



Midterm evaluation of DARCOF II

Increased production and closer relationships
between organic and inherent qualities

Report for the evaluation group
October 2002

Danish Research Centre for Organic Farming

DARCOF

The Danish Research Centre for Organic Farming (DARCOF) coordinates Danish research in organic farming with a view to achieving optimum use of the resources allocated for research.

DARCOF is a so-called "centre without walls" where the research expertise is constituted by the app. 140 researchers and 20 institutions that participate in the research effort.

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Preface

There is a growing desire for research to contribute to the development of sustainable organic production systems. Systems that will meet society's demands for environmental considerations, nature protection and socio-economic development, farmers' demand for stable production and reasonable livelihood, and consumers' demand for healthy and palatable food.

Since the mid nineties the Danish Research Centre for Organic Farming (DARCOF) has had the responsibility for initiating and coordinating research that contributes to the development of organic agriculture and the general promotion of sustainable agriculture in Denmark. DARCOF is a "centre without walls", which is to say that the researchers remain in their own research environment. The research is based on collaboration between researchers, research institutes, and professional associations in organic farming, consumer organisations and authorities.

From 1996 to 2000 thirty-three large research projects have been carried out within the framework of DARCOF. The projects involved about 100 researchers from 15 different research institutes. In 2000 a new research effort (DARCOF II) was initiated in continuation of the second Danish action plan for organic farming. After the initiation of complementary research projects in 2001 and 2002 the effort today involves 43 research projects, 20 research institutes and app. 140 researchers.

Most projects in DARCOF II initiated in 2000 are planned to end in 2004 or 2005. In early 2002 DARCOF's board of Directors and DARCOF's User Committee therefore asked for a midterm evaluation of the 23 projects established in 2000 and for DARCOF II as a whole.

The evaluation process was discussed with the project leaders during the first half of 2002. Medio 2002 the outlines for the evaluation procedure were determined, and a team of eight international researchers with experience in organic farming was appointed.

There are two main goals for the evaluation:

1. An evaluation of the individual projects and, if necessary, suggestions for changing the plans
2. An evaluation of DARCOF II as a whole with respect to its stated goals and, if necessary, suggestions for adjustments

The first goal is to be met through written evaluations of the individual projects. Each evaluator will evaluate 5 to 6 projects and two evaluators will evaluate each project.

The second goal is to be met through a common evaluation meeting on the 23rd of October in Viborg. Besides the evaluators, the board of directors, the user committee and all the project leaders from DARCOF will attend the meeting.

The present paper is thus prepared as a presentation of DARCOF II as a whole and a preamble to the midterm evaluation meeting. Furthermore, the paper complements the midterm evaluation report from project V. *Coordination, synergy and education.*

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Contents

1 Danish Research Centre for Organic Farming	5
1.1 Formation of DARCOF.....	5
1.2 Organisation of DARCOF.....	6
1.3 Synergetic activities.....	6
1.4 Research facilities.....	8
2 Formation and status of DARCOF II	8
2.1 Research challenges	8
2.2 Remit and objectives of DARCOF II	19
2.3 Selection and establishment of projects in 2000	11
2.4 Selection and establishment of projects in 2001 and 2002.....	11
2.5 Integration of objectives in the individual research projects.....	12
2.6 Progress in the individual projects	13
3 Quantity and quality of products.....	13
4 Reflexive objectivity of DARCOF II	13
Tables	
1 Contribution to the objectives of DARCOF II	16
2 Progress and use of economic resources 2000 - 2005.....	17
3 Products in different categories in the individual DARCOF II projects	18
Appendix	
1 Questionnaire for the midterm evaluation of DARCOF II.....	19

1 Danish Research Centre for Organic Farming

Danish agriculture and food productions are in a state of flux. Society makes ever-increasing demands for a reduction in the use of agricultural inputs such as pesticides, artificial fertilisers and prophylactic medicines. At the same time there is scepticism amongst many consumers with regard to the intensification and specialisation that has characterised agricultural development in recent years.

In this context, organic farming represents an alternative and more holistic view of agriculture and food production, and directly addresses the problems faced in many areas of conventional agricultural practice. Concerns for the environment, biodiversity, animal welfare, product quality, safety, and nutritional value are thus essential ingredients of the philosophy behind organic farming.

Based on a holistic view of agriculture and food production, organic farming has emerged and grown as an alternative to the general development. In Denmark throughout the 1990s a continuing transition from conventional to organic farming occurred. In 1990 organic farming accounted for less than 1 percent of the cultivated land, whereas in 2002 this proportion has approach about 6,5 percent. The conversion has primarily occurred on relatively large farms. For example, organic milk amounts to app. 10 percent of the total milk production in Denmark.

1.1 Formation of DARCOF

Since organic production addresses many of the difficulties faced in current agricultural practices, research in this area can be expected to gain considerable benefits for agriculture and society in general.

