



Annual Status Report 2001 and Application for Continuation in 2002

For research projects financed by grants from
The Directorate for Food, Fisheries and Agro Business
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1. Research program

Research in organic farming 2000-2005 (DARCOF II)

2. Project title and number

III.2 Economic analyses of the future development of organic farming. Effects at the field, farm, sector and macroeconomic levels

3. Head of project

Research Director Søren Elkjær Frandsen

4. Participating institutes

The Danish Institute of Agricultural and Fisheries Economics (SJFI) and the Danish Institute of Agricultural Science, Department of Agricultural Engineering (DIAS-DAE)

5. Contact persons

Research Director Søren Elkjær Frandsen

6. Other project staff

7. Start of project: 2001

End of project: 2004

8. Annual report 2001 / Application for continuation in 2002

A. Objectives and expected achievements (from application)

The objective of this research project is to analyse the future development of organic farming in Denmark from the field, farm, sector and macroeconomic perspectives. Emphasis will be placed on the economic impacts of a continued expansion of organic farming in Denmark taking into account the adjustment problems of converting conventional farming into organic farming. Part of the research will also be devoted to analysing the regional effects, the impact on various environmental indicators of organic farming as well as the economic effects of policy initiatives in general (i.e. changes in agricultural and environmental policies).

The major achievements will be:

- **Field and farm levels:** A description of the labour and machinery demand and costs involved in different organic lines of production dependent on different technological assumptions (existing and new innovative technologies).
- **Field and farm levels:** An analysis of the cost, direct energy use and impacts on environmental indicators of different organic production systems (existing and new innovative technologies).
- **Farm level:** Development of a farm model (Ø-plan) covering the most important organic farm types.
- **Sector and regional levels:** Adjustment of a sector econometric model ESMERALDA to describe and analyse organic farming at the regional level.
- **Sector and macroeconomic levels:** Development of a dynamic general equilibrium model for the Danish economy with organic farming included.
- **All levels:** Establishment of an overall consistent model structure – where consistency is established from the field to the farm, sector and macroeconomic level. Given the model structure the research team will be able - with relative short notice – to analyse the economic effects and impacts on environmental indicators of new policy initiatives.
- **All levels:** Construction of a consistent baseline scenario illustrating future developments of organic farming in Denmark dependent upon a number of different supply, demand and policy assumptions.
- **All levels:** Economic analysis of a large range of different agricultural, environmental, regulatory and technology scenarios of which a number of scenarios will be co-ordinated across all five work packages.

B. Project summary (from application)

The objective of this research project is to analyse the future development of organic farming in Denmark from the field, farm, sector and macroeconomic perspectives. Emphasis will be placed on the economic impacts of a continued expansion of organic farming in Denmark taking into account the adjustment problems of converting conventional farming into organic farming. Part of the research will also be devoted to analysing the regional effects, the impact on various environmental indicators of organic farming as well as the economic effects of policy initiatives in general (i.e. changes in agricultural and environmental policies).

The research project is characterised by co-ordinated efforts from the field level to the farm, sector and macroeconomic levels. At the field and farm levels the project will focus on the specification of labour and machinery systems in organic farming. Furthermore, the implications for total production costs and cost structures for different farm types will be determined. Given these and existing data for cost structures in conventional and organic farming, existing farm, sector and macroeconomic models will be adjusted and extended to incorporate the information obtained through this research project. Key words for the research efforts are the analyses of barriers to entry, the effects of uncertainty with respect to future markets and prices for organic products, impacts of different policy initiatives as well as the dynamic processes of converting Danish conventional farming into organic farming.

A core activity of the project will be to undertake a number of illustrative scenarios describing the eco-

conomic effects at the farm, sector and macroeconomic levels. The scenarios will be co-ordinated across all work packages. The scenarios will include both the construction of a baseline scenario describing possible perspectives for the future expansion of organic farming in Denmark as well as a number of policy, regulatory and technology scenarios.

The results of the research project will illustrate the impacts of different designs of agricultural and environmental policies on the agricultural sector in general and on organic farming in particular. Furthermore, the results from the field and farm level analyses can be used to support farmers in converting to organic farming and to develop organic production systems.

Finally, the results from the research project will be made available to the public through the SJFI web site as well as through the publication of working papers, articles and research reports. Moreover, the research group is planning to arrange both a mid-term workshop and a final policy workshop with the objective of discussing methodology, data and policy implications.

