

# Organic farming and growing impacts on food quality – the Newcastle study

Peter Melchett



**Soil Association**

# The Soil Association 1946



Healthy soil, healthy crops and animals, healthy people





# Scientists Reviewed 343 Studies to see if Organic Food is Better for you. Here's what they Found Out

August 20, 2014 / 42830 views

## **This settles the debate over organic foods.**

Are organic foods really healthier than non-organic foods? Researchers from Newcastle University in England have reviewed and conducted meta-analysis on 343 peer-reviewed studies in an effort to find out if organic foods contained greater nutritional value than conventional foods. **The results will probably shock some, but will confirm what many people already knew; organic foods are indeed much healthier for human consumption than 'conventional' foods.**

- the history – the FSA study's impact
- the Newcastle meta-analysis
- the reaction
- the crucial take-home message

# Why did the FSA commission research in 2007?

At the time, the Soil Association asked the FSA to wait until a large number of new research projects undertaken under the EU Quality Low Input Food research programme, led by Professor Carlo Leifert of Newcastle University, were published over the next two years (45% of papers in Newcastle study were published after the FSA research).

The FSA refused.

We were later told by the FSA that they were under pressure to carry out the review then – no information on where that pressure came from, but there had been a number of positive individual studies published in recent years.

July 30, 2009 3:00 am

## Organic food industry finds health study hard to stomach

By Jenny Wiggins, Consumer Industries Correspondent

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Organic food is no healthier than conventionally produced food, a report published by the Foods Standards Agency has concluded.

Proponents of organic food described the findings as "disappointing", saying more research was needed, particularly on the implications of pesticide use.

The report is the result of a systematic review by the London School of Hygiene and Tropical Medicine of literature on the nutritional content of organic against conventional food.

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## 'Organic nosh not healthier'



Trendy ... organic grub



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## Anger as organic claims shot down



metrowebukmetro Wednesday 29 Jul 2009 7:30 pm



**A row erupted after an independent review concluded today that organic food is no healthier for you than other produce.**

The findings sparked outrage because the study focused on nutrients and did not compare pesticide levels.



Organic food is not more nutritious for you


The research carried the stamp of authority because it was carried out for the Food Standards Agency and looked at findings published over 50 years.

# Organic food 'no healthier' than conventional produce, reveals watchdog

By FIONA MACRAE FOR THE DAILY MAIL

UPDATED: 09:58, 30 July 2009



 [View comments](#)

Organic food is no more healthy or nutritious than other food, watchdogs declared yesterday.

The Food Standards Agency's ruling, which follows the world's largest study into the subject, will be a huge blow to the booming organics business.

It will also dismay the millions of Britons who spend more than £2billion a year on fruit, vegetables, eggs and meats produced without the aid of pesticides, artificial fertilisers and intensive farming techniques.



**Tasty: But the FSA says eating organic vegetables does not have significant health benefits**

They pay up to 10p a pint more for organic milk, while organically reared chickens can cost nearly three times as much as those from battery farms.

The analysis of 50 years of research into organic food was quickly rejected by the Soil Association, Britain's biggest certifier of organic foodstuffs.

## **What we did in 2009:**

The Soil Association did more than 15 broadcast interviews, e.g. BBC News (radio and TV) at 6pm and 10pm, and ITN; loads of regional radio, Radio Wales, Radio London, Radio 5 Live, Radio 5 Drive Time, the World Tonight.

The Soil Association response was sent out to around 500 journalists within a few minutes of the FSA press conference.

Following the launch of the FSA research the Soil Association talked to more than 50 journalists, giving the Soil Association response and talking about all the benefits of organic food and farming.

## What we did in 2009:

The Soil Association debated the FSA study with Professor Dangour at a meeting of the All Party Group on health in the House of Commons, and he was challenged by scientists at an EU scientific meeting in Brussels.

But we were clear that the huge damage done by the FSA research, in the UK and world-wide, could only be undone by a new meta-analysis which could include all the new scientific papers published after Dangour's cut-off date in 2007.

With EU funding, and the crucial support of the Sheepdrove Trust, that is what Professor Carlo Leifert and his international scientific team did.

## What we didn't know in 2009:

The FSA study omitted a number of relevant studies – all replicated field trials, studies not reported in English, and some they simply missed.

The FSA study used statistical tests that were not the strongest, and lumped crops, milk and meat together which increased variation in results.

Even so, the FSA research found positive trends for many beneficial nutrients in organic food.

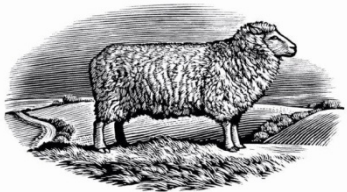
They avoided mentioning this, simply saying they had found no **significant** differences.



