



## Status Report 2003 and Application for Continuation in 2004

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

Use of antimicrobials and occurrence of resistance in organic cattle herds

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### 3. Head of project

Frank Møller Aarestrup, DVM, Ph.D.  
Statens Veterinære Serumlaboratorium  
Bülowsvej 27  
1790 København V

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### 4. Participating institutes

Dansk Veterinær Institut  
Bülowsvej 27  
1790 København V

Den Kgl. Veterinær- og Landbohøjskole  
Grønnegaardsvej 2  
1870 Frederiksberg C

Dansk Jordbrugsforskning  
Foulum P.O. Box 50  
8830 Tjele

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## 5. Other project staff

Stig Milan Thamsborg, DVM, Ph.D.  
Den Kgl. Veterinær- og Landbohøjskole  
Dyrlægevej 10  
1870 Frederiksberg C  
Tlf: 35 28 3778  
E-mail: [smt@kvl.dk](mailto:smt@kvl.dk)

Mette Vaarst, DVM, Ph.D.  
Dansk Jordbrugsforskning  
Foulum P.O. Box 50  
8830 Tjele  
Tlf: 89 99 19 00  
Fax: 89 99 19 19  
E-mail: [Mette.Vaarst@agrsci.dk](mailto:Mette.Vaarst@agrsci.dk)

Torben W. Bennedsgaard, DVM , Ph.D.  
Dansk Jordbrugsforskning  
Foulum P.O. Box 50  
8830 Tjele  
Tlf: 89991541  
E-mail: [twb@kvl.dk](mailto:twb@kvl.dk)

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## 6. Project period (month, year)

Start of project:	2000
End of project:	12, 2003 ( suggested new : 8,2004)

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## 7. Midterm description of the project, its results and progress, and application for continuation in 2004

### A. Project summary

Methods to perform a continuous surveillance for antimicrobial resistance at herd level will be evaluated and used to compare the occurrence of resistance between organic and conventional dairy herds. In addition the treatment pattern of animals in organic herds will be studied. Based upon an eventual relation between treatment patterns and antimicrobial resistance on herd level or in general guidelines for disease treatment will be developed and implemented as herd specific treatment strategies which meet the demand for animal welfare and minimises the risk for antimicrobial resistance.

The project consists of four work packages

#### **WP1 Monitoring of use of medicine**

Establishing of a registration and reporting procedure on the use of drugs for individual animals. Clinical mastitis is described using a protocol which is developed by the research group in another project.

#### **WP2 Occurrence and dynamics of antimicrobial resistance in dairy herds**

Antimicrobial resistance of commensal *E. coli* is assessed in 20 herds by isolates from fecal samples of randomly selected animals in two groups: calves up to 3 month old and cows. Samples are taken at the start and at the end of the project. In five herds samples are taken four times the first year of the study to evaluate the dynamics on herd level and in relation to season.

Data are analysed together with results from ongoing projects from another 20 organic and 20 conventional herds to describe the pattern and dynamics of resistance and develop a scheme for monitoring of antimicrobial resistance on herd level.

Data on antimicrobial resistance is combined with data on use of antibiotics and descriptions of general treatment strategies based on qualitative research interviews.

#### **WP3 Characterization of treatments in organic farms**

Systematic clinical registrations of udder health of cows with and without veterinary treatment are implemented on a monthly basis in five herds, to provide data on treatment strategy and outcome of antibiotic treatments.

Herd managers are interviewed on treatment routines using qualitative research interviews. Data are analysed using method triangulation based on grounded theory analysis.

Results of these analyses will be combined with analysis of data on somatic cell counts and milk production.

#### **WP4 Use of herd specific plans for control of antibiotic resistance**

Plans for control of antimicrobial resistance will be formulated in 10 new herds. The plans should describe:

- risk areas for antimicrobial resistance
- disease prevention plans
- herd specific treatment strategy.

The herds selected should have a very low use of antibiotics and/or a good herd health at the time of inclusion.

