



Final Report

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

1. Research program

Research in organic farming 2000-2005 (DARCOF II)

2. Project title and number

Improvement of animal health and welfare in organic dairy production with special focus on the calves

3. Head of project

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4. Participating institutes

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The Royal Veterinary and Agricultural University, Bülowsvej 13, DK – 1870 Frederiksberg C (Stig Milan Thamsborg, Danish Centre for Experimental Parasitology; Torben W. Bennedsgaard has moved from The Royal Danish Veterinary and Agricultural University to Research Centre Foulum)

Slutrapporten sendes elektronisk til Forskningscenter for Økologisk Jordbrug
foejo@agrsci.dk senest 3 måneder efter projektets afslutning.

Slutrapporten vedlægges et dansk resumé.

5. Other project staff

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6. Project period (month, year)

Start of project: 1st Nov 2000

End of project: 1st Nov 2004

7. Final report

A. Project summary

Table A.1: Work package list (from application)

No.	Work package title	Participants*	Budget (1.000 DKK)	Start	End	Deliverable and milestone no(s):
1	Animal welfare assessment: development of a theoretical and practical framework under organic production conditions	<u>Mette Vaarst</u> , Torben W. Bennedsgaard, Stig M. Thamsborg, Christine Fossing	1.200.000	1 st Nov 2000	1 st March 2003	D1, D4, D7, D8, D9, D10 M1, M2, M3
2	Prevention of coccidiosis among dairy calves	<u>Klaus Lønne Ingvarsen</u> , Charlotte Maddox-Hyttel, Ellen-Margrethe Vestergaard	1.300.000	1 st Sep- tember 2001	1 st March 2004	D6, D12, D13 M4, M5, M6, M7
3	Veterinary homeopathy: development of research model and in-practice pilot studies	<u>Mette Vaarst</u> , Christine Fossing	500.000	1 st May 2001	1 st Jan. 2003	D2, D3, D11, D13 M8, M9, M10, M11

* Responsible participants are underlined

B. Objectives and expected achievements

The overall objective of the project is to form basis for an improved health and welfare in organic dairy herds with special focus on calves. Two characteristics are regarded as core qualities for the research results:

- a) Theory and practice must be consistently and closely linked together
- b) The flexibility and possibility to apply the knowledge in a wide spectrum of different organic herds must be present.

The following goals are linked to the overall objectives:

- 1) To form a relevant theoretical and practical framework, within which animal welfare can be discussed and assessed under organic production conditions. From this framework, suggestions to improvements can be given on animal, herd and production system level.
- 2) To characterise and analyse the health status and the production conditions including management routines and potential health risks connected to calves 0-6 months of age.
- 3) To develop strategies for preventing coccidiosis in calves on straw and deep litter areas through epidemiological studies and in-practice trials.
- 4) To develop a model for clinical trials in veterinary homeopathic treatments and other holistic treatment methods by carrying through pilot-studies.

Progress and results

C.1 Description (summary) of main results and conclusions

WP 1: Animal welfare

Based on theoretical considerations (described in Vaarst et al. 2001 & Alrøe, H.F., Vaarst, M. & Kristensen, E.S. 2001. Does Organic Farming Face Distinctive Livestock Welfare Issues? – A Conceptual Analysis (Journal of Agricultural and Environmental Ethics)), the first parameters in the animal wel-

fare recordings were identified within the four terms 'Naturalness', 'Harmony', 'Human care-taking' and 'Freedom of choice'. Recordings were made and herd visits took place over the summer 2002. Based on this, a manual was developed for a graphical animal welfare assessment scheme, showing herd strengths and weaknesses within the four organic key-areas mentioned. This manual was presented at and changed during and following an international expert panel workshop in May 2003, where three new key areas were identified for the assessment: 'Naturalness', 'Animal Integrity', and 'Health and management'. The contents of these three areas are covering the key points within the four previous terms, but relating them in a new way, using a graphical wheel model. The results of this workshop and the process following this was written in a project report, which is currently re-written into a journal article:

'Developing a calf welfare assessment system for organic dairy herds' (author group: Mette Vaarst, Stephen Roderick, Hugo Fjelsted Alrøe, Vonne Lund, Christina Leeb, Tine Rousing, Britt Henriksen, Thorkild Bülow Nissen). This article is close to submission and will be sent to co-authors for comments in mid-June 2005.

The project was finalised in a dissemination process among Danish organic dairy farmers and advisors within the project. In collaboration with the Danish Association of Organic Farmers ('Økologisk Landsforening'), we arranged a workshop with participation of 17 Danish organic dairy farming advisors, two organic farmers and two participants from the Plant Directory, both of whom are in charge of the Danish control of organic farms. These workshops took place in November and December 2003 and formed background for an electronic calf welfare assessment spreadsheet, which is now widely used in organic herds by advisors and farmers. It was further developed during the winter 2003-2004 and during the summer 2004, it was used in the newest version in 20 organic dairy herds.

Based on this, the following manuscripts are in preparation and expected to be submitted in spring 2006:

- 1) 'Welfare in organic dairy calves: synergy and dilemmas between naturalness, dairy farming conditions and human care taking' (author group: Mette Vaarst, Hugo Fjelsted Alrøe, Stephen Roderick, Vonne Lund, Ilka Klaas) and
- 2) 'Calf welfare in Danish organic herds described through a newly developed calf welfare assessment system' (authorgroup Mette Vaarst, Ilka Klaas, Thorkild Bülow Nissen).

The basis for all three publications in preparation has been 100% funded by DARCOF (the first mentioned) or 5-25% from DARCOF (the two latter, as they were used as parts of other projects to assess animal welfare among calves), although the time for writing the publication has not been covered by DARCOF. The idea, concept and results of the project has been presented at the Danish Organic Conference November 2004, on farmer meetings during the winter 2004-2005, and will be presented through teaching and international meetings in the future, as generally much interest has been shown to the concept of naturalness being evaluated and discussed in practice.