# New evidence for organic food having a better **nutritional composition**

**Carlo Leifert**

**Nafferton Ecological Farming Group (NEFG)**



Sheepdrove  
Trust



COMMUNITY RESEARCH

**Peter & Juliett Kinderley**

# New evidence for organic food having a better nutritional composition

Barański, M., Średnicka-Tober, D., Volakakis, N., Seal, C., Sanderson, R., Stewart, G.B., Benbrook, C., Biavati, B., Markellou, E., Giotis, H., Gromadzka-Ostrowska, J., Rembiałkowska, E., Skwarło-Sonta, K., Tahvonen, R., Janovská, D., Niggli, U., Nicot, P. and Leifert, C. (2014)

**Higher antioxidant and lower cadmium concentrations and lower incidence of pesticide residues in organically grown crops: a systematic literature review and meta-analysis.**

***British Journal of Nutrition* online; 2014**

(doi:10.1017/S0007114514001366)

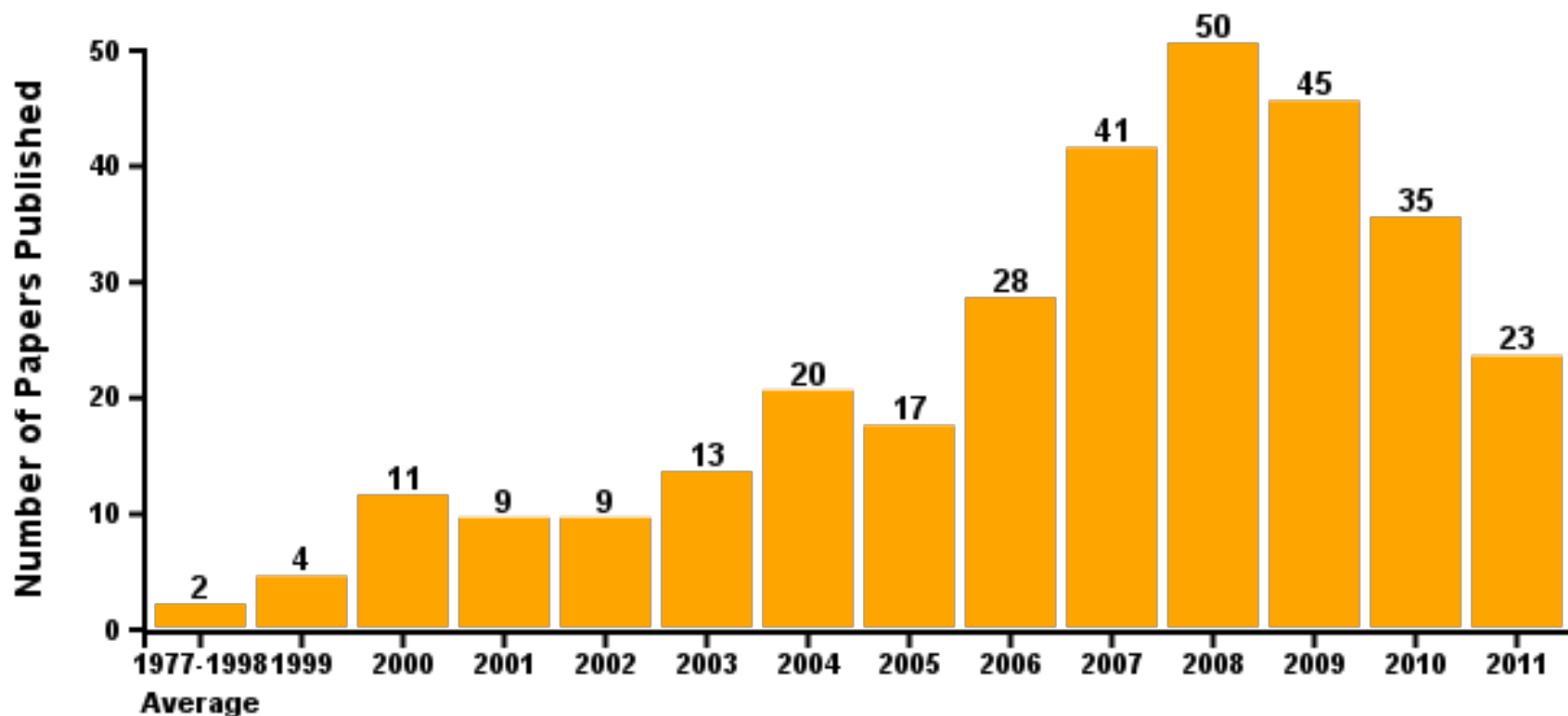
**For more information see:**

**<http://research.ncl.ac.uk/nefg/QOF>**

**Systematic literature review: 343 peer-reviewed papers**

**FSA study (Dangour et al. 2009): 46 papers only!  
(on crops, meat and dairy)**

**Figure 1: Number of Papers Published by Year**



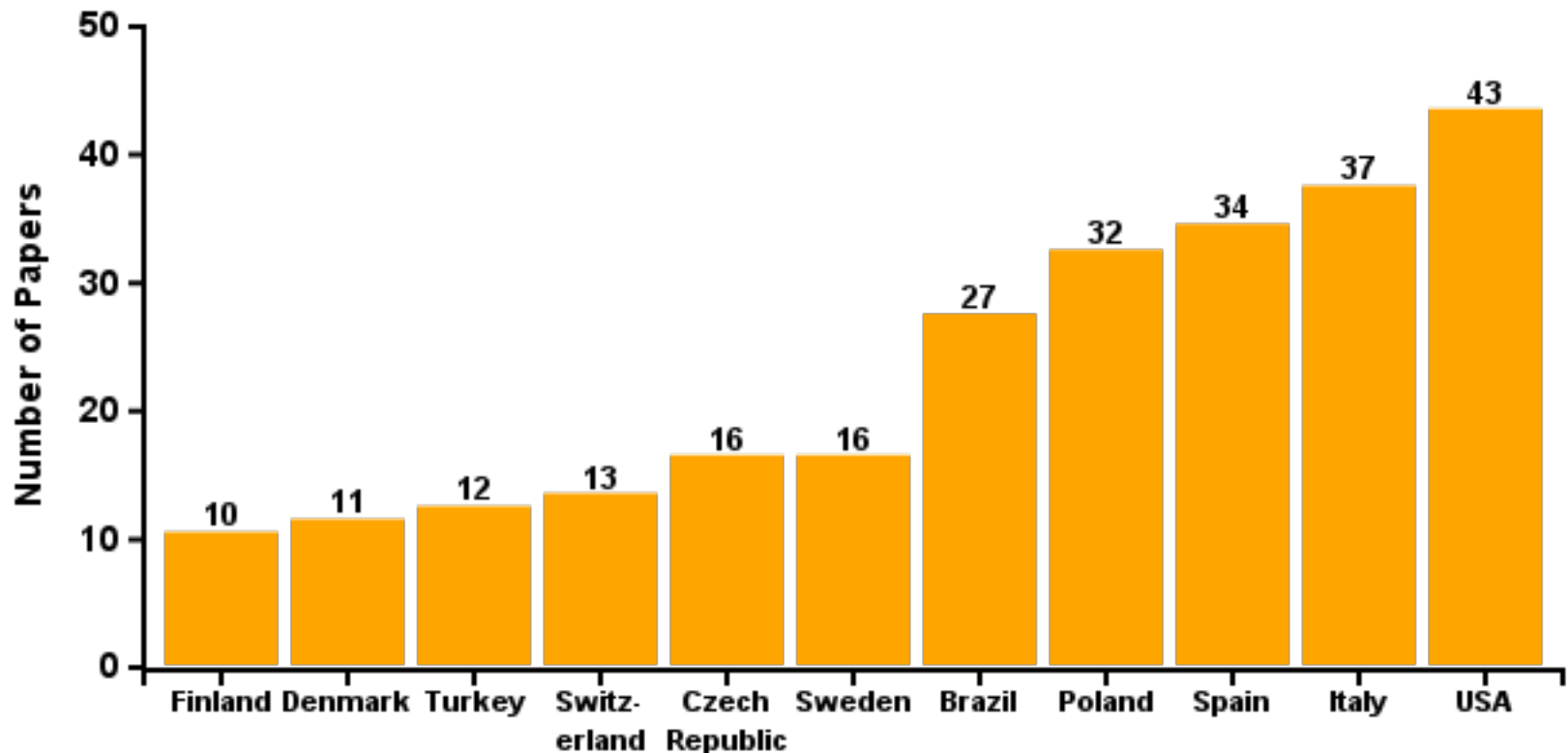
**Notes:** 17% of studies were published before 2002. 45% were published from 2008-2011, and since the Dangour et al. review, 17% of studies from 2010-2011.

