

ELM FARM RESEARCH CENTRE CONFERENCE

DOES ORGANIC FOOD HAVE AN 'EXTRA QUALITY'? New Research, New Perspectives and New Insights

A record of the Conference held on TUESDAY, 23RD NOVEMBER 2004



This Conference was sponsored by Sheepdrove Trustin collaboration with



FQH (International Network for Food Quality and Health) Sustain (the alliance for better food and farming)

ELM FARM RESEARCH CENTRE

The Organic Research Centre 'For organic principles and best practice'

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ACKNOWLEDGEMENTS

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We would like to thank **all** those who participated in the Conference on 23rd November 2004 - those who gave presentations, those who chaired, those who responded and those who participated in asking questions and the discussions.

We also thank the team that organised the event so effectively.

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"Stressing the importance of differentiating between accepted dogma: "Organic food is better for you" and what is actually "true", i.e. the scientifically proven, Dr Brandt's interesting and balanced paper highlighted the need for a consistent approach and common understanding if claims about organic food are to be accepted.

The science that proves the "extra qualities" of organic food, or equally that demonstrates the detrimental effects of "conventionally-produced" foods, on our health is still developing, as shown by other speakers. But Dr Brandt concluded that organic farming, which has distinct benefits for the environment and food produced, has that "extra quality" that was the Conference's theme.

For consumers, the key benefit of organic produce may simply derive from the fact that positive choices are made in food purchasing that enhance a sense of individual value and well-being".

Alara Wholefoods

"Projects that give statistically robust nutritional differentiation between organic and non-organic food are very welcome by organic food manufacturers".

Duchy Home Farm



ORGANIC FOOD QUALITY - DEFINITION

Six criteria, from Elm Farm Research Centre, for food quality:

Authentic Food which is traditional and/or natural:

- Regional and artisanal
- Not synthetic
- Not including the products of genetic modification
- Free from adulteration in production, processing or storage

Sensual Food which appeals to the senses:

- Taste and smell
- Texture
- Visual appearance
- Aesthetic appeal

Ethical Food which is produced in a way which meets ethical standards:

- Environmental impact of production, processing, distribution
- Social conditions on the farm, factory or shop floor
- Morality of the food production system
- Political effects on the country or region of production

Functional Food fit for the purpose intended:

- Cooking
- Storing
- Processing

Biological Food which interacts with the body's functioning, both positive and negative:

- Possible protection against cancer
- Stimulation of the immune system
- Maintenance of a healthy gut flora
- Allergic reaction

Nutrition Food which contributes to a healthy and balanced diet, both positive and negative:

- Balanced protein, carbohydrates and fat
- Vitamin, minerals and trace elements
- Excess sugar or fat
- Excess nitrate or sodium
- Potentially harmful pesticide residues

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Christopher Stopes

First I want to reflect on the conference Lawrence organised with EFRC and in which I was involved nearly 20 years ago on this same subject. Angelika was there as was Hardy Vogtmann and I would like to report that from my perspective that things have moved on enormously. At that time we had Ursula Balzer-Graff's crystal pictures with only her interpretation - some of you may know who I am referring to. 20 years on we have got a validated method. The photons described then were a completely whacky idea that Popp had come up with and have moved on and validated that method also. So the progress that has been made over the last 20 years I think is remarkable

What I wanted to ask was a reflection on what the **Food Standards Agency** is doing in this country and to think about the fact that they spent something like £0.5 million on the method of determining organic and conventional food through enisotope dilution. What I want to ask the speakers from this morning is to think about the error of the FSA's approach which is reducing organic or conventional only to the source of nitrogen and to contrast that with the way in which the holistic methods are perhaps trying to encapsulate a coherent component of the whole system in the way that Angelika identified five dimensions - growth, light, differentiation, reproduction and one other which I can't remember!

Each of the holistic methods is somehow a metaphor for a way of discovering each of those principles and that is of course, building up to a whole system whereas the FSA approach is reducing the characterisation of organic and conventional only to the source of nitrogen which actually is only one small part of the system difference. We need to attack the FSA head on in the public money they wasted in this country but also build up a better understanding of the way in which the whole system is more than the sum of its parts and the sort of novel approaches that have been described today are a way in to those sorts of attributes.