WP2: Coccidiosis

An initial literature review including results from the initial survey in 25 organic Danish herds was compiled into a DJF report. The latter data are currently being further analysed together with data from 30 dairy calf herds (non-organic), which were collected in relation to a master study at the Danish Veterinary Institute. The transectional study of 25 organic herds demonstrated that coccidia were found in all herds in various numbers and of various species, but without obvious connection to clinical symptoms. Thus, focus turned to the long term effect of housing, exposure, etc. to the occurrence of coccidia and coccidiosis in selected herds. During winter and early spring 2002, recordings and samples were collected fortnightly in 6 herds with a total of eight

faecal samples and clinical recordings per calf from all calves born in the interim period. Focus was on coccidiosis, but included aspects of calf diseases on a broader basis and, in particular, the living conditions of the calves. Results from this study confirm the notion of coccidiosis being mainly an infection following poor living conditions. A small case-control study on calf rearing and coccidiosis (small because of a relatively small fundings for analyses) was proposed to be conducted during the winter 2003-2004 in order to identify associations between living conditions of the calves, other diseases, and the presence of coccidiosis. However, the results of the 2 previous studies (1 transectional and 1 longitudinal) of the prevalence and associated risk factors of coccidiosis caused the replacement of such a study with further analysis of collected data.

- 1) Maddox-Hyttel, C., Vaarst, M., Vestergaard, E.M., Ingvarstsen, K.L., Badsberg, J.H.: Coccidiosis in calves: Comparison of prevalence of coccidia in relation to management in organic versus conventional dairy herds. Intended for International Journal of Parasitology.
- 2) Vestergaard E.M., Maddox-Hyttel C., Ingvarstsen, K.L. & Badsberg, J.H. : Coccidiosis in organic dairy calves: Longitudinal investigations from six farms on the excretion of coccidia by calves from one week to four months of age. Intended for Veterinary Parasitology.

WP3: Veterinary homoeopathy

Ph.D. student Christine Fossing started her Ph.D. study 1st November 2001 (see status report on her project). Nine homoeopathically educated veterinarians formed a Danish panel for the discussions of the research methods and the approach. The aim of the PhD project was to develop a framework for a definitive trial, which was acceptable from a scientific and homeopathic stance, for testing the effect of alternative treatments, such as homeopathy, on clinical mastitis, and to explore possibilities and restrictions in relation to this. To this end, the thesis introduces a framework developed by the Medical Research Council (MRC) for investigation of complex interventions, as a prototype for a framework for investigation of effect of homeopathy. The 4 papers included in the thesis, describe 2 observational studies, a qualitative study and an explorative trial, involved in the setting up the framework for a definitive trial. The first 3 studies investigated the reliability and relevance of clinical measurements relevant in relation to evaluation of severity of clinical mastitis. In the 1st study, although some of the measurements for the selected clinical variables differed significantly between the participants in the study, the estimates derived from the statistical models for the prevalence of the variables in the cow population were similar. In the 2nd study, although different terms were used by conventional veterinarians and homeopaths to describe health in examined animals, agreement of health descriptions was semantically meaningful and significantly different from random profiles. Furthermore, terms relating to general exterior and behaviour of the cows were used by both groups of participants. The 3rd study investigated use of antibiotics and homeopathy on 29 Danish dairy farms and revealed that cows treated by homeopathy had significantly milder symptoms and a lower risk of being dried off or culled within 8 weeks after treatment than cows treated with antibiotics. Odds ratios for likelihood of having no symptoms of mastitis after treatment were similar (0.95 vs. 0.99 for the 2 groups respectively). However, conclusions regarding comparisons of effect between treatments should be made with caution, as cows came from 2 different populations. The exploratory trial, set up to examine the MRC framework for investigation of effect of homeopathy used for treatment of mild clinical mastitis, was underpowered and exposed several issues, which need further investigation before a definitive trial can be set up using this design. The thesis discusses results of the 4 studies in relation to usage of the framework, and in relation to the values of the stakeholders. Issues, such as the fact that there seemed to be different expectations to effect of treatment with homeopathy compared to antibiotic, and the difficulties in extraction of the specific effect of the homeopathic treatment, because of the impact of effect the farmers' experience and the full health management concept, are discussed. Such issues must be solved if homeopathy

and other alternative treatments, similar in terms of mechanism of effect, are to be registered in pharmacopoeias as effectual treatment of specific diseases. The main conclusion of the project is that the framework works well for investigation of effect of homeopathy but more knowledge needs to be gathered regarding prescription and the therapeutic values. Suggestions for further research include characterisation of individual cases and farms where homeopathy works well, as well as qualitative interviews with experienced users of homeopathy, to reveal more information regarding therapeutic criteria. Another suggestion for further research is to further develop of the qualitative method for evaluation of terminology and values applied in health descriptions applied in the 2nd study of the PhD study. Finally, the design of the exploratory trial may be repeated with a larger number of cases to decide if inexperienced farmers can effectively treat mild mastitis using clinical homeopathy (key symptom treatment) with only written prescription guidelines to help them choose a treatment.

The Ph.D.thesis with the title 'Researching alternative medicine for treatment of mastitis in cattle: possibilities and limitations' is expected to be submitted 15th April.

C.1 Description (summary) of main results and conclusions

A graphical model of animal welfare assessment systems was implemented as a part of the Danish advisory tools connected to organic herds in early spring 2004. In November 2003, two workshops were held as described above. Several management factors are – based on the initial animal welfare assessments and the descriptive analyses in the WP2 about coccidiosis – identified to be crucial for calf welfare. Management is generally described as very poor in most herds involved in any activity of this study. Calf rearing systems in organic herds in practice generally contains several identified well-known risk-factors for calf diseases, among others coccidiosis. All species of coccidia are found in the majority of herds. The variation in amount and consequences of the presence of coccidia seems closely connected to basic management factors (human care-taking and hygiene) in the herd. In preliminary analyses, calving areas are identified to be a major risk-factor for disease among small calves.

