

Diversity of meats, diversity of stability requirements

Norma A. Pensel, Adriana M. Descalzo, E. Marina Insani, Carlos A. Margaría and Pilar T. García
Instituto Tecnología de Alimentos (ITA). CA. CNIA. INTA. CC77, 1708 Morón, Buenos Aires, Argentina

Introduction

Today, food products not only have to be nutritious, safe, stable and functional, but most important they have to please the consumer's expectation for organoleptic characteristics and individual preferences (Karel, 2000). It is a natural consequence that the diversity of consumer preferences forces the development of a diversity of products. The different shipping destinations for meat with specific characteristics also implies a variety of maintenance conditions that will demand diversity of stability requirements. Consequently, there is a requirement for grass- and grain-produced meat, and meat that will have to keep its quality for short and long storage periods. However, this obvious line of thoughts is not so simple from the stability point of view. The oxidation stability scenarios will be different due to the changed significance of the pro- and anti-oxidant compounds present in the tissue and also affected by industrialisation procedures. For example, different diets produce changes on intramuscular fatty acid composition. Despite this is more easily accomplished in non-ruminants; the changes produced in ruminants are also enough to have an impact on oxidation stability. The results presented derive from the studies carried out at Food Technology Institute (ITA), to establish the variables that will have to be considered to assure Argentine beef quality in these different scenarios.

Different diets and short refrigerated storage time

The results of an oxidative stability study to determine the effects, of traditional Argentine basal diet (intensive pasture system) compared with feedlot feeding, during retail display storage (without ageing) of *Psoas major* showed that: 1- A better antioxidant status is achieved when cattle are fed on pasture. This situation confers to muscle tissue less susceptibility to oxidative deterioration processes involving lipid and protein compounds (Insani et al, 2000). The higher level of antioxidants represented by α -tocopherol and β -carotene found in pasture-finished animals, improved the muscle colour stability in terms of better retention of redness at the end of retail display. No observed influence of antioxidants on the rate of surface metmyoglobin formation was found (Pensel et al., 2000b). 2- In relation to antioxidant enzyme involvement the initial higher activity levels of catalase (CAT) and glutathione peroxidase (GPx) enzymes found in feedlot beef did not contribute to reduce oxidation development after nine days of refrigerated storage. GPx presented a negative correlation with oxidation levels, and was significantly sensible to oxidising conditions developed during storage, for both, pasture and feedlot meat. Superoxide dismutase and CAT activities did not have a positive or negative contribution to the oxidation stability of muscle tissue (Descalzo et al, 2000a).

Different diets, supra-nutritional supplementation and long refrigerated storage time

Some of the findings from a research project, which is being conducted at Food Technology Institute (INTA), to characterise oxidative stability of Argentine beef containing different levels of α -tocopherol, as well as its influence on nutritional quality and organoleptic parameters in vacuum packaged meat stored up to 90 days, established that: 1- Vacuum packaged beef did not present objectionable alterations after 90 days of vacuum storage (Pensel et al., 2000a). 2- The contribution of natural antioxidants (α -tocopherol and β -carotene) found in meat from pasture fed steers was sufficient to compensate the high pro-oxidant effect of polyunsaturated fatty acids with more than two double bonds. Despite vitamin E supplementation, which retarded lipid oxidation, pasture diet presented a higher contribution to muscle tissue antioxidant defence than grain diet. Therefore, this study confirms that basal diet is extremely important to determine the antioxidant supplementation strategy when the objective is to mimic the pasture meat antioxidant quality (Descalzo et al., 2000b). 3- Before storage begins, meat from grain and pasture-fed steers exhibit different aroma, as indicated by E-nose odour profiles (Grigioni et al, 2000).

References

- Descalzo, A. M.; Insani, E. M.; Eyherabide, A.; Guidi, S. M. and Pensel, N. A. 2000 a. Antioxidant enzymes activity in *Psoas major* beef muscle from different production systems. Proc. 46th ICoMST, Buenos Aires, Argentina.
- Descalzo, A.; Insani, M.; Margaría, C.; García, P.; Josifovich, J. and Pensel, N. 2000 b. Antioxidant status and lipid oxidation in fresh Argentine beef meat from pasture and grain-fed steers with vitamin E supra-nutritional supplementation. Proc. 46th ICoMST, Buenos Aires, Argentina.
- Grigioni, G.M.; Descalzo, A.; Insani, M.; Pensel, N.A. and Margaría, C.A. 2000. Effect of vitamin E-supplemented feed regimen on beef odour assessed by a conducted polymer sensors based electronic nose. Proc. 46th ICoMST, Buenos Aires, Argentina.
- Insani, E.; Eyherabide, A.; Descalzo, A.; Sancho, A. and Pensel, N. 2000. Argentine beef: Lipid and protein oxidation and its relationship with natural antioxidants during refrigerated retail display. Proc. 46th ICoMST, Bs As, Argentina.
- Karel, M. 2000. Tasks of Food Technology in the 21st Century. Food Technology. 54 (6), 56-64.
- Pensel, N.; Descalzo, A.; Insani, M.; Eyherabide, A. Meichtri, L.; Sancho, A.; Margaría, C.; Lasta, J. and García, P. 2000 a. Oxidative stability of argentine beef during ninety days of storage: supra-nutritional supplementation with vitamin E on grain and pasture production. Proc. 46th ICoMST, Buenos Aires, Argentina.
- Pensel, N.A.; Insani, E.M.; Eyherabide, A.; Descalzo, A.M.; Grigioni, G.M.; Sancho, A.M. and Margaría, C.A. 2000 b. Argentine beef: antioxidants and colour stability during refrigerated retail display. Proc. 46th ICoMST, Buenos Aires, Argentina.