

**Organic Congress 2009 - Odense, Denmark**

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***Organic Food & Health***  
***The good news and the bad news***

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# ***Organic Food & Health Research***

## ***Facts & Challenges ahead***

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I N S T I T U T E

***The question with high societal interest:  
“Is organic more Healthy?”***

***The bad news: we cannot prove that (yet?).***

***The good news: the “Body of Evidence”  
is growing***

# **”Body of Evidence” ???**

*= In science this means the increasing amount of research results that point in the same direction.*

*> Which results do we have so far?*

# *Organic Food & Health Research*

## Two types of Health Research Lines:

1. **Nutritional Value** comparisons = contents of **compounds**, *desired and not-desired*
2. **Health effects** on living organisms after **consumption** of foods

## **Review of the literature:**

- On 1. more than 200 studies
- On 2. only a few studies!

*A short overview of both:*

# 1. Nutritional value 1 – Org vs. Conv.

## *Desired compounds*



<b>Protein</b>	<b>10-20%</b> ↓	<b>Grains</b>
<b>Healthy fatty acids (CLA, omega 3)</b>	<b>10-60%</b> ↑	<b>Milk, dairy</b>
<b>Vitamin C</b>	<b>5-90%</b> ↑	<b>Leaf vegetables, Fruits</b>
<b>Sec. plantmetabolites (flavonols, polyfenols, glucosinolates, carotenoids)</b>	<b>10-50%</b> ↑	<b>Fruits, Certain vegetables, e.g. tomatoes, maize, wine</b>
<b>Dry matter</b>	<b>Max. 20%</b> ↑	<b>Vegetables</b>

**Source: more than 200 studies, QLIF included**

***Note: Big variation between studies!***

# 1. Nutritional value 2 – Org vs. Conv.

## *Undesired compounds*

<b>Residues of pesticides</b>	↓	<b>Vegetables, grains, fruits, wine, etc.</b>
<b>Residues of antibiotics</b>	↓	<b>Milk, meat</b>
<b>Antibiotic resistant bacteria</b>	↓ ↓	<b>Chicken and Pork meat</b>
<b>Mycotoxins</b>	=	<b>Grains</b>
<b>Nitrate</b>	↓	<b>Vegetables</b>



# Latest publications of 2009

- **British FSA report and paper (Dangour, 2009):**
  - *Systemic review on nutritional quality for 50 years. From 52.500 articles 55 remained.*
  - *Very much was excluded: studies on pesticide residues, fertilization levels, authenticity studies & if the certification body was not mentioned.*
  - *A mixture of types of studies was analysed: basket studies, farm studies and field trials.*
  - *Conclusions: Conventional more nitrate; Organic more phosphorus and titratable acidity. Further no differences, nor in animal products.*
  - *Result: Large debate between “the most reliable scientific study ever” towards “biased and hiding the positive results in Appendices and saying these are irrelevant”.*
- **French AFSSA paper (Lairon, 2009):**
  - *Based on review from 2003 with additional results since then.*
  - *Conclusions: Organic 50% less nitrate, more dry matter and minerals (e.g. iron, magnesium) and more antioxidant polyphenols. Animal products more polyunsaturated fatty acids. Concerning pesticide residues: 94% - 100% of organic food free of residues.*

- **Question:** *what do these research results about nutrient contents **indicate** in relation to health?*
- *Hypotheses about that exist, but these are often **reconsidered...***
- **Compounds do not deliver the desired proof,**  
*because ...*

Because **the relevant questions** are...

- Does the body take up the nutrient = '**bioavailability**'?  
*Recent studies show that 'desired' compounds in organic products are often not found in the blood.*  
*But also the contrary occurs: not very explicit differences between products, but yet differences found in the blood!*
- And once taken up: what is the '**biological effect**'? *A high blood-level does not guarantee a functionality in the body.*
- For many nutrients an '**optimum**' amount of intake is known. *Too little, as well as too much may be harmful: '**Hormesis**': the desired effect occurs with a certain dose.*
- Plants are considered to contain approx. **75.000 compounds**. *What is the value of the now analysed nutrients, in relation to still unknown nutrients?*

*That is why other types of studies are necessary:*

**Effect studies:**

**In Vitro** (Lab), in **Animals** and in **Humans**.

*Some recent results:*

## 2.1 In Vitro Studies

- Cell proliferation of **cancer cells** decreased on extracts of organic, compared to extracts of conventional strawberries (Olsson, 2006)
- Better repair of damaged DNA in **bacteria** on juices from organic onions, Chinese cabbage and other vegetables, compared to conventional juices (Ren, 2001)

## 2.2 Animal Studies

Feeding studies in the past have indicated that animals have a better fertility, lower bodyweight, higher immune parameters on organic feed.