Table 1: Work package list (from application)

| WP No | Workpackage title | Responsible participant | Budget, Mio. DKr. | Start | End | Deliverable No |
|-------|--|-------------------------|-------------------|-----------|-----------|----------------|
| 1 | Labour and machinery systems in organic farming | DIAS-DAE | 1,400 | 1.10.2000 | 1.10.2003 | 1,2,3 |
| 2 | Organic farming at the farm level. A study of the conversion process. | SJFI-Farm | 1,860 | 1.01.2001 | 1.10.2003 | 4,5,7,8 |
| 3 | Economic Analysis of organic farming at the regional level | SJFI-Policy | 0,500 | 1.11.2001 | 1.07.2003 | 9,10 |
| 4 | Development of a dynamic general equilibrium model with organic farming | SJFI-Policy | 0,935 | 1.01.2001 | 1.06.2002 | 11,12 |
| 5 | Economic analysis of organic farming at the sector and macroeconomic level | SJFI-Policy | 0,935 | 1.06.2002 | 1.01.2004 | 13,15 |

C. Progress

C.1 Annual description (resume) of main results and conclusions

The project was initiated in October 2000 and as demonstrated below only a few adjustments of the original plan have been necessary during the first phase of the research project. A few tasks have been delayed, whereas other tasks have been undertaken a few months earlier than originally expected. Generally the project progresses according to the original plans, including the design and development of the respective economic models at the different analytical levels.

At the agronomic, engineering and field level the main results from the research undertaking has succeeded in extending and improving the data on labour and machinery demand in organic farming. Current as well as innovative technologies and work methods have been identified and evaluated. Technologies that are expected to be implemented in the next 5 years have been selected for further elaboration within the scope of case farms.

Existing labour and machinery data has been reviewed and missing data and knowledge have been identified. Ways of acquiring missing information and data have been selected. A questionnaire has been designed for the acquisition of data on management tasks and work regarding pig production on organic farming.

The sequence of the tasks of collection new data and information and the selection of case farms has to some extent been reversed in order to focus the collection of data.

At the farm level, the extension of the Ø-plan model has been initiated and the development of the model progresses as planned. By the end of this year the Ø-plan model will also deal with dairy farms

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and their crop rotation. The design of the case farms, describing the “organic farms of tomorrow” has been made. The identification of all machinery operations on a weekly basis has also been included in the economic farm level model. Furthermore, work which will lead to the calculation of N- and P-surpluses at the farm level have been initiated.

At the sector and macroeconomic level the development of a Dynamic Equilibrium Model of the Danish Economy, including a description of the organic sectors, has been initiated and progresses slightly ahead of plans. The theoretical microeconomic models structure and associated data has been identified. A first version of the economic model has been implemented in its dynamic version including the collection and processing of a fully detailed input-output table describing a large number of organic sectors and industries and their linkages with the rest of the Danish Economy. The data and the model has been tested and in its preliminary version the model is up and running.

The macro economic model is therefore capable of simulation the development of organic farming in the long run taking into account parts of the dynamic adjustments processes necessary to convert conventional farming into organic farming. Current results yield credible results but intensive testing and evaluation still need to be undertaken. Further, improvements of the data await more detailed results from of other parts of the overall research project.

C.2 Fulfilment of tasks and deadlines in individual work packages

| WP1: Labour and machinery systems in organic farming | Time schedule, according to application | Deviations, if any* |
|--|---|--|
| Task | | |
| 1: Compilation of existing labour and machinery data and identification of missing data | 1.10.2000 - 1.02.2001 | |
| 2: Identification of new technologies and work methods applied in organic farming | 1.11.2000 - 1.04.2001 | |
| 3: Collect data on labour demand and machine capabilities | 1.03.2001 - 1.11.2001 1.04.2002 - 1.10.2002 | 1.08.2001- 1.10.2002 |
| 4: Analyse results for labour demand and machine capability for different crops and production systems | 1.07.2001 - 1.11.2001 1.06.2002 - 1.11.2002 | 1.01.2002 - 1.11.2002 |
| 5: Prepare results at the crop level for economic analyses | 1.01.2001 - 1.03.2001 1.10.2001 - 1.01.2002 1.09.2002 - 1.11.2002 | 1.10.2001 - 1.02.2002 1.09.2002 - 1.11.2002 |
| 6: Design of case farms representing typical organic farming systems | 1.12.2001 - 1.04.2002 | 1.06.2001 - 1.01.2002 |
| 7: Analyse machinery systems and labour profiles for case farms | 1.03.2002 - 1.06.2003 | |
| 8: Validate results from model with empirical data from organic farms | 1.07.2002 - 1.12.2002 | |
| 9: Supply labour and machine data at the farm level for economic analyses | 1.10.2002 - 1.12.2002 | |
| 10: Report on results | 1.03.2003 - 1.10.2003 | |
| Deliverables | | |
| 1: Paper on existing labour and machinery data on organic farming tasks | 1.12.2001 | |
| 2: Paper on innovative technologies and work methods | 1.06.2002 | |
| 3: Whole-farm analysis of labour and machinery demand, labour budgets and labour profiles for selected farm types with a specified collection of work operations (DIAS report) | 1.06.2003 | |

