

Kill all known germs

Organic farming must ditch its irrational mistrust of science or risk losing its reputation as being safer and healthier, says **Dominic Dyer**

I WORKED closely with the organic industry for almost a decade, first as head of the UK Food and Drink Federation's Organic Food Manufacturers Group and then as a representative on the UK government's Organic Action Plan Committee. I believe that the growth in the organic food sector has brought many benefits to farmers, food producers and consumers around the world.

The market for organic food has developed rapidly over the past 20 years as more consumers have become willing to pay a premium for products they consider to be both healthier and better for the environment. Although the recent economic downturn has led to a significant reduction in organic food sales, there are now over 170,000 organic farms in Europe, covering almost 2 per cent of the total agricultural land.

The organic industry can be proud of its achievements in putting animal welfare, environmental protection, traceability and food quality at the heart of the farming and food agenda.

However, in recent years I have become increasingly concerned by the willingness of the organic industry to market its products as both a healthier and safer alternative to conventional food production. They are not. In fact, by shunning science, organic producers could be increasing consumers' risk of contracting *Escherichia coli* and other food-borne diseases.

The recent fatal *E. coli* outbreak centred on Germany has focused



attention on the validity of the claims that organic food is healthier and safer. The outbreak has been traced to bean sprouts grown on an organic farm in Bienenbüttel, northern Germany. As *New Scientist* went to press, 35 people had died in the outbreak and thousands more were made ill. As a result, concern is growing over standards of microbiological food safety in organic farming.

So are we at higher risk of *E. coli* and other food-borne diseases from organic food and, if so, what can producers do to reduce this risk and restore confidence in the organic brand?

There have been very few scientific studies comparing the

are susceptible to contamination by pathogenic microorganisms at every point in the food chain. It can occur during production, from manure and water, during processing from environmental sources and during the final handling and packing, possibly as a result of poor human sanitation.

One area where organic production systems might pose a higher health risk is through the use of untreated manure as fertiliser. Studies carried out on organic and conventional produce by Minnesota farmers in 2004 found that *E. coli* contamination was 19 times greater on organic farms which used manure or compost less than 12 months old than on farms which used older materials.

Although the risks are reduced as manure matures, researchers have found that many pathogenic organisms such as *E. coli* and salmonella can easily survive up to 60 days or more in compost and in the soil, depending on temperature and the condition of the soil.

Another extra risk factor in organic production is the avoidance of fungicides, which can lead to the growth of moulds and increased risk of mycotoxins such as aflatoxin and ergot in crops.

Taking these risks into account, and with recent events in Germany in mind, I think organic food producers need to focus on risk management. More research should also be done into pathogen survival in the food chain.

I also believe that the organic industry must put aside its

microbiological safety of organic and conventional food production systems. In theory, organic food could be more prone to microbial contamination due to the absence of preservatives and the use of manure as fertiliser. However, where studies have been carried out, the results have not been conclusive. This is due to a number of factors, including a small sample size and a failure to factor in seasonal and regional variations.

What is clear is that both organic and conventional foods

“Organic food could be more prone to microbial contamination due to using manure as fertiliser”

suspicion and mistrust of science in food production and look at how it can introduce new systems that reduce the risk of future outbreaks of deadly food-borne diseases such as *E. coli*.

The real tragedy of the *E. coli* incident in Germany is that the outbreak could have been prevented if the organic industry had been willing to irradiate their produce. The bean sprout crop that was the source of the outbreak requires a warm and humid environment to grow, which increases the risk of contamination by *E. coli* and other disease-causing bacteria. The only certain means of reducing this risk is to irradiate the bean sprout seeds, which effectively kills 99.999 per cent of *E. coli*. There is no evidence that food irradiation is harmful to consumers, and also no evidence that it affects the nutritional quality of food.

Despite these facts, the organic industry continues to lobby against the use of irradiation. When President Bill Clinton's agriculture secretary Dan Glickman proposed including irradiation in the US National Organic Standards in 1998 – specifically to reduce *E. coli* risk – the US Department of Agriculture received over 300,000 petitions from individuals and organisations in the US and Europe opposing this move. As a result this provision was removed from the final legislation.

If the organic industry is to retain confidence it must show that it is willing to adopt technologies which put food safety first. If organic food is irradiated then the technology will be more widely accepted across the food chain in general and lives will be saved. That is a goal every food producer should be striving for. ■

Dominic Dyer is chief executive of the UK Crop Protection Association based in Peterborough and has many years experience working with the organic food industry

One minute with... Alex Bellos

What's your favourite number and why? This man who writes and blogs about maths wants to know the answer. Yes, really

Why are you interested in favourite numbers?

I give popular talks about mathematics and I'm often asked about my favourite number. I don't have an emotional reaction to numbers and so don't have a favourite. So at first I was annoyed by these questions but then I became puzzled. I began to ask around and found that lots of people have a personal relationship with numbers. I thought it would be fun to try and quantify this.

So you have set up a website to find out (favouritenumber.net). What kind of response have you had?

It's really caught people's imagination. My survey only launched a few weeks ago and already more than 5100 people have responded. I'm going to leave it up until September or so, to get as many responses from as many cultures as possible. As well as asking people to give their favourite number and describe why they chose it, I also ask where they are from and their age and gender.

What do you expect to find?

I'll be able to say, for example, that x number of people voted for the number 25, that 30 per cent of them were women and break this down by age and country. But the most interesting stuff is the fascinating reasons people give for their choices.

What are they saying about their favourite numbers?

People have given an amazing range of responses. For example, one person might say they like 8 because it has a beautiful shape, another because it is $2 \times 2 \times 2$ and another because that's the number on the football shirt he or she wears.

Are any strange numbers coming up?

Less obvious numbers come up surprisingly regularly. Some are physical constants and there are quite a lot of references to popular culture. For example, the number 73 has a cult following because of a sketch in the comedy show *The Big Bang Theory* in which 73 is described as the "Chuck Norris of numbers", not least because it is a mirror prime: both 73 and 37 are primes.



PROFILE

Alex Bellos is author of *Alex's Adventures in Numberland*, published as *Here's Looking at Euclid* in the US. To enter your favourite number in his survey, and the reasons why you like it, go to favouritenumber.net

Have you seen patterns in the choices?

Patterns seem to be emerging although I haven't done a detailed analysis yet. These patterns raise interesting questions. For example, when people choose birthdays, certain types of date seem more popular than others. Why is this? Others choose a number because it has a certain mathematical property – it is a palindrome, for example. But why are these properties more popular than others?

Why do you think people have favourite numbers?

Humans seem hard-wired to make impersonal things seem personal and so try to personalise numbers by projecting something about themselves onto them. For people who aren't mathematicians, it is a way of feeling in control. I think this touches the issue of why some people are scared of maths and why others love it. Your personality seems to be an important factor in your choice, for example, whether you are superstitious or not.

Interview by Justin Mullins