

Challenges for an organic food quality concept – the Inner Quality Concept

Requirements demonstrated on an experimental concept

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Abstract - At the Louis Bolk Institute, together with several international partners, years of work and several research projects were directed towards the validation of the "Inner Quality Concept"; an organic food quality concept. This concept intends to build two bridges. One bridge between crop management and food quality and another bridge between food quality and possible health effects for the consumer. This paper focuses on requirements for validating a concept, presenting examples from the work in the Louis Bolk Institute.¹

INTRODUCTION

The discussion on differences between, and possible advantages of, organic food compared to conventionally produced food is hot and ongoing in the public media. A finding of more healthy fatty acids in organic dairy (Trouw, April 1st '05) is followed by front page news (De Volkskrant, January 26st '06) that organic fruits and vegetables are no way better in quality and health benefits than conventional products. The discussion is about ingredients, about isolated substances in products, which are considered to have beneficial health effects. Not reaching the front pages, but heard within the organic movement, is the statement that measuring isolated ingredients does not sufficiently reflect the quality of organic products. It is often posed that organic agriculture is a system approach and because of this, needs a broadened, holistic view on the quality of its products. This view is summarized in the saying: "the whole is more than the sum of the parts", which is connected to the products. However, a statement like this has the risk to end up totally vague, if not a well defined conceptual context for interpretation of this "wholeness" is worked out. The need for such a concept is high, but it needs to be scientifically validated. This is often underestimated. Whatever quality concept is chosen, methodological requirements for validating such a concept remain the same. This paper discusses these requirements.

A DESIGN FOR A CONCEPT

Over the past 7 years, the Louis Bolk Institute has developed and validated an organic quality concept, the Inner Quality Concept, according to the required standards. The goal is to link the concept

to farm management tools, to measurable quality properties, to clear experiences of consumers, and to explanation of optional health effects (Bloksma, 2002).

This concept is based on life processes: growth and ripening, also called growth and differentiation, and the integration or coherence of these two processes. Substances are the (end) products of these metabolic processes, and their levels can be regarded as the physiological response of biological systems to environmental changes. The approach is not new; much work has been done in the past in this line of thinking, by pioneers of the biodynamic and organic movement (e.g. Schuphan, 1961; Klett, 1968; Pettersson, 1970; Koepf et al. 1976; Kunz, 1999; Bauer, 1999). This approach was chosen because it gives a very appropriate connection towards actual problems in quality, related to mismanagement of these life processes. New is the methodological founding of the concept, with extensive experimental work on apples (Bloksma et al., 2001, Bloksma et al., 2004), carrots (Northolt et al., 2004), and first experiments with milk.

REQUIREMENTS FOR VALIDATING A QUALITY CONCEPT

Whatever concept is chosen, methodological requirements for validating such a concept remain the same. In the medical sciences methodology towards validating concepts is well available and applicable. Shortly the different steps are introduced here (based on Streiner and Norman, 2001):

1. Once a quality concept is chosen, its so called face validity should be tested: is it recognised by the workers in the field (e.g. farmers), and is it recognised by specialists (e.g. physiologists)? Recognition was extensively tested with farmers. Growth and differentiation (including ripening) are familiar processes for organic producers. They are aware that effective management of these processes are necessary to obtain a crop with higher resistance (against stress, pests and diseases) and a product with better taste and storage quality and which may also be better for human health. For them this thinking in processes was no problem. Researchers and specialists (most of the time) needed quite some more discussion before understanding the step from ingredients towards life processes.

2. The content validity should be tested: Is the concept consistent in itself, and is it consistent with current theories? Literature study was performed to

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test the content validity. It appeared that growth and differentiation is described in the 'growth-differentiation-balance-hypothesis theory (e.g. Herms and Mattson, 1992; Lerdau et al., 1994; Galston, 1994)

3. The predictive validity requires consistency with empirical data. Experiments need to be performed to underline the concept. The apple and carrot experiments from extreme controlled series served this purpose (Bloksma et al., 2001, 2004; Northolt et al., 2004).

4. Are reliable established parameters available, in connection to the defined quality concept? Is there good correlation between parameters for the same item and do different observers and laboratories reach the same results? Do parameters differentiate sufficiently? For biocrystallisation and biophotons is validation work done among several institutions (Popp et al., 1981, 1993; Kahl et al., 2003; Busscher et al., 2004).

5. In the case of new parameters, can the parameter be compared to established parameters in controlled field studies, or if not available, is the parameter based on logical (physiological) theories? At the Louis Bolk Institute the parameters in the apple and carrot experiments are connected to the defined quality concept. The correlation between parameters for the same item and different observers and laboratories does not always reach the same results.

It will be clear that to reach these requirements a lot of work is needed, but this will bring forth a well founded concept that does justice to the way of thinking within the organic movement.

CONCLUSION

The Inner Quality Concept based on life processes offers good perspectives as a tool for improving the production of high quality crops and measuring the health effects of these products in the future. Growth and differentiation processes are well distinguished. The integration aspect is still the weakest part of the concept and needs to be developed further in connection to plant physiology and experimental parameters.

Parameters are especially useful for the Inner Quality Concept when they express the three aspects of the concept: growth, differentiation and integration. Such parameters might involve crop observations (e.g. a test of resistance to stress, diseases and pests), content analyses dealing with sugar/nitrogen ratios, physiological amino acid status and secondary metabolites (phenols), biocrystallisation pictures and spectral-range luminescence. These last two mentioned new holistic parameters have a secondary purpose: they also open scientists' eyes to new aspects resulting from life processes. In the future, they might be replaced by the cheaper content analyses.

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