| Milestones | | |
|--|--------------|----------------|
| 1: Existing labour and machinery data related to organic production practices identified | Accomplished | |
| 2: Completion of plan for data acquisition on labour demand and machinery capacities | Accomplished | |
| 3: Selected technologies and work methods | Accomplished | |
| 4: Preliminary completion of collection of data on labour demand and machinery capacities for selected technologies and work methods | | Postponed |
| 5: Selection and design of model farms with adapted technologies | | Pushed forward |

* Deviations are to be further discussed at C3

| WP2: Organic farming at the farm level – A study of the conversion process | Time schedule according to application | Deviations, if any* |
|---|--|---------------------|
| Task | | |
| 11: Improve Ø-plan with machinery and labour | 1.08.2001 - 1.01.2002 | |
| 12: New crop rotations and farm types | 1.01.2001 - 1.08.2001 | |
| 13: Nutrient flows | 1.10.2001 - 1.07.2002 | |
| 14: Economic analyses of new machinery | 1.10.2001 - 1.02.2002 1.10.2002 - 1.01.2003 | 1.12.2001-1.4.2002 |
| 15: Design of case farms | 1.12.2001 - 1.04.2002 | 1.7.2001-1.11.2001 |
| 16: Improve Ø-plan with new machinery and labour | 1.06.2002 - 1.10.2002 | |
| 17: Verification and validation of case farms | 1.10.2002 - 1.01.2003 | |
| 18: Analyse the impact of changes in regulation | 1.01.2003 - 1.09.2003 | |
| 19: Data for sector analysis | 1.11.2001 - 1.12.2001 1.11.2002 - 1.01.2003 | |
| 20: Report on results at the farm level | 1.05.2003 - 1.10.2003 | |
| Deliverables | | |
| 4: An SJFI paper on the machinery and labour costs | 1.09.2002 | |
| 5: An SJFI paper as documentation for the new Ø-plan model | 1.10.2002 | |
| 7: An SJFI paper on the data to be used in the sector analysis | 1.02.2003 | |
| 8: An SJFI report on the results from the different farms | 1.10.2003 | |
| Milestones | | |
| 1: Labour and machinery data from WP1 | Accomplished | |
| 2: New crop rotations and farm types are included in Ø plan | To be accomplished by the end of 2001 | |
| 3: Nutrient surplus are included in Ø-plan | | |
| 4: Machinery and labour for new technologies are included in Ø-plan | | |
| 5: Verification of the whole farm results in relation to study farms | | |
| 6: Analyse the impact of changes in regulation etc. | | |
| 7: Data for sector analysis are prepared | | |
| 8: Report on the effect of different scenarios on model farms | | |

* Deviations are to be further discussed at C3

| WP3: Economic Analysis of organic farming at the regional level | Time schedule according to application | Deviations, if any* |
|--|--|---------------------|
| Task | | |
| 21: Establishing a data base for organic farming in Denmark | 1.11.2001-1.12.2001 | |
| 22: Establishing behavioural parameters for the organic farming sector | 1.12.2001-1.01.2002 | |
| 23: Developing procedures for aggregating organic and conventional farms to the regional level | 1.01.2002-1.03.2002 | |
| 24: Linking of environmental indicators to organic farms | 1.03.2002-1.04.2002 | |
| 25: Model analysis of the economic potentials for organic farming in different regions of Denmark | 1.03.2003-1.04.2003 | |
| 26: Analysing regional economic consequences of enhancing organic farming in specific regions of Denmark | 1.04.2003-1.06.2003 | |
| 27: Report on results | 1.06.2003-1.07.2003 | |
| Deliverables | | |
| 9: An SJFI-working paper on the development of ESMERALDA to allow for analysis of organic farming | 1.02.2003 | |
| 10: An SJFI-report on baseline results and a selected number of policy scenarios (regional focus) | 1.10.2003 | |
| Milestones | | |
| 1. Study of the representation of organic farms in the ESMERALDA database | | |
| 2. Determination of behavioural parameters for organic farms | | |
| 3. Representation of organic farms on a regional basis (aggregation) | | |
| 4. Linking of environmental indicators to organic farms | | |
| 5. Economic potentials for organic farming in different regions of Denmark | | |
| 6. Undertaken policy scenarios. Report on results found | | |

