLUSIONS & PERSPECTIVES

Lörtsy embodies local food culture and illustrates how small-scale regional foods enrich cultural and culinary diversity. This study shows that a traditional recipe can be reformulated to improve nutritional quality and significantly reduce its biodiversity footprint while maintaining cultural relevance.

These findings suggest that small, evidence-based modifications to traditional recipes can support healthier diets and biodiversity conservation. Further development of the new *lörtsy* recipe should include a consumer sensory study to assess public acceptance of the new product version. In addition, a sensory profile of *lörtsy* could be developed through a trained sensory panel study.