In accordance with its policy to promote protection of the environment and to produce a sustainable development in agriculture, the Danish government has provided considerable support for transition, regulation and control, advisory service, education, and research relating to organic farming. This development has been planned through the preparation of national policies (action plans).

As a direct result of the first action plan for organic farming in Denmark the Danish Research Centre for Organic Farming (DARCOF) was founded in 1995 with the objective to provide the overall framework for Danish research on organic farming. The general remit of DARCOF is thus to coordinate Danish research and development (R&D) for organic farming, with a view to achieving optimum benefit from the allocated resources. Its aim is to elucidate the ideas and problems faced in organic farming through the promotion of high quality research of international standard. This research is intended to ease the transition from conventional to organic farming, while encouraging a sustainable development of the economic, ecological and social aspects of agriculture.

During the period 1996 – 2000, DARCOF activities involved 15 research institutes and about 100 research scientists, who, in six main areas of interest completed a total of 33 large research projects. More information on this research can be found on www.darcof.dk.

1.2 Organisation of DARCOF

DARCOF is a "centre without walls", which is to say that the researchers remain in their own research environment but collaborate across institutes. Currently, app. 140 researchers from 20 research institutes participate in DARCOF (see www.darcof.dk).

A board of directors consisting of research leaders from the central research institutes leads DARCOF. To ensure the relevance of its R&D activities, including contact with the various user groups, a user committee has been appointed with representatives from farmers associations and NGOs within organic farming (Figure 1).

1.3 Synergy activities¹

As the co-ordinating organ for Danish research in organic farming, DARCOF must first and foremost ensure that the research system focuses on the most relevant challenges, that the projects are undertaken in the most appropriate manner, and that the various target groups are regularly informed of the findings. In relation to these objectives, the assignments are:

Co-ordination

The main responsibility of the centre management is to co-ordinate, evaluate and manage ongoing research projects in accordance with the overall objectives of DARCOF.

Synthesis of knowledge

The collaboration in DARCOF offers a unique opportunity to synthesise information in order to analyse different aspects of the transition from conventional to organic farming, to identify areas where new research is most needed, and to clarify complex problems.

Research methodology and value inquiry

The organic movement is based on explicit principles and goals, and certain values are entailed in these principles and goals. Therefore value inquiry and awareness of the interplay of values and facts are significant elements of systems research in organic farming.

Education

An important aim of DARCOF is to contribute to the postgraduate education of researchers in the disciplines and research areas of greatest relevance to organic farming. In collaboration with the Royal Veterinary and Agricultural University a research school for organic farming has been established.

Communication and mediation

Activities of DARCOF are conducted in dialogue with producers, advisors, consumers and various research institutes. National and international communication is thus an integrated part of the activities.

International cooperation

DARCOF seeks to contribute to the international development of research in organic farming. Among others, this is done by supporting the exchange of research results, by improving knowledge on EU-research programmes, and by international evaluation of research projects.

¹ The activities are organized in project V. Coordination, synergy and education.