* *Deviations are to be further discussed at C3*

| WP4: Development of a dynamic general equilibrium model with organic farming | Time schedule according to application | Deviations, if any* |
|---|--|-----------------------|
| Task | | |
| 28: Identification of the theoretical microeconomic model structure and associated data | 1.01.2001-1.02.2001 | |
| 29: Data collecting of macroeconomic data such as capital stocks, investments and rates of return. | 1.01.2001-1.03.2001 | |
| 30: Data collecting of environmental indicators and adjusting them to the rest of the database and model | 1.03.2001-1.05.2001 | 1.03.2002 - 1.05.2002 |
| 31: Adjustments of farm level data for organic farm types delivered from work package 2. | 1.06.2001-1.10.2001 | |
| 32: Adjustments of behavioural parameters in CGE model according to results found in work package 3. | 1.09.2001-1.11.2001 | |
| 33: Programming the dynamic version of the general equilibrium model and 'fitting data to that structure' | 1.10.2001-1.01.2002 | 1.09.2001 - 1.12.2001 |
| 34: Testing the implemented dynamic model. | 1.01.2002-1.03.2002 | 1.10.2001 - 1.01.2002 |
| 35: A fully operational dynamic version of AAGE general equilibrium model documented | 1.03.2002-1.06.2002 | |

| | | |
|--|--------------|-----------|
| Deliverables | | |
| D11: An SJFI-working paper documenting the theoretical structure chosen and the applied economic data and environmental indicators. The working paper will also discuss similarities and differences across organic sectors and across conventional and organic farming sectors. | 1.11.2001 | |
| D12: An SJFI-report describing the dynamic version of the AAGE model and a few illustrative scenarios focusing specifically upon the new features relative to the static version of the model. | 1.06.2002 | |
| Milestones | | |
| 1. Identification of the theoretical microeconomic model structure and associated data. | Accomplished | |
| 2. Data collecting of macroeconomic data such as capital stocks, investments and rates of return. | Accomplished | |
| 3. Data collecting of environmental indicators and adjusting them to the rest of the database and model. | | Postponed |
| 4. Adjustments of farm level data for organic farm types delivered from work package 2. | | |
| 5. Adjustments of behavioural parameters in CGE model according to results found in work package 2 and 3. | | |
| 6. Programming the dynamic version of the general equilibrium model and 'fitting data to that structure'. | In progress | |
| 7. Testing the implemented dynamic model. | In progress | |
| 8. A fully operational dynamic version of AAGE general equilibrium model documented. | | |

* *Deviations are to be further discussed at C3*

| WP5: Economic analysis of organic farming at the sector and macroeconomic level | Time schedule according to application | Deviations, if any* |
|---|--|-----------------------|
| Task | | |
| 36: Identification of principles for constructing a baseline using the dynamic AAGE mode | 1.06.2002 - 1.09.2002 | 1.05.2001 - 1.12.2001 |
| 37: Identification of major determinants behind the development of organic farming | 1.08.2002 - 1.10.2002 | |
| 38: Identification and design of baseline scenario and policy scenarios. | 1.10.2002 - 1.03.2003 | |
| 39: Undertaking simulations and undertaken sensitivity analysis. | 1.03.2003 - 1.05.2003 | |
| 40: Documenting the work and the results found in research report; popular and scientific articles. | 1.06.2003 - 1.10.2003 | |
| 41: Final report. | 1.10.2003 - 1.01.2004 | |
| Deliverables | | |
| D13: An SJFI report analysing a number of different scenarios, including a baseline scenario describing possible future developments of organic farming in Denmark. | 1.10.2003 | |
| D15: An SJFI report concluding on the overall project with its main focus on the overall results found in the research project – from field level to farm, regional and sector and macroeconomic level. | 1.01.2004 | |

| Milestones | | |
|---|-------------|--|
| 1: Identification of principles for constructing a baseline using the dynamic AAGE model | In progress | |
| 2: Identification of major determinants behind the development of organic farming | | |
| 3: Identification and design of baseline scenario and policy scenarios. | | |
| 4: Undertaking simulations and undertaken sensitivity analysis. | | |
| 5: Documenting the work and the results found in research report and in popular and scientific articles | | |

* *Deviations are to be further discussed at C3*

C.3 Discussion on the progress, incl. deviations and achievements in the project as a whole and in the individual work packages

Work package 1

The main objective of WP 1 is to describe the labour and machinery demand and costs involved in different organic lines of production dependent on different technological assumptions (existing and new innovative technologies).

