

The effect of storage and cooking on lipid oxidation of raw and cooked beef and goat meat

K Widayaka¹, T Setyawardani¹, J Sumarmono²

¹Department of Animal Science, Soedirman University, Purwokerto, 53123, Indonesia

²School of Animal Studies, University of Queensland, Gatton Campus, QLD, 4345

Oxidised lipids are not only responsible for the development of off-odour and off-flavour of meat during storage but also often associated with heart and vascular diseases in humans. It has been demonstrated that during processing and storage both polyunsaturated fatty acids and cholesterol tend to be oxidised (1). Meat from different species may have different rates of oxidation because of the differences in the amount of fats and fatty acid composition.

This study examined the rates of lipid oxidation in raw and cooked beef and goat meat during frozen storage. Samples were *Biceps femoris* muscles of beef and goat. Open-air oven (200°C) was used to cook the meat until it reached internal temperature of 85°C. Raw and cooked samples were packaged in oxygen-impermeable bags and stored in the freezer (-18°C) for four, eight and 12 weeks. Lipid oxidation was determined at 0, 4, 8 and 12 weeks by measuring the peroxide (mg malonaldehyde/kg) and thiobarbituric acid (TBA, ml equivalent peroxide/kg oil) values (2). Sensory properties of the meat were also analysed by 10 semi-trained panelists. Results are presented in Figures 1 and 2.

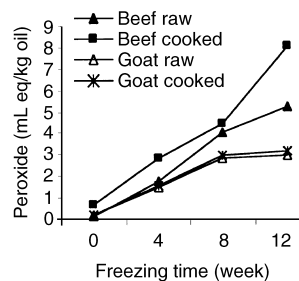


Figure 1. Changes in peroxide values of beef and goat meat during frozen storage.

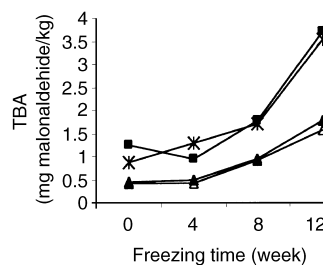


Figure 2. Changes in TBA values of beef and goat meat during frozen storage.

Lipid oxidation, as expressed by the peroxide and TBA values, occurred in both beef and goat meat, cooked and raw. The longer the meats were stored in the freezer, the more lipids were oxidised ($P < 0.01$). Lipids in cooked meat were more easily oxidised than those in raw meat ($P < 0.01$). This finding is similar to the observations of (1). However, panelists were not able to detect any sign of rancidity of meat after storage for 12 weeks. In conclusion, frozen storage and cooking accelerate lipid oxidation in beef and goat meat.

1. Ahn DU, Nam KC, Du M, Jo C. Effect of irradiation and packaging conditions after cooking on the formation of cholesterol and lipid oxidation products in meats during storage. *Meat Sci* 2001; 57: 413–418.
2. Pikul J, Leszczynski DE, Kummerow FA. Evaluation of three modified TBA methods for measuring lipid oxidation in chicken meat. *J Agric Food Chem* 1989; 37: 1309–13.