QUALITY PARAMETERS OF BEEF PATTIES SUBSTITUTED WITH OYSTER MUSHROOM

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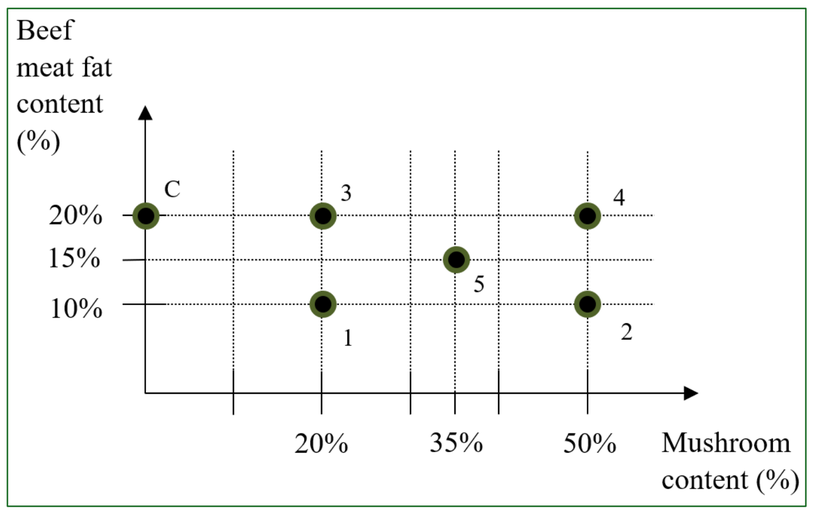
INTRODUCTION

Due to changing consumer lifestyles, the consumption of ground beef-based products like meatballs and burgers has increased over the past two decades. However, regular intake of meat and fat can be connected to various health risks, including obesity, cardiovascular diseases, and diabetes. This has driven demand for healthier alternatives. Oyster mushrooms (*Pleurotus ostreatus*), low in fat, calories, and cholesterol, offer a promising substitute due to their umami flavor and meat-like texture. Their inclusion lowers fat and calorie content while adding protein, fiber, vitamins, and minerals. This study explores the development of a reduced-meat, reduced-fat burger patty by incorporating oyster mushrooms. This approach supports both improved health outcomes and more sustainable food production.