Lawrence Woodward responded to the FSA question. First of all I completely agree with Christopher's characterisation of the money that is completely wasted on this approach without actually, any real explanation as to why they are doing it, and in terms of transparency from government and from it agents, the failure to explain to anybody in any coherent terms why they have wasted some millions on this programme, is a scandal.

The one thing one might say they are using it for is to use the method in terms of verification or authentication of what is organic and what is conventional. But in fact, anyone who knows anything about organic systems or anything indeed anything about biological agricultural systems, knows that that way is fundamentally flawed. The whole problem with the FSA approach as opposed to the approach that we have heard about today, is that actually they have no concept of health and it is questionable as to really whether they have valid concept of food safety but the certainly have no concept of health. Therefore, they have no concept really about nutrition and where health fits in either a farming system or nutritional policy. As a result they really are all at sea and not only in my view making a number of painfully wrong decisions in many areas and not just this N15 area, and I think all of the speakers this morning, in different ways, reiterated the fact that organic agriculture is a system that in order to assess it, evaluate it, for whatever reason you are doing that, whether it is authenticate the process, or whether it is to understand it in order to further develop it, then you have to have an approach which is holistic or multi-faceted and looks at the complexity of the whole system not simply at one factor. So the FSA approach - cul-de-sac, blind alley, scandalous waste of money (*Melchett interrupted here to say but if it works what is all the fuss about*) ...

First of all it isn't working (Melchett interrupted again, but you don't know that it isn't - unusual situation here for me to be standing up for the FSA! - but you don't know as they haven't finished their research)

LW: There is no theoretical basis for expecting the movement of nitrogen through soil into plants can be differentiated by N15 analysis that can show whether you have got an organic or conventional system.

Peter Melchett again - this was first done by an eminent German scientist - is the German government interested in discriminating through N istope work between organic and non-organic?

It is not true that there is no discrimination whatsoever but it doesn't show anything like good enough discrimination for use as a test which is why they are now adding in isotopes or something else.

Angelika Meier-Ploeger said that of course our Min for Agric Food and Consumer Affairs has an interest to develop new methodology to increase the market for organic products. But the way it is going now is to find a common platform for



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discussion about research topics and research areas so the next step now is that we have to combine our complementary methods to research done in the field of nutrition and health so there is a project about allergic reactions coming from food and Johannes Kahl is to be the coordinator of this whole project. He is linking the research of the complementary methods together with the results from the medical treatments so there will be a study for allergic reactions and one for children using the same foods that we are using for our complementary methods. This is new research started 2 months ago and will last for the next 2 years but as our colleagues from University of Reading have already told us normally you are using clinical studies or intervention studies and this costs a lot of money and our government is cutting short the research money and therefore we only have a short period of 2 years now for the next step so we are just a little bit out of breath, always following the lines of the politicians. We would like to have the money for say 10 years to do proper work but that is how it now for research.

Kirsten Brandt responded. This isotope method is similar where you want to have a method where you can measure, for example in plants whether they have been grown using compost and manure on the one hand, or with synthetic fertiliser on the other hand. I would put that kind of method in the same brackets as, for example, to detect residues of pesticides. It is a routine thing for organic foods to be tested for pesticides to check if somebody along the chain has been somehow breaching the regulations and using pesticides. And just because some companies say "well if we buy organic food then we want to take these tests because that is a routine method", does not mean to say that this company necessarily reduces organic food to just a matter of pesticides or not. But they could still have a objective of making sure that the one person out of how many who try to cheat, that there is a chance they could be caught.

I don't see that you need to say that, even if we have a good control system for certification, one element of a control system can be that people think that they can get caught and that does not necessarily mean that the food is of any less quality than if you don't have an extra control in the system. It doesn't say anything whatsoever about the value for health of those products that you test for authenticity or not, these two things are separate things. Of course we can always discuss how much effort to use in control at the production stage or later stages and so on, to organise the chain to decrease incentive for cheating so there are a lot of things you can discuss and how to get the most out of the money but the issue of the food and health context is a completely different one and I would find it would be a pity if we start mixing up those things and saying that one method is bad because it can't do everything because no method can do everything. We need specific methods for specific purposes and would be better having a method we have to validate it for that particular purpose which is supposed to be showing.

Peter Melchett -Let's move on to the theme of the conference which is **Does Organic Food have Extra Quality?** because I must say that Kirsten and Lawrence dealt with the FSA and the real problem was that they didn't talk to anyone and didn't think about it and approached it without really knowing what they were trying to do and it is a particularly British problem. Did anyone in the audience feel that Rafe and Steve were unfair when they said that what you heard this morning didn't tell you about whether organic food did actually have any extra quality, may be different, produced different sorts of shapes or crystals or react differently to different tests - does it tell you anything about the quality of the food let alone its impact on human health?