### **Dansk sammendrag**

Mulighederne for at gennemføre en kontinuer overvågning for antibiotikaresistens vil blive evalueret og anvendt til at sammenligne forekomsten af resistens blandt konventionelle og økologiske besætninger. Behandlingsregimerne vil blive registreret og baseret på eventuelle sammenhænge mellem behandling og forekomst af resistens vil der blive udviklet retningslinier for behand-

ling med henblik på at minimere resistensudviklingen.

Projektet består af fire delprojekter

**WP1 Monitorering af medicinanvendelsen**

Anvendelsen af medicin registreres i udvalgte økologiske og konventionelle besætninger og forbruget sammenlignes.

**WP2 Forekomst af antibiotikaresistens**

Forekomsten af antimikrobiel resistens bestemmes for E. coli fra fæcesprøver i 20 besætninger med prøveudtagninger i begyndelsen og afslutningen af projektet. I fem besætninger følges forekomsten af resistens med prøveudtagninger hvert kvartal i det første projektår. Data analyseres for eventuelle sammenhænge mellem forekomst af resistens og medicinforbrug.

**WP3 Karakterisering af behandlinger i økologiske besætninger**

Der foretages systematiske kliniske registreringer af yversundhed blandt behandlede og ikke behandlede køer hver måned i 5 besætninger. Besætningsejere interviewes for at finde ud af på hvilket grundlag der iværksættes behandlinger.

**WP4 Anvendelse af besætningspecifikke planer til kontrol af antibiotikaresistens**

Der vil blive udarbejdet planer til reduktion af antibiotikaresistens i 10 besætninger. Dette vil inkludere:

- risikofaktorer for antibiotikaresistens
- planer for forebyggelse af sygdom
- besætningspecifikke behandlingsstrategier

Fem af disse besætninger skal have et meget lille forbrug af veterinær medicin ved inklusion i studiet og baseret på erfaringer i disse besætninger vil der blive introduceret planer i de øvrige 5 besætninger, hvorefter alle besætninger følges i et år

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

Work-package No	Work package title	Participants*	Budget	Start	End	Deliverable No
1	Monitoring of use of medicine	<u>SMT, KVL</u> TWB, MV	245	1	33	1
2	Occurrence and dynamics of antimicrobial resistance in dairy herds	<u>FAA, DVI</u> TWB, KVL	868	12	39	3, 6, 8
3	Characterization of treatments in organic farms	<u>MV, DJF</u> TWB, SMT, KVL	314	7	39	5, 9
4	Use of herd specific plans for control of antibiotic resistance	<u>SMT, KVL</u> TWB, MV	277	10	39	9, 10

\* Responsible participants are underlined

**B. Objectives and expected achievements**

- To determine potential differences in the occurrence of antimicrobial resistance between conventional and organic dairy farms
- To investigate the possibility to perform a continuous monitoring of antimicrobial resistance by evaluating the dynamics of antimicrobial resistance.
- To characterise the treatment pattern of organic herds and based on this, develop guidelines for disease treatment which fits the goals for the organic herd, meet the demand for animal welfare and minimise the risk for antimicrobial resistance.

## C. Midterm results and progress

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

#### WP1 Monitoring of use of medicine

A continuous monitoring of medicine usage has been carried out in the first five herds in the project. The data shows a considerably variation in the amount and types of antibiotics used in the herds (table 1). Based on the initial discussion with the farmers and veterinarians on herd visits the differences seem to relate more to preferences of the veterinarian than to herd specific factors. These findings are used for the herd plans in wp4.

#### WP2 Occurrence and dynamics of antimicrobial resistance in dairy herds

Analysis of data on antimicrobial resistance of commensal *E. coli* shows that the prevalence of antimicrobial resistance is related to age in the 60 herds examined. Table 1 shows the results of the initial analysis for calves up to 23 weeks old. The prevalence of antimicrobial resistance was found to be very low (<5%) among cows in both organic and conventional herds. The sampling scheme was changed in the first 5 herds based on these findings to sample the same calves at 3 months intervals. The analysis of these samples confirmed the finding that the prevalence of antimicrobial resistance decreases with age. Highest level of resistance is found 1 week after birth. However, the trend of decreasing resistance is broken at the age of 3-4 month. These findings might be related to treatments for diarrhoea and pneumonia respectively. The results were submitted for publication in March 2003. The relation between treatment of individual animals and occurrence of resistance have been analyzed, but no relation has been found in the dataset so far. No systematic change in resistance related to season was found.