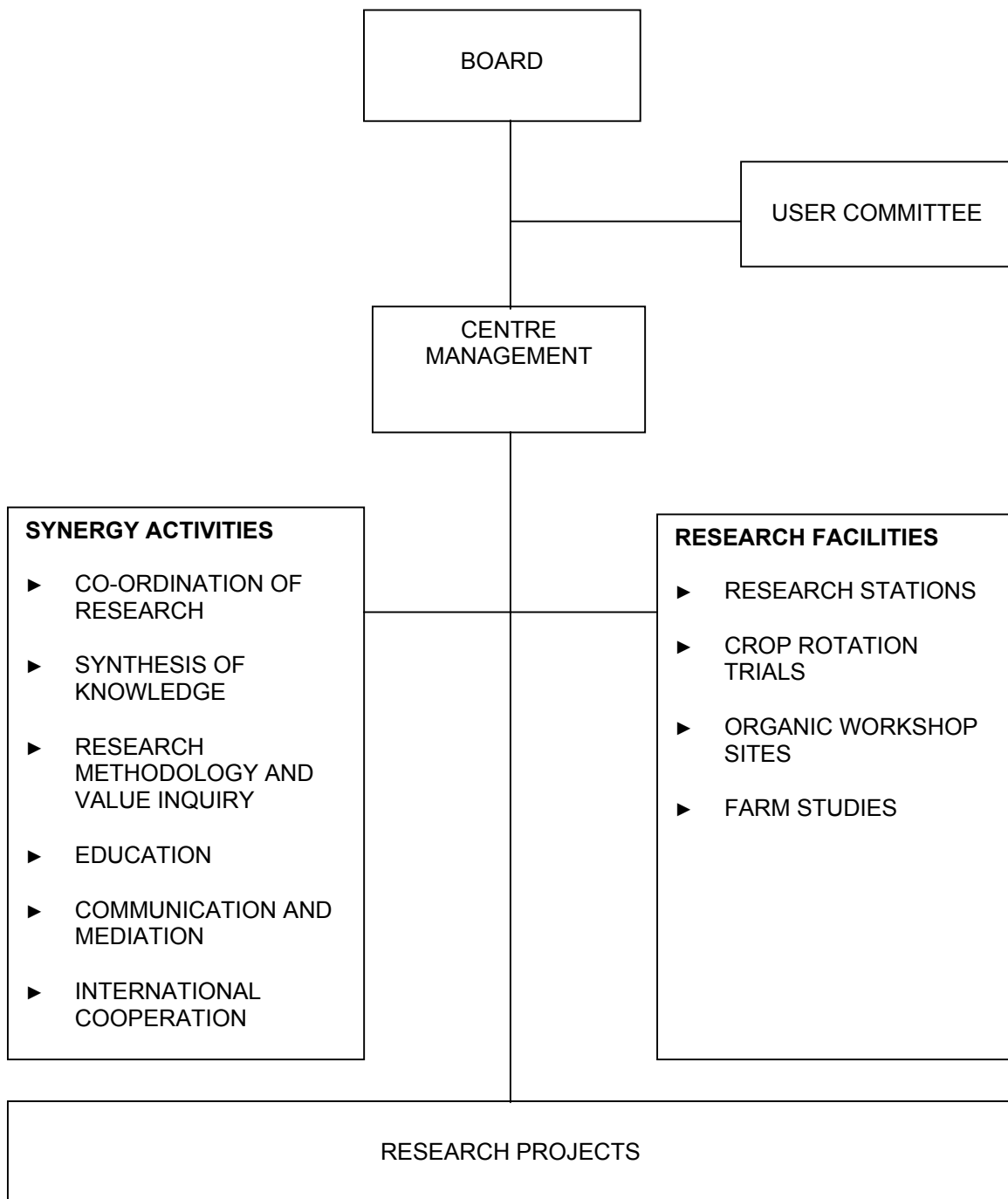


Figure 1. Organisation of DARCOF

1.4 Research facilities²

In DARCOF a series of unique research facilities has been set up to provide opportunity for conducting different projects simultaneously, using the same research fields, herds, etc. This allows close co-operation between different research environments, with a high degree of interdisciplinary collaboration, synergy, and complementary research. The main facilities are:

Organic research stations

At Rugballegaard near Bygholm Research Centre, a research station has been established to investigate organic animal production and the interactions between animal husbandry and crops on a large area of land. Furthermore, one of the research farms, Bakkegaarden, at the Royal Veterinary and Agricultural University, is dedicated to organic farming.

Crop rotation trials

Long-term organic crop rotation trials are performed on four locations: Jyndevad, Foulum, Flakkebjerg and Holeby. The aim is to investigate how the type of rotation affects yields, nutrient balances, weed and disease problems, and soil fertility on different soil types and with different levels of manure.

Organic workshop sites

Organic workshop sites for research are set up at Aarslev, Flakkebjerg and Foulum research centres and at Jyndevad and Askov research stations. At these sites it is possible to conduct analytical studies that require different soil types and climatic conditions.

Farm studies

In addition to the establishment of research facilities, agreements have been drawn up with private organic farmers who make their farms available for research. The systematic monitoring and the collaboration of the farmers provide in-depth information about the individual farms. In this way a sound basis is acquired for analysing and interpreting farm results in relation to different management strategies, this providing a solid foundation for the further development of organic production.

2 Formation of DARCOF II

As early as the beginning of 1998, DARCOF's Board of Management and User Committee began to discuss the research input of DARCOF II.

2.1 Research challenges

In the late nineties the public interest in organic and sustainable agriculture stimulated the preparation of various national documents (policies) on the subject. In addition to describing the main social interests in this area, these documents raised a number of demands and concerns relating to the associated research.

² The establishment and running of the research facilities are organized in project IV. Experimental units for research in organic farming systems.

For organic farming the most important documents were *Action Plan II – Developments in organic farming*, which was prepared by the Danish Organic Foods Council to the minister of Food, Agriculture and Fisheries.

One of the problems dealt with in Action Plan II (published in February 1999) was the fact that large quantities of organic cereals, protein crops and vegetables are imported, in contravention of the organic principle of using local resources. This problem may become more acute in future years, since an increased demand for organic food is expected. Another aim of the Action Plan was to describe how organic farming could develop its management and production practices such that its various sustainability principles can more successfully be adhered to. Specific developments were recommended that will help to improve the management of nutrients and energy, taking due regard to natural assets, soil fertility, and better health and welfare in organic animal production.

An important goal of organic farming is to produce foods of optimal nutritional quality. The Action Plan therefore pointed to various initiatives that would help to improve the quality of organic foods, both in their cultivation and the manufacture of products. In this context the opportunities for promoting the nutritional and health promoting characteristics of foods are being investigated.