Achievements

Current as well as innovative technologies and work methods has been identified. These technologies and work methods has been described and evaluated as regards their compliance with generally accepted criteria for technology adaptation in organic farming. Furthermore, the analysis has provided the basis for the selecting of foreseeable technologies to be implemented on organic farms in the next 5 years.

Existing labour and machinery data has been reviewed as regards the current state of knowledge. Missing data and knowledge have been identified. Subsequently the need for knowledge acquisition and data collection has been estimated. Various ways of acquiring information and collecting data been evaluated and appropriate methods have been selected. As one method, a questionnaire directed at acquiring information on management tasks within organic farming systems has been designed.

The analysis of the applicability of current/innovative technologies/work methods to organic farming systems has shown the importance of evaluating any organic technology adaptation in the view of a system oriented approach, taking into account a number of sustainability factors. Also, the development within conventional agriculture in terms of the implementation of information technology and precision operations has a clear relation to the basic elements of organic farming, where spatial as well as temporal aspects of work operations are emphasised.

A number of new/innovative technologies believed to be implemented in the near future in organic farming has been selected to be part of case farms representing typical organic farming systems. These include automatic milking systems (AMS), GPS guidance for controlling animal manure application, slurry injection on grass and fallow land, mechanical weed control using traditional harrows, gas burner, steam and weeding robots.

The analysis on the current state of knowledge regarding labour and machinery data in organic farming has identified missing data/information. The current database on labour data contains information on most current working methods used in conventional farming and subsequently in organic farming. However, specific work methods, which are present in organic farming, will require the inclusion of labour data for such methods. Existing task time models may be re-evaluated to see if they are relevant in the context of organic farming or new data may be required. Specifically, data to some extent is missing as regards management tasks, out-door pig production and special crops in plant production.

Various ways of acquiring the missing data have been evaluated. The following conclusion have been

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reached:

- in order to focus the collection of data it is important that the characteristics of the selected case farms be known
- the evaluation of labour demand based on farmer registration over a specified period is considered too unreliable in this case
- a survey using a questionnaire is selected as the best method for acquiring information on management tasks in organic farming as related to a situation prior to conversion. The survey will include 18 pilot farms covering 6 pig productions, 6 cattle productions and 6 plant productions
- in connection with the implementation of the survey on management tasks supplemental information collection on labour demand for out-door pig production will be attempted
- the labour demand/machine capacity as regards new technologies will be estimated based on specific assumptions regarding the use of the machinery.

Deviations

The tasks concerning review of existing labour/machinery data, identification of missing data as well as the identification and evaluation of new/innovative technologies for organic farming system has been accomplished as scheduled. This includes the selection of appropriate data collection methods, e.g. the use and design of a questionnaire for the survey of management tasks and specific work operations within the out-door pig production.

As regard the tasks of collecting labour/machinery data (Task 3), analysis of labour demand machine capability (Task 4), and preparation of results for economic results (Task 5), these have been postponed as a result of the conclusions from the preliminary evaluation of the need for labour and machinery data. In order to increase the efficiency and focus of the labour data acquisition it was concluded that the specific selection of case farms be known. Consequently, the designing of case farms representing typical organic farming systems (Task 6) has been pushed forward in time, whereas the tasks of collection data and analysing the case farms have been delayed a few months.

Work package 2

The main objective of WP 2 is to determine the costs associated with the adoption of new technologies, to develop a farm model (Ø-plan) covering the most important organic farm types and to describe the conversion process from conventional farming to organic production.

Achievements

The development of the Ø-plan model has been initiated and the development of the model progresses as planned. By the end of this year the Ø-plan model will also deal with dairy farms and their crop rotation. The design of the case farms, describing the "organic farms of tomorrow" has been made. The identification of all machinery operations on a weekly basis has also been included in the economic farm level model.

Furthermore, work which will lead to the calculation of N- and P-surpluses at the farm level have been initiated. For each case farm both crop rotation and the production system for animals is described in detail. The work on nutrient flows has focused on the N- and P- turnover in a given production system based on a preliminary DJF-report on N, P and K-norms in animal manure.

