MALONALDEYDE CONCENTRATION IN MEATS AND IN SOME MEAT BY-PRODUCTS ACCORDING TO THE PROCESSING CONDITIONS

A.PIZZA, R.SPINELLI, R. PEDRIELLI

Stazione Sperimentale per l'Industria delle Conserve Alimentari, Viale Tanara 31/a, 43100 PARMA - ITALY

Keywords: TBA value, meat, meat products, processing

Background and objectives

Malonaldehyde is a potential cancerous substance. It is one of the main components coming from oxidation of linoleic, arachidonic and other fatty acids (1). Such an aldehyde reacts in solution with DNA by affecting its structure. This property along with its similarity with other clear cancerous compounds highlights its potential cancerousity. Even if it is a product associated to oxidation it is not always associated to rancidity; also raw meat have a significant content of it. Frying operation increase the TBA value as well as the microwaves cooking increase the value of 15% (2). In the present research the TBA values have been checked both on swine meat model systems de-frozen by air and by a radiofrequency oven and on two formulations for mortadella obtained from the already mentioned swine meat cuts.

Material and Methods

National and English shoulder meats, ham trimming, ham cuttings and swine coppa trimming, previously conditioned at -2°C, have been chopped, salt added at 1.5%, nitrite added at 150 ppm, packed under vacuum into polyethylene bags and heat treated till $F^{70}_{core} = 40$ min, that is the heat treatment sufficient for cooking meat products (3). The same cuts conditioned a -6°C by air and radiofrequencies has been then employed for two mortadella formulations: a first quality sample (F1) and one second quality sample (F2) (4). Malonaldehyde content has been obtained by steam distillation method (5).

Result and discussion

Tab. 1 and Tab. 2 show the TBA values for the air (A) de-frozen samples , the radiofrequency (RF) de-frozen samples, and for the two mortadella formulations that supported a very long cooking treatment. The values are generally low, cooking increased the TBA value only in mortadella formulations, the radiofrequency employment generally lowered it. These results confirm the meat high tolerance to oxidative spoiling but on the other hand emphasise the great importance of applying "mild technologies", as radiofrequency, for raw material treatment.

References

1) Karel M., Schaich K. and Roy R.B. (1975). J. Agric. Food Chem. 23: 159-163.

2) Newburg D.S. and Concon G.M. (1980). J. Food Sci. 45:1681.

3) Reichert J.E. (1985). Die Warmebehandlung von Fleischwaren, Hans Holzman Verlag, Bad Wörishafen.

4) Pizza A., Pedrielli R. e Franceschini M. (1985). Fleischwirtshaft, 1442.

5) Tarladgis B.G., Watts B.M. and Yonathan M.T. (1960). J.Am. Oil Chemists Soc., 37, 44.

Tab.1 - TBA values on model sistems based on thawed meats (n=6)

MEAT CONSTITUENTS	TBA value (ppm) A	TBA value (ppm) RF
National shoulder	0.173 ± 0.049	0.094 ± 0.005
Ham trimmings	0.249 ± 0.010	0.098 ± 0.003
Minced ham	0.203 ± 0.012	0.133 ± 0.029
Neck trimmings	0.285 ± 0.015	0.247 ± 0.014
English shoulder	0.495 ± 0.006	0.376 ± 0.079

A : air thawing RF : radiofrequency thawing

Tab. 2 - TBA values on model sistems based on thawed and cooked (70°C for 40 minutes) meats (n=6) and on typical italian mortadella formulations, F1 (n=6) and F2 (n=4).

MEAT CONSTITUENTS	TBA value (ppm) A	TBA value (ppm) RF
National shoulder	0.160 ± 0.022	0.099 ± 0.011
Ham trimmings	0.263 ± 0.010	0.097 ± 0.002
Minced ham	0.202 ± 0.007	0.136 ± 0.019
Neck trimmings	0.282 ± 0.010	0.246 ± 0.006
English shoulder	0.494 ± 0.015	0.372 ± 0.017
"MORTADELLA" FORMULATIONS		
F1	0.281 ± 0.010	0.177 ± 0.014
F2	0.239 ± 0.002	0.196 ± 0.003

A : air thawing RF : radiofrequency thawing