

Nanotechnology and Food

Submission by Professor Derek Burke

1. My submission to this inquiry is focused on regulatory aspects of the introduction of nanotechnology into the food industry. It draws on my own experience as the first Chair of the Advisory Committee on Novel Foods and Processes (ACNFP) from 1989 to 1997. I consider that this issue is of considerable current importance.
2. The ACNFP first considered the issue in 2005 with a brief report on “Nanoparticles in food¹”. The Committee agreed “that the use of nanoparticles in food was an issue of increasing public interest that would require further consideration... Members also indicated that the committee might require input from additional experts if it is to examine this area in depth.” This report was based on a committee paper (ACNFP/70/4)² which defined nanotechnology, referred briefly to the Royal Society/RAE Report³ and highlighted the following conclusions:
 - That the toxicity of chemicals in the form of free nanoparticles and nanotubules cannot be predicted from their toxicity in larger form and that in some cases they will be more toxic than the same mass of the same chemical in larger form;
 - That regulatory bodies and their respective advisory committees include future applications of nanotechnology in their horizon scanning programmes to ensure any regulatory gaps are identified at an appropriate stage.
3. In November, 2004, the environmental group ETC published a report “Down on the Farm: The Impact of Nano-scale Technologies on Food and Agriculture”⁴ which identified a number of current and projected uses of nanoparticles in food manufacture. These included:
 - The current practice of using nano-scale carotenoids as colourings in lemonades, fruit juices and margarines. The small particle size improves dispersion and stability of the ingredient.
 - The current practice of micro-encapsulating nano-scale active ingredients in functional foods, for example when adding fish oils to bread. The oils are released from the micro-capsules in the stomach and so do not impair the taste of the product.
 - The projected practice of using oxygen impermeable coatings on confectionery, made from nano-scale silicon dioxide, to improve shelf life.
4. The conclusions in this ETC report included, *inter alia*:

- That national governments must establish a *sui generis* regulatory regime specifically designed to address the unique health issues associated with nano-scale materials used in food.
 - That in keeping with the Precautionary Principle, all food, feed and beverage products (including nutritional supplements) incorporating manufactured nanoparticles should be removed from the shelves until such time as regulatory regimes are in place that take into account the special characteristics of these materials, and until the products have been shown as safe.
5. The Food Standards Agency has recently (August 2008) published “A review⁵ of the potential implications of nanotechnologies for regulations and risk assessment in relation to food”. They concluded:
- On the basis of current information, most potential uses of nanotechnologies that could affect the food area would come under some form of approval process before being permitted for use.
 - This review has not identified any major gaps in regulations but there is uncertainty in some areas whether applications of nanotechnologies would be picked up consistently. In these cases there are relatively straightforward options to address this uncertainty. As food regulations are harmonised at EU level, the Agency will seek to address them at EU level through the European Commission and other Member States. The Commission’s Nanotechnology Action Plan commits it to coordinating an approach to such issues.
 - The view of the independent advisory Committees on Toxicity, on Carcinogenicity and on Mutagenicity of Chemicals in Food, Consumer Products and the Environment, is that the existing model for risk assessment is applicable to nanomaterials *although there are major gaps in information for hazard identification*. (My italics) Risk assessment relies on provision of sufficient reliable information to inform an assessment in each case. Risk assessment procedures will need to include procedures for provision of information to inform risk assessments, for example in relation to an application for approval for a new product or process. The Agency will support the development of risk assessment in this area in close partnership with other Departments and the independent advisory bodies in the UK and the EU.
6. My own view is that this is a somewhat complacent conclusion. For example in Paragraph 35 headed “Gaps in regulation”, the review points out that “The legislation as it stands does not differentiate between chemicals produced routinely by current methods and those that may be developed by nanotechnology.” I suggest that this misses the whole point of nanotechnology which is that properties of substances change when they are very small, in particular as the surface area to volume ratio changes.

7. The Food Standards Agency also consulted a number of relevant stakeholders on a draft of this report. Only six responses (42 individual comments) were received⁶ but the responses are helpful and important. For example, Friends of the Earth commented “A regulatory framework must be established that is specifically designed to address the unique health and environmental issues associated with nanomaterials used in food and agriculture. This must be part of an integrated Government approach to nanotechnology, which takes into account the wider issues beyond food applications.” Similar comments were of received from Professor Vic Morris and the Institute of Food Science and Technology (IFST) which made a number of pertinent and thoughtful comments, in particular comments about the way in which EU regulatory directives and regulations bore on this issue. I considered that the FSA response was rather cool and I suggest that there are a number of these issues that the committee might wish to follow up. Too often the FSA response was “The Agency has noted these comments.” My own experience in Brussels suggests to me that the faith placed by the Food Standards Agency places in a speedy regulatory response from Brussels is over optimistic.
8. I have not been able to find any more recent material, in particular any record of activity by the ACNFP since the publication of the FSA review last August. My overall impression is that the FSA are being too complacent. The history of regulation of new technology arising from discoveries in the biosciences is that regulatory issues are often only spotted after they have arisen (my own personal experience of genetically modified foods and crops bears this out), and one of the lessons of the last ten years is that regulatory issue should be anticipated, and responses framed in advance if at all possible.
9. There are therefore a number of areas which I suggest that the Lords Science Committee might consider, including:
 - I have not found any record of horizon scanning on nanotechnology by the FSA or the ACNFP, but maybe this is in train. But such horizon scanning, which is an important part of FSA strategy, would be very important in this area. So the questions are: what has been done, what is planned, and if nothing has been done, when is it going to be started?
 - The next obvious question one is whether the current regulatory framework will be able to cope with the likely developments in nanotechnology. The Research Councils recently hosted a one day workshop with members from the Research Councils, FSA, ACNSP, Royal Society etc on possible new regulatory issues arising from the development of synthetic biology, which I attended. In this particular instance, it concluded that the current regulatory regime is capable of handing all foreseeable developments. Maybe such a workshop has taken place or is planned for nanotechnology?

- From the current list of ACNFP members^{7 8} I cannot see anyone with expertise in nanotechnology, although this might be present, since the list of members' interests⁹ has not been updated since April 2005. If not, it would seem an important skill to add to that committee.

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¹ Advisory Committee on Novel Foods and Processes, Annual Report, 2005, p.15.

² http://www.food.gov.uk/multimedia/pdfs/acnfp_70_4.pdf

³ <http://www.nanotec.org.uk/finalReport.htm>.

⁴ <http://www.etcgroup.org/article.asp?newsid=485>

⁵ <http://www.food.gov.uk/multimedia/pdfs/nanoregreviewreport.pdf>

⁶ <http://www.food.gov.uk/multimedia/pdfs/consultationresponse/nanoconsultsummary.pdf>

⁷ <http://www.acnfp.gov.uk/acnfpmembership/135812>

⁸ <http://www.acnfp.gov.uk/acnfpmembership/members/>

⁹ <http://www.food.gov.uk/multimedia/pdfs/acnfpmembersfactsheet.pdf>