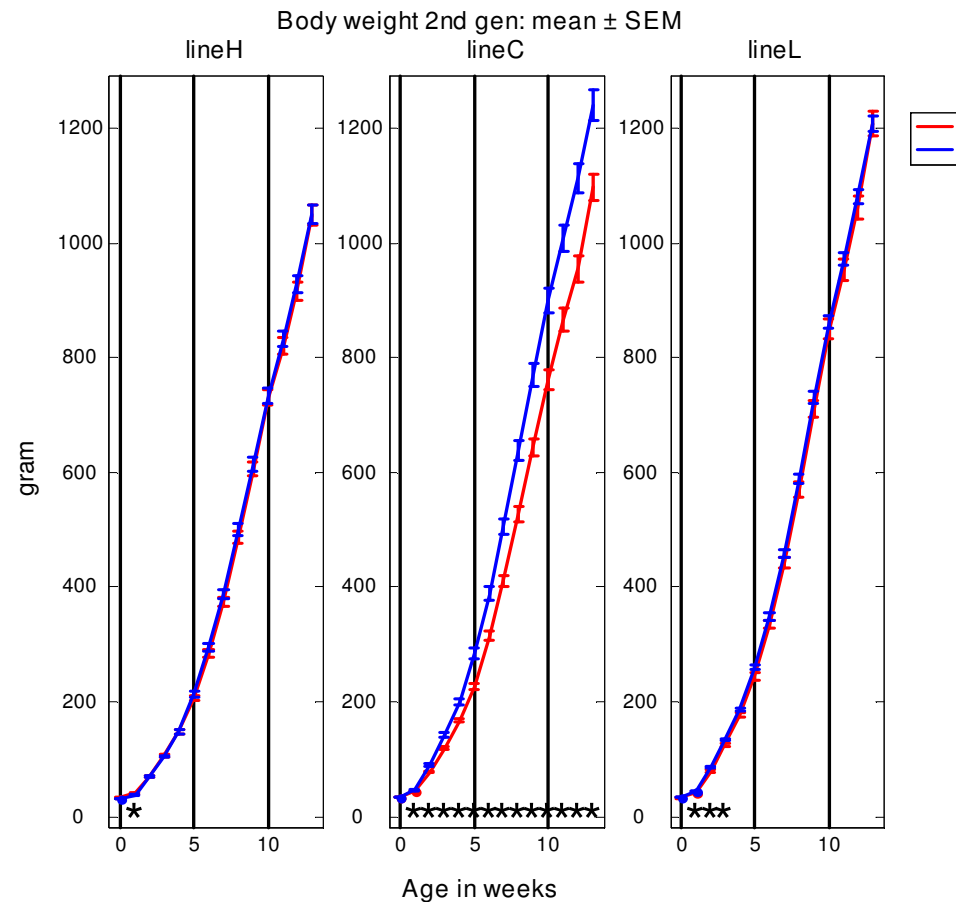
### Most recent:

- *Organic, More Healthy?* (Huber, 2009): A lower body weight, higher immune reactivity (more 'alert') and after a **challenge** a better '*catch-up growth*' in chickens.
- *QLIF*, Rembialkowska et al.: A lower body weight, differences in immune parameters and hormonal status in rats.
- Lauridsen, 2005: Less fat tissue, more IgG (Immune parameter), more relaxed behaviour in rats.