**Source:** Supplemental Figure 1 in the published paper.



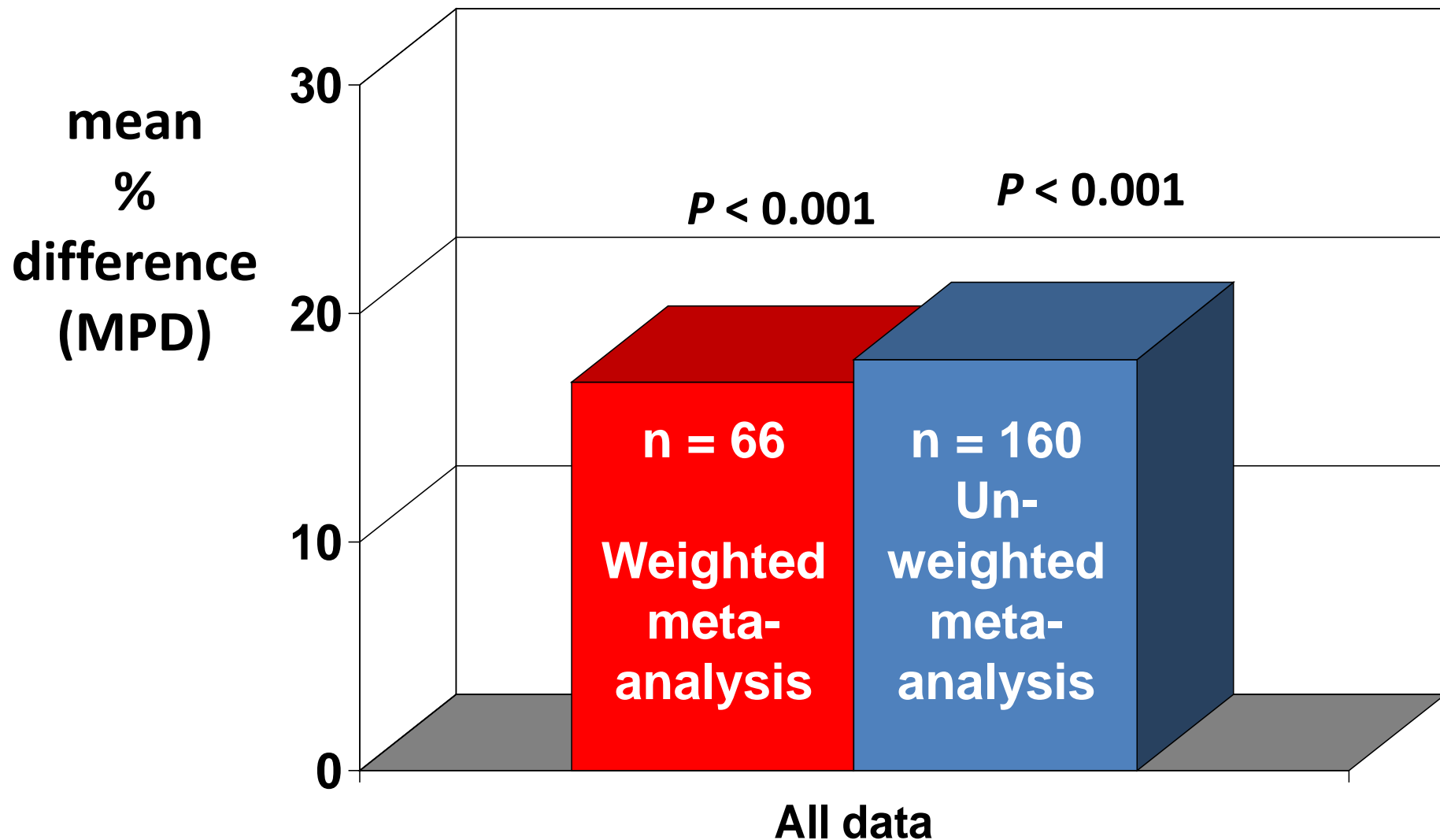
# Systematic literature review: where was the data from?

**Figure 3: 11 Countries from which 10 or more of the Studies Originated**



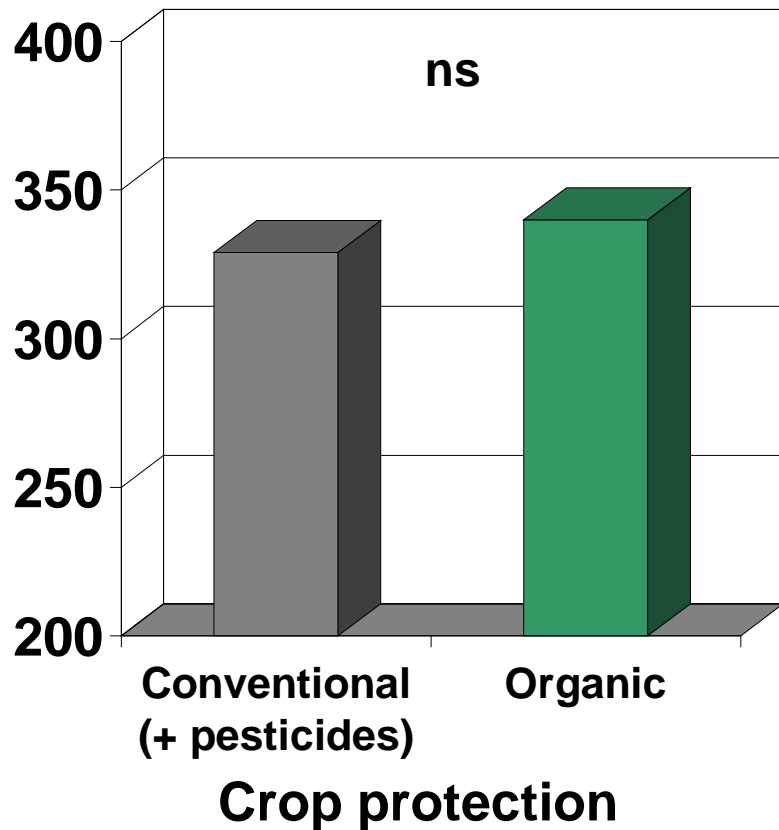
**Source:** Figure 2 in the Supplemental Data of the published paper.