Methods of follow-up of homoeopathically treated mastitis have been identified. It is confirmed that homoeopathically practicing veterinarians can identify common key parameters describing the health status of cows, which are in accordance with the homoeopathic concepts of health and disease. A longitudinal observational study design for following up on homoeopathic treatments was described, and a design for clinical randomised trials has been tested on pilot basis.. It is confirmed that it is very difficult to combine two disease paradigms, but several guidelines and pre-conditions are being formulated.

C.2 Fulfilment of deliverables and milestones

WP1: Animal welfare assessment: development of a theoretical and practical framework under organic production conditions	Time schedule according to application	Outcome and deviations, if any
Deliverables		
D1 Workshop 1: development of theoretical framework for the understanding of animal welfare.	May 2001	May 2003.
D4 'Aspects of animal welfare under organic production condition'	Sep. 2001	2001 + input to journal articles, see text above
D7 International expert panel: the understanding of animal welfare in organic agriculture	Jan. 2002	May 2003
D8 Manual for welfare assessment	Oct. 2002	Named 'Kalveliv 100'
D9 'Welfare assessment: theoretical and practical framework'	Dec. 2002	New title, see text above.

D10 Workshop: Welfare assessment among dairy calves; presentation of welfare assessment model and evaluation of different organic herds	Jan. 2003	November and December 2003
Milestones		
M1. Identification of central conditions and patterns of disease and behaviour among calves	(nothing mentioned in application)	May-July 2003
M2 A profound understanding of the concepts of animal welfare within the organic production has been reached through national and international workshops, working groups and reviews.	(nothing mentioned in application)	Fulfilled. Presentations and discussions on several workshops and meetings.
M3 A framework for animal welfare assessment based on the fundamental goals for organic production combined with concepts of animal welfare, and based on a continuous dialectic relationship between theoretical research and practical implementation, has been developed.	(nothing mentioned in application)	Implemented in Danish advisory service for organic farming and adopted as a method to improve animal welfare by the Danish Organisation of Organic Farmers.

WP 2: Prevention of coccidiosis among dairy calves	Time schedule according to application	Outcomes and deviations, if any
Deliverables		
D6 Coccidiosis – a review on causal factors of potential importance for the development of coccidiosis in organic farms.	Oct. 2001	January 2004 .
D12 Prevention of coccidiosis in organic farms	Sep 2004	Danish Report.
D13 Meeting for organic farmers and advisors	Oct. 2004	Not been held. When final publications are made, a Danish conference presentation will be prepared in relation to a larger meeting for organic farmers and advisors.
Milestones		
M4 Conclusion of results of initial survey on prevalence, characterisation of patterns of coccidia species, housing condition and management routines in organic calf herds. Danish report based on this survey.	(nothing mentioned in application)	Fulfilled. Danish report completed.
M5 Conclusion and adjustment of study plan in on-farm experimental set-ups on causal factors for coccidiosis including sampling procedures (faeces and blood).	(nothing mentioned in application)	Fulfilled. Observational study completed.
M6 Conclusion and evaluation of laboratory analyses of collected faecal and blood samples, and collected data (clinical examinations etc.).	(nothing mentioned in application)	Fulfilled.
M7 Publication and presentation of results.	(nothing mentioned in application)	Current activities

WP 3: Veterinary homeopathy: development of research model and in-practice pilot studies	Time schedule according to application	Outcome and deviations, if any
Deliverables		
D2: ‘Up-dating role and status of veterinary homeopathy in Danish dairy farming’	June 2001	Titles changed, see literature list

D3: Workshop, homeopathy experts panel. Models for clinical research in veterinary homeopathy.	Aug. 2001	August 2002; Main results in Ph.D.thesis. Internal project report with summary from the meeting can be obtained on request from project participants.
D11: Homeopathic treatment: pilot studies presented and published	Feb. 2003	Ph.D.thesis and submitted articles.
Milestones		
M8: Updating knowledge and status of alternative treatments in organic farming with focus on homeopathy.	(nothing mentioned in application)	Completed.
M9: An international expert team is established to critically evaluate pilot study design, journals and follow-up procedure after treatment.	(nothing mentioned in application)	Fulfilled
M10: A team of veterinarians who are well experienced in homeopathic treatments of dairy cattle is established	(nothing mentioned in application)	Fulfilled
M11: Journals and follow-up procedure is described in details, as well as the design of the pilot studies.	(nothing mentioned in application)	Follow-up procedure described
M12: Data collection is completed and discussed among the international experts	(nothing mentioned in application)	Completed.
M13: A manual with one or more models suitable for clinical trials and research in veterinary homeopathy is completed.	(nothing mentioned in application)	A part of Ph.D. thesis
M14: Publication of pilot studies and the suggestion of a concept of research in homeopathy.	(nothing mentioned in application)	A part of Ph.D. thesis

D. Description of deviations and subsequent adjustments of plans

Initiation of the whole project

Apart from some delays, only one delivery has been cancelled. This is a farmer meeting about coccidiosis, which was scheduled to the end of the project, but has not been held. The reason for this is partly changes in structure of the project, where more samples and analyses were planned, as described and discussed in earlier reports, and due to the fact that one of the main participants in this activity started in another employment in another institution after the completion of the project activities. The start of the project was delayed. The first project meeting was held in April 2001, and no herd activities were allowed during the period early March till June, 2001, due to the foot & mouth disease outbreak in UK and NL, followed by restrictions in Denmark. The Ph.D.study was initiated later than originally planned. Therefore, a number of milestones and deliverables were postponed, but they are all fulfilled or expected fulfilled.

