

## Responses

### Funding sources

Neither the European Commission or the Sheepdrove Trust funded the work with the goal of proving the benefits of organic farming.

Both sponsors provided us with funding because we proposed to carry out research that contributes to answering one main scientific question: “Does the way we produce food (using organic vs conventional protocols) result in significant differences in food composition?”

The EC also provided us with funding to determine to which extent agronomic factors (variety choice, fertilisation, crop protection, rotation) that differ between organic and conventional systems are responsible for composition differences, but also gene and protein expression pattern.

Both wanted to know whether there are differences, in order to provide consumers/society with better information to aid their decision making.

We were very happy to applied and receive funding from the to the Sheepdrove Trust because there were “no strings” attached! We would have been happy to accept funding from other sources (including food companies) to answer the same scientific question as long as there were no expectations or pressure to come up with specific results desired by the sponsor.

**I have now been able to look at the detail of the criticism made by the Imperial College authors of the Dangour et al. study via the UK Science Media Centre, an organisation which many in the UK consider as being not exactly “impartial”, but mainly a lobbying organisation for specific commercial and academic interest groups.**

**I do not think they have read our paper properly before launching their criticisms and their criticism seems to me based on “accusing us of making statement in the paper that we in fact did NOT make” and then taking issues with them.**

**To go through his criticisms one by one:**

### Antioxidants

- We do not refer to antioxidants as “a class of essential nutrients” so we cannot really be criticised of doing so
- He quite rightly points to the fact that the World Cancer Research Foundation feels there is as yet insufficient evidence for allowing health claims related to higher antioxidant and phenolic intake. However, this does not mean there is no evidence, but only that there is not yet enough for health claims! He fails to point to the fact that there is a growing body of evidence that many of the antioxidants that we found significant differences for (we quote previous

literature reviews of dietary intervention studies based evidence were shown to be linked to positive health indicators/impacts). Interestingly he does not comment on that at all on the other potential health benefits we linked anti-oxidants to!

- I suspect, but obviously I do not know their real motivations, based on their very unbalanced criticism that both Prof. Sanders and Dr Dangour simply do not want to admit that the conclusion of their analyses were wrong and that the way organic food is produced does in fact affects food composition in a way that may have health impact or they simply do not like the organic farming approach.
- In fact I wonder how many of the authors of the original Dangour et al. paper are on record or feel that increasing the anthocyanin concentrations in tomato via crop breeding or genetic engineering is a valuable approach from a human nutrition point of view!!

### **Nitrate**

- We do not claim that both reduced “nitrate and nitrite in organic vegetables would be beneficial to health” because we agree with him that for nitrate the evidence on whether it has beneficial or deleterious effects is controversial, and it will probably turn out that it can have both.
- Instead we describe the current evidence in the following, we feel balanced way in the paper: “The higher NO<sub>2</sub><sup>+</sup> (=nitrite) concentrations in conventional crops/crop based foods are nutritionally undesirable, as they have been described to be risk factors for stomach cancer and methaemoglobinaemia in humans”. However, while increasing dietary NO<sub>2</sub><sup>+</sup> (=nitrite) intake levels is widely considered to be potentially harmful for human health, there is still controversy about the potential health impacts of crop-based NO<sub>3</sub><sup>-</sup> (=nitrate) intake.
- Incidentally, I was part of the team that first published potential beneficial effects of vegetable based nitrate intake in Nature Medicine and subsequently reviewed the topic in the BJN.

Duncan, C., Dougal, H., Johnston, P., Green, S., Brogan, R., Leifert, C., Smith, L., Golden, M., Benjamin, N. (1995). Chemical generation of nitric oxide in the mouth from the enterosalivary circulation of dietary nitrate. Nature Medicine, 1,546-551.

McKnight, G.M., Duncan, C.W., Leifert, C. & Golden, M.H.N. (1999) Dietary Nitrate in Man - friend or foe? British Journal of Nutrition 81, 349-358.

### **Cadmium**

- Prof Saunders claims that we only found differences for cereals. This is in fact wrong:
  - o We found significant differences for cereals using both the weighted and unweighted meta-analysis protocol and for cereals we found the largest relative differences.
  - o We also detected significant differences using the unweighted meta-analysis, but in the weighted analysis (for which we only had 10 data-sets/ comparisons) no significant differences was detected
  - o For fruit we had only 4 data-sets/comparisons available and could only carry out an unweighted meta-analysis and still detected a trend towards significantly higher Cd

concentrations in fruit, but clearly to confirm that there are differences for Cd in fruit additional studies are required.

- Prof Saunders claims that “Cadmium levels are dependent on the soil and have nothing to do with organic certification”. This shows his ignorance of what is going on in agriculture.
  - o If you follow his soils claim through, then to explain our results on Cd he thinks organic farms are, for some magical reason, based in regions with soils naturally low in Cd, while conventional ones are located on soils with high Cd soils”, that is complete utter non-sense.
  - o Also, it is complete non-sense to suggest that the fact that organic farms have to undergo regular inspections/certification that is responsible for composition differences. Certification is just a paper-exercise, and it is the differences in agronomic practices between organic and conventional farms that explain the differences between organic and conventional crops. Soil and climatic conditions do, however, contribute to the variation we find, and are the reason why having large number of comparisons are required before significant differences are detected, which I think Gavin has already explained in detail.

### **Protein**

Prof Saunders quite rightly points, that, as we describe in our paper, “organic products contained less protein” and that other nutrient differences detected in our study were trivial. I assume he agrees with our conclusions that these other differences are not important in nutritional terms, so this is not really a criticism, but presented in a way he tries to give the impression that we are hiding something, which in fact we are not!