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Effect of Texturised Soy Protein and Yeast on the Instrumental and Sensory Quality of Hybrid Beef Meatballs

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Abstract : Hybrid meat analogues are meat products whereby a proportion of meat has been partially replaced by more sustainable protein sources. These products could bridge the gap between meat and meat-free products, providing convenience, and allowing consumers to continue using meat products as they conventionally would, while lowering their overall meat intake. The study aimed to investigate the effect of introducing texturized soy protein (TSP) at different levels (15% and 30%) with and without nutritional yeast as flavour enhancer on the sensory and instrumental quality of beef meatballs, compared to a soy and yeast-free control. Proximate analysis, yield, colour, instrumental texture, and sensory quality were investigated. The addition of soy and yeast did not have significant effects on the overall protein content, but the total fat and moisture content went down with increasing soy substitution. Samples with 30% TSP had significantly higher yield than the other recipes. In terms of colour, a* redness values tended to go down and b* yellowness values tended to go up with increasing soy addition. The addition of increasing levels of soy and yeast modified the structure of meatballs resulting in a progressive decrease in hardness and chewiness compared to control. Sixty participants assessed the samples using Check-all-that-apply (CATA) questions and hedonic scales. The texture of all TSP-containing samples received significantly higher acceptability scores than control, while 15% TSP with yeast received significantly higher flavour and overall acceptability scores than control. Control samples were significantly more often associated than the other recipes to the term 'hard' and the least associated to 'soft' and 'crumbly and easy to cut'. All recipes were similarly associated to the terms 'weak meaty', 'strong meaty', 'characteristic' and 'unusual'. Correspondence analysis separated the meatballs in three distinct groups: 1) control; 2) 30%TSP with yeast; and 3) 15%TSP, 15%TSP with yeast and 30%TSP located together on the sensory map, showing similarity. Adding 15-30% TSP with or without yeast inclusion could be beneficial for the development of future meat hybrids with acceptable sensory quality. These results can provide encouragement for the use of the hybrid concept by the meat industry to promote the partial substitution of meat in flexitarians' diets.

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