The list of publications, presentations, production of teaching material and participation in national and international meetings where the ideas and results of this project are discussed, is extended significantly from the original plan. This is primarily due to the discovery of several aspects of the animal welfare discussion with specific focus on the aspects of naturalness in relation to animal health and welfare. Besides, much activity of communication is often taking place in relation to a Ph.D.study, and research methodology in veterinary homoeopathy has been discussed at several meetings. This was not foreseen at the time of the application.

WP1: Animal welfare assessment

The most essential deviation was the combination of Deliverables 1 and 7. This was explained and accepted, and the expert panel workshop took place in May 2003 and must be regarded as a successful workshop with much input from both Danish and international experts. Collaboration with a group in UK (through Dr. Steve Roderick, Cornwall Agricultural College and Tina Leeb, Bristol University) has emphasised the importance of combining practice and theory. Two colleagues from NORSOEK and Norwegian Veterinary University (Britt Henriksen and Paul Steinar Valle) participated in practical exercises in the herd development of the assessment system.

WP2: Coccidiosis among calves

In work package 2, more emphasis was directed towards the observational approach. Describing health status and risk factors were included more coherently. Focus is still on coccidiosis (during winter seasons), but the spectrum is slightly enlarged, and in collaboration with work package 1, an emphasis is put on describing perspectives of 'calf health' on a more general basis. This is found to be highly relevant, based on results from the initial survey in 25 herds. Six herds were included in the second phase of the study. The results of the analyses of this data seem to confirm this conclusion and furthermore indicate interactions between coccidial infections and both overall immunological status (measured by various blood parameters) as well as infection with other parasitic pathogens (*Cryptosporidium*) during the first month of calf life prior to the coccidial infections focused on here.

WP3: Veterinary homoeopathy

The Ph.D. study on veterinary homoeopathy was originally planned earlier, which was not possible due to administration and the current job of the applicant, which should be finished first. All activities connected to homoeopathy were therefore accepted as postponed. An expert panel in veterinary homoeopathy was held in August 2002, after initiation of the first practical study within the Ph.D. study. This enabled the discussions of expert panels to be based on concrete experience from Denmark as well as in the institutions of some of the other participating experts, hence creating a more consistent practice-theory-iterative process. A report is made from this meeting, where several research approaches are described and discussed.

Project publications and other products

1. Products from Organic Eprints archive

Peer-reviewed and accepted

English

Vaarst, M.; Alban, L.; Mogensen, L.; Thamsborg, S.M. and Kristensen, E.S. (2001) [Animal Health and Welfare during transition to organic dairy production: problems, priorities and perspectives](#). *Journal of Agricultural and Environmental* 14(4):pp. 367-390.*

Dansk - Danish

Vaarst, M.; Ingvarsen, K.L.; Vestergaard, E.M. and Maddox-Hyttel, C. (2003) [Coccidiose hos kvæg: En oversigt over coccidiearter, patogenese, epidemiologi og forebyggelse specielt i økologiske besætninger](#). Report.

Submitted for peer-review but not yet accepted

English

Fossing, C.; Vaarst, M.; Ersbøll, A.K. and Thamsborg, S. (2005) [Monitoring recovery after clinical mastitis in dairy cows after 2 different types of treatment](#). *Veterinary Medicine, Series A*.

Fossing, C.; Vaarst, M.; Houe, H. and Enevoldsen, C. (2005) [Contributions to variability of Clinical Measures for use as Indicators of Udder Health Status in a Clinical Protocol](#). *Acta Agriculturae Scandinavica*.

Fossing, C.; Vaarst, M.; Wemelsfelder, F. and Thamsborg, S.M. (2005) [Using the statistical method of Free Choice Profiling to evaluate Health in Dairy Cattle](#). *Journal of agricultural, biological and environmental statistics*.

Not peer-reviewed

English

Fossing, C.; Vaarst, M. and Thamsborg, S. (2004) [The effect of homeopathy in mild clinical mastitis: a double blinded clinical trial on 6 British dairy farms](#). [preprint]*

Vaarst, M.; Roderick, S.; Lund, V. and Lockeretz, W. (2004) [Combining Ethological Thinking and Epidemiological Knowledge to Enhance the Naturalness of Organic Livestock Systems](#). Paper presented at Practical Forage and Livestock Production.

Dansk - Danish

Vaarst, M. (2004) [Dilemma og synergi i økologisk husdyrhold: Dyrevelfærd, naturlighed og fødevarerikkerhed](#). In *FORSKNINGSNYTT om økologisk landbrug i Norden*, October, No 3.*

Vaarst, M.; Maddox-Hyttel, C.; Thamsborg, S. M.; Bennedsgaard, T.W.; Vestergaard, E.M.; Fossing, C. and Ingvarsten, K.L. (2004) [Sundhed og velfærd i kalveholdet](#). Folder om FØJO projekt II.4 Forbedring af dyresundhed og -velfærd i økologiske malkekvægsbesætninger med speciel fokus på kalveholdet (HEWDAICA) . Forskningscenter for Økologisk Jordbrug (FØJO).

Vaarst, M. and Nissen, T.B. (2003) [Manual til Kalveliv 100. – Vurdering af kalvenes velfærd i økologiske besætninger](#). Report.*

2. Other products (oral presentations, public meetings, field days, Danish newsletter /magazine papers, book chapter etc.)

Papers presented at congresses, symposiums, etc.

Fossing, C., 2002. Research in homoeopathy – venturing into dangerous waters? (RAPH Ph.D.course, essay in ‘Ethics in Science, RVAU, February 2002)

Fossing, C., 2002. Using qualitative assessment to examine the language of veterinary homoeopaths (Research seminar held at Faculty of Homoeopathy, London, July 2002).