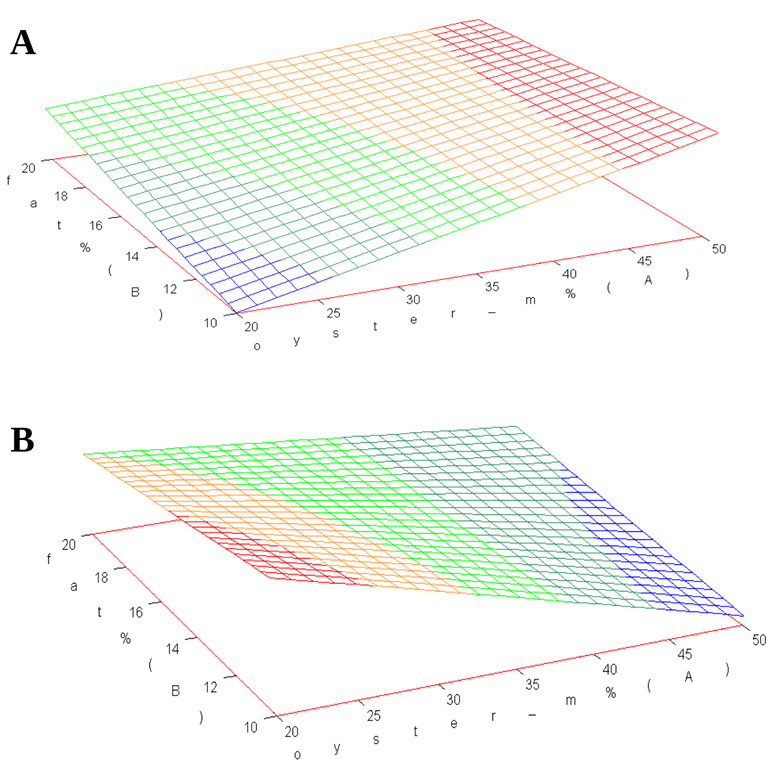
MATERIALS AND METHODS

- 2^n-experimental design: beef meat fat content (%) and mushroom content (%) as the two factors.
- Materials: oyster mushroom, 20% fat beef, lean beef.
- 20% fat content beef patty for control sample.
- Robot Coupe R502 cutter (20×1s pulses) for mixing.
- 100 g patties each, formulated with a metal ring.
- Cooking with LAINOX VE051P oven at 180 °C for 20 minutes, without flipping.
- Sprinkled 0,15 g salt on the patties to advance sensory testing.
- Measured cooking loss with digital scale of two decimal place accuracy.
- Measured CIELAB* color parameters with Chroma Meter CR-400.
- Measured texture with TA.XT plus Texture Analyzer, 5 mm cylindrical probe.
- Sensory evaluation with a Hedonic scale was used for smell (0 bad - 10 good), taste (0 bad - 10 good) and overall liking (0 don't like it – 10 really like it). For color (0 greyish – 10 brownish), texture (0 crumbly – 10 firm) and juiciness (0 dry – 10 juicy) the end of the scale represented two opposite extremes of each sensory attribute.



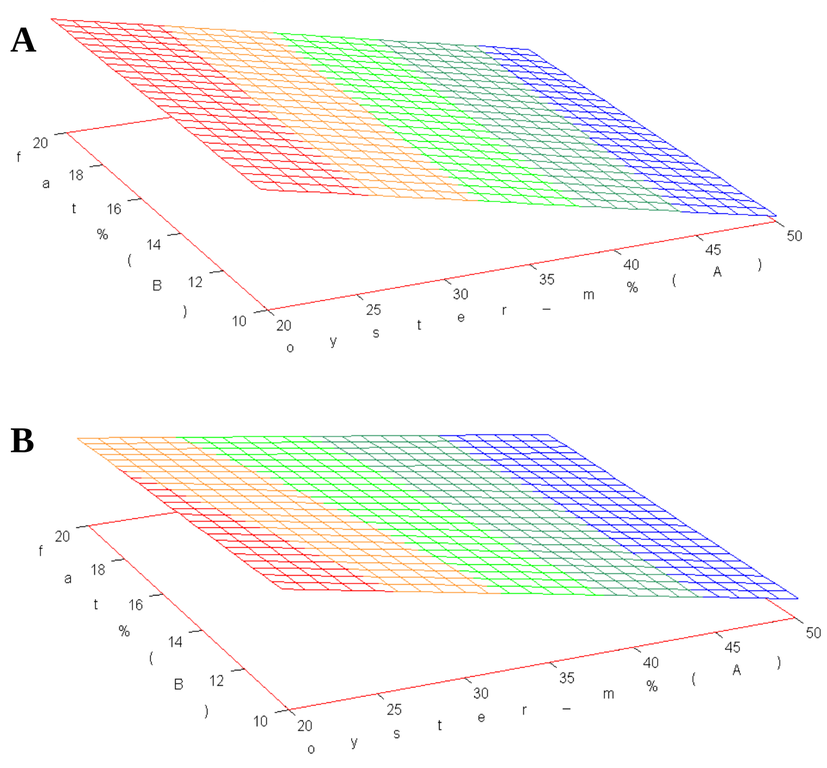
2^n-experimental design visualization

MEASURED COOKING LOSS (A) AND SENSORY EVALUATION OF JUICINESS (B)



