



# 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 Trust  
in 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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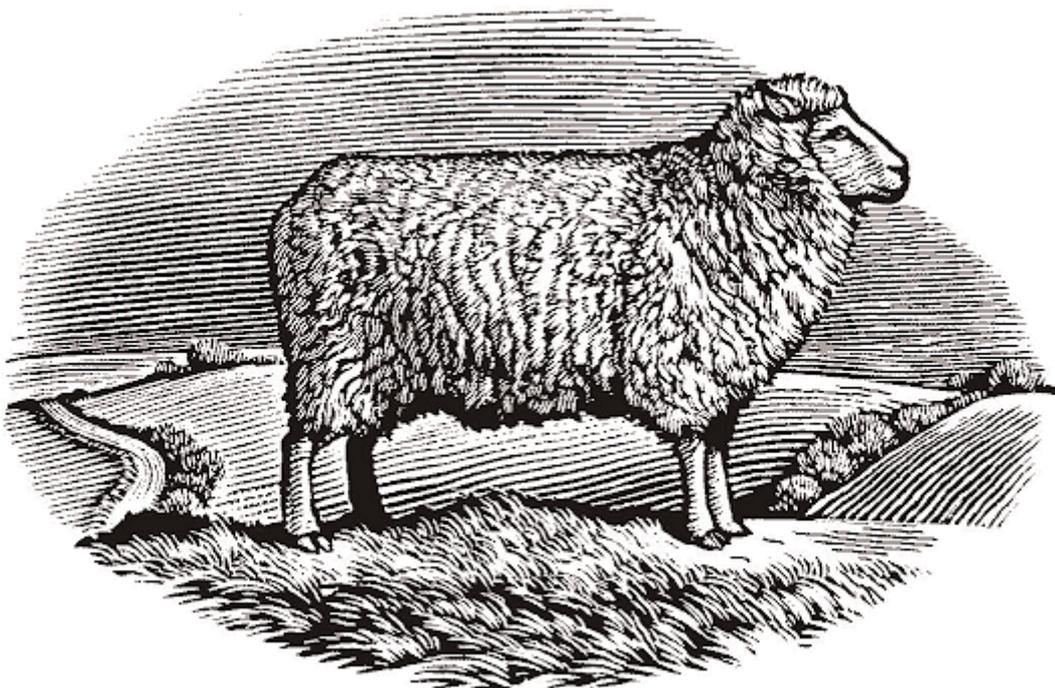
For further information please contact the Director, Elm Farm Research Centre.



## ACKNOWLEDGEMENTS

### A special acknowledgement

**We acknowledge and thank the Sheepdrove Trust for its financial support towards this Conference which allowed the use of the beautiful setting of the Kindersley Centre and its excellent facilities**





# ACKNOWLEDGEMENTS

## Acknowledgements

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.

**The production of these proceedings has been supported by:**



"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**



# Complementary methods of food quality determination - their value and validation

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Edited from transcript by Lawrence Woodward

## Introduction

Food is more than a basic necessity to many people. It is a way to express their values and their lifestyle. Nowadays when the term "quality" is used with respect to food, a value judgement is being made. Participants in the food marketplace - producers, processors, commentators (ranging from food writers to medical doctors) and consumers can have different judgements about the value of e.g. a functional food drink or yoghurt.

Commercially the image world of "quality" is a magical place - full of thoughts and wishes that brings smiles to the face and money to a "mature" market. To keep expanding the market, processors and retailers have to come up with new products or new results from scientific work that seeks to provide evidence of a better quality. This leads to the question "Are there differences between the quality of organic and conventional food?" - and if so - "which parameters can show this?" And last but not least "Are organic foods better for health?"

Over 20 years ago EU legislation, EC 2092/91, defined organic food through a description of the production process not by an assessment of the final product. So the question is can we find and validate methods that are able to distinguish differences between blind samples from different farming systems (i.e. organic and conventional) and whether differences in the production process are seen in the quality of the final product itself?