# Primary assessment – antioxidant activity is significantly higher in organic crops

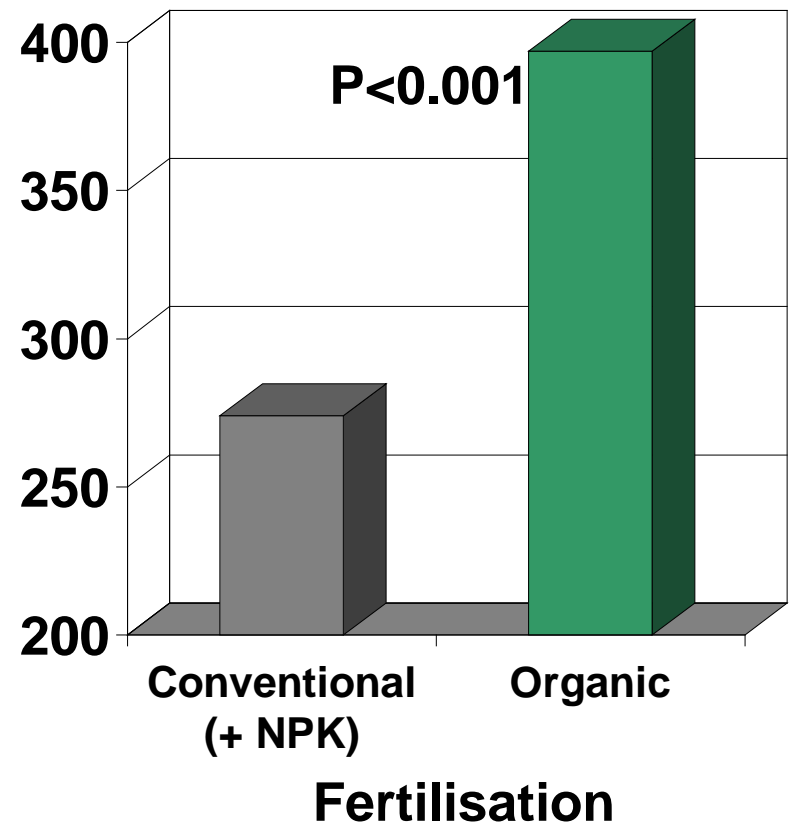


Effect of fertilisation and crop protection on the **glycosinolate** content in cabbage (average of 2 seasons)

