



## Annual Status Report 2000 and Application for Continuation in 2001

For research projects financed by grants from  
The Directorate for Food, Fisheries and Agro Business  
under the Danish Ministry of Food, Agriculture and Fisheries

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### 1. Research program

Research in organic farming 2000-2005 (DARCOF II)

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### 2. Project title and number

II.8 Management in relation to health and food safety in organic pig production

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### 3. Head of project

Jan Tind Sørensen Head of research Unit, Phd.  
Dept. of Animal Health and Welfare  
Danish institute of Agricultural Sciences

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### 4. Participating institutes

Danish institute of Agricultural Sciences  
Royal Veterinary and Agricultural University  
Danish Pest infestation Laboratory

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### 5. Contact persons

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## 6. Other project staff

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7. **Start of project:** **May 2001**  
**End of project:** **Dec 2004**

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## 8. Annual report/Application for continuation in 2001

### A. Objectives and expected achievements (from application)

Parasites are unavoidable in organic pig production but need to be controlled at an acceptable level. In order to develop non-medical strategies for controlling parasites in organic pig production it is urgent to obtain specific answers to some of the most frequent questions from organic farmers and practising veterinarians: When and to which extent do piglets obtain helminth infections from the environment? For how long time should the pastures remain free of pigs before the infectivity is so low that pigs can return? What is the effect of ploughing the pasture? These questions will be addressed in WP1.

Risk factors for parasites, diseases, zoonoses and welfare problems can be identified based on existing knowledge. However we need to quantify these risks and further to identify critical control points for on-farm use in order to establish a monitoring system for controlling these risks at farm level. Researchers, advisors and experienced farmers have important knowledge on operational management. This knowledge can be systematised and described in systematic operation programmes and can be elicited in an expert opinion study. However, before a systematic operation programme is proven useful for organic pig farmers it needs to be evaluated for on farm use. These tasks are carried out in WP2.

Wild rodents such as rats will always be present in organic pig production. However, since rats are assumed to be an important risk factor for diseases and zoonoses, it is necessary to develop efficient rodent control strategies for organic pig production without use of rodenticides. Knowledge on pest supporting factors in Danish out door pig production systems is lacking, and a survey identifying these factors is therefore a necessary part of developing such strategies. This work will be carried out in WP3.

Existing knowledge combined with results obtained in WP1 and WP 3 provide a basis for relevant management strategies for organic pig production developed in WP2.

Valuable knowledge relevant for this project will be produced in other national and international projects. To promote efficient communication for the benefit of this project a scientific workshop will be organised focusing on diseases, zoonoses and welfare problems in organic pig production. The workshop will be organised ultimo 2002. This task will be carried out in WP4.

The project is expected to produce:

- Strategies for non-medical parasite control in piglets
- Hazard analysis and critical control points for measuring risks for leg problems and weaning diarrhoea, *Salmonella* and animal welfare problems
- Effective rodent management strategies
- Systematic operation programmes for preventing and treating leg problems in sows, weaning diarrhoea, *Salmonella* and animal welfare problems

## **B. Project summary (from application)**

Organic pig production is a relatively new production concept with promising possibilities for growth. A major challenge in organic pig production is to maintain and in some areas to improve animal health and food safety without compromising animal welfare. It is assumed that many problems concerning diseases, zoonoses and animal welfare can be reduced by improved management in organic pig production systems. The purpose with this project is to develop management strategies for controlling diseases, zoonoses and animal welfare problems.

Parasites are a major problem for animal health and welfare in many organic pig production systems. Knowledge relevant for parasite control in organic pig production is scarce. In an experiment in this project the parasite transmission rate in piglets is described and the long term infectivity of naturally contaminated pastures is measured. Also the effect of ploughing and reestablishing of the grass is examined.

Rodents are assumed to be an important risk factor for diseases and zoonoses in organic pig production systems. Traditional rodent control with application of rodenticides is not desirable in organic pig production. It is therefore necessary to develop organically acceptable and efficient rodent control strategies for organic pig production. Since knowledge on pest supporting factors in Danish out door pig production systems is lacking, a survey identifying these factors will be carried out. The ecology of the pest problem is investigated in organic pig farm cases and strategies for controlling the most important pest problems will be developed.

The development of strategies preventing health and food safety problems needs to acknowledge the complex interaction between diseases/zoonoses, production systems and management which prevail in organic pig production. It is also important that strategies for controlling diseases and zoonoses do not compromise animal welfare. Hazard-Analysis-Critical-Control-Point (HACCP) is a risk analysis concept, which in recent years has been described for applications at the livestock farm level. A HACCP concept for application in an organic pig farm is developed in this project focusing on CCP's for diseases, zoonoses and animal welfare problems.

