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PAPRIKA INFLUENCE UPON COLOUR PROPERTIES OF DRY SAUSAGES

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INTRODUCTION

Capsicums are the most popular and widely cultivated of spices. Available in a wide range of varieties, sizes, shapes, colours, and pungency, they are used in many ways and in a variety of foods, characterizing the cuisines of the world. Besides being used for thousands of years in the land of their origin, Central and Northern South America, the capsicums have been widely accepted as food additives in all the countries where they have been introduced. The three types of capsicums that have been established and cultivated in the different regions of the world are: the paprika around the Mediterranean regions, the chilies that were established in the Asian and African continents and the sweet or weakly pungent, grown extensively in the U.S., China, and, on a smaller scale, in other parts of the world . Paprika is an equally big and well-known product in Spain and it is by definition "the product obtained by milling and grinding mature, dry, healthy and clean fruits of the Solanaceous plant, Capsicum annum and Capsicum longum deprived of their peduncles". The Spanish standards describe three types: sweet, semi-sweet and pungent (Govindarajan 1986, Salmeron 1973).

Capsicums are used for their property to provide red colour in food products. Paprika colour is due to different pigments: red pigments (capsanthin and capsorubin) and yellow pigments (betacarotene, kryptoxanthin and lutein) (Geister *et al.*, 1989; Reeves, 1987; Sarasibar *et al.*, 1989).

In Spain there are many products in which Paprika is a very important ingredient in their composition ("Chorizo", "Mallorquina", etc). Paprika provides products some specific colour characteristics. Therefore, the study of this parameter's evolution, in order to define the influence of this spice in the colour of dry sausages, is very interesting.

The aim of this work was to study the influence of Paprika in the evolution of colour parameters, during the process in raw fermented sausages with and without this spice.

MATERIALS AND METHODS

The products were prepared in a pilot meat plant according to the usual industrial practice. Each sausage contained lean pork meat (65%), pork back fat (28%) and a commercial mix of additives (salt, lactose, dextrose, phosphates, dehydrated garlic, white pepper, potassium sorbate, sodium glutamate, potassium nitrate, sodium ascorbate, sodium nitrite) Pilarica S.A. To half of this sample smoked and sweet paprika were added. Both, meat and fat were ground in a bowl chopper (Cato 114) and mixed thoroughly with the other ingredients in a kneading machine (Cato). The mixture was stored at 2°C for 12 hours and then stuffed into artificial casings having a diameter of 65mm. Each sample was divided in two zones (core and outer). The core had diameter of 25mm. The sausages were fermented for two days at 20-22°C and 90-95 %RH, and then ripened for 24 days at 12-14°C and 75-80 %RH. The products were collected at different times: 0, 0.5, 1, 1.5, 2, 5, 13, 20 and 26 days. The colour parameters were L*, a*, b* values (CIE, 1976 notations), C* (Chroma), h* (Hue) (McLaren 1980), Reflectance ratios R570/R650 (Red stability index or RSI) and R560/R500 (Nitrosation Index or NI) (Giddey 1966). All of these parameters were evaluated by a Minolta CM1000

R Spectrophotometer (10_, D65). The measurements were conducted as closely as possible in the absence of light.

RESULTS AND DISCUSSION

The fermentation phase and ripening phase were significantly different ($P<0.05$) in all respects, except in terms of a*. Moreover, the CIE L*, a* and b* parameters, C* and NI were influenced by paprika.

The use of paprika in dry sausages diminished L* relative to normal dry sausages. This is because it reduces the scattering effect (Palombo *et al.*, 1989). The increase that is observed in L* during the ripening phase is due to the myoglobin chemical transformations, as can be observed in Figure 1 (Beriain 1992; Palombo *et al.*, 1989; Smulders *et al.*, 1989).

The a* value remains constant during all the process. No differences were found between the zones under study, as can be observed in Figure 2. Dry sausages containing paprika showed an a* value that was higher than in normal dry sausages. This difference is due to the red pigments provided by the paprika (Geister *et al.*, 1989; Reeves, 1987; Sarasibar *et al.*, 1989).

The parameters b* and C* showed that in ripening they were stabilized. In Figures 3 and 4 it is shown that the b* and C* values in dry sausages are greater when paprika is used. The b* upper values in paprika dry sausages is due to the yellow pigments of paprika (Geister *et al.*, 1989; Reeves, 1987; Sarasibar *et al.*, 1989). Paprika dry sausage reaches a more intense colour as is reflected by C* (Smulders *et al.*, 1989).

Hue is not affected by the use of the paprika in dry sausages. In both dry sausages values near 30_ (red) (Instituto Nacional de Racionalización 1981) was reached. Higher values of h* were found in the core zone. Figure 5 shows h* evolution in dry sausages with and without paprika.

RSI was not influenced by paprika as shown in Figure 6. Its values are higher in the core, which is caused by dehydration (Gorospe *et al.*, 1989).

NI is affected by the presence of paprika, its value being higher when this spice is used. NI is a relation between FeII pigments and FeII pigments stabilized by nitrosation (Giddey 1966). The results can be observed in Figure 7. The high microorganism level in paprika competes with and holds up the action of the nitrifying bacteria (Sarasibar *et al.*, 1989; Govindarajan 1985).

Nitrousmyoglobin formation in dry sausages without paprika took place before the fermentation phase. When paprika is added nitrosation took place later, during the fermentation phase. In ripening this value is stabilized. Dry sausages without paprika showed low values of this index, these values being constant with time.

CONCLUSIONS

Opacity, colour intensity, b* and a* of the dry sausages increase with paprika addition. Hue isn't affected by the use of the paprika in dry sausages. The nitrification process is held up by paprika.

REFERENCES

References were not attached to the paper. Please consult the authors.