Fossing, C. 2002. Using FCP as a tool to evaluate udder health. Oral presentation, 1st international FCP Workshop, Scottish Agricultural College, Edinburgh, July 2002.

Fossing, C. 2002. Quantitative aspects of research in homoeopathy. NKJ meeting, Oslo, March, 2002.

Fossing, C., Vaarst, M. & Thamsborg, S.M. 2003. Clinical follow-up of dairy cows being treated with homoeopathy. Poster presentation accepted at the ISVEE, Chile, November 2003.

Reports, articles in agricultural journals, etc.

Maddox-Hyttel, C, Vestergaard, E.-M., 2004. Forebyggelse af staldcoccidiose blandt kalve – råmælk, stråfoder og god hygiejne er vigtigt! Kvægportalen, oktober 2004.

Vestergaard, E.-M., Maddox-Hyttel, C. & Autzen, S. 2002: Økologiske kalve og risici for coccidiose i deres omgivelser. Økologisk Jordbrug 13, 10 .

Vestergaard, E.-M., Maddox-Hyttel, C. & Autzen, S. 2002. Rengøring mod coccidiose. Økologisk Jordbrug, 13, p. 10.

Oral presentations, public meetings, field days, etc.

Vaarst, M. 2002. Målsætning og praksis – er der overensstemmelse? Økologikongres 2002, session C7.

Expert panel working with homoeopathy and perception of health and disease. Internal project report for project participants, being written into Ph.D.thesis.

Expert panel ‘The good life of the calf’, 2 days, May 2003. Outcome: Project report, being rewritten into journal article

Farmers meetings in WP3 (veterinary homoeopathy) for farmers and veterinarians practicing homoeopathy. 3 meetings in 2002-2003.

Two group meetings have been performed for veterinary homoeopaths who participated in free choice profiling activities. January 2002, Research Centre Foulum & May 2002, Rødding Højskole.

In connection to research schools, Christine Fossing has presented her study plans and discuss results to a wide audience of Ph.D. students and supervisors and received feed-back.

Vaarst, M., Fossing, C., Thamsborg, S.M. 2002. Discussion report: Alternative treatment methods. In: Hovi, M. & Vaarst, M. (eds.) Positive health: preventive measures and alternative strategies. Proceedings of the 5th NAHWOA Workshop, Rødding, Denmark, November 2001, 52-56.

Fossing, C. 2001: Using clinical methodology as an assessment criteria in evaluating success of mastitis treatment. Poster-presentation, NAHWOA workshop, Nov. 2001.

Two presentations in May 2003 in Iceland in connection with meeting in Nordic Network for Research in Veterinary Homoeopathy (NKJ funded), presenting background and results from the

study about homoeopathic treatments in Danish dairy herds.

Three presentations in Stockholm, 4th December 2003 in connection with meeting in Nordic Network for Research in Veterinary Homoeopathy (NKJ funded), presenting background and results from the study about homoeopathic treatments in Danish dairy herds.

Two workshops in November 2003 implementing calf welfare assesment in a group of 17 Danish advisors and stakeholders within the organic sector.

Vaarst, M. & Alrøe, H. F. 2003: Velfærd i økologiske besætninger – mål, vægt og praktisk etik (Winter 2003-2004, oral teaching session 4 hrs, for agricultural advisors).

Nissen, T.B. & Vaarst, M. 2004. Kalvenes vægt vurderes med vægt på naturlighed. Præsentation 12. november på Dansk Økologi-kongres. Findes på www.eksperimenter.dk.

Others (book chapter; scientific book)

Vaarst, M., Wemelsfelder, F., Seabrook, M., Boivin, X. & Idel, A. 2004. The role of humans in the management of organic herds. In: Vaarst, M., Roderick, S., Lund, V. & Lockeretz, W. (eds.) 2004. Animal Health and Welfare in Organic Agriculture, CABI Publishing, Wallingford, UK, 205-225.

* 25-75% financed by DARCOF

** 5-25% financed by DARCOF

F. Scientific education

One Ph.D.study carried through and completed with funding from this project.

G. National and international cooperation

The project was initially carried out with close contact to two projects, which are now being completed: one study about development of health advisory service in Danish organic dairy herds, and projects about animal welfare assesment (these projects are taking place at the Department of Animal Health and Welfare).

The project team had beneficial connections to the international EU-network: 'Network on Animal health and Welfare in Organic Agriculture' (NAHWOA), in which Mette Vaarst and Stig Milan Thamsborg were partners. This network had participants from all over Europe.

Close contact is established to national as well as international groups of veterinary homoeopaths, through former project activities. A Scandinavian Network on research in veterinary homoeopathy includes discussions about possibilities for clinical trials in dairy cattle, from which this project benefits. The Ph.D. student connected to WP3 is expected to collaborate with two different research environments on setting up clinical trials for test of homoeopathy: Bristol University, UK, and Louis Bolk Institute, NL.

Parts of the publication activities in work package 1 will be carried out in close contact with Hugo Fjelsted Alrøe from Research Centre for Organic Farming (DARCOF).

Critical reflection on the project

This point is very much the same as was given in the status reports during the project years. The project was formed from three original project applications on three different topics. The project group was very diverse, and the aims of the constituent projects are very far from each other with regard to methodology, discipline and focus areas. What possibly can keep the projects together is the challenge of making them suitable for the goals and ways of thinking in organic farming. All project participants were active in the expert panel session in May 2003 regarding animal welfare among organic herd calves, which is also improving the common understanding. One of the three work packages has been a Ph.D. study has made this work package 'belong' to one person, which has increased the general feeling of inconsistency within the project.