Development in these areas will mainly occur in response to an increase in research activity, and for this reason the Action Plan also recommended that research in organic agriculture must be increased and intensified.

It should also be mentioned that an important aim of the Action Plan was to increase the sale and export of organic foods. As far as possible market forces must drive this development, and research is seen as an important link to improve effectiveness, ensure adequate supplies, and secure the relationship between the organic and inherent qualities of the product and the consumer's food desires. It is therefore important that research activities help to raise public confidence in organic products, partly by providing information and recommendations for the regulation of organic food production.

This was supported by another national document, namely the report of the so-called Bichel Committee, who – by order of the Danish parliament - investigated the possibilities for reductions in the use of pesticides and the consequent pollution of ground water and the environment. This committee report supported the development of organic farming as a tool for advancing environmental policies.

2.2 Remit and objectives of DARCOF II

On the basis of the national documents described in the previous section it can be concluded that research initiatives must take due regard to market demands, while preserving the values associated with organic principles. The aim is therefore to raise production, and secure the relationship between the inherent and organic qualities of a product. This is achieved by developing production systems that build on a desire to raise the natural component of organic farming, improve animal health and welfare in organic production systems, and raise the quality of organic foods, etc. Clearly, this is something other and more comprehensive than goal-oriented research that tries simply to reduce the problems associated with food quality, animal health, or environmental stress.

Expressed in another way, in future initiatives emphasis must concentrate on the development of sustainable production systems that build on a desire to actively sustain appropriate conditions relating

to nature, the environment, animal welfare and health, food quality etc. The objective is that these concerns and the organic principles can be directly associated with organic products such that the latter stand out as a real alternative to conventional produce. Against this background the remit and objectives of DARCOF II can now be described.

Remit

The remit of DARCOF II is thus “*to produce knowledge that can be used to promote increased production and a closer relationship between the inherent and organic qualities of organic foods*”.

Objectives

The objectives are to provide information on:

1. Effective and rational organic production methods
2. Inherent qualities, including:
 - the content of nutrients (primary and secondary constituents)
 - food safety (freedom from such undesirable compounds as pesticides, residues of medicines, mycotoxins, zoonoses)
 - the standard of manufacture and other traditional parameters of quality
3. Organic qualities, including:
 - reduced environmental pressures (nitrogen, phosphorus, pesticides, GMOs, residues of medicines, etc.)
 - higher quality of nature (diversity, variety, and harmony in primary production)
 - higher levels of animal welfare (harmony, natural behaviour and needs, and animal care)
 - other organic principles (recycling, precaution and prophylaxis)

Regarding 1: Information on effective and rational organic production methods

There is an increasing demand for many organic foods. Nevertheless, their higher cost relative to that of conventional foods is undoubtedly of great significance in determining their market share. A continuing requirement for information on how to make organic food production more effective and rational can therefore be predicted. On the other hand there is also a need for information on whether there are types of product for which the efficiency of production can hardly be improved, and for which the market is expected to remain niche-oriented.

Regarding 2: Information on inherent qualities

The information on inherent qualities is directly associated with the product and is therefore hardly different from that for conventionally produced foods. The difference is, however, that on the one hand organic foods are known to be free of various undesirable compounds and to supplement with a higher content of secondary metabolites that could be health promoting. Against this, the production method can raise problems with, for example, mycotoxins.

Another feature of inherent quality parameters is that information on these can be used directly in the market place, since they can be measured and documented in the product itself.

Regarding 3: Information on organic qualities

Information about organic qualities relates primarily to the production process. In other words it relates to characteristics that cannot be measured directly in the product. The Ø-mark (the Danish organic label) and associated regulations thus constitute a guarantee for society and the consumer that organic food production lives up to the particular demands of organic quality.

2.3 Selection and establishment of projects in 2000

In September 1999, DARCOF invited expressions of interest from any research scientists and research environments interested in collaborating in organic farming studies. Subsequently it received 216 responses, with a stated funding requirement of about 700 million DKK (almost 100 million Euro).

Individual applications were examined and their merit assessed on the basis of the criteria stipulated in the invitation. DARCOF's Board of Management and Consumer Committee then nominated 23 research teams, and a project leader responsible for each project. In this way, each project satisfies the interests of several different research groups, which, under the project leader, are responsible for organising and co-ordinating the project. This approach satisfies the individual areas of interest, and to the greatest possible extent complies with the overall objectives of DARCOF II.

As a means to further secure the scientific quality of the research, the project applications undertook a thorough evaluation by external, international experts, whose criticisms were decisive for determining to which extent a project could be conducted.

2.4 Selection and establishment of projects in 2001 and 2002

In some central areas of interest (pig production, the quality of nature, the protection of ground water, food quality and human health, quality of organic plant breeding and seed production, and the possibilities for an organic production free of GMOs) the expressions of interest were so diverse and incoherent that it was not possible to initiate research projects directly in the above manner. For instance, there were very different expectations as to which production systems would prevail in future organic farming – something that is quite decisive for the initiation of research.