The design of the case farms has been made in order to find the "organic farms of tomorrow". Local organic advisors have been involved in finding the type of farms, which characterize the farms that are and will be converting to organic farming. Also possible future trends with respect to network cooperation between dairy and crop farmers as well as crop rotations with more protein crops or cash crops like sugar beet has been considered and will be included.

The work in WP2 has since the beginning of the project been closely coordinated mainly with WP1 to ensure the link between the technical analysis regarding labour and machinery. Work on the data exchange between WP2 and WP3+4 has also been initiated and the initial discussions of the design and specification of data and parameters to be delivered to work package 3 and 4 has been carried out.

Deviations

In co-operation with the research undertaken in work package 1 it soon became apparent that the design of the case farms had to be put forward so that the collecting of labour data could focus on the relevant farm types and issues (Task 15). Therefore, the economic analysis of new machinery has been postponed a few months (Task 14).

Work package 3:

The objective of WP 3 is to adjust the sector econometric model ESMERALDA to describe and analyse organic farming at the regional level. As planned WP 3 has not yet been initiated.

Work package 4:

The objective of work package 4 is the development of a Dynamic Equilibrium Model, which allows for quantitative assessment of the development of organic farming.

Achievements

The organic dynamic version of the AAGE model has been implemented and it is now working in a preliminary version. Preliminary data from work package 2 has been used so far in the development of the model.

The model is capable of simulation the development of organic farming in the long run taking into account parts of the dynamic adjustments processes necessary to convert conventional farming into organic farming. The theoretical microeconomic foundation is therefore currently being implemented allowing for short run dynamic behaviour in organic farming. Current results yield credible results but intensive testing and evaluation still need to be undertaken.

The collection of macroeconomic data for capital stocks, investments and rates of return has been carried out as well as the data has been adjusted and implemented in the overall model structure.

Deviations

The time schedule of Task 30, 33 and 34 has been changed to take advantage of the visit of Dr. P. Adams, Monash University and CoPS, Australia. This means that Task 33 and 34 has taken place earlier than expected and therefore specific organic features of the model are programmed (task 33) and the implemented features undergo currently appropriate testing (task 34). Instead Task 30 has been postponed until 1.03.2002

Adjustment of farm level data for organic farm types (task 31) and behavioural parameters (task 32) are awaiting final deliverances from WP 2 and 3. In its preliminary version of the model provisionally result from WP 2 and 3 is used instead.

WP 5:

The objective of work package 5 is to construct a credible baseline scenario and to undertake a number of policy scenarios using the organic dynamic version of the AAGE model.

Achievements

The identification of the important principles for constructing a baseline using the dynamic AAGE model has been completed and so far a credible baseline for the standard model (without organic farming) has been constructed for the period 1995 to 2010. Work to extend this baseline to organic farming is also in progress. A first version of a SJFI working paper on the principles for constructing a credible baseline is well in progress.

Deviations

According to the plan work package 5 is first to be initiated in 2002. Parts of the effort have, as described above, already been done, i.e. task 36 "Identification of principles for constructing a baseline using the dynamic AAGE mode". This work has been started to take advantages of Dr. P. Adams visit at SJFI.

D. Description of plans and future work in the project as a whole and in the work package (Including plans for publication and communication)

In the next year of the project an increased focus will be on the co-ordination of the individual work packages as well as work package 3 will be initialised. Work package 1+2 will be co-ordinated more closely with work package 3+4, including establishing the needed data and parameters to be included in the sector and macroeconomic models. Furthermore, part of the research will be on establishing the modelling framework for analysing the regional economic aspects of organic farming (WP 3). The testing and further development of the organic dynamic version of the general equilibrium model of the Danish Economy will continue and a number of test scenarios will be undertaken.

In the coming year a total of 2 papers, 4 working papers and 3 reports will be published. Furthermore, 1-3 articles will be drafted and forwarded to national and/or international refereed journals.

WP1:

A survey of management tasks and specific labour demands for out-door pig production will be carried out on 18 pilot farms and finished by the end of 2001. The results will be analysed and standardised for use together with the existing labour database in model calculations.

Ø-plan will provide the crop rotation scheme, types of operations and their time of execution for selected case farms. Based on this information and maybe some adjustments due to operational requirements (timeliness, workability, etc.) a machinery complement will be selected, including information on machinery sizes, machinery types, etc. Following this the labour demand and machine capacity will be estimated on a weekly basis together with the labour demand for the work operations residing in the animal houses.

Parallel with the heuristic effort of identifying a farm specific machinery complement an optimising approach will be pursued. A prototype model for the estimating of optimal machinery sizes based on costs, timeliness effect, etc. will be adjusted for the purpose at hand. Also, in connection with the identification of the machinery complement the feasibility of using contractors will be evaluated.