We could have chosen to run the three different projects as three separate entities, only kept together by the common source of finances. In the project group, however, we originally chose the opposite: to try and link things, focus primarily on calves in two of the projects, and to use the project meetings for mutual inspiration to the different activities. One initiative we have taken in the project group in order to build bridges over the gap, is the attempt to give much weight to discussions on the subject matter, the research methods and the results at some of the project meetings. on expense of practical details and administration. However, in the last two project years, for practical reasons, most meetings were held as video-link meetings, which has forced the emphasis to the necessary project administration topics.

The project budget is absolutely cut down to the minimum. This means that project administration and meetings – despite the statement above - have been given relatively low priority, compared to research activities and recordings. In projects of this kind – very diverse – there should be given separate budget for project management in order to ensure that constituent projects are linked properly together. As a result of this low budget, we have not had joint project meetings (except from video-link) since the calf welfare expert panel meeting. With regard to research methodology, completely new initiatives and development of research approaches have been in focus. This is particularly the case with work package 3 (veterinary homoeopathy), and to some extent with work package 1 (animal welfare assessment). This is very resource demanding (especially with regard to personnel and time resources). It must be recommended to give more time (man-months) to projects, where not only new topics, but also research paradigms are explored and evaluated. The time for completing publications was also very limited, and the report and publication work was still ongoing at the project end. Because of the relatively great interest from surroundings, the journal articles, however, are being given high priority by the project participants.

8. Budget

A. Account for any change in budgets**B. Budget for the whole project (1.000 DKK)****B. Budget for the whole project (1.000 DKK)**

Year:	Original budget	Consumption before 2003			Consumption 2003	Consumption 2004	Total
		2000	2001	2002			
Man-months							
Scientific personnel	37	1	6,5	11,5	8,5	3	30,5
Technical personnel	16	0	7	2	3	0	12

Year:	Original budget	Consumption before 2003			Consumption 2003	Consumption 2004	Total
		2000	2001	2002			
Salaries							
Scientific personnel	1543.6	38	230.2	474.2	368.6	138.7	1249.7
Technical personnel	423,7	0	179	60	84	0	423.5
Other operational costs	532,6	20.4	203.8	492	201.2	10.5	927.9
Equipment	0	0	0	0	0	0	0
Others (please specify)	0	0	0	0	0	0	0
Direct costs	2500	58.4	613	1026.2	653.8	149.2	2500.6
Indirect costs (20% of direct costs)	500	11.6	122.4	204	131.6	29.8	499.4
Total	3000	70	735.4	1230.2	785.4	179	3000

C. Budget for each participating institute (1.000 DKr)

Name of Institute: DIAS (project participants from 2 sections at the Department for Animal Health and Welfare participate in this project)

Year:	Original budget	Consumption before 2003			Consumption 2003	Consumption 2004	Total
		2000	2001	2002			
Man-months							
Scientific personnel	28	1	5	7	7	0	20
Technical personnel	16	0	7	2	3	0	12

Year:	Original budget	Consumption before 2003			Consumption 2003	Consumption 2004	Total
		2000	2001	2002			
Salaries							
Scientific personnel	1170.1	38	170.2	284	333	0	825.2
Technical personnel	423.7	0	178	60	0	0	238
Other operational costs ¹	325.4	20.3	165	364	216	134	899.3
Equipment	0	0	0	0	0	0	0
Others (please specify)	0	0	0	0	0	0	0
Direct costs	1961.2	58.3	514	708	549	134	1962.5
Indirect costs (20% of direct costs)	392.2	11.7	103	142	108	27	392.5
Total	2353.5	70	617	850	657	161	2355

Comments: ¹The project contributes to the phd-project described in WP 3. The PhD-costs are specified as operational costs.

Name of Institute and department: Danish Institute for Food and Veterinary Research, Section for Immunology and Parasitology

Year:	Original budget	Consumption before 2003			Consumption 2003	Consumption 2004	Total
		2000	2001	2002			
Man-months							
Scientific personnel	3	0	1	1	0	1	3
Technical personnel	0	0	0	0	0	0	0

Year:	Original budget	Consumption before 2003			Consumption 2003	Consumption 2004	Total
		2000	2001	2002			
Salaries							
Scientific personnel	127.9	0	40	41.8	0	46.2	128
Technical personnel	0	0	0	0	0	0	0
Other operational costs	173.2	0	36.7	89.9	36.7	10.5	173.8
Equipment	0	0	0	0	0	0	0
Others (please specify)	0	0	0	0	0	0	0
Direct costs	301.2	0	76.7	131.7	36.7	56.7	301.8
Indirect costs (20% of direct costs)	60.2	0	15.3	26.3	7.3	11.3	60.2
Total	361.4	0	92	158	44	68	362

Comments:

Name of Institute and department: The Royal Veterinary and Agricultural University

Year:	Original budget	Consumption before 2003			Consumption 2003	Consumption 2004	Total
		2000	2001	2002			
Man-months							
Scientific personnel	5	0	0.5	3.5	1.5	0	5.5
Technical personnel	0	0	0	0	0	0	0

Year:	Original budget	Consumption before 2003			Consumption 2003	Consumption 2004	Total
		2000	2001	2002			
Salaries							
Scientific personnel	205.4	0	20	125	60.6	0	205.6
Technical personnel	0	0	0	0	0	0	0
Other operational costs	30	0	2	11	17.2	0	30.2
Equipment	0	0	0	0	0	0	0
Others (please specify)	0	0	0	0	0	0	0
Direct costs	234.5	0	22	136	77.8	0	235.8
Indirect costs (20% of direct costs)	47.1	0	4.4	26.2	16.6	0	47.2
Total	282.6	0	26.4	162.2	94.4	0	283

9. Signatures and stamps

Name	Institute	Date	Signature
Head of project Mette Vaarst	Danish Institute of Agricultural Sciences	20 th May 2005	

Appendix 1: work package description, wp 1-3

WP1: Animal welfare assessment: development of a theoretical and practical framework under organic production conditions

Work package number: 1

Starting date or starting event: 1st Nov 2000

Responsible persons: Mette Vaarst

Contributing persons: Mette Vaarst, Christine Fossing, Stig Milan Thamsborg, persons from WP2 (Charlotte Maddox-Hyttel, Klaus Lønne Ingvarsen, Ellen-Margrethe Vestergaard,)

National and international expert groups. Working groups (project participants and selected partners, with whom co-work is established).