Organic pig production is a relatively new production form and most stockmen are inexperienced and need to develop suitable management routines. A concept for operational management for inexperienced farmers or for farmers with present management problems has been developed and is called Systematic Operation Programmes (SOP). In this project a SOP focusing on the control of diseases, zoonoses and animal welfare problems is developed and evaluated. In the development phase experience from researchers, advisors and farmers is elicited in an expert opinion study.

**Table 1: Work package list (from application)**

| WP No        | WP title  | Responsible participant | Budget           | Start     | End       | Deliverable, No |
|--------------|---|-------------------------|------------------|-----------|-----------|-----------------|
| 1            | Non-medical parasite control in piglets   | AR                      | 850.000          | May 2001  | July 2004 | D1-D4           |
| 2            | Development of a HACCP and systematic operation programme for control of diseases, zoonoses and animal welfare problems | JTS                     | 925.000          | Jan 2002  | Sept 2004 | D5-D10          |
| 3            | Development of strategies for pest management   | HL                      | 500.000          | June 2001 | May 2004  | D11-D13         |
| 4            | Project co-ordination and organisation of an international workshop   | JTS                     | 225.000          | May 2001  | Dec 2004  | D14             |
| <b>Total</b> |   |                         | <b>2.500.000</b> |           |           |                 |

### C. Progress

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

#### C.2 Fulfilment of tasks and deadlines in individual work packages (To be completed for each work package)

| WP number and title   | Time schedule according to application | Deviations, if any* |
|---|--|---------------------|
| WP1 Non-medical parasite control in piglets   |  |                     |
| Task  |  |                     |
| 1. Parasites in piglets on contaminated farrowing pastures  | May 2001- Dec. 2001                    |                     |
| 2. Long-term infectivity on naturally contaminated pastures   | Nov 2001- Mar 2004                     |                     |
| 3. Comparison of longterm infectivity of continuous grass and on ploughed/new grass   | Nov 2001- Mar 2004                     |                     |
| Deliverables  |  |                     |
| D1. International journal paper on neonatal helminth infections   | June 30 2002                           | 6 month delay       |
| D2. Informative publication on neonatal helminth infections   | Aug 31 2002                            | 4 month delay       |
| D3. International journal paper on long-term helminth infectivity of continuous and ploughed pastures                                   | April 2004                             |                     |
| D4 Informative publication with recommendations for organic farmers on pasture management in non-medical control of helminth infections | Feb 28 2004                            |                     |
| Milestones  |  |                     |
| M1 Experiment on helminth infections in piglets on contaminated pastures completed  | Dec. 2001                              |                     |
| M2 Experiment on long-term survival of infective helminth stages on continuous and ploughed pastures completed                          | Dec. 2003                              |                     |

\* Deviations are to be further discussed at C3

| WP number and title  | Time schedule according to application | Deviations, if any* |
|--|--|---------------------|
| WP2 Development of a HACCP and a systematic operation programme for control of diseases, zoonoses and animal welfare problems                      |  |                     |
| Task   |  |                     |
| 4. Development of a protocol for critical control points   | Jan – Oct 2002                         |                     |
| 5. Development of a systematic operation programme (SOP)   | May – Oct 2002                         |                     |
| 6. Application of a CCP-protocol and a SOP on organic pig farms  | Nov 2002- Oct 2003                     |                     |
| 7. Evaluation of a CCP report as a decision support system   | Nov 2003- Sep 2004                     |                     |
| 8. Evaluation of a SOP as a decision support system  | Nov 2003 – Dec 2004                    |                     |
| Deliverables   |  |                     |
| D5. A report on risks of leg problems, weaning diarrhoea, <i>Salmonella</i> during one year  | June 2004                              |                     |
| D6. A report on welfare problems on 6-8 organic pig farms during a year  | June 2004                              |                     |
| D7. A scientific journal paper on the relationship between diseases, animal behaviour problems, and production at sow level                        | May 2004                               |                     |
| D8. A report on a HACCP for leg problems, weaning diarrhoea, <i>Salmonella</i> , and animal welfare problems on an organic pig farm.               | Aug 2004                               |                     |
| D9. A report on how the farmers have perceived a SOP as a management tool.   | Sep. 2004                              |                     |
| D10. A Systematic operation programme is described on the Internet including a procedure for how to apply the programme.                           | Dec. 2004                              |                     |
| Milestones   |  |                     |
| M3. A CCP monitor protocol is available.   | Nov 2002                               |                     |
| M4. A prototype of CCP report focusing on risks for leg problems, weaning diarrhoea, <i>Salmonella</i> , and animal welfare problems is available. | Jan. 2004                              |                     |
| M5. An evaluation of the HACCP-report as a decision support tool   | Sept 2004                              |                     |
| M6. A final version of a SOP-manual is completed on paper  | Oct. 2004.                             |                     |

