Abstract

The shelf life of processed oat products and the usability of oats in modern food formulations are in many cases still limited by the lipid-associated deterioration. To elucidate the role of lipase inactivation in the development of rancidity in oats, heat treatments varying in severity were applied. Effects of these treatments on lipase activity and lipid oxidation were studied either directly after processing by mixing the fractions in water or after a long-term storage of dry fractions. A trend was found, that the lower the residual lipase activity in whole kernels or kernel fractions, the higher was the oxidation of lipids and evolution of volatile oxidation products during prolonged storage of the dry fractions. If bran was heat-treated to zero lipase activity, the amount of headspace hexanal detected after 12-month storage was 5 to 7 times larger than detected in non-heat treated bran. This formation of hexanal was linked to the oxidation of polar lipids. If the heat treatment was totally omitted, the oxidation of unsaturated fatty acids in polar lipids did not occur even during prolonged storage. The oxidation of polar lipids suggests heat-induced disintegration of membrane structures and inactivation of heat labile antioxidants. This study identifies heat treatments as critical control points in obtaining oat products with enhanced self-stability.