

**House of Lords Science and Technology Select Committee
Call for Evidence: Nanotechnologies and Food**

Response from Campden BRI

1. Our Organisation

1.1 Campden BRI is the world's largest, independent, membership-based, research and technology organisation serving the food and drinks sectors. The organisation has over 1700 member companies in more than 60 countries. Over the last three years, we have received funding from defra and EPSRC to identify applications and potential barriers to the uptake of nanotechnologies in the food sector. This has been, and continues to be achieved, through a series of meetings with industry and through email alerts to industry on developments in nanotechnologies that may have relevance to food applications. The mailing list for emails consists of 1100 industry contacts.

1.2 The meetings have been composed of presentations from companies providing nanotechnology-based products such as coatings, manufacturers of foods, ingredients and agro-chemicals, academics carrying out research on nano-science or consumer attitudes, and representatives of Government departments. Our response to the call from the House of Lords is based on those presentations and information and enquiries from our members in response to those meetings and the email alerts.

1.3 Our response begins by looking at "Other Issues" not specifically identified in the call as we believe these set the scene for our response.

2. "Other Issues"

2.1 Questions from industry indicate a difficulty in understanding the meaning of the term "nanotechnologies". Some companies know that they experience equipment wear and that this leads to particles, at the nanoscale of 1-100 nm, in the product. Some processes used in the manufacture of foods produce particles that exist at the nanoscale for only short time periods and do not exist at that scale in the final product. Other processes, such as vapour deposition used in the manufacture of packaging, may create particles that are short-lived at the nano-scale or create films that are at the nano-scale in the final package. Conventional food processing operations, such as emulsification, may also create nano-structures. There is confusion as to whether these products are to be considered as "nano-products". There is also concern that sales of such products, which have been produced by methods available for many years, would be damaged if legislation were introduced that required them to be labelled as "containing manufactured nanoparticles".

2.2 Difficulties arise because nanotechnology has been given a specific size category but novel properties may be achieved outside this range and conventional processes, used for many years, may produce particles within that range.

2.3 Existing legislation requires food to be safe irrespective of the method of manufacture or size of particles that it contains.

2.4 Defining nanotechnologies as producing materials with novel properties restricts some of the difficulties in understanding what the term means but it does not altogether eliminate the

problem. For example, a beer bottle has been available that includes a layer containing clay particles at the nanoscale. The bottle extends the shelf life of the beer by restricting oxygen ingress. This would appear to be a novel property of the bottle material but not necessarily of the individual particles. Our comments below relate to nanotechnologies as procedures or equipment that create particles that have novel properties.

3. State of the science and its current use in the food sector

What are the main potential applications and benefits?

3.1 Applications for which the industry would like to see nanotechnology deliver solutions include: extended shelf life to reduce waste; improved quality such as flavour; alternative utilisation of food waste such as energy generation; sensing of contaminants (microorganisms, allergens); improved packaging to increase shelf life and reduce waste; alternative methods of creating desired mouth feel and taste of products with reduced fat, sugar, and salt composition. Nanotechnologies are believed to have the potential to offer solutions.

What is the current state of the market?

3.2 There have been at least eight reports written about the applications of nanotechnologies in the agri-food sector and at least one computer-based inventory of consumer products containing nanoparticles is available (Woodrow Wilson Inventory). Whether all of the applications or products are created using nanotechnologies is often unclear.

3.3 Silver is a known anti-microbial and applications to food supplements, food containers and food cutting boards are cited in the Woodrow Wilson inventory. None of these materials have been identified in the UK market although some clothing containing silver has been available. The inventory also cites canola oil and a tea as food products containing particles. The canola oil claims to use micelles to restrict the transfer of cholesterol into the blood stream. The tea is promoted as releasing increased selenium due to a ball milling operation reducing the size of the tea during manufacture. Micellation and ball milling have been known for many years.

3.4 Probably the most widely cited application of nanotechnology in the drinks sector is the beer bottle incorporating a layer of nano-clay, although other bottles based on vapour deposition of silicon oxides have also been reported.

3.5 Despite our efforts, we have not identified any food products or food packaging materials on the UK market that contain particles that have been deliberately engineered at the nano-scale using new and novel technologies. Understanding of food structure is developing through measurements and modelling at the nano-scale.

What are the barriers to the development of new nano-products or processes in the food sector?

3.6 Discussions at our meetings have indicated that the greatest barriers are cost (some barrier materials for packaging could be created for greater shelf life but the increased cost would not be justified); technical difficulty (nanoparticles can be difficult to manufacture and control); and health and safety concerns. A significant barrier is consumer attitude and the industry concern over that attitude. There is considerable worry that nanotechnology could suffer from adverse public opinion in a similar way to developments in biotechnology and

that conventional food processing methods, which involve control of nano-structures in foods, would be associated with the newer developments in nanotechnology.

4. Summarising Comments

4.1 Despite there being definitions of "nanotechnologies" from many recognised sources, there is still uncertainty about the meaning of the word. It is unclear whether any process that produces particles at the nano-scale should be considered as "nanotechnology". Even if the meaning is extended to include a reference to novel properties, there could still be concern that nano-scale particles, irrespective of how they were created, could have an adverse effect on health. There are many developments in food and packaging manufacture that could provide benefits to consumers and nanotechnologies offer one of the routes to achieving those goals.