## A definition of food quality

The term "food quality" is difficult to define because it is subject to differing perceptions and value judgements including those of consumers as well as the status and development of science. One approach recognises that food quality is composed of various partial aspects but in order to regard a product as "good" quality the sum of all characteristics should be considered with all components scoring highly in the assessment. This approach proposes that six criteria are used to identify important components of quality:

<b><u>Authentic</u></b>	Food that is authentic (e.g. not genetically modified), traditional or natural and has not been synthesised or adulterated in production, processing or storage
<b><u>Functional</u></b>	How appropriate food is to its specific purpose, i.e. food that produces, stores or cooks well
<b><u>Biological</u></b>	How food interacts with the body's functioning, both positive and negative
<b><u>Nutritional</u></b>	how food contributes to a balanced diet, both positive and negative interactions
<b><u>Sensual</u></b>	Food that appeals to the senses
<b><u>Ethical</u></b>	This concept has four related but distinct meanings: environmental, social, ethical and political

This has been illustrated and labelled "The Magic Hexagon".

**Magic Hexagon**





# Complementary methods of food quality determination - their value and validation

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## Concepts and methods of food quality determination

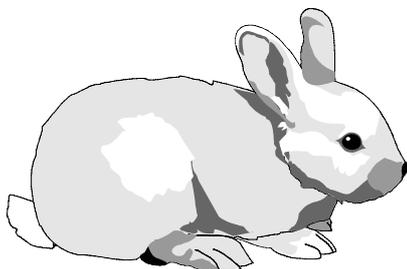
### Limitation of nutrient content assessment

The most common method of estimating the quality of food for humans is comparison of nutrient content with the recommended dietary allowances (RDA). Humans are seen as an accumulation of cells and their metabolic systems. The value judgement is solely nutrient driven.

Estimates of food value in terms of biological and nutritional quality has changed over the years and will change in the future as new results in nutrition research (e.g. dietary fibre or secondary plant components) are found. At present, chemical analyses are widely employed to determine the nutritionally desirable and undesirable content of food.

Of course this approach does not take account of environmental, ethical or social factors that are increasingly seen as important in perceptions of food. As a response methodologies such as eco-balance sheets and life cycle assessments are used alongside nutrient analysis to give a more comprehensive determination.

Furthermore some nutrition studies have demonstrated the limitations of a purely RDA approach. Results of feeding experiments with animals have shown that even if the proportion and amount of chemically determined feed components are equal, the fertility and survival rate of newborn animals is different. The table below shows that hare, fed with conventional feed compared to feed produced according to biodynamic standards had significantly fewer embryos in the 2nd and 3rd generation (6.3 and 6.3 per hare compared to 10.8 and 9.7) even though the analysed nutrient content was the same.



### Fertility of hare influenced by feed from different farming systems

	1. Generation	average	deviation	n
<b>Amount of embryos per hare</b>	<b>Group I</b>	<b>10,0</b>	<b>2,8</b>	<b>15</b>
	<b>Group II (organic feed)</b>	<b>9,0</b>	<b>2,8</b>	<b>10</b>
<b>Amount of born hare per litter</b>	Group I	5,6	2,3	26
	Group II (organic feed)	6,2	2,4	19
	2. Generation	average	deviation	n
<b>Amount of embryos per hare</b>	<b>Group I</b>	<b>6,3</b>	<b>4,4</b>	<b>8</b>
	<b>Group II (organic feed)</b>	<b>10,8</b>	<b>1,9</b>	<b>6</b>
<b>Amount of born hare per litter</b>	Group I	4,9	2,2	26
	Group II (organic feed)	6,4	3,1	30
	3. Generation	average	deviation	n
<b>Amount of embryos per hare</b>	<b>Group I</b>	<b>6,3</b>	<b>3,4</b>	<b>17</b>
	<b>Group II (organic feed)</b>	<b>9,7</b>	<b>2,8</b>	<b>29</b>