# Organic, More Healthy? - Results

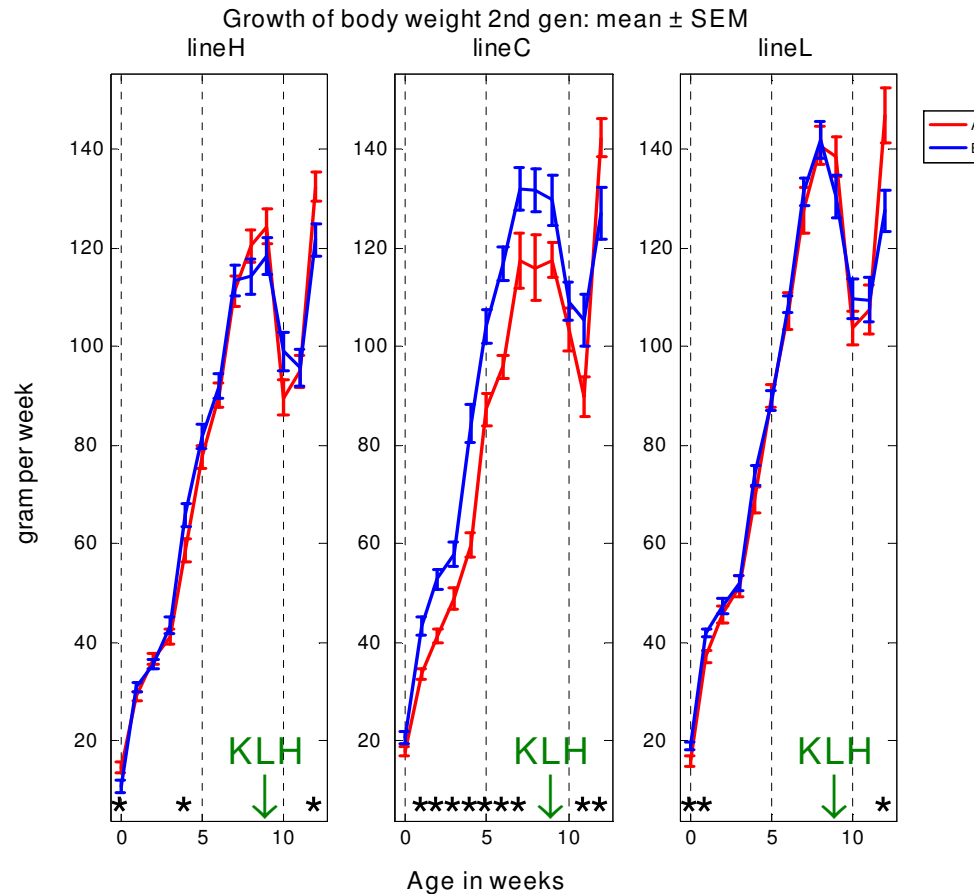
**Weight:** Animals on the conventional feed gained more weight.

- **Blue** is **coventional** feed
- **Red** is **organic** feed



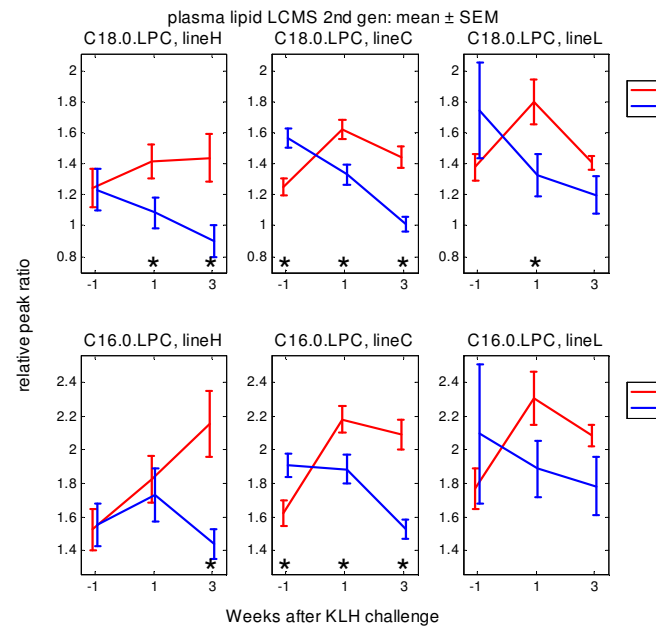
# Organic, More Healthy? - Results

**Growth:** Animals on the **conventional feed** grew stronger till the *challenge*. Then the **organic group** took over ('catch-up growth')



# Organic, More Healthy? - Results

**Metabolomics:** Strong differences in all 'platforms'.  
Animals on the **organic feed** showing a **stronger** 'Acute phase response' on the *challenge* and a **stronger** liver metabolism. The reaction was called '*More Alert*'.