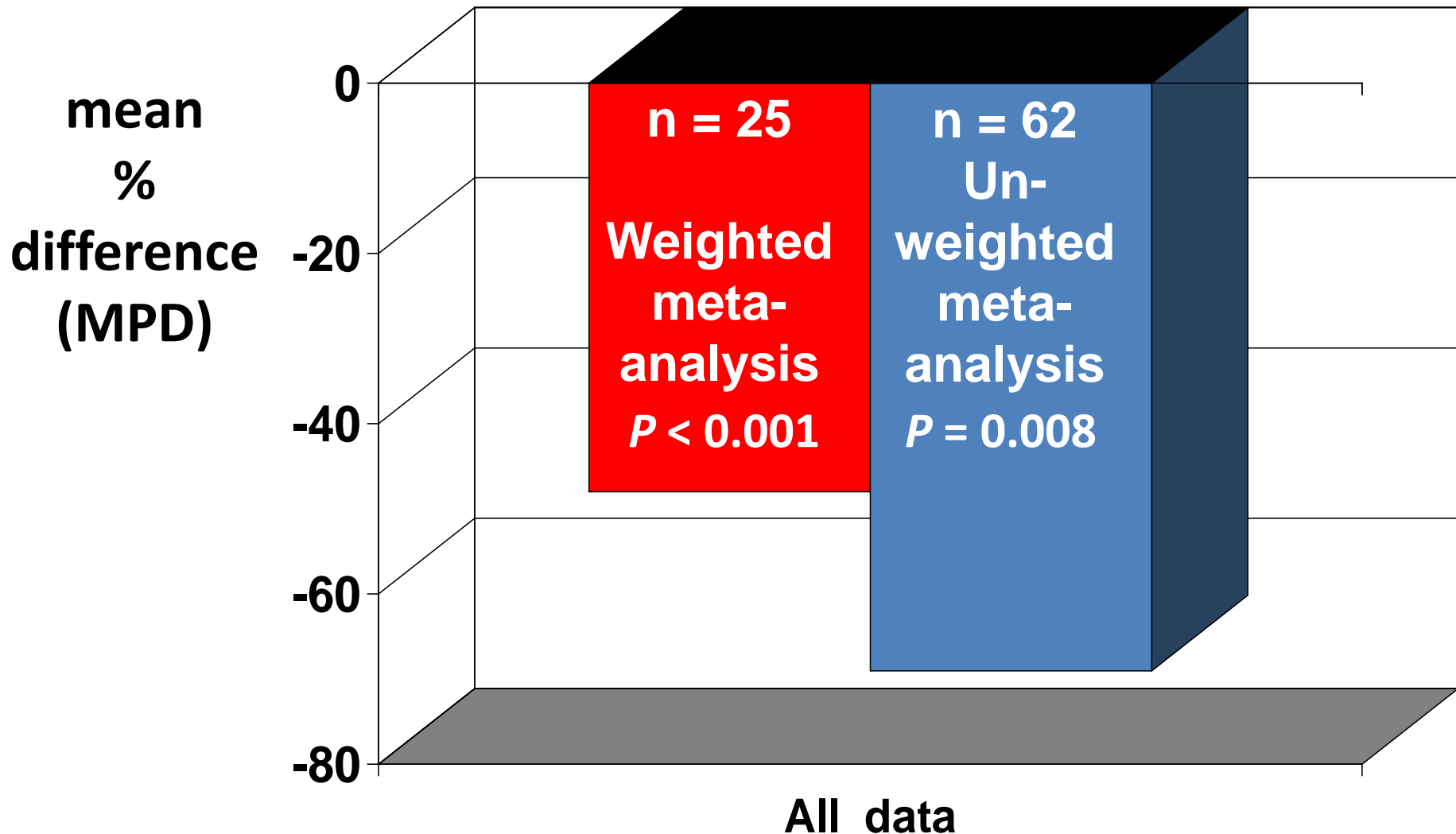
mg kg<sup>-1</sup>  
fresh weight



mg kg<sup>-1</sup>  
fresh weight



# Primary assessment – cadmium concentration are significantly lower in organic crops

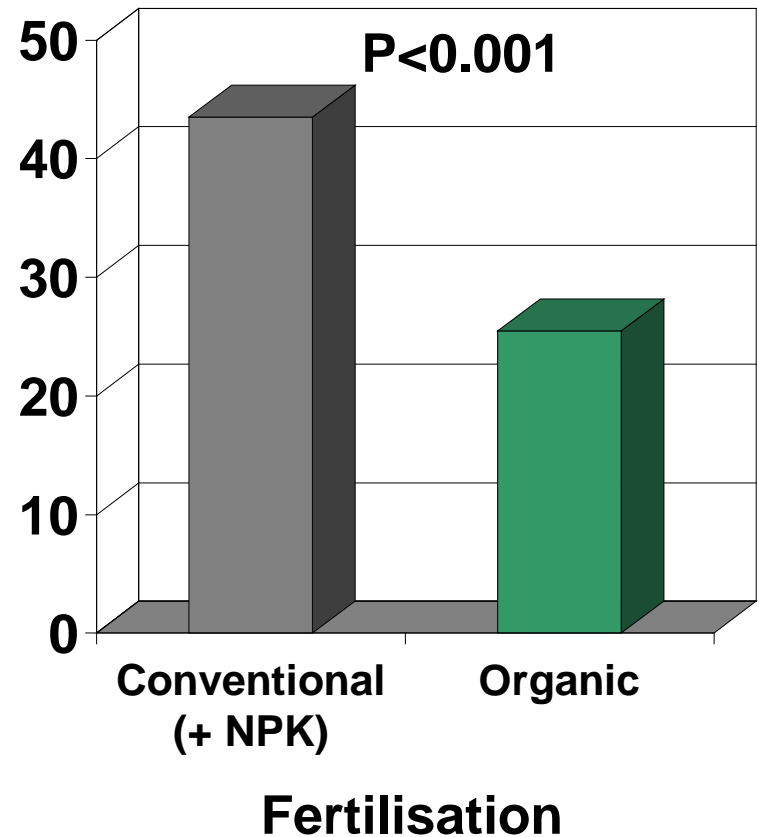


# Effect of fertilisation and crop protection on the **Cadmium** content in potato (mean of 4 years data)

- mineral P-fertilisers contain cadmium (Cd)
- a range of scientific studies showed a close link between P-fertiliser use and cadmium concentrations in crops

(Cooper et al. 2011)