In these areas knowledge syntheses were performed during the year 2000. In short, a knowledge synthesis analyses, discusses and synthesises the existing knowledge on an unclarified, and often disputed, subject in relation to the main points of view. The work takes place in a group of experts from different fields, representing the different points of view on the subject. An important aim of the knowledge synthesis is to create mutual understanding among the experts with a view to future research and the development of organic farming.

Based on the knowledge syntheses six new research projects were initiated in 2001. Three of these projects were dealing with organic pig production (II.8, II.9 & II.10), one project with nature quality (III.5), one with healthy seeds (VI.1), and one project was dealing with food quality and human health (III.6).

Following the knowledge syntheses on "*Consequences of genetically modified crops for organic farming in Denmark*" and "*Breeding and improvements of seed quality in organic grain and grain legumes*" a new call for expressions of interest was announced in June 2001.

In addition, the call also asked for expressions of interest on a number of issues that the DARCOF board of directors and the DARCOF user committee believed would strengthen the whole programme.

All together the call asked for expressions of interest under the following headings:

- Breeding and protection of GMO-free organic varieties
- Food quality, food safety and health
- Regional protection of groundwater
- Principles of organic farming
- Communication and research within organic practices

After a procedure much similar to the one described in section 2.3 a total of 19 new research projects within the mentioned areas was established.

2.5 Integration of objectives in the individual research projects

In selection the research teams much emphasis was laid on a holistic approach to the individual project. This meant that, as far as possible, the subjects of research would incorporate the whole chain of causal events from resources to production and quality, both organic and inherent. In practice the projects are relatively large, and typically involve many different disciplines. Furthermore, at particular problem is examined under a range of conditions: for example, on clay and sandy soils, in lysimeter studies, field trials, and farm studies.

Effect on the inherent qualities (objective 2) and organic qualities (objective 3) are often related to production level and economics (objective 1). In order to know this relationship it is important to investigate all aspects in one project.

In some situations a positive relationship can be assumed between the objectives of organic quality and the production economics. For example an improvement in nutrient management is likely to benefit both the environment and the production. In these situations the provision and application of more information is sufficient to achieve an improvement.

In other cases a negative relationship between organic quality and production economy objectives will occur. In these situations, scientific knowledge can be used to recommend regulation changes and promote continued confidence in the Ø-mark.

In table 1 it is shown how the different objectives are integrated in the different projects. It appears that plant production is the main aspect in 35 projects. Cattle production is targeted in 25 projects, while 26 projects were oriented towards the production of pigs and poultry. The inherent quality is a main aspect in 30 projects and, likewise, organic qualities are an important aspect in 36 projects.

As it appears from the final project portfolio, the projects are listed under six main areas:

- I. Crop production, the environment and the quality of vegetables
- II. Animal husbandry, health and the quality of livestock products
- III. Agriculture and society
- IV. Research units and workshop areas

- V. Research co-ordination, synergy and education
- VI. Seed production and developments

However the projects listed under each heading are more embracing, than the headings might suggest. In the area of crop production, the projects relate to plant production systems, nutrient metabolism, and foods quality and safety. The animal husbandry area incorporates projects on livestock production, health and welfare, and food quality and safety. For agriculture and society, the projects cover consumer preference, legislation and confidence, society and economics, organic food and human health, nature quality and research with in the organic principles. Areas IV and V include projects that are instrumental in the completion of the research projects in the other areas. Finally, area VI contains projects dealing with improvement of seeds and plant varieties, together with research aiming on providing knowledge on how to avoid contamination of organic produce with genetically modified materials.

2.6 Progress in the individual projects

Table 2 shows the progress and the use of economic resources in the individual projects. In the progress reports and the midterm evaluation reports (see www.okoforsk.dk) the progress including preliminary results can be studied in details³.

By studying the progress report the general picture is that minor delays has occurred in many projects, but the subsequent adjustment in plans indicates that the overall objectives will be made. However in a few projects more severe delays and adjustment suggest that the projects overall objective will not be met in time without major adjustments in plans.

3 Quantity and quality of products

Table 3 shows the amount of products in four different categories. It appears that in total 85 papers are submitted or published in reviewed scientific journals (category 1), 196 papers in other journals (category 3), 157 distributions has been given to scientific congresses (category 2) and 187 distributions are given on field days etc. (category 4) 20 Ph.D. students and 13 MSc student are connected to the projects.

It should be noted that not all products are entirely from the mentioned projects, and that there might be some overlaps in papers from collaborating projects.

4 Reflexive objectivity of DARCOF II

For the use of the midterm evaluation the individual project teams were asked to reflect on the plans, progress and results of the project. In the following some general reflections on DARCOF II are offered.

³ It should be noted that some of the main preliminary results will be shown at the meeting of October 23.