## ***Organic, More Healthy?***

- Based on differences in the feeds, no effects were expected.
- “Which animals are healthier?” This question could not be definitely answered, as the long term implications of the results are not clear.
- In science the concept of ‘health’ has not been elaborated!
- In the study we introduced the **concept of ‘resilience’**, which is used in ecology and psychology. Reactions on disturbances are studied, using this term as a measure for ‘elasticity’, in relating to a state of homeostasis. In health research this concept is new.

## 2.2 Animal Studies concluded

Measurements from these and other studies constitute potential **biomarkers** for intervention studies in humans.

● A problem: The effects are not yet understood as from the feed ingredients.

Now some **epidemiological** studies on **humans**...

## 2.3 Human Studies

- **Parsifal study:** 14.000 children in 5 EU-countries studied as to allergies in relation to life style factors. **Result:** Eczema/allergy complaints **30 % lower** in children with an anthroposophic lifestyle, including organic and biodynamic food (Alfven 2005)
  - > These children had a lower BMI (bodyweight).....
- **Koala study:** Nearly **3000 mothers and children**, of whom 25% with an 'alternative' lifestyle, are being studied as to allergies in relation to lifestyle factors e.g. organic nutrition. Uni Maastricht, LBI et al.
  - Results organic nutrition of mothers:** **More CLA's** in breast milk of mothers who used **organic** dairy (progressive).
  - Results organic nutrition in children at age 2 years:** **Eczema 30 % less** among children that use >90% organic **dairy**.
    - > This study is being continued at 7 years, looking at allergies and body weight.

# *The Challenges ahead*

- The results from these studies *in Vitro*, in *animals* and in *humans* lead me to the hypothesis of organic nutrition as **'stabalizing'** *the different physiological functions in the organism (weight, growth, immune function, fertility, etc.)*
- Further research is needed to elaborate this!
- Which research is **most promising?**