The paper on the current state of knowledge regarding labour and machinery data will be finished as indicated (D1). The preliminary version of the paper on innovative technologies and work methods adapted to organic farming (D2) has been drafted and will be complemented with specific evaluations regarding the effects on labour demand, crop yield, etc. to be finished by mid 2002. A summary of D1 and D2 will be produced. Results from these two papers as well as preliminary results from the analysis of labour demand and machine capabilities will be presented at the mid term workshop (D6).

Publication strategy for WP1: two papers (D1 and D2), one report (D3) and one international article on the findings.

WP2:

The work in 2002 will focus on detailed analysis of the case farms in order to get a detailed assessment of labour use, machinery systems and machinery costs. The analysis will be carried out for case farms using both existing and new technology (e.g. robots for weed control). The work on describing nitrogen and phosphor surplus at the farm level will also be finished. The results from the Ø-plan model will be compared and verified with actual results from a number of study farms where detailed production data etc. can be obtained. Also the work with preparing data for the regional and sector analyses will be intensified.

In the coming year the deliverables from this work package will consist of specific data deliverables to work package 4 and two working papers the machinery and labour costs in organic farming (D4) and a documentation of the extended and finalized Ø-plan model (D5). Both papers will be published in the working paper series of SJFI.

WP3:

In 2002 the activities will correspond closely to the content and timing as indicated in the application. The effort in 2002 is therefore expected to result in a version of sector econometric model Esmeralda and database in which organic agriculture is fully integrated.

WP4:

The research undertaken in 2001 will in the coming period result in an SJFI-working paper documenting the theoretical structure chosen and the applied economic data. Furthermore, a first version of the model with organic agriculture represented in the dynamic version of the AAGE model will be implemented and tested systematically focusing in particular on the behaviour of the organic sectors in the model. The resulting working paper will also discuss similarities and differences across organic sectors and across conventional and organic farming sectors.

In the second half of 2002 an SJFI report will be published describing the dynamic version of the AAGE model and a few illustrative scenarios focusing specifically upon the new features relative to the static version of the model. It is expected that one article will be forwarded to a refereed international journal.

WP5:

In the second half of 2002 a credible baseline scenario for the Danish Economy, including a forecast for the organic sectors, will be established focusing in particular on the identification of major determinants behind the development of organic farming the coming years. The construction of the scenario will be based on the use of the developed dynamic general equilibrium model as described in work package 4.

A working paper on the construction of a structural forecast of the Danish Economy with the developed standard dynamic version of the model will be finalised. Later on these efforts will be generalised to include also a structural forecast for the organic sectors of the economy. It is expected that one article will be forwarded to a refereed international journal.

The research effort will also result in an SJFI report documenting the developed dynamic version of the AAGE model. In the report the construction of the database will be presented and discussed, the theoretical structure of the model and in particular the description of the modelling of the dynamic adjustment processes of converting conventional agriculture into organic production. A few illustrative scenarios will also be conducted.

E. Project publications

1. Articles in international, scientific journals with review procedures

2. Presentations at congresses, symposiums etc.

Andersen, Lill, Lars-Bo Jacobsen and Philip Adams (2001), Does timing and announcement matter? Restricting the production of pigs within a dynamic CGE model, Presentation at the Fourth Annual conference on Global Economic Analysis, Purdue University, Indiana, USA, June 27-29, 2001.

3. Research Reports, articles in agricultural journals etc.

Adams, Philip (2000): Dynamic AAGE – A Dynamic Applied General Equilibrium Model of the Danish Economy based on the AAGE and MONASH models. Report no. 115, Danish Institute of Agricultural and Fisheries Economics (Report in Co-operation with the SJFI-Policy-team)

Adams, Philip, Lill Andersen and Lars-Bo Jacobsen (2001): Structural forecasts for the Danish Economy using the Dynamic-AAGE model, SJFI preliminary draft: 25. September 2001.

Kledal, Paul Rye (2001), Økologi for fremtiden, Jord og Viden nr. 2001. 11.

Kledal, Paul Rye (2001a), Melklister, billefangere og økologisk raps, Jord og Viden nr. 2001. 15.

Sørensen, Claus (2001), Økologisk teknologi: indikationer vedr. eksisterende/innovativ teknologi og valg af teknologi til scenarier, DIAS-DAE.