Changes in demands for organic foods

The organic sector in Denmark is very dynamic, and huge changes in supply and demand for organic products have occurred since the start of DARCOF II in 1999-2000. In 1999 demand was exceeding supply. Lately the supply has more than doubled within most products, while demand has not yet increased to the same level, meaning a surplus of many organic products in Denmark.

This development in society has led to a change in focus - from primary production to the consumer and the later steps in the food chain. From this perspective it can be said that DARCOF II has too much focus on primary production. This was taken into account, when DARCOF presented its second call for expressions of interest in 2002.

However when asking the researchers, the lack of knowledge seems to be most evident in the primary production, and when moving to later steps in the food supply chain, it seems that the suggested research is less original and less relevant for the organic sector.

Collaboration and research methodology

An important objective for DARCOF is to coordinate Danish research that relates to organic farming, across institutes and disciplines. By drawing on research environments working in different disciplines it is possible to focus their unique knowledge and expertise to solve the complex problems faced in organic farming. In several status reports positive reflections are stated on the collaboration between different research environments.

The coordinated cooperation therefore seems to produce a high degree of synergy between the different scientific disciplines. An important aspect of interdisciplinary collaboration is the use of joint research facilities and workshop areas, which can provide common orientation and a common source of information across the project boundaries. Also the use of knowledge synthesis research methodology and communication are important tools. In project V. *Coordination, synergy and education* these efforts a more thorough description is given.

Integrity of research in organic farming

The umbrella organisation of DARCOF gives excellent access to some of the most skilled research scientist and the best research facilities at the Danish research institutes. The benefit of this is that the scientists in DARCOF in general are very well educated, they know their “workmanship” and they are usually very productive in terms of scientific production and mediation.

On the other hand the organisational structure is highly depending on that the centre of DARCOF is able very explicit to define and express the need for research in organic farming. Given the grass-root nature of organic farming many values might be “hidden”. The umbrella organisation of DARCOF relying on short term projects might therefore imply a risk of “dilution the organic values. This is in particular due to the increasing competition within agricultural research in Denmark.

In 2000 DARCOF’s user committee therefore initiated a discussion on the principles of organic farming (an English translation of the discussion document can be found on www.darcof.dk). This discussion has continued within the organic movements, and the debate has to some extent contributed to ensure the integrity of organic farming in Denmark.

International collaborations

During the recent years there has been an increased interest in organic farming and organic products through out the entire world (i.e. 32 countries has fully implemented regulations and 24 countries has draft regulations).

The research in DARCOF II is primarily focussing on the challenges in Danish organic farming. These challenges might look different from an international perspective and properly more general knowledge could be generated through transnational collaboration.

However international collaboration within research in organic farming might be hampered due to the lack of resources and the often relatively small research groups dealing with organic farming in the various countries.

Table 1 Contribution to the objectives of DARCOF II

DARCOF II		Budget 1000 DKR	Production systems ¹⁾			Inherent quality	Organic quality
			Plants	Cattle	Pigs/ poultry		
I Crop production, environment and food quality							
I.1	Organic prod. of cucumber and tomato	4.700	x			xx	x
I.2	Sustainable prod. systems for apples	2.350	x			xx	
I.3	Nitrogen dynamics, crop prod. and biodiv.	8.915	x	x	x		xxx
I.4	Enhanced bread wheat production	6.570	x	(x)	x	xx	xx
I.5	Production of grain legumes and cereals	6.570	x	(x)	x	x	x
I.6	Cultivation in ridges and mixed cropping	4.700	x		x	x	xx
I.7	Soil quality in organic farming	5.631	x	x	x		xx
I.8	Management of perennial weed species	2.350	x	x	x		
I.9	Band heating for intra-row weed control	4.700	x	x	x	x	x
I.10	Organic vegetable cultivation methods	11.270	x		x	x	xx
I.11	Cultivation of org. clover and grass seed	3.755	x	x	x	xx	x
I.12	Preventing mycotoxin problems	3.851	x		x	x	
I.13	Dinitrogen fix. and nitrous oxide losses	3.660	x	x		xx	
I.14	Control of scab in organic apple growing	2.170	x			x	
I.15	Nitrate leaching from dairy farming	1.000	x	x			xx
I.16	Regional groundwater protection	3.000	x	x	x		xx
II Animal husbandry, health and food quality							
II.1	Organic dairy productions systems	9.050	x	x		x	xx
II.2	Prod. of organic milk of high quality	2.000	x				
II.3	Production of steers and bioactive forage	6.570	x	x	x	xx	xx
II.4	Health and welfare for organic calves	3.000		x		x	xx
II.5	Use of antimicrobials	1.600		x		x	xx
II.6	Research in poultry production systems	5.630			x	x	x
II.7	Improved pig feed and feeding strategies	5.000			x	xx	
II.8	Health management in organic pig prod.	2.500			x	xx	xx
II.9	New systems in organic pig production	3.500	x	(x)	x	x	xx
II.10	Bacterial infection risk – pig production	2.000			x	x	x
II.11	Production of raw milk cheese	2.750		x		xx	xx
II.12	Product quality of organic beef and pork	770		x		xxx	
III Agriculture and society							
III.1	Consumer demand for organic foods	4.230	x	x	x	x	x
III.2	Analyses of the future development	5.630	x	x	x	x	x
III.3	Closing the rural-urban nutrient cycle	5.630	x		x		xx
III.4	Organic food and health	7.860	x			xx	x
III.5	Nature quality in organic farming	9.000	x	x	x		xx
III.7	Future supply and marketing strategies	1.200	x	x	x	x	x
III.8	Distribution channels for organic foods	1.550	x	x	x	x	x
III.9	Organic agriculture in social entirety	1.999	x	x	x	x	x
IV.1	Experimental units for research	20.020	x	x	x		xx
V	Coordination, synergy and education	20.300	x	x	x	x	xx
VI Breeding and production of GMO-free seeds							
VI.1	Healthy seed – cereals and legumes	10.000	x			x	xx
VI.2	Characteristics for spring barley varieties	10.450	x				xx
VI.3	Tools for protection against cont. by GMO	2.200	x				xx
VI.4	Grain legumes for organic farming	5.350	x				xx
VI.5	Vegetable and forage seed	2.000	x				xx
Total		226.981					