Matthew Adams - Good Gardeners Association

I have been doing some research myself into food quality and I have been looking at comparative methods of conservation and nutritional components of minerals because I believe they relate more directly to health and are the building blocks of good health - the starting point. Perhaps some of the techniques being explained today are perhaps more advanced techniques and I would like to hear from the panel actually how they see the relationship between their methods and the relationship with health which is the point of the whole thing.

Dr Strigner

There is a point about minerals which I think is pertinent - I am a physician by the way and hope to look after wrecks and try to resurrect them - one of the things that has happened in this country is that there were five surveys done, first one in 1941, second in 1946, another in 1972 I think, and a couple in the 90s - of the mineral content of food in this country. Every single survey showed a successive drop until some of the mineral content of foods and I am talking about meat, dairy products, grains, vegetables - all showed a drop some of the mineral content is now 50% of what it was 50 years ago. The only food in which the minerals haven't dropped is marine food - fish and marine vegetables and that's all I really have to say about that.



(taken from the transcriptions - with apologies if some areas are not too clear!)

Juliet Davenport, Good Energy

As an individual, my impression is that the public awareness of feeling that health and organic food go together is far in advance of where the science has got to in terms of the proof of that, and I think one of the dangers probably in terms of politics and funding of a lot of this science, must be in terms of what you are doing, that people would assume that you had already found that out that organic food was better for you and is there a problem in terms of admitting essentially by doing this research you don't actually know yet. In terms of where the public is in terms of their perception - they go in, buy their organic food and are OK, thank you very much? I think it answered the question that we seem to be way behind in the science of where the perception in the public is.

Matthew Adams - Good Gardeners Association

In relation to the minerals - in the research we have done which is only year 1 we have doubled the mineral content in potatoes and got 60% more in carrots. Now that is actually within an organic garden which does beg the question what is the difference between organic and organic, but in the relation to the gentleman's concern about minerals declining over the last 60 years, yes it is true and I agree with that - I follow that research - but within a very short space of time we have put some of those minerals back into the food and that's through working with the life in the soil which it also gives it energy print as well which perhaps is part of the crystallisation technique.

David Marsh, The McCarrison Society

Are we being over-optimistic that the general public can think that organic is more nutritious and better for us than inorganic when probably 75% of the public today don't even make a connection between the general quality of nutrition and the quality of health? The second question is whilst we are agonising over which method of analysis is accurate will the genetic modification movement negate everybody's efforts?

Paul Gosling, HDRA

All the methods we have heard about this morning are very interesting but from the perspective of trying to encourage people to buy organic food, I am not sure they move us on any further from the more reductionist methods such as mineral analysis. Even if we can prove that they, the bio-photons or crystallisation, can be connected to health, what I think was omitted by all speakers this morning is that we do not have a consistent difference between organic and conventional. Yes, we can differentiate but it is not always there and perhaps sometimes the difference between two different organic systems or two different organic products, are as large as the difference between and organic and conventional, and if that is the case then that is exactly what we have at the moment in the more traditional analysis of minerals and vitamins. Yes, we can show a difference between conventional and organic but it is not consistent so I am not entirely sure that we are moving any further on with these new analyses.

Richard Blacklaw-Jones / Pembrokeshire Organic Group

One of the methods talked about this morning indicated a greater ability in organically raised produce for structure building or self replication. To me this seems to have a connection to fertility. There is in Great Britain, a charity called Foresight who routinely advise people who are having difficulties in getting pregnant to switch to an organic diet amongst other things. They claim an 80% success rate when IVF has a 20% success rate and incidentally costs an enormous amount of money. I wonder if the panel have anything to say about **organic and fertility**.

Johannes Kahl

We presented our results at the conference in Berlin. There were a lot of federal institutes there and before they said there was no difference between organic and conventional. We presented our methods and results and as we said, yes our methods can also show a difference. So I think now we are starting to discuss if there is a difference or not, and we are not starting from the position that it makes no difference. We just look at how we can measure this difference and how we can relate this difference to nutrition and human health.