4. Other presentations at meetings, field days etc.

Adams, Philip and Lill Andersen (September 2001): Structural forecasts for the Danish Economy using the Dynamic-AAGE model, SJFI-KVL seminar, SJFI.

Jacobsen, Lars-Bo (March 2001): Organic farming. Lecture at the course "Introduction to Organic Farming". Royal Veterinary and Agricultural University

Jacobsen, Lars-Bo (March 2001): Potential for organic farming – Sector- and Economy-wide implication. Presentation for the Minister of Food, Agricultural and Fisheries at her SJFI visit.

Jacobsen, Lars-Bo (June, 2001): Potential for organic farming – Sector- and Economy-wide implication. Presentation, June 12, 2001, Meeting of the Organic Food Council

Jacobsen, Lars-Bo (August, 2001): Potential for organic farming – Sector- and Economy-wide implication. Lecture at the workshop on the SJFI organic projects.

Jacobsen, Lars-Bo (August, 2001): Perspectives on Organic agriculture. Lecture at the course: Agriculture and the Danish Economy.

Jacobsen, Lars-Bo (September 2001): Perspectives on Organic agriculture. Presentation for a group of organic farmers, Borup Denmark

Kledal, Paul Rye (March 2001), Økologisk Jordbrug for fremtiden. Økologisk Forum.

Kledal, Paul Rye (March 2001), Potentialet for økologisk produktion frem til år 2010". Præsentation for Fødevarerministeren ved hendes besøg på SJFI

Kledal, Paul Rye (June 2001), Økologisk Jordbrug for fremtiden. Præsentation for det økologiske fødevareråd.

Kledal, Paul Rye (August 2001), Økologisk Jordbrug for fremtiden". SJFI workshop

Kledal, Paul Rye (September 2001), Økologisk jordbrug, Wilhjelmudvalget og diskurser i natursyn. Foredrag ved VUC-Nordfyn, temaugle om natur og miljø

Tvedegaard, Niels (February, 2001), Accounts and the economic perspectives in organic agriculture (crops, pork and poultry) including a demonstration of Ø-plan, guest lectures at KVL

Tvedegaard, Niels (March 2001), Demonstration of Ø-plan, Annual Meeting at Økologisk

Tvedegaard, Niels (March 2001), Demonstration of Ø-plan, The Organic Agricultural School.

Tvedegaard, Niels (August 2001), The economic situation during and after converting to organic farming. Lecture at the workshop on the SJFI organic projects.

F. Scientific education (ph.d. and post doc.), including visiting scientists and visits abroad

Dr. Phillip Adams from CoPS and the IMPACT project at the University of Melbourne Australia has during 2000 and 2001 visited SJFI for a longer period. He has in co-operation with the SJFI-Policy team contributed to the development of the Dynamic AAGE model with a particular focus on the dynamic specification, structural forecasting and features related to the technical specification of organic farming and its adjustments processes.

G. National and international co-operation

WP1

WP1 is associated with a number of ongoing research projects within The Danish Institute of Agricultural Sciences (DIAS), covering topics like the fertility of the soil in relation to organic cropping praxis and soil treatment, weed control, and row cropping systems.

WP1 is using information and experiences obtained from international contacts and co-operation (e.g. CIGR-Working Group 17: "Models, Methods and Database for Labour and Machinery in Agriculture" with participants from Germany, The Netherlands, Finland and Denmark). Also, WP1 will be associated with a possible EU-project "Labour in Organic Agriculture: Assessing and enhancing labour and social dynamics, farm-household performance, and rural development".

WP2:

A close contact to local organic advisors mainly in the Southern part of Jutland is undertaken as an integrated part of the research.

WP4 and WP5:

The project is co-ordinated with other economic research projects at the SJFI, including the SSF financed research project entitled: "En anvendt dynamisk generel ligevægtsmodel for dansk økonomi med hjælp fra udenlandsk gæsteforsker", which has made the visit of Dr. Philp Adams possible. In addition synergy is obtained by linking the present research project to a larger research project focusing on the perspectives of the Danish pig production and its economy-wide impacts financed by Norma and Frode Jacobsens Fond as well as a large research project focusing on the food quality and safety issues financed by 'Produktudviklingsfonden'. The significant costs associated with developing the dynamic model is thereby split between several distinct research projects.

The project is also co-ordinated with the DARCOF II research project headed by AKF (project III.1). That project focuses in particular on the consumption of and willingness to pay for organic products. Results from that research project are expected to be used in the construction of the demand system in the organic version of the dynamic general equilibrium model of the Danish Economy.

H. Possible elaboration of project and achieved results