1) Effective and rational organic production methods in different systems

Table 2 Progress and use of economic resources 2000-2005

No.	Short title	Established year	Consum. < 2002	Consum. 2002	Budget 2003	Budget total
I Crop production, environment and food quality						
I.1	Organic prod. of cucumber and tomato	2000	1.153	1.657	1.573	4.700
I.2	Sustainable prod. systems for apples	2000	517	240	451	2.350
I.3	Nitrogen dynamics, crop prod. and biodiv.	2000	3.879	2.830	2.301	8.915
I.4	Enhanced bread wheat production	2000	1.642	2.228	1.970	6.570
I.5	Production of grain legumes and cereals	2000	2.200	2.440	1.930	6.570
I.6	Cultivation in ridges and mixed cropping	2000	1.512	1.866	1.162	4.700
I.7	Soil quality in organic farming	2000	915	1.557	1.828	5.631
I.8	Management of perennial weed species	2000	789	546	569	2.350
I.9	Band heating for intra-row weed control	2000	1.892	1.186	828	4.700
I.10	Organic vegetable cultivation methods	2000	3.468	3.311	2.705	11.270
I.11	Cultivation of org. clover and grass seed	2000	1.159	911	932	3.755
I.12	Preventing mycotoxin problems	2000	1.074	1.236	870	3.851
I.13	Dinitrogen fix. and nitrous oxide losses	2000	1.035	1.127	1.228	3.660
I.14	Control of scab in organic apple growing	2002	-	383	891	2.170
I.15	Nitrate leaching from dairy farming	2002	-	-	37	1.000
I.16	Regional groundwater protection	2002	-	432	1.480	3.000
II Animal husbandry, health and food quality						
II.1	Organic dairy productions systems	2000	3.153	2.272	2.183	9.050
II.2	Prod. of organic milk of high quality	2002	-	168	546	2.000
II.3	Production of steers and bioactive forage	2000	2.829	2.302	1.103	6.570
II.4	Health and welfare for organic calves	2000	893	1.237	691	3.000
II.5	Use of antimicrobials	2000	246	864	676	1.600
II.6	Research in poultry production systems	2000	1.453	1.847	587	5.630
II.7	Improved pig feed and feeding strategies	2001	356	1.326	1.541	5.000
II.8	Health management in organic pig prod.	2001	-	765	866	2.500
II.9	New systems in organic pig production	2001	81	1.067	1.289	3.500
II.10	Bacterial infection risk – pig production	2002	-	138	1.454	2.000
II.11	Production of raw milk cheese	2002	-	936	1.529	2.750
II.12	Product quality of organic beef and pork	2002	-	137	524	770
III Agriculture and society						
III.1	Consumer demand for organic foods	2000	1.365	1.430	1.308	4.230
III.2	Analyses of the future development	2000	1.843	1.734	2.053	5.630
III.3	Closing the rural-urban nutrient cycle	2000	136	1.182	1.709	5.630
III.4	Organic food and health	2001	852	2.631	3.267	7.860
III.5	Nature quality in organic farming	2001	688	2.250	3.965	9.000
III.7	Future supply and marketing strategies	2002	-	273	590	1.200
III.8	Distribution channels for organic foods	2002	-	180	861	1.550
III.9	Organic agriculture in social entirety	2002	-	593	958	1.999
IV.1	Experimental units for research		7.986	3.631	2.756	20.020
V	Coordination, synergy and education		3.000	5.000	5.000	20.300
VI Breeding and production of GMO-free seeds						
VI.1	Healthy seed – cereals and legumes	2001	352	2.818	2.883	10.000
VI.2	Characteristics for spring barley varieties	2002	-	2.086	3.340	10.450
VI.3	Tools for protection against cont. by GMO	2002	-	730	1.470	2.200
VI.4	Grain legumes for organic farming	2002	-	1.018	1.368	5.350
VI.5	Vegetable and forage seed	2002	-	90	740	2.000
Total			46.468	60.655	66.012	226.981