| WP number and title   | Time schedule according to application | Deviations, if any* |
|---|--|---------------------|
| WP3 Development of strategies for peat management in selected production systems  |  |                     |
| Task  |  |                     |
| 9. Identification of pest-supporting factors  | Jun-Nov 2001                           |                     |
| 10. Ecology of pest problems  | Oct 2001- Mar 2004                     |                     |
| 11. Identification of pest control tools  | Apr-Jun 2004                           |                     |
| Deliverables  |  |                     |
| D11. A list of factors which are known to increase pest problems in open air pig farms to be incorporated in risk analysis and decision support systems | Feb 28 2004                            |                     |
| D12. An annotated list of non-pesticide-based pest control tools for use in outdoor pig systems   | May 31 2004                            |                     |
| D13. An international journal paper on the ecology of wild rodents in outdoor pig farm systems  | May 31 2004                            |                     |
| Milestones  |  |                     |
| M7. Questionnaire results analysed  | Nov 2002                               |                     |
| M8. Ecology field work finalised  | Jan. 2004                              |                     |
| M9. Potential control techniques listed   | Sept 2004                              |                     |

| WP number and title   | Time schedule according to application | Deviations, if any* |
|---|--|---------------------|
| WP4 Project co-ordination and organisation of an international workshop |  |                     |
| Task  |  |                     |
| 12. Organisation of a scientific workshop                               | Jan-Dec. 2002                          |                     |
| 13. Co-ordination   | May 2001- Dec 2004                     |                     |
| Deliverables  |  |                     |
| D14. A workshop report  | Jan 2003                               |                     |
| Milestones  |  |                     |
| M10. A scientific workshop  | Dec 2002                               |                     |

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

#### WP1

WP1 has been initiated and been running as scheduled. Thus 6 identical farrowing pastures has been established in the spring of 2001, and subsequently pairwise contaminated with intestinal parasites by 3 litters of pig in May and June. As planned, the parasites encompass *Ascaris suum* and *Oesophagostomum dentatum*, however the whipworm *Trichuris suis* has been included as well. *Trichuris* will not be a part of Task 1, as very few eggs will embryonate within the summer 2001, but the long-lived *Trichuris* eggs will constitute an essential part of the long-term studies of Task 2 and 3.

Soil and grass samples showed that all pastures were heavily contaminated with *Ascaris* eggs, moderately contaminated with *Trichuris* eggs, while the large numbers of excreted *Oesophagostomum* eggs only resulted in a rather light contamination rate. Groups of helminth-free tracer pigs were turned out on the experimental pastures in late June to monitor the pasture infectivity. Necropsy of these pigs revealed that almost no parasites had become infective yet.



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

Three of the six pastures used in WP1 are ploughed in the autumn and new grass will be established.

WP2 will start as planned developing a protocol for critical control points for leg problems in sows and weaning diarrhoea in piglets and further develop a prototype of a systematic operation programme in 2002.

Based on the questionnaire information retrieved in WP3, two farms will be selected for the ecological work with as the main selection criteria the organic nature of the farm, the size of the rodent problem and the size of the farm (not too small). In view of the transport and travel costs involved in this work (which requires numerous field visits), attempts are also made to select outdoor pig systems within convenient distance from SSL. Contact is made with the farmers in order to obtain their accept for a long-term study. This work will be finished soon so that the actual fieldwork can start in November 2001.

In WP4 a scientific workshop will be planned and take place in December 2002

## **E. Project publications**

1. **Articles in international, scientific journals with review procedures**
2. **Presentations at congresses, symposiums etc.**
3. **Articles in agricultural journals etc.**
4. **Other presentations at meetings, field days etc.**

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

M.Sc. Helena Mejer has initiated the Ph.D. project "Management and alternative crops as means of reducing the parasite loads in organic swine production systems" by July 1, 2001, funded by the DARCOF projects MANORPIG and PROSBIO, as well as co-financed by DARCOF.

## **G. National and international co-operation**

The parasite contaminated farrowing pens of WP1 will hopefully be a part of a future EU project "Endoparasite control in organic/sustainable pig production systems without chemotherapeutics", for which a proposal has been submitted in October 2001. If successful, this EU project will secure extra observations on the long-term survival of parasites on the pastures.

## **H. Possible elaboration of project and achieved results**