**Table 1.** Predicted proportion of isolates resistant to streptomycin, sulphamethoxazole, ampicillin, tetracycline, trimetoprim, chloramphenicol and nalidixic acid for calves 9, 60 and 180 days old and to streptomycin, sulphamethoxazole, ampicillin and tetracycline for cows. Predictions for calves based on model of 949 Danish isolates of *E. coli* from 58 herds. Details are published in Bennedsgaard (2003).

Age of animal	Antimicrobial agent*						
	STR	SMX	AMP	TET	TMP	CHL	NAL
<b>Calves 9 days</b>							
Conventional	0.69 <sup>a</sup> <sub>b</sub>	0.71 <sup>a</sup> <sub>b</sub>	0.47	0.52	0.47	0.20	0.17
Old organic	0.64 <sup>b</sup>	0.61 <sup>b</sup>	0.47	0.55	0.29	0.24	0.11
Converting herds							
before conversion	0.78 <sup>a</sup>	0.77 <sup>a</sup>	0.58	0.69	0.43	0.22	0.14
Converting herds two years after conversion	0.69 <sup>a</sup> <sub>b</sub>	0.68 <sup>a</sup> <sub>b</sub>	0.61	0.69	0.37	0.21	0.11
<b>Calves 60 days old</b>							
Conventional	0.25	0.21	0.07	0.06	0.10	0.01	0.00
Old organic	0.20	0.15	0.07	0.07	0.05	0.01	0.00
Converting herds							
before conversion	0.35	0.27	0.11	0.12	0.09	0.01	0.00
Converting herds two years after conversion	0.27	0.20	0.12	0.12	0.07	0.02	0.00
<b>Calves 180 days old</b>							
Conventional	0.02	0.02	0.00	0.00	0.00	0.01	0.00
Old organic	0.02	0.01	0.00	0.00	0.00	0.01	0.00
Converting herds	0.03	0.03	0.00	0.01	0.00	0.01	0.01

before conversion							
Converting herds two years after conversion	0.02	0.02	0.00	0.01	0.00	0.01	0.00

**Cows**

Conventional	0.04	0.02	0.03	0.04
Old organic	0.03	0.01	0.01	0.01
Converting herds before conversion	0.02	0.06	0.02	0.01
Converting herds two years after conversion	0.03	0.03	0.03	0.01

\*STR=streptomycin, SMX=sulphamethoxazole, TET=tetracycline, AMP=ampicillin, TMP=trimetoprim, CHL= chloramphenicol, NAL=nalidixic acid.

Based on the results it can not be recommended to use *E. coli* as indicator for antibiotic resistance of adult cattle in dairy herds, sampling of calves can be used if the number of animals sampled are relatively large and correction or age are made. However, further investigation into the reason for herd differences are needed.

**WP3 Characterization of treatments in organic farms**

The initial interviews were carried out in November-December 2001 based on key figures from herd data and a step-wise identification of treatment criteria on four different levels (symptom level, cow level, and the levels of the herd situation and perception of alternatives, respectively, identified through previous study; Vaarst et al. 2002).

Based on this, expectations and wishes connected to a more explicit future treatment pattern were discussed with the farmer and in most herds the veterinarian on herd visits in February 2002 in five herds.

An initial model for description of success of treatment and graphical presentations of data on udder health and use of veterinary medicine has been developed. These tools are being used and evaluated in the discussion of future treatment strategies in the selected herds, and have been used for introduction of the project in the next group of herds.

The average number of days of treatment with antibiotics in case of mastitis decreased in most herds after conversion to organic production in June 1999 (table 2).