I think it is very important that we succeed in organic to go from the systemic approach in agriculture to the systemic approach in food quality analysis and systemic approach in health because if you make nutritional or clinical studies and that is what we discussed over lunch, just minerals in blood pressure or the quality of the faeces (!!) and not how I behave. As the WHO definition says: the social and mental wellbeing so I think this kind of parameter - social and wellbeing - are very important when I want to eat something. It is not only because I want to hear sleepy coma patient, because I am also alive but I cannot express myself so there is not a good and a bad method. It is a validated method or a not-validated method..



(taken from the transcriptions - with apologies if some areas are not too clear!)

Jurgen Strube

One of the questions we heard was: is it not possible that the different substances make the differences in the measurement, especially for the human measurement, pigments etc. If one thing offers food as composition of substances it may be correct if we measure differences in substances but if you look on the big nutritional studies of the last years, it shows up that substances like metacarotine or licopine which were identified as giving certain health benefits, they failed. If they were added to the diet furthermore they caused opposite than what was expected and though the thinking that special substances cause special health in certain ways must be wrong. It may be that in a certain food a certain composition of substances is necessary so that every element his its counterpart and if one has organic food then the final composition is different and in the conventional way - and that is why we always measure differences. One of my explanations is why we measure always differences between organic and conventional - but we have also differences between organic and non-organic in different varieties, locations and so on. It may even be bigger than from organic to conventional, but one difference may be caused by the photo level of substances, but what makes the real difference is what the inner composition is. If one accepts this model then it is not so important what the total content of the substance is but what the relation of the substance is to each other and so in this way I think in a lot of science we have these methods like crystallisation and the luminescent measures can be interpreted because there is a certain correlation between substances and measurements but to only about 60-70%

The next question was what is the result in health? We look most of the time to short-term effects and we think to the rabbits this morning and the studies go back to 30 years of the last century. We have indicators that long-term effects are more important and the other point, which is difficult to be exact, is maybe the real effect of short-term during one life of the people is that it is more the mental effect you can feel but we have no instrument to measure that precise in which way organic food effects our mental health or ability. For example, if people talk to each other you hear the sound but what was before the sound is the thinking, you hear the sound and you make your own picture and so there we have some what before makes the truth in a special form and we see only the result and we measure this side of the composition. Maybe in the future we find ways to demonstrate this in a better way but I know in Germany at least there are a lot of people who are concerned with this kind of research which may sound a little bit esoteric but it is quite reasonable I think and in the next 10-15 years I think there will come out a new direction of research which will become more important than the classical methods maybe.

Angelika Meier-Ploeger

I would like to stress the point of fertility that was made. Of course there was the study by Mr Steiger in 1988 and since then we have some report in Germany stressing the point that one has residues of pesticides in the sperm for male humans. There was one report and the other report stressed the point that having residues of heavy metals. Then we have nearly the same observation in Germany, that you can alter your food habits to more fresh food and to more organic products then the conception will be better. But discussing it with scientific people, then you have the problem that they say yes but there is another point that it is stress, lifestyle and so on, then you have to prove that food habits or the nutrition is the main point that has changed. So talking about that, you do not have clear evidence that organic food increases the fertility.

I am very grateful for the remarks of Lynda Brown. She told us that nowadays people have not taken over the duty or responsibility of their own nutrition and they would like to put it in the hands of pharmacists or medical doctors, and therefore they are buying functional foods. My personal view - and of course each scientist has a personal driving force while he or she is working - is that I think putting nutrients to products will not improve the health of the person eating that product and I think our research will be joined by protesting companies and scientists being in the processing business because then you have to prove that matrix bound already grown foodstuffs and nutrients matrix bound have another impact. I think that will be one of the topics we are going to research in the next few years just to say to the people you have to do it yourself, take on the responsibility for your own life, you cannot put it in the hand of pharmacists.

Lynda Brown

One of the things I wanted to raise was that for me what we are talking about is: **is organic food healthier?** What we do know for example in this country is that people who take box schemes eat more vegetables, start cooking more vegetables, start thinking about their diet differently, start cooking more, they then move on to the meat, etc. So you could say, I believe passionately that we do have to take the responsibility for our own health on our own shoulders, everybody needs to do that and if you really want good health you basically have to eat real food, produced in ways which are not going to cause ill health and it is as simple as that. Inadvertently although we can come up with every single cutting edge method under the sun, in the long



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run if through eating organic food sets off that chain of events, that says to me personally that organic food has more than justified its presence on earth.