## **‘Weighing of scientific results’ of studies on Health Effects:**

### **1. *Intervention studies***

*Controlled studies*

### **2. *Observational studies***

*Prospective cohort studies*

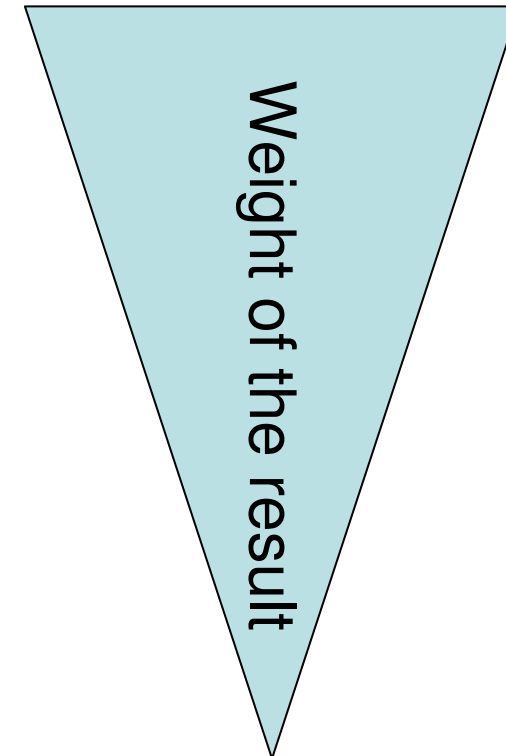
### **3. *Supportive research***

*e.g. in vitro studies*

*> underlying mechanisms*

***Studies on humans are more convincing  
than studies on animals***

Source: Dutch Government-VWA



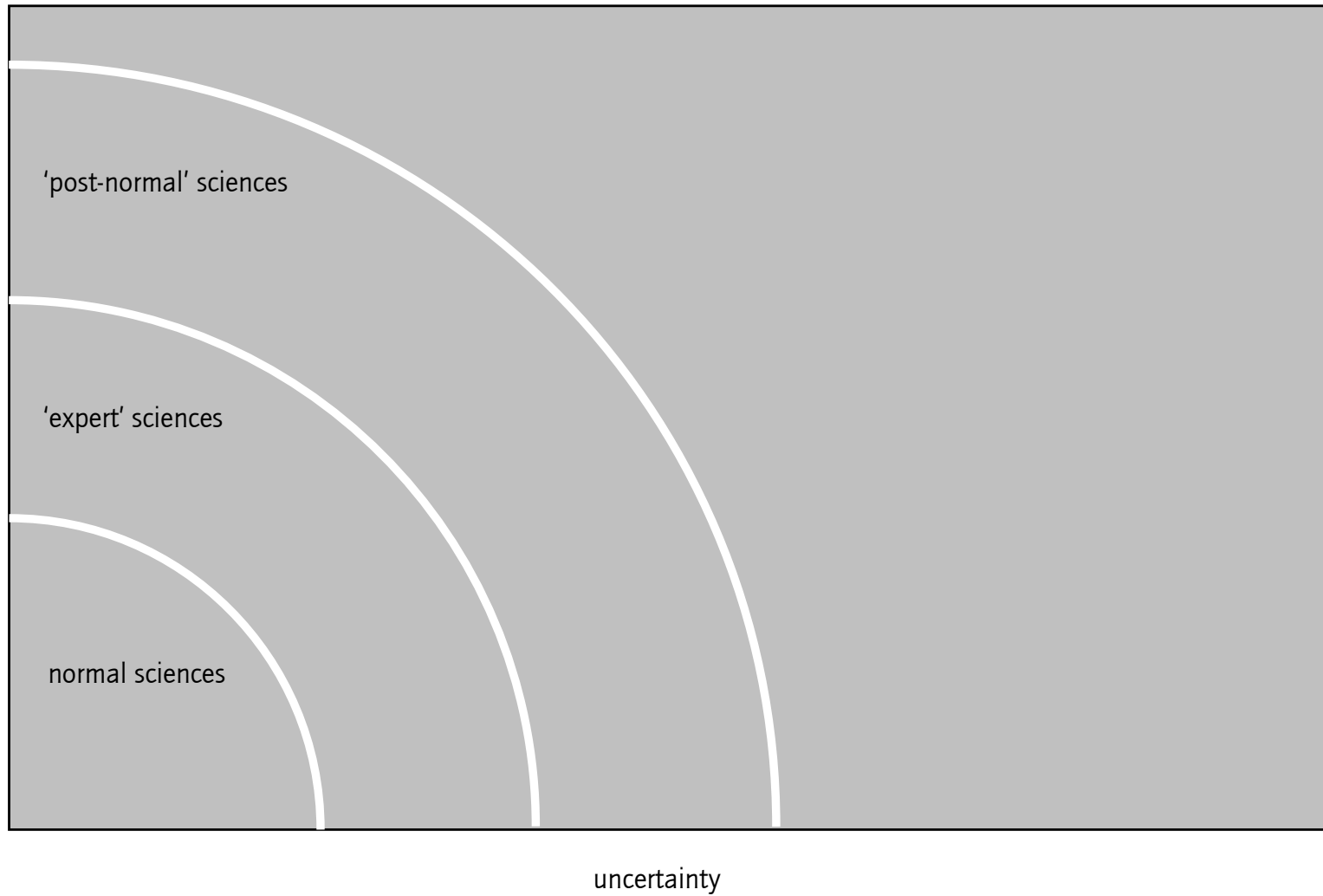
# Value of different study designs & challenges

1. **Intervention studies** – Require clearly defined food, and in humans clear biomarkers and an adequate concept of health. Modern ‘-omics techniques’ will be helpful.
2. **Observational (epidemiological) studies** – Because of large numbers, differences in consumed quality are ruled out.
3. **Supportive research** – In vitro models could serve as a quick ‘vitality test’. Can bring insight in underlying mechanisms.