Table 2. Mean number of days pr mastitis treatment, five herds. Data from 1998 to 2002.

Year after conversion	mean	minimum	maximum
-1	2,2	1,0	3,0
1	1,4	1,0	2,0
2	1,5	1,0	2,0
3	1,6	1,1	2,7

Table 3. Use of antibiotics for mastitis treatment in five herds in 2001. Percent of treatments with different groups of antibiotics

Antibiotics	Mean (%)	Min	Max
Narrow-spectrum penicillins	29	11	41
Narrow-spectrum penicillins and streptomycin	9	0	29
Broad-spectrum penicillins <sup>2</sup>	24	17	26
Cephalosporins	17	1	29

Macrolides	4	1	9
Sulfonamides/trimetoprim	4	0	13
Tetracyclines	6	0	23

<sup>2</sup> Ampicillin, amoxicillin, cloxacillin

A description of the choice of antibiotics and duration of antibiotic treatments has been submitted for publication in March 2003 based on data from this study and a parallel study (Bennedsgaard, 2003). The study concluded that the average length of treatment decreased after conversion in herds that had access to follow up treatments by the farmer before conversion and that organic herds differed in the choice of products for intramammary products. In the organic herds products with the shortest withdrawal time of milk was more commonly used.

#### **WP4 Use of herd specific plans for control of antibiotic resistance**

Only minor changes in the use of antibiotics were seen in the five herds involved in WP3 in the first year of the study. One of the obstacles to reducing the use of antibiotics seemed to be the lack of experience with handling of infection without antibiotics among both farmers and veterinarians.

Based on this experience the selection of herds for WP4 has been changed. Five herds that have used none or only very small amounts of antibiotics were selected in June 2003 together with five herds with good health status and interest in reducing the use of antibiotics.

These ten herds were visited and interviewed in September 2003. The herds' treatment and prevention strategies were assessed with the dialog-tool developed in WP3 and by data analysis. Together with Økologiens Hus focus-group interviews were carried out in October 2003. These interviews resulted in a number of specific suggestions for improvement in the individual herds. These are to be carried out and monitored within the next 8-9 months.

## **C.2 Fulfilment of deliverables and milestones**

<b>WP1 Monitoring of use of medicine</b>	Time schedule according to application	Deviations, if any*
<b>Deliverables</b>		
Data on disease, use of medicine and clinical cases of mastitis	Continuous	no
<b>Milestones</b>		
M3 Establishment of a system for registration of use of drugs and disease in herds	May 2000	no
M4 Introduction of registration of clinical mastitis	Feb 2002	March 2002
M13 Termination of data collection	June 2003	May 2004

<b>WP2 Occurrence and dynamics of antimicrobial resistance in dairy herds</b>	Time schedule according to application	Deviations, if any*
<b>Deliverables</b>		
3. Determination of the difference in the occurrence of antimicrobial resistance in conventional and organic dairy herds. (Pu)	June 2002	March 2003
6. Description of the dynamics of antimicrobial resistance over time. (Pu) (one publication with D3)	July 2002	March 2003

8. Description of changes in disease incidence and antimicrobial resistance after conversion to organic farming. (Pu)	July 2003	March 2003 July 2003
<b>Milestones</b>		
M1 Determination of the difference in the occurrence of antimicrobial resistance in conventional and new and old organic dairy herds.	Sept 2001	March 2003
M10 Description of the dynamics of antimicrobial resistance over time	July 2002	March 2003
M12 Collection of fecal samples	June 2002 – March 2003	August 2002- June 2003 No collection in June 2003
M14 Evaluation of changes in antimicrobial resistance from conversion until 3½ years after conversion to organic farming.	July 2003	Not carried out

