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Effect of partial replacement of meat by carrot on physicochemical composition of turkey fresh sausages (#273)

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Introduction

Meat consumers are becoming increasingly aware of the relationship between health and nutrition. This trend is leading to increase interest in foods that are not only nutritious but that also confer additional benefits for the consumer health. In this regard, the conversion of vegetables into ingredients, for their later incorporation in meat product formulations, could be a strategy to improve quality and image of processed meat. Carrot (*Daucus carota* L.) is a vegetable appreciated by its orange root. It is part of a group of foods used for their nutritional value, health benefits and technological properties (Sharma et al., 2012). Therefore, carrot can be used to develop healthier meat products (Alvarado- Ramírez et al., 2018). The aim of the present study was to evaluate the effect of partial replacement of meat by carrot on the physicochemical composition of turkey fresh sausages.

Methods

The fresh turkey meat, ingredients and additives used to obtain the different types of sausages were provided by Frigolouro - Grupo Coren (Pontevedra, Spain). The study considered 36 fresh turkey sausages divided in three batches: control (100% of turkey meat), carrot 10 (10% carrot, 90% turkey meat), and carrot 30 (30% carrot, 70% turkey meat). In the sausages preparation, the raw material was weighed separately, as well as the other ingredients and water, and meat was ground (6 mm plate). The ingredients were dissolved in water, manually mixed with meat for 5 min, then kept refrigerated (4 °C) until a mass formation. The mass was stuffed into artificial collagen casings prior hydration with cold water. The pH, L*a*b* color, and proximate composition were measured according to Carvalho et al. (2019). Data were analyzed by a one-way ANOVA with the IBM SPSS Statistics 21.0 (IBM Corporation, Somers, NY, USA) and LSM were separated using Duncan's t-test ($P<0.05$).

Results

The effect of partial replacement of meat by carrot on physicochemical traits of fresh turkey sausages is shown in Table 1. The incorporation of carrot had a significant effect ($P<0.001$) on pH values, which decreased from values of 6.1 of the control samples to values below 6.0 found in sausages with carrot. This result agrees with those by Yadav et al. (2018), where the incorporation of vegetables in meat products decreased the pH values. This decline could be related to acid pH of the carrot (FDA, 2007). The L*a*b* color value of fresh sausages was affected ($P<0.01$) by the addition of carrots. The L* and a* values increased with the carrot inclusion. The highest L* value was obtained with carrot 10, whereas the highest a* value with the carrot 30. The carrot inclusion gradually raised the b* values from 14.9 (control) to 41.0 (carrot 30). Except for moisture, carrot inclusion had a significant effect ($P<0.001$) on proximate composition. As expected, control sausages showed the highest fat content (7.5%), that decreased with the increase of the carrot inclusion. This result is in agreement with that found by Carvalho et al. (2019) where the addition of carrot, pea and spinach reduced the fat content of meat products. The explanation relates to the low-fat content of the added vegetables and the reduction of the added meat/fat. Like the results found in other studies (Yadav et al., 2018), protein contents decreased with the incorporation of carrot in turkey fresh sausages.

Conclusion

Meat and fat can be partially substituted by carrots in the production of turkey fresh sausages to obtain healthier meat products. The incorporation of carrot in fresh sausages modified their color parameters.

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Table 1. Physicochemical parameters and proximate composition of turkey fresh sausages.

	Batches			SEM	Sig.
	Control	Carrot 10	Carrot 30		
pH	6.09^{c}	5.95^{b}	5.90^{a}	0.01	***
Color parameters					
L*	57.97^{a}	65.38^{c}	60.97^{b}	0.62	***
a*	14.44^{b}	12.25^{a}	20.43^{c}	0.65	***
b*	14.90^{a}	29.83^{b}	40.95^{c}	1.83	***
Proximate composition (g/100g)					
Moisture	68.18	68.40	68.57	0.13	ns
Fat	7.53^{c}	6.55^{b}	5.26^{a}	0.20	***
Protein	18.49^{a}	18.25^{a}	16.78^{b}	0.15	***

SEM: Standard error of the mean; Sig. Significance; ns: not significant; ***: P<0.001
$^{a-c}$Means in the same row with different letters differ significantly (P<0.05; test Duncan).

Table 1

Notes