Oats: a minor grain with major potential
Fred Gates, Simon Penson and Julian South
Campden BRI, Station Road, Chipping Campden, GL55 6LD

Oats were a major cereal crop until the internal combustion engine replaced horses in the early 20th century. They have advantages in being a low input crop compared to wheat, perform well on marginal land, are also a valuable break crop, and for reducing pests and weeds in cereal rotations. Since the 1980s there has been considerable research interest in the link between the consumption of soluble fibre from sources such as oats and various health benefits. The US Food and Drug Administration (FDA) and the European Food Safety Authority (EFSA) have approved health claims to be made for foods containing oats, providing that they meet certain criteria.

Oats have a ‘clean’ image and are often chosen as ingredients for this purpose. Health claims focussing on ‘natural’ often assume that the product is free of contaminants. However, this is not always the case and there are numerous chemical hazards which can be found in oats, both in organic and traditional growing systems. These include agrochemical and environmental contaminants, mycotoxins and chemicals (such as acrylamide) that may be formed during processing. There are many types of contaminants (Hutton et al., 2011) and they should be considered in relation to their source, whether they are residues from agricultural production and storage (e.g. pesticides), environmental (e.g. heavy metals) or formed during processing (e.g. acrylamide). Some of the key contaminants to consider in oat products are considered here. With careful selection of grain samples for processing, and monitoring of residues in the harvested grain, oats can provide an excellent cereal to include in healthy products.

The high lipid content and active enzyme systems make oats susceptible to rancidity. For this reason most commercially available oat products (e.g. flakes, flour and bran) are stabilised using a heat treatment to inactivate the lipid hydrolysing enzymes. This process also modifies the technological quality of the product and may contribute to food safety by reducing microbial loads. Native oat has a mild, sometimes grassy flavour, however the heat treatments that are traditionally used in oat processing generate a number of flavour compounds. Flavour is determined by the precursors present in the groat and thermal processing. Further processing such as cooking the oatmeal, extrusion or baking will modify the flavour as new compounds are formed and volatiles are evaporated. These can be characterised using advanced techniques such as quadrupole time of flight gas chromatography mass spectroscopy (Q-TOF GC/MS), which can rapidly determine an aroma profile for a sample.

Oat is a minor grain that has received renewed interest in the past few years. This has been mainly driven by consumer perception of oats as naturally healthy and the health benefits of oat beta-glucan. There is considerable scope to expand the range of products that include oats to help increase the level of fibre in the diet. Achieving the level of addition required to make a health claim in a commercially viable product is challenging. Developing well-defined and widely accepted specifications for quality attributes would benefit this growing market.