Table 3 Products in different categories in individual DARCOF II projects

No.	Short title	Products				Phd/ MSc
		1*	2*	3*	4*	
I Crop production, environment and food quality						
I.1	Organic prod. of cucumber and tomato	-	1	1	3	1/-
I.2	Sustainable prod. systems for apples	1	3	11	15	-/-
I.3	Nitrogen dynamics, crop prod. and biodiv.	7	4	-	1	1/2
I.4	Enhanced bread wheat production	12	6	7	4	-/-
I.5	Production of grain legumes and cereals	4	5	7	22	1/3
I.6	Cultivation in ridges and mixed cropping	1	4	3	13	-/-
I.7	Soil quality in organic farming	7	8	5	21	2/1?
I.8	Management of perennial weed species	-	-	-	6	1/-
I.9	Band heating for intra-row weed control	2	9	2	4	-/-
I.10	Organic vegetable cultivation methods	1	3	1	?	-/1?
I.11	Cultivation of org. clover and grass seed	-	5	12	5	(1)/-
I.12	Preventing mycotoxin problems	2	2	6	4	-/-
I.13	Dinitrogen fix. and nitrous oxide losses	1	3	2	7	1*/1*
I.14	Control of scab in organic apple growing	-	1	1	3	-/-
I.15	Nitrate leaching from dairy farming	-	-	-	-	-/-
I.16	Regional groundwater protection	-	-	-	-	-/-
II Animal husbandry, health and food quality						
II.1	Organic dairy productions systems	1	9	10	4	-/1+2?
II.2	Prod. of organic milk of high quality	-	-	-	-	1/-
II.3	Production of steers and bioactive forage	7	9	9	7	2/2
II.4	Health and welfare for organic calves	4	5	4	7	1/-
II.5	Use of antimicrobials	1	-	2	2	1/1
II.6	Research in poultry production systems	5	4	3	1	(1)/-
II.7	Improved pig feed and feeding strategies	-	-	-	-	(1)/-
II.8	Health management in organic pig prod.	-	2	-	3	1/-
II.9	New systems in organic pig production	1	2	3	4	(1)/-
II.10	Bacterial infection risk – pig production					1/-
II.11	Production of raw milk cheese					-/-
II.12	Product quality of organic beef and pork					planned/-
III Agriculture and society						
III.1	Consumer demand for organic foods	4	7	14	4	1
III.2	Analyses of the future development	-	6	20	24	-/-
III.3	Closing the rural-urban nutrient cycle	1	2	3	3	-/-
III.4	Organic food and health	1	6	2	3	?/-
III.5	Nature quality in organic farming	1	-	1	2	2/-
III.7	Future supply and marketing strategies	-	-	-	1	1/-
III.8	Distribution channels for organic foods	-	-	-	-	-/-
III.9	Organic agriculture in social entirety	-	1	-	2	-/-
IV	Experimental units for research	14	23	38	6	+/+
V	Coordination, synergy and education	7	16	17	-	(10)/-
VI Breeding and production of GMO-free seeds						
VI.1	Healthy seed – cereals and legumes	-	4	6	5	-/-
VI.2	Characteristics for spring barley varieties	-	6	-	?	1/-
VI.3	Tools for protection against cont. by GMO	-	-	1	-	1/-
VI.4	Grain legumes for organic farming	-	1	-	1	-/-
VI.5	Vegetable and forage seed	-	-	5	?	-/-
Total		85	157	196	187	20/13

1* Articles in international, scientific journals with review procedures

2* Presentations at congresses, symposiums etc.

3* Reports, articles in agricultural journals etc.

4* Other presentations, public meeting, field days etc.

Midterm evaluation 2002 of DARCOF II as a whole

Please fill out the evaluation for each of the three criteria

Evaluation criteria*	Evaluation
<p>1. The quality of the research process How is the quality of the formation of DARCOF II? Does the allocation of resources reflect the need for research and is the progress sufficient to meet the remit of DARCOF II? (Section 2)</p>	
<p>2. The quantity and quality of different kinds of research products Are the different product categories appropriate and adequate to ensure high scientific quality and to meet the needs of organic farming? Is the scientific productivity and mediation satisfactory? (Section 3)</p>	
<p>3. The reflexive objectivity of the project Are the mentioned topics appropriate and adequate? (Section 4)</p>	
<p>4. Important aspects not included / suggestions for adjustments (optional):</p>	

Initials of evaluator: _____

* Section numbers refer to the report about DARCOF II as a whole