### A consideration of alternative methods

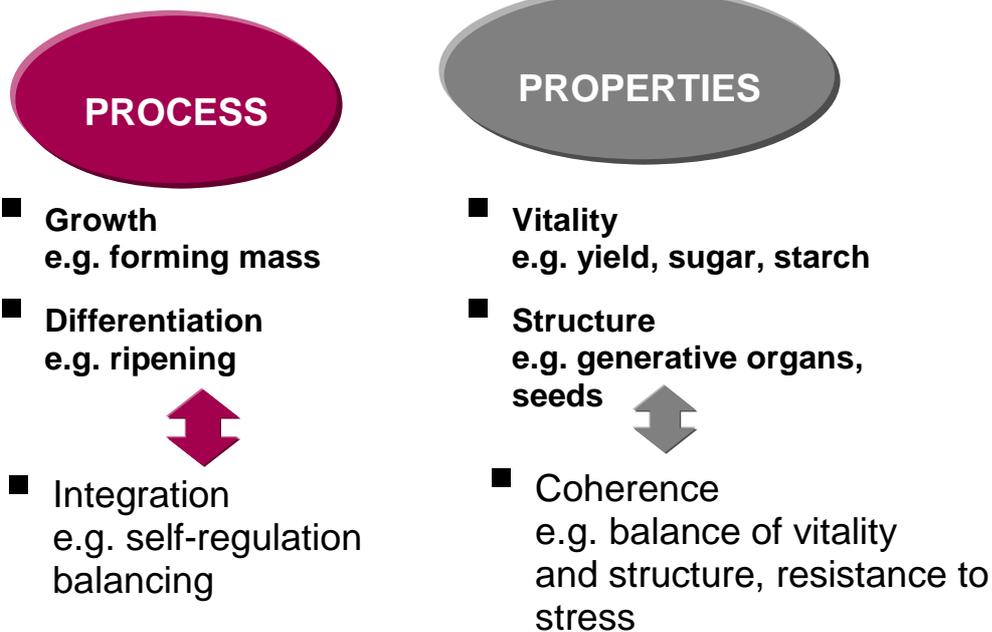
In part because of results like these and also because of different philosophical perspectives a significant number of people have sought for alternatives to the nutrient and even gene - driven developments in nutritional sciences. For example, vegetarian, macrobiotic or wholefood nutritionists go beyond consideration of single nutrients to address the whole dietary regime with its many interactions.



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Other approaches e.g. macrobiotic include the concept of "balance" or "harmony" to describe the potential of food to human health. The bio-dynamic approach describes food quality as a balance between "growth" and "differentiation". Both have to be in harmony (integration). Therefore the methods to determine quality should focus on parameters showing these different steps in the growth process (yield, sugar), the structure (seeds) and coherence (resistance to stress).



Underpinning this approach is the "Concept of Vital Quality" which provides an example of an important differentiation within the range of alternative methods; those that are complementary and those that can be called holistic.

**Concept of Vital Quality**  
Louis Bolk Institut, 2001

**vitality is the result of  
Growth**

**Structure is the result of  
Differentiation**

**Coherence is the result of  
integration**

Complementary methods are those that seek to reflect aspects of food quality other than nutrients. Holistic methods are complementary methods that seek to provide evidence for the contention that "the living whole is more than the sum of its parts".

## Holistic methods

Additionally a holistic method will not destroy the food itself during examination and therefore can provide some ideas about the matrix (e.g. binding form) and/or show results in response to a living organism. Included in this category are fluorescence excitation / low-level luminescence / biophotons; copper chloride crystallisation; microbiology tests (e.g. stress test); and sensory evaluation of food with men and animals (feeding trials, fertility tests).