*So far the about Organic Food & Health Research*

***Thank you for your attention!***

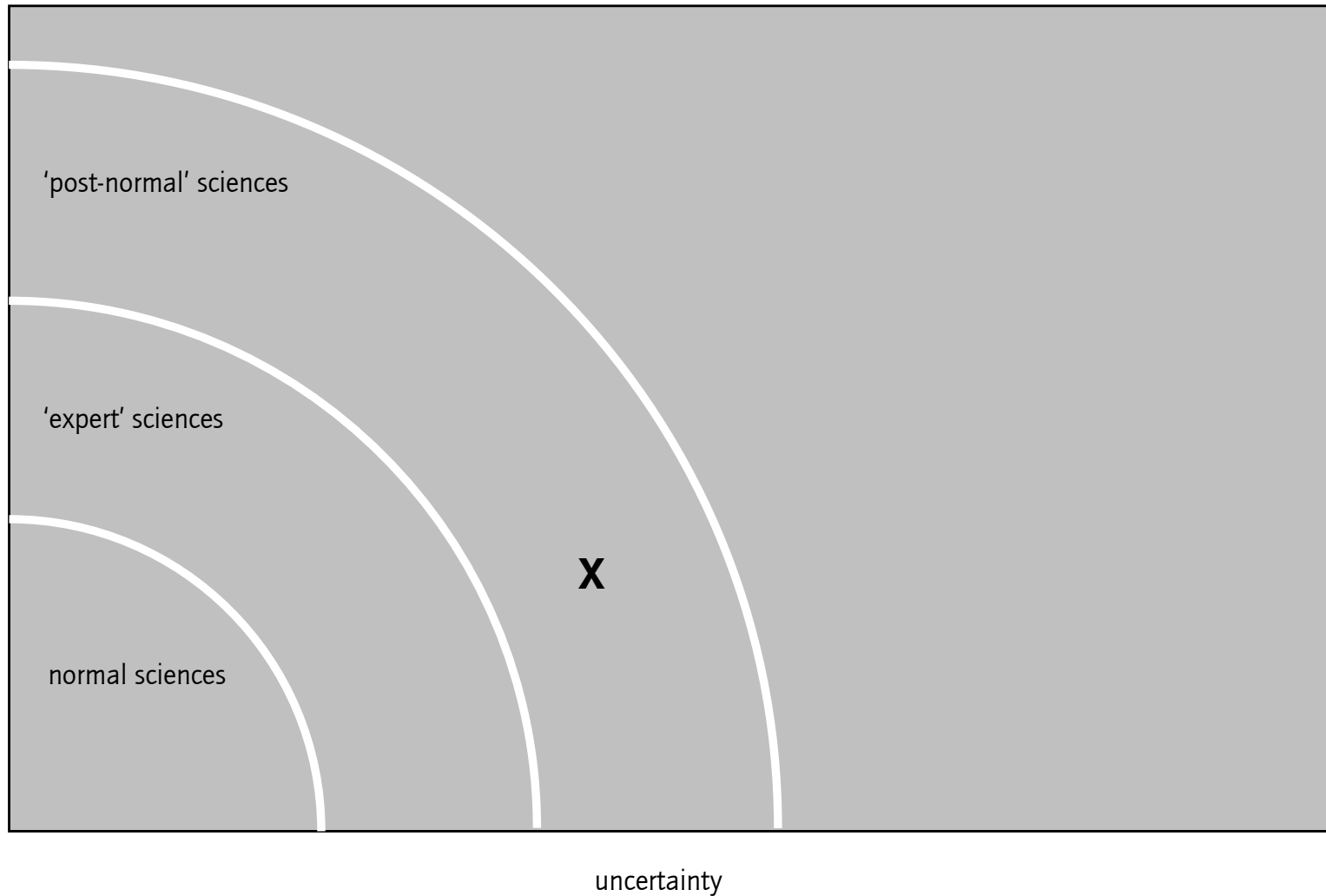
# Sociological classification of sciences



Funtowicz and Ravetz (1991)