Person-months: Scientific: 14 months; technical: 5 months

Objectives:

- 1) To reach a theoretical foundation for understanding and defining animal welfare in organic dairy herds, actively combining goals of organic farming with concepts of animal welfare
- 2) To develop a practically oriented framework for animal welfare assessment based on and in a continuous dialectic process with objective 1). This should be used as a dialogue tool for the organic farmers to improve welfare among cows and calves in the organic dairy herd.

Description of work:

The basic principle of this project is to keep a close relationship between theoretical development and practical implementation. Both theoretical and practical results will be evaluated, compared and discussed together.

The elements of this work package is as follows:

- 1) Identification of relevant problems and production conditions
- 2) Theoretical discussions in teams of experts
- 3) Development of practical guide lines in working groups
- 4) Reviewing and writing
- 5) Practical evaluation and development of welfare assessment in different types of systems
- 6) Development of a manual for welfare assessment as a dialogue tool between the organic farmer and his partners.

Each activity will be shortly described in the following:

- 1) Identification of relevant problems and production conditions. An initial survey will be carried through in 20 organic dairy herds. Special focus will be offered to the calves, and the activity should form basis for theoretical discussions about understanding and assessment of animal welfare, as well as for the activities in work packages 2 and 3. Herds are chosen among these to continue with recordings in animal welfare and participation in work packages 2 or 3.
- 2) Theoretical discussions in teams of experts. Two expert groups are collected: a) A national expert group of 8-10 persons with knowledge about animal welfare, calves and /or organic dairy production. b) An international expert group of 4-6 persons, primarily chosen through the EU network project 'Network on Animal Health and Welfare in Organic Animal Husbandry' (NAHWOA). Besides, temporary working groups or expert panels can be formed and participate in project group meetings. The project group will participate in all these workshops, as well as a number of invited persons. The choice of these persons – who are national or international experts in the field – will be based on the topic of each workshop.
- 3) Development of practical guidelines in working groups. Smaller working groups will be formed within the project. Persons from the project group as well as partners from relevant activities, with whom close co-work is established, will develop practical guidelines for data collection and analysis of data.

- 4) Reviewing and writing. Mette Vaarst will be the primary person to synthesise and describe the theoretical understanding of animal welfare as well as the practical implementation process of welfare assessment in the herds. This is expected to be carried through in close co-work with Hugo Fjelsted Alrøe from Research Centre for Organic Farming (DARCOF).
- 5) Practical trying-off and development of welfare assessment in different types of systems. Data collections in the herds participating in the whole project (all work packages) will continuously be carried out. This data will form a practical overall framework for the whole project. Welfare assessment will be done on the basis of a recording manual, which will be continuously adjusted in accordance with the guide-lines given and developed by project participants and connected experts, and feed-back to these persons will be ensured through a practical implementation and data analysis.
- 6) Development of a manual for welfare assessment as a dialogue tool between the organic farmer and his partners. Mette Vaarst will be the primary persons to synthesise and describe the final product of this process. This is expected to be carried out in close co-work with Hugo Fjelsted Alrøe from DARCOF. All project participants and national as well as international experts, who have been included in the process will be offered the opportunity to review and influence the results through a final workshop.

Deliverables:
D1, D4, D7, D8, D9, D10
Milestones:

M1: Identification of central conditions and patterns of disease and behaviour among calves (relevant production conditions, disease problems and behavioural patterns in the organic calf herds with special focus on inter-suckling and coccidiosis). The details of the designs of WP2 will in part be based on these results.

M2: A profound understanding of the concepts of animal welfare within the organic production has been reached through national and international workshops, working groups and reviews.

M3: A framework for animal welfare assessment based on the fundamental goals for organic production combined with concepts of animal welfare, and based on a continuous dialectic relationship between theoretical research and practical implementation, has been developed.

WP2: Prevention of coccidiosis among dairy calves

Workpackage number:	2
Start date or starting event:	1 st Sep. 2001
Responsible person:	K.L. Ingvarlsen
Contributing persons:	E.M.Vestergaard, C.Maddox-Hyttel, B.M. Damgaard, persons from other work packages in this project (Mette Vaarst, Stig Milan Thamsborg, Christine Fossing)
Person-months:	14 (scientific) 8 (technical)

Objectives:

The overall objective is to describe the incidence of *Eimeria* coccidiosis in organic farms and how to prevent the disease in calves.

Specific goals are:

- To identify causal factors important for the development of *Eimeria* coccidiosis and their potential importance in organic farming systems
- To investigate the influence of selected nutritional, management and/or environmental factors on susceptibility to *Eimeria* coccidiosis.
- To develop methods for non-medical prevention and control of *Eimeria* coccidiosis in calves.

Description of work:

The line of attack includes the following:

- 1) Identification of causal factors of potential importance for the development of coccidiosis
- 2) Planning and co-ordination of experimental work
- 3) Execution of the experimental work and laboratory analyses
- 4) Development of methods for non-medical prevention and control of coccidiosis

To identify causal factors of potential importance for the development of coccidiosis. A process like the described "synthesis of knowledge" (Kristensen & Thamsborg, 2000) will be carried out. The work will focus on reviewing causal factors for coccidiosis and relating these to organic farming systems based mainly on results from the screening carried out in WP1. The work will include a description of clinical and diagnostic methods for the identification of coccidiosis.