It is the same with school meals, if you think about it, we have now had a huge interest all of a sudden in school meals and it is the organic movement which has fuelled that interest and if you look at the recent food issues in this country, again it is the organic movement which has been a catalyst for addressing those issues, so I would say very definitely organic food and farming has already proved itself in the health stakes and the more we can do to encourage everybody - wait a minute, this is me, this my body, this is my food I am putting inside my body - the buck starts and stops with me, then I think the faster we will move the whole debate forward.

Dr Strigner

I want to pick up a couple of things. Angelika, your comment about the significance of the food matrix is possibly the most important things that has been said today. Part of the reason that the recent research on mineral and vitamin supplementation is coming up with a string of negatives and in some cases, even toxic effects, is because what is pharmaceutically derived and fed back by a very small cartel of companies, is actually dead. There is nothing in nature ever that is presented without it being in the matrix form that is, fully bonded. It was recently taken to the Supreme Court in the US and it was found and proven to everybody's satisfaction that the food matrix form is the closest to what might be termed food of anything that is currently on the market and until such time as that is fully understood we won't be able to make the progress that you are talking about, and it is for that reason that a lot of the research has been leading nowhere.

I wondered whether if you are all aware of some of the other methods of visualising the living nature or content of both food and living organisms gas discharged visualisation for example, and by infra-red spectroscophy, some of which are generating very interesting objective repeatable and measurable images and mathematical formulations of the differences between organic and non-organic foods. I am a physician and at the end of the day what counts is whether people get better.

One of the greatest stories that I have is of the most senior community psychiatric nurse in Glasgow who came to me having had three re-sections of colon for ulcerative colitis. She is now drug-free, she has no symptoms and the only thing that was done in the first instance was to change her to an organic diet. She was a totally sceptical individual but she was willing to try with us and within 4 months the symptoms had turned around and I think there are probably a number of physicians who are in this position. We ignore, at our peril, the wellbeing and experience of our patients and there is a wealth of scientific technology that enables us to monitor that, especially in the psychological fields so I would behave everybody to look at what we are already doing.

Jason Gathorne-Hardy

One point which seems to have come up several times and that is the use of organic farming as opposed to conventional farming - the language. I would argue that it is a real misnomer to call what most farming is at the moment "conventional". It is not, it is a very recent phenomenon and I don't think it should be used. I think what is being described as conventional farming would be more appropriately described as modern chemical farming and what people are describing as organic is actually very traditional with a very longstanding history which has a lot of repercussions.

I think another point that has come up is that food is essentially about nutrition and I would say that a lot of modern processed food may be edible but I don't know if it has much nutritional value.

Peter Melchett - there is an argument for saying that chemical farming is now becoming a bit old fashioned.

A delegate

I think I need a bit of help from the audience and the panel as well. We have touched on it several times - the thing about organic food is that is that jumbles up or links up with cooking and with a positive attitude and with learning how to do interesting things with cabbage and all kinds of interesting things that reductionist scientists would call "variables" that they want to exclude from the research in order to get at what the real thing is with organic food and I am locked in this circular thing because I believe as Lynda does and as Juliet does, and as I am sure all of us do, that the thing about organic food is that it is not just the food, it is everything that goes with it. But when you talk to reductionist scientists about that they say no they are



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extraneous variables and try to get rid of all of that. I don't know which is why I need everyone's help - how to get out of that round and round argument that I keep having with reductionist scientists.

Robert Duxbury, True Food Values

I just wanted to pick up on this point that was raised about organic and conventional. I think Lynda also raised it earlier on and I am not sure about this setting against one against another that we seem to have here. I see maybe that it is more to do with a continuum from intensive to extensive and I am just wondering whether there is an element of barrier creation in setting this up as an organic-only project and perhaps by opening up this wider vista of extensive to intensive might just bring in conventional interests and engage them more fully than might otherwise be the case.

One further point is that I have heard no mention of the word value or worth today and I am not quite sure how it does fit in, only to say that clearly there is a whole section of consumer base that doesn't buy organic food because it is too expensive. I would like to see some kind of linkage here to creating more justification for the value of organic food, yes nutritional value, health value but also maybe to do with the price value. I made my business - True Food Values - partly because of an indulgence of that interest and it will be interesting to see if that theme can be developed as well.