# Classification of sciences

## X = 'Organic More Healthy?'



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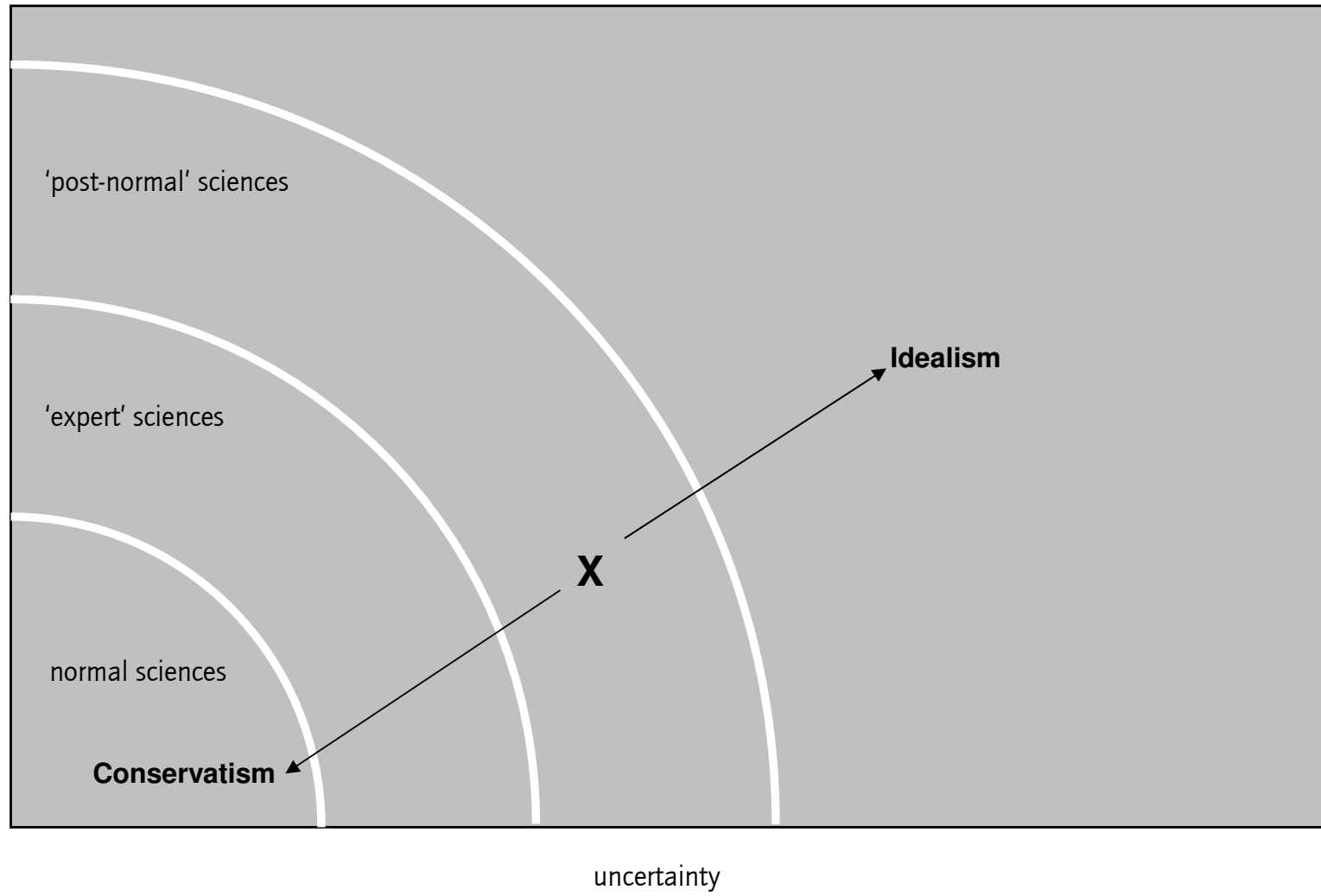
interest

uncertainty

Funtowicz and Ravetz (1991)

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# Risk of extreme interpretations



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interest

'post-normal' sciences

'expert' sciences

normal sciences

Conservatism

X

Idealism

uncertainty

Funtowicz and Ravetz (1991)

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