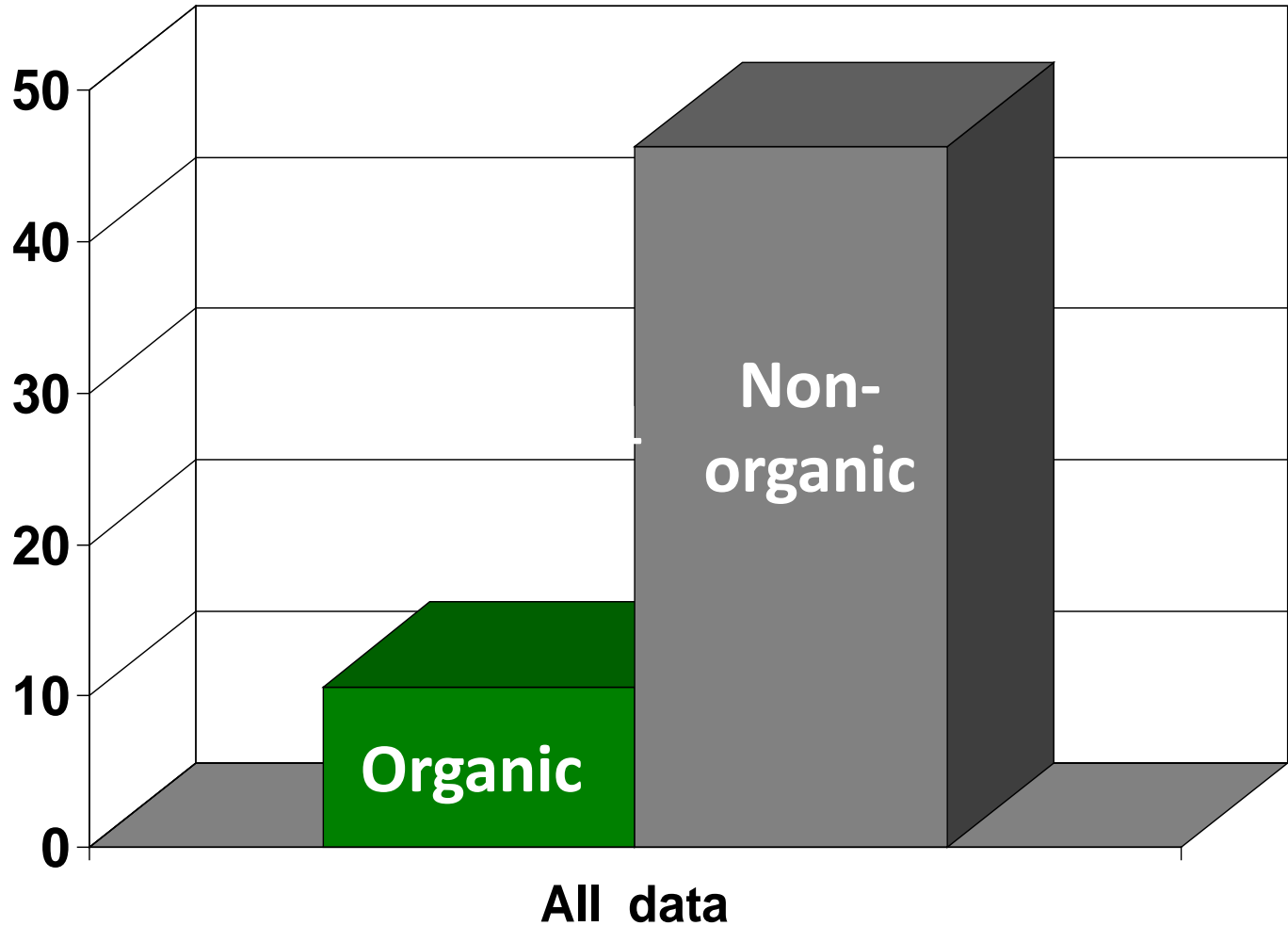
$\mu\text{g kg}^{-1}$   
fresh weight



# Primary assessment – pesticide residues are less frequently detected in organic crops

$P < 0.001$   
(n = 66)

%  
positive  
samples



# Pesticide concentrations in organic and conventional crops

- There were too few studies/data-sets to compare **pesticide concentrations** in organic and conventional crops
- In the few individual studies where pesticide concentrations were compared, **concentrations in conventional crops were 10 to 100 times higher**
- **Why is the frequency of pesticide residues lower in organic crops?**
  - The use of synthetic chemical pesticides is prohibited in organic farming
  - **Organic farmers stick to the rules!!!!**



# Is there any evidence that organic **crop-food consumption** has a **positive impact on human health?**

- **until recently**, there were no cohort or dietary intervention studies into the effect of organic crop food consumption
- these types of studies are extremely expensive
- now there is evidence from **one Norwegian cohort study** linking organic vegetable consumption to a **lower risk of pre-eclampsia** (which is a major reason for maternal and perinatal morbidity/mortality worldwide)



# Global coverage

- the summary of global coverage runs to 57 pages
- key targets were the New York Times and the BBC science website – blanket coverage in the UK, including a full page in the Guardian
- the Newcastle University press office did a great job – their press release and the Abstract were immediately available in 19 languages
- Professor Chuck Benbrook in the USA and Dr Urs Niggli in Germany, Switzerland and Austria, secured excellent coverage
- we also know of coverage in Canada, France, Ireland, Italy, Spain, Belgium, Denmark, Greece, Poland, Armenia, Mexico, Brazil, Argentina, Paraguay, Bolivia, Venezuela, Russia, India, Australia, New Zealand & China

# Four quick final points

- manufactured fertiliser to blame
- growing emphasis on healthy diets and food
- we still need to eat more fruit and veg
- the crucial take-home message





Easi-Cut

20.8.14

20.8.14



**Easi-Cut**



**EEC FERTILIZER**

**NPK FERTILIZER**

20.8.14

Net Weight	50kg
Net Content	50kg
Net Weight	50kg
Net Content	50kg
Net Weight	50kg
Net Content	50kg



*“The food we offer is often the first sight a patient or visitor gets of whether a hospital is good in other respects. Food and medical care must not be separated; **food is medicine, the food we offer is part of our treatment** – I urge all our commissioners to embrace the hospital food CQUIN and make good food part of what we do”.*

*Dr Michael Dixon, Advisor and Past President,  
NHS Clinical Commissioners*

Scenarios	Yields		Demand-side reductions	
	Current trends in yields	Yield gap closures (sustainable intensification)	50% food waste reduction	Healthy diets
CT1	×			
CT2	×		×	
CT3	×		×	×
YG1		×		
YG2		×	×	
YG3		×	×	×

The Current Trends (CT) scenarios assume yields in each region will continue to increase at current rates<sup>4</sup>. The Yield Gap (YG) scenarios assume that sustainable intensification will achieve yield gap closures<sup>10</sup> in all regions. Both yield scenarios are set against three different options on the demand-side: no changes to the system; a 50% reduction in food and agricultural waste; and waste reduction as above plus a move towards healthy diets, meaning the average consumption of sugar, oil, meat and dairy is limited according to expert health recommendations<sup>37-40</sup>.