Kirsten Brandt

I think I will come back to one of the things which was mentioned several times about the understanding of the supplements and minerals and vitamins and isolation on the one hand, and then the health value of food on the other. If we have food, like my example of carrot, and we do lots of experiments and we find out that this orange piece of carotene vitamin A precursor in the carrot, if we give that to people in isolation then it does not reproduce the effect of the carrot. Everybody in science knows that is the situation. There are, in principle, two different explanations. One is that the nutritional value of the carrot is simply the sum of the chemical constituents that there would some other chemical constituents in the carrot than the betacarotene - and that is a reason why if you have isolated betacarotene that is one effect and if you have another because the whole carrot has some other constituents. That is one way of looking at it.

The point is that this is one possible explanation but if it is not the case then of course the other possibility is that the health effect of the carrot is not directly related to the chemical constituents. The way it is looked at from the rule of thumb in science says that normally the simplest explanation is likely to be the right one so that is the reason why I prefer the one with the simple chemicals because it is simply easier to grasp for someone like me.

The other thing about why I like to see it this way is that for science it is very disappointing that we somehow have taken on the responsibility to understand how nature works and when we realise that we do not understand what is going on, well it is very dissatisfying. You feel that you are not doing your job properly so this is quite important for us to find out these things but we don't just do it for our own vanity. If we can for example find out that it is either some chemical component in the carrot or it is some picture forming property which can be measured in some way, either explanation which is directly proportional to the effect of the carrot on the health. Then we can go out and we can look at different production systems whether comparing organic and conventional or compare different ways of doing organic agriculture or conventional agriculture and say which one is better for health and which is not . To me, understanding how the food you eat affects your health does not take anything away from the joy of food that tastes good and I like cooking just as much even though I know a lot about how these different molecules change after cooking. It doesn't take anything away fortunately.

Of course while you are doing your experiments you have to exclude the extraneous factors but that doesn't mean that you don't think they are important, it is just that you can only have one at a time. But if after you have taken them one at a time if you cannot then put everything back together and if the puzzle doesn't fit then that you have not been doing your reductionist science well enough and you have to go back and start all over again. It is only if it all fits together and then that is a holistic situation where we do understand that both the whole and which is more than a sum of the parts so I don't really see this as a confrontation, I think what is important is to get down to the bottom end of it to find out how do these things fit together, where are the crucial differences, so that we can go out and say we understand how the food affects health and then we can make say one kind of food is better than the other. Then we can improve organic food and also improve the conventional food and first of all, that is one of the things which I think will come as soon as we can explain why plants would grow and mature slowly, why they have a different constituent which affects health, and why people have to pay them extra money for food which is grown in a slowly normal way rather than food which is being paced along and ends up being mostly water. That is one of the things we will be able to document once we get to the bottom of it.



(taken from the transcriptions - with apologies if some areas are not too clear!)

Peter Melchett on GM

I think it is not going to undermine any of this or be a threat to any of it partly because the first generation of GM crops have now clearly failed and they failed to the extent that what was supposed to be the hot bed of GM enthusiasm has prevented the next GM wheat crop being developed at all. It has been banned in the US and Canada and because pesticide use is now clearly rising quite rapidly in the US, on the back of what were meant to be pesticide-resistant crops which would reduce spray use.

But more interestingly in the context of today's discussions, I think is to think about the second generation of GM crops, for example the Golden Rose which had betacarotone gene added to it in the theory that this would then deliver vitamin A very efficiently and have the same effect as people eating vegetables rich in vitamin A. If what Kirsten said is right then there does seem to be good science emerging on this but that things do not work in isolation in that way, in terms of affecting human health and in terms of what we eat.

The whole of the second generation of GM crops are doomed to fail because all of them depend on moving very precise characteristics expressed by a particular gene. This is the theory which geneticists have into something where it will then express successfully and impact positively on human health. Now everything I think you have heard today suggests that that is flawed fairly seriously. There are other reasons why it probably won't work, to say nothing of the dangers and risks and uncertainties, but what you have heard today is a very good argument against second-generation GM crops.

Peter Melchett closing said that it had struck him that an awful lot depends as it always does in science and politics and everything else, that how you frame the question and the question we were talking about today was essentially, is organic healthier, there is another way of addressing that question, which is to say something along the lines - lots of people eat organic food and we know that many of them do it because they believe that it is much healthier than non-organic food. There is absolutely no scientific evidence whatsoever to suggest that people are wrong in that belief.

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