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RESEARCH ON THE CONSUMPTION OF MEAT PRODUCTS WITH PLANT-BASED PROTEIN ADDITIVES

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Abstract: Today, consumers are increasingly initiating meat-free days as alternatives to their menu, reducing consumption for reasons of health, the environment, and animal welfare. The study aims to identify hybrid meat products that have been launched on the international market, determine the effects that protein additives have on the final product, and analyze consumers' attitudes towards these products. Hybrid meat products are meat products that contain varying amounts of plant-based additives (such as legumes, cereals, fruits, and vegetables in different proportions) that are not added as extensions, but for their positive connotation. The products analyzed include sausages, burgers, meatballs, and minced meat from different companies.

• Introduction

Plant-based protein additives are becoming increasingly common in the chemical composition of meat products. These additives have superior nutritional benefits, providing a unique taste and texture.The development of hybrid products such as sausages, meatballs, burgers, and minced meat presents both challenges and opportunities due to the effects that the plant portion has on the technological and sensory properties (texture, appearance, taste, etc.) of the meat matrices. Experiments have shown that these products with plant additives are highly sought after by consumers because they contain a high level of protein. (Lang, 2020) However, there are barriers, such as favorable perceptions towards meat and meat-based societal structures, which make the complete transition from a conventional meat-based diet to vegetarianism or veganism difficult. Nevertheless, adopting a semi-vegetarian diet, consisting mainly of plant-based foods and allowing small amounts of meat, is less restrictive and provides positive benefits. In this context, hybrid meat products have been introduced to the market. There is no official definition for hybrid meat products, but they have been referred to as meat products containing varying amounts of vegetable-based ingredients (such as legumes, cereals, fruits, and vegetables in different proportions, ranging from approximately 25% to approximately 50%), which are not added as extenders but for their positive connotation. (Bakhsh et al., 2021)

• Material and method

The study material used consists of meat products such as sausages, meatballs, burgers, and minced meat with vegetable protein additives from peas, soy, pumpkin seeds, sunflower seeds, potato protein, lentils, chickpeas, beans, hemp seed flour, and wheat flour. These products come from the international market.

The purpose of the study was to create new products for consumers, identify the effects of protein additives on the final product, and analyze consumers' attitudes and future perspectives towards hybrid meat products.This study lasted for three years.

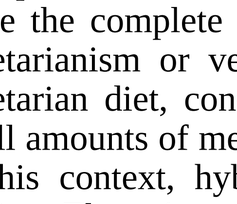

Figure 1. The brand Danish Crown conducted the study in Denmark

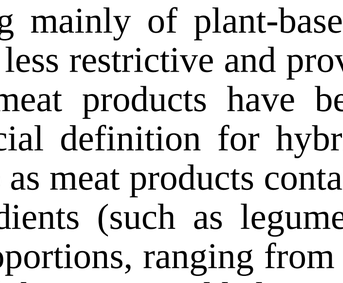

Figure 3. The brand Well Carved conducted the study in USA

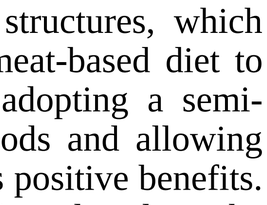

Figure 2. The brand Rebel Meat conducted the study in Austria

• Results and discussions

The purpose of the study was to create new products for consumers, identify the effects of protein additives on the final product, and analyze consumers' attitudes and future perspectives towards hybrid meat products. Products with protein additives have a higher content of essential linoleic and linolenic acids. They increase dietary fiber, have higher cooking yield, and smaller reductions in diameter. They also have accelerated, consistent, and elastic drying. The texture is softer with lower elasticity. Improved cooking qualities include being softer, less cohesive, less elastic, and more chewy compared to pork meatballs with lentil, chickpea, or bean additives. (Table 1)

Table 1.
Studies on ther amount of protein added to the finished products

Brand	Product name	Meat	Ingredients	The amount of added plant-based protein (%)
Rebel Meat	sausages	pork	pumpkin seed protein	12,5-50%
Rebel Meat	sausages	chicken	hemp seed flour wheat flour	**15-40%**
Rebel Meat	meatballs	chicken	Pea protein	**50%**
Well Carved	meatballs	pork	pea protein, sunflower seed protein and pumpkin seed protein	30%
Well Carved	burgers	chicken	chickpeas, lentils	**15,5-45%**
Danish Crown	burgers	pork	lentils, chickpeas, peas, beans	10-35%
Rebel Meat	burgers	chicken	yello peas, lentils, chickpeas	**25-50%**
Rebel Meat	ground meat	pork	lentils, chickpeas	10-44%
Rebel Meat	ground meat	pork	potato protein	10-20%

Upon analysis, it was found that Rebel Meat company uses a higher quantity of pumpkin seed proteins for their pork sausages, which is preferred by consumers.
Well Carved meatballs have a 30% content of plant-based proteins, while Rebel Meat has added 50% soy protein, thus improving the product.
In the case of burgers, the company that recorded a higher quantity of protein additives was Rebel Meat.

Figure 4. Summary of consumer studies on hybrid meat products conducted between 2020-2022

Study title	Geographic region	Method	Subjects (100%)	Reference
"Consumer acceptance of herbal ingredient blending"	SUA	Survey online	99	*Lang (2020)*
"How to create hybrid meat producrs"	DANEMARCA	Survey online	48	*Barone și colab. (2021)*
"Factors that influence the intention to purchase products with vegetable additives"	AUSTRIA	Survey clasic	60	*Sogari și colab. (2022)*

According to studies conducted by Lang (2020), Barone (2021), and Sogari (2022), the consumers who responded positively to the survey were from the USA. These consumers mentioned in Lang's study that these products are a convenient and easy alternative for human nutrition.

Conclusion

These protein additives have modified the viscosity of the preparations. The protein additives have increased cooking yield. Water loss capacity has decreased, while firmness has slightly increased. By adding these vegetable proteins from soy, lentils, chickpeas, sunflower seeds, pumpkin seeds, and wheat, the texture can be improved and it helps increase the digestibility of the products.
Because these flours used have an antioxidant effect and a high fiber content, they have the effect of prolonging the shelf life of the products and increasing their nutritional value.
Additionally, burger products, sausages, meatballs, and minced meat are healthier and more tender with the help of these additives.

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