# Business as usual cannot be an option

## Importance of food-demand management for climate mitigation

Bojana Bajželj<sup>1\*</sup>, Keith S. Richards<sup>2</sup>, Julian M. Allwood<sup>1</sup>, Pete Smith<sup>3</sup>, John S. Dennis<sup>4</sup>, Elizabeth Curmi<sup>1</sup> and Christopher A. Gilligan<sup>5</sup>

Business as usual

Healthy diets  
Waste, technology

	Units	2009 <sup>*</sup>	CT1	CT2	CT3	YG1	YG2	YG3
Cropland	Mkm <sup>2</sup>	15.6	22.2 (+42%)	19.2 (+23%)	18.2 (+17%)	16.4 (+5%)	14.2 (-9%)	13.7 (-12%)
Pasture	Mkm <sup>2</sup>	32.8	37.1 (+13%)	33.7 (+3%)	25.4 (-23%)	37.7 (+15%)	33.9 (+3%)	25.8 (-21%)
Net forest cover <sup>†</sup>	Mkm <sup>2</sup>	26.1	22.6 (-14%)	23.9 (-8%)	26.0 (-0%)	24.0 (-8%)	25.9 (-1%)	27.2 (+4%)
Tropical pristine forests	Mkm <sup>2</sup>	7.9	7.2 (-10%)	7.3 (-8%)	7.5 (-6%)	7.5 (-6%)	7.7 (-3%)	7.7 (-3%)
Total GHG emissions	GtCO <sub>2</sub> yr <sup>-1</sup>	11.4	20.2 (+77%)	15.7 (+38%)	9.3 (-19%)	16.2 (+42%)	11.7 (+2%)	5.9 (-48%)
Fertilizer use	Mt yr <sup>-1</sup>	106	154 (+45%)	136 (+29%)	125 (+18%)	190 (+79%)	161 (+51%)	145 (+37%)
Irrigation water use	km <sup>3</sup> yr <sup>-1</sup>	2,890	6,370 (+120%)	5,410 (+87%)	5,270 (+82%)	4,500 (+56%)	3,830 (+33%)	3,790 (+31%)

Percentages in brackets are relative to values in 2009. In the two scenarios with no demand management, cropland area increases for 5-42%, pasture for 13-15%, there is significant deforestation and an increase in GHG emissions. YG scenarios fare better across the indicators, with the exception of fertilizer use. Demand reduction measures on the other hand improve all indicators. \*Showing middle values<sup>22,34,2,49</sup>, uncertainty ranges are up to ±70%. †Excluding boreal forests.



Organic  
versus  
Non-organic

**A NEW EVALUATION OF  
NUTRITIONAL DIFFERENCE**

*Crops*

## At a glance – organic vs non-organic

- **Production method affects quality:** This new analysis is the most extensive and reliable to date and clearly supports the view that the quality of food is influenced by the way it is produced.
- **More of the good, less of the bad:** Organic crops and processed foods (such as bread, baby food, fruit juice and wine) have more desirable antioxidants/(poly)phenolics and less potentially harmful cadmium, nitrogen and pesticide residues than their non-organic counterparts.
- **Health benefits:** Plant antioxidants and (poly)phenolics are of scientific interest due to strong evidence of beneficial effects on human health, including potential protection against cancers, diabetes and cardiovascular and neurodegenerative diseases.\*
- **Reduction in pesticides:** Organic food consumption can reduce exposure to synthetic pesticide residues. This study found that the frequency of occurrence of detectable pesticide residues was four times higher in conventionally produced rather than organic crops.\*
- **Organic IS different:** The new study, therefore, clearly shows that there are meaningful nutritional differences between organic and non-organic food.



## Higher concentrations of antioxidants/(poly)phenolics

There is strong scientific evidence that there are health benefits to eating a diet rich in (poly)phenolics and antioxidants. Studies have linked an increased intake to protection against chronic diseases, including cardiovascular and neurodegenerative diseases and certain cancers.

While no-one should decrease their consumption of fruit and vegetables, for anti-oxidants, switching to organic crop consumption



is equivalent to eating one or two additional portions of fruit and veg per day because, with greater nutrient and antioxidant density, every mouthful... counts for more.

*“The crucially important thing about this research is that it shatters the myth that how we farm does not affect the quality of the food we eat.”*

**Helen Browning OBE, Chief Executive, Soil Association**



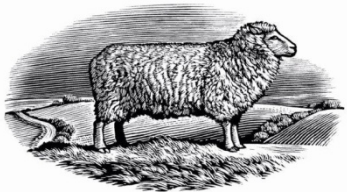
*Neal's Yard Remedies is a proud supporter of the Newcastle University-led study and its findings*



# New evidence for organic food having a better **nutritional composition**;

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