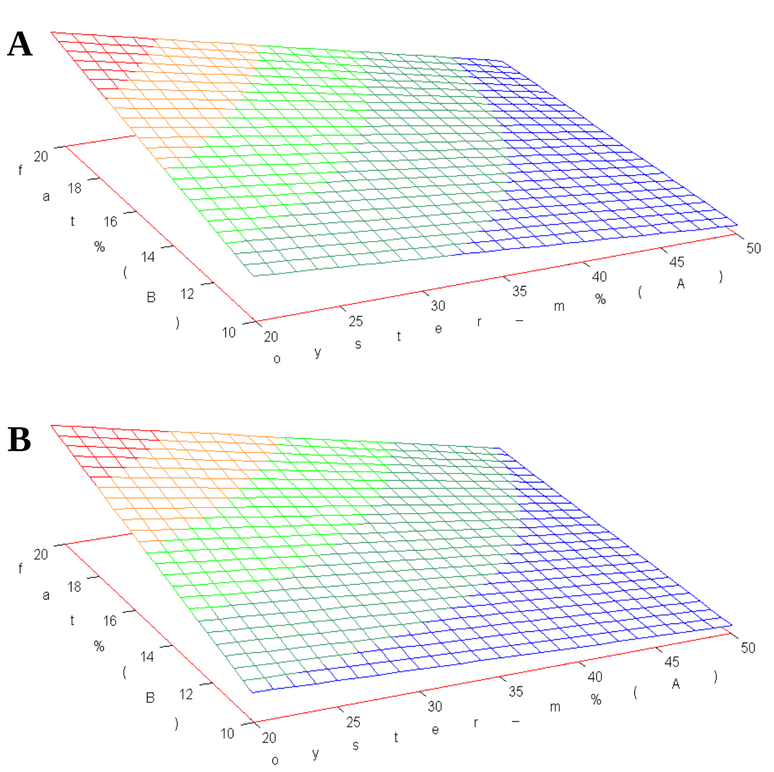
Other than reducing cooking loss, the incorporation of mushrooms had a noticeable effect on the juiciness of the patties. Sensory evaluation results clearly indicated that the juiciness increased as the mushroom content was raised, at 50% mushroom content the higher fat ratio did not make a difference. The improvement in juiciness can be explained by the basically high moisture content of mushrooms, as well as the ability of mushroom-derived fibers and proteins to retain water throughout the cooking process. These molecules trap moisture within the matrix of the patty, reducing the extent of cooking loss that typically occurs during heat treatment.

MEASURED HARDNESS (A) AND SENSORY EVALUATION OF TEXTURE (B)



The addition of mushroom to the patty formulation significantly alters its texture, making it crumblier. This effect is attributed to increased mushroom content, as no differences were observed between samples with the same mushroom but different fat percentages. Sensory evaluation confirmed that oyster mushroom affects texture and can be perceived by panelists. Samples with higher fat content were easier to differentiate. Mushrooms lack the binding capacity of meat proteins and introduce additional moisture and fiber. These factors disrupt the patty's structural matrix. As mushrooms do not form a strong gel-like network when cooked, higher levels lead to reduced cohesiveness.

SENSORY EVALUATION OF TASTE (A) AND SENSORY EVALUATION OF OVERALL LIKING (B)



Sensory evaluation showed that patties with higher fat content received more favorable taste ratings, while increased mushroom content tended to reduce flavor acceptability. This may be due to fat's ability to solubilize mushroom flavor compounds. However too high level of oyster mushrooms could result in an overpowering taste, even for those who typically enjoy them. Combining higher fat and mushroom levels improved sensory perception, suggesting that fat can balance mushroom intensity and enhance palatability. Overall liking closely followed taste scores, highlighting taste as a key factor in consumer acceptance.

CONCLUSION

The partial substitution of meat with oyster mushroom influenced key quality attributes of beef patties, particularly at the 50% replacement level. These samples demonstrated reduced cooking loss and textural hardness, alongside improved juiciness and taste. The observed effects are attributed to the moisture-binding capacity and matrix-disrupting properties of mushroom-derived fibers and enzymes. Sensory data aligned with instrumental measurements, indicating perceptible changes without compromising product acceptability. Notably, the limited number of statistically significant differences compared to the control sample confirms that meat substitution was successful, supporting the use of oyster mushrooms as a viable functional ingredient in further meat analog development.