Planning and co-ordination of experimental work. Based on the above knowledge synthesis we will initiate detailed planning of experimental treatments in selected organic farms. We will select organic farms that have been identified to have problems with coccidiosis (WP1). We expect to focus on risk factors related to nutrition, management and/or the environment. The number of farms included in the study is expected to be 5-6 but will depend on the research strategy decided on the basis of the above synthesis of knowledge.

- 1) The execution of the experimental work and analysis. Coccidiosis during the winter period is expected to be in focus but sampling 8-10 days post turn out on pasture will be considered (depending on recommendations given in the synthesis of knowledge process described above). Each herd of calves will randomly be split in two halves - one group being controls (C) and one group being alternative (A). The controls will receive the nutrition/management/environment previously used. Group A will be an alternative nutrition, management or environmental factor. The age group will be from 0 to 24 weeks. Registration/sampling will be carried out regularly and is expected to include: 1) calves: live weight and daily gain, blood samples, faecal samples, clinical status, cleanness of calves; others 2) environment: temperature, condition of bedding, oocysts in bedding, cleanness of water bowls and troughs, other factors. If calves have had diarrhoea for more than 4 days a faecal sample will be taken for determination of oocysts. Registrations and sampling will be repeated during the experimental period (3 times) and focused around potentially stressful events for the calves (e.g. feed changes, moving). Expected total number of calves included in these intensive studies is approximately

400 calves.

- 2) Development of methods for non-medical prevention and control of coccidiosis. The work carried out in the knowledge synthesis will be continued. The results from the performed experimental studies (Ad 3) will be integrated and different strategies for prevention of coccidiosis will be suggested.

Deliverables:

D6, D12, D13

Milestones:

- M4:** Conclusion of results of initial survey (work package 1; M1) on prevalence, characterisation of pattern of coccidia species, housing condition and management routines in organic calf herds at work shop within the framework of work package 1. Danish report based on this survey.
- M5:** Conclusion and adjustment of study plan in on-farm experimental set-ups on causal factors for coccidiosis including sampling procedures (faeces and blood)
- M6:** Conclusion and evaluation of laboratory analyses of collected faecal and blood samples, and collected data (clinical examinations etc.).
- M7:** Publication and presentation of results.

WP3: Alternative treatments of dairy cows and calves: development of research model and in-practice pilot studies with focus on veterinary homoeopathy

Work package number: 3

Starting date or starting event: 1st May 2001

Responsible persons: Mette Vaarst

Contributing persons: Christine Fossing (Ph.D. student), International expert panel; a team of Danish practising veterinarians, contributors from other work packages in this project.

Person-months: Scientific: 7; technical: 3:

Objectives:

- 1) To update the status and obtain an overview of the possibilities for alternative treatments in organic dairy farming with focus on veterinary homeopathy
- 2) To develop one or more models for clinical research in veterinary homoeopathy, which meets the demands for documentation from the tradition of natural sciences, and – simultaneously – provides new and useful knowledge for veterinary homoeopathy.

Description of work:

One fundamental red line in this work package is to evaluate the methods and steps in the practical clinical trials continuously on a theoretical level, and to implement theoretical results into practice through adjusted journals and designs of pilot studies.

The elements of this work package is as follows:

- 1) To update knowledge and obtain an overview of the possibilities for treatment of production diseases with so-called alternative treatment methods with focus on homoeopathy
- 2) Establish a team of international experts in veterinary homoeopathy
- 3) Establish a team of Danish practising veterinarians who can carry out the treatments in clinical trials
- 4) To develop a system of journals for anamnesis and clinical findings in a case of disease
- 5) Develop an appropriate follow-up matching the demand for documentation of the development of a disease course.

Each of these activities will be shortly described in the following:

- 1) An updating and overview of the possibilities for treatment of production diseases with so-called alternative treatment methods under Danish organic production condition will be obtained. This will be

an update based on the reviewed report from the Danish Institute of Agricultural Sciences (no. 731) from 1996.

- 2) International experts will be pointed out and asked to contribute to the development of this method, partly as critical reviewers of the results and steps in the process of this project, and partly in a workshop to be held half way through the project. The team is expected to be the size of 6-10 people, and veterinary epidemiologists, toxicologists as well as classical veterinary homoeopaths will be included.
- 3) A small number of Danish veterinarians have completed an internationally certified post-graduate education in veterinary homoeopathy, and a small number have carried out homeopathic treatments through a long time period (more than 10 years). Three or four of these veterinarians, who treat homoeopathically in production animal herds will be picked out and included in this study as the ones carrying out the practical treatments. Standardised journals and procedures for follow-up on cases will be worked out in collaboration with these veterinarians (see below).
- 4) Journals will be developed throughout the whole project. The treatment cases will be limited to mastitis among dairy cows and diarrhoea among calves. Mastitis is chosen because that is a classical single cow treatment, and the disease most often treated in Danish dairy farming, including organic farming. Homoeopathy is claimed to be a treatment method very much oriented towards the single individual. The literature review mentioned above nevertheless suggested homeopathic treatments to be used in groups of animals in cases, where the situation of this group allows one to treat them as 'one individual'. Therefore, diarrhoea among calves is chosen, because it is a condition often found in a group of calves, and calves within the same herd very often react in the same way.

Deliverables:
D2, D3, D11, D13

Milestones:

M8: Updating knowledge and status of alternative treatments in organic farming with focus on homoeopathy.

M9: An international expert team is established to critically evaluate pilot study design, journals and follow-up procedure after treatment.

M10: A team of veterinarians who are well experienced in homoeopathic treatments of dairy cattle is established.

M11: Journals and follow-up procedure is described in details, as well as the design of the pilot studies.

M12: Data collection is completed and discussed among the international experts as well as at a national workshop meeting within the framework of work package 1.

M13: A manual with one or more models suitable for clinical trials and research in veterinary homeopathy is completed.

M14: Publication of pilot studies and the suggestion of a concept of research in homoeopathy.