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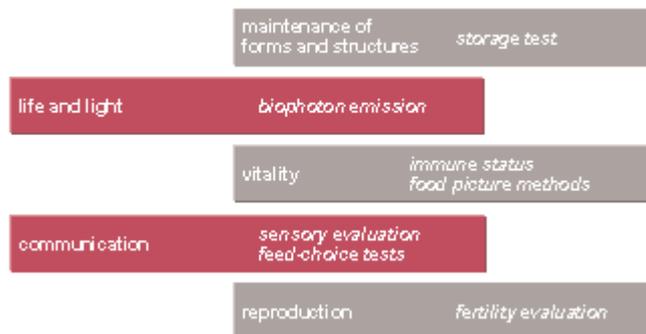
The question "What is life?" (As posed for example by Schrödinger) is the central focus point of holistic methods from a nature philosophical view. And from this immediately derives the question "Which kind of quality must food have to support life process?" The scientific work of Werner Kollath and Rudolf Steiner in Germany, Bircher- Benner in Switzerland and McCarrison in the Britain is based on the hypothesis that: "The living whole is more than the sum of its parts"

It can be concluded from their work that

- Life is bound to forms/structures and their maintenance
- Life is bound to light
- Life is linked to communication
- Life is reproduction

A number of methods for determining food quality have been developed to try to correspond or relate to these concepts. These can be seen below:

## Corresponding methods



Of these, two copper chloride crystallisation and biophoton emissions/ fluorescence excitation have recently been validated according to international standards.

### Copper Chloride Crystallisation

This method has been developed by Pfeiffer (1930), Selawry (1975) and Enqvist (1970) and is based on the philosophy of Rudolf Steiner (1861 - 1925). It tries to visualise force/ structure/ order in food and the potential of different foods to support life in this aspect. The "vitality" of foods is illustrated and determined by pictures developed from samples. Over the years work by different organisations and scientists have been remarkably successful in differentiating between farming systems and production techniques.

### Fluorescence Excitation

Referring to investigations from the beginning of our century the physicist Popp (1991) pointed out that every living cell emits light (low level luminescence). Food is not only carrier of calories and nutrients but transmits information (energy) that builds up the structure of living systems and stabilizes them against external chaotic influences. This method seems to be capable to differentiating blind samples of plant produce from different fertilisation regimes and eggs from different housing and feeding regimes.



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### Validation of Methods to ISO 17025 standards

Over the last 4 years a number of scientists from Germany, Denmark and Holland have worked together- with funding from the German Ministry of Consumer Affairs, Food and Agriculture and The Sheepdrove Trust- to validate these holistic methods.

The project involved the following methods:

- \* copper chloride crystallisation
- \* fluorescence excitation
- \* electrochemical method
- \* HPLC polyphenols
- \* physiological amino acid status

Blind samples were taken from

- \* different farming systems (same variety)
- \* different organic fertilizer
- \* different varieties

The main features of the project were

- ◆ strict coordination (methodology, statistics, logistic)
- ◆ well defined samples (primarily from the DOC trial in Switzerland)
- ◆ good sample storage and delivery
- ◆ scientists willing to work interdisciplinary
- ◆ scientists eager to discuss methods and argue about concepts

### Conclusion

All interdisciplinary research projects - and especially intercomparison studies - are a challenge. They require strict coordination, a good sample storage and postage system. Additionally this one required scientists willing to understand "novel" principles and terminology and prepared to discuss, not only, results, but also, new concepts and interpretation in a constructive way.

Access to good and well-defined samples was critical and this project was able to use samples from the longest running and best documented, replicated organic systems comparison trial in the world. The DOK trial has been operated by FIBL in Switzerland for over 24 years and recently received particular notice in the journal "Science" (May 2002)

The achievement of gaining ISO 17025 validation for the copper chloride crystallisation and the fluorescence excitation methods is highly significant. It has shown that holistic methods can achieve the highest levels of standardisation and repeatability and that therefore the results obtained by them are real and valid. They can no longer be dismissed as "junk science".

More work needs to be done to correlate data from chemical analysis with holistic methods and many more studies will need to be undertaken before it is known how much more information they give us beyond nutrient status. It is likely to be some time before we know if these "pictures/structures/ forces/ energy" are important for animal and human health. But they do already show us that there is indeed an extra dimension or quality to organic food.

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Elm Farm Research Centre (EFRC) is one of the UK's leading research, development and advisory institutes for organic agriculture.

For more than 20 years EFRC has played a central role in the development of policy and standards for organic farming and food within the UK, EU and internationally.

The Centre's alliance of practice and policy – on-farm and desk research and consultancy and advice is unique.



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