<b>WP 3, Characterization of treatments in organic farms</b>	Time schedule according to application	Deviations, if any*
<b>Deliverables</b>		
1 Description of the combination of qualitative studies of treatment choices and quantitative data (pu.)	June 2002	November 2002 (first publication June 2002)
9 Recommendations for treatment strategies in organic dairy herds (Danish Report)	October 2003	July 2004
<b>Milestones</b>		
M1: Selection of herds and implementation of clinical examinations	Nov. 2001	March 2002
M7: Qualitative analysis on herd level of treatment patterns carried out	Feb. 2002	May 2002
M9: Analysis of data from 5 herds (in depth studies) and 40-45 herds (overall level; standardised health and production recordings)	June 2002	March 2004
M15: Recommendations (Danish Report)	October 2003	July 2004

<b>WP 4, Use of herd specific plans for control of antibiotic resistance</b>	Time schedule according to application	Deviations, if any*
<b>Deliverables</b>		
9 Recommendations for treatment strategies in organic dairy herds (Danish Report)	October 2003	July 2004
10. Description of the effect of change in treatment strategies on the occurrence of anti-microbial resistance Changed to: Description of differences in use of antimicrobials and occurrence of antimicrobial resistance.	October 2003	April 2003 (based on <i>S. aureus</i> milk samples)
<b>Milestones</b>		
M2 Selection of herds and determination of initial occurrence of anti-microbial resistance	Nov. 2001	Nov. 2001
M6 Preparation of herd specific plans	Dec. 2001	Feb-Nov. 2002
M8 Midway evaluation and correction of plans	May 2002	Dec. 2002
M11 Final evaluation of plans and status of occurrence of anti-microbial resistance.	April 2003	April 2004

M15 Recommendations (Danish report) including results from WP3	October 2003	July 2004
M17 Analysis of change in antibiotic resistance and changes in use of medicine	October 2003	July 2004 (only use of medicine)

#### D. Description of deviations and subsequent adjustments of plans

There has been some delay in the plan, due to the fact that all contact to herds has been impossible during the last part of the housing period 2001 (early March-June) because of restrictions in connection with the outbreak of foot & mouth disease. The selection of herds and introduction of registrations has therefore been postponed to the late autumn 2001.

Data on medicine use and resistance in conventional and old organic herds has been delayed because of extensive work on validation of data from the central databases.

The initial sampling of fecal samples showed a very low prevalence of resistance in samples from cows, whereas calves samples showed a high level of antimicrobial resistance in very young calves (1-3 month) and less in older calves. Based on these findings the sample plan for fecal samples has been changed to sampling of only 20 calves from 0-6 month of age including calves sampled at the previous visit.

One of the five herds in wp2+3 has dropped out of the study because of return to conventional production. The herd will not be substituted by another herd.

Only minor changes in the use of antibiotics were seen in the five herds involved in WP3 in the first year of the study. One of the obstacles to reducing the use of antibiotics seemed to be the lack of experience with handling of infection without antibiotics among both farmers and veterinarians. Based on this it is unlikely that any major changes will take place with regards to antibiotic resistance.

Based on this experience the selection of herds for WP4 has been changed. Five herds that have used none or only very small amounts of antibiotics was selected in June 2003 together with five herds with good health status and interest in reducing the use of antibiotics. The aim of inclusion of these herds is to describe the challenges in adopting the experiences from herds with very low or no use of antibiotics in motivated herds with a good herd health. This is planned to take place from late 2003 until end of May 2004.

The change in the selection of the herds has resulted in a delay of the project. The final analysis of data will be carried out in the June 2004 with the final report being finished in August 2004

Thorkild Nissen from Økologiens Hus has been involved in the work in WP4 financed by Økologisk Hus.

Because of the lack of differences in antibiotic resistance of *E. coli* between the herd groups and the strong relation between age of the animal and prevalence of resistant *E. coli* it was decided to access the level of antibiotic resistance in the 10 new herds by isolation of *S. aureus* milk samples.

## E. Project publications and other products

### 1. Articles in international, scientific journals with review procedures

Vaarst, M., Thamsborg, S. M., Bennedsgaard T. W., Houe, H., Enevoldsen, C., Aarestrup, F. M. & Snoo, A. de. 2003. Organic dairy farmers decision making in the first 2 years after conversion in relation to mastitis treatment. *Livestock Production Science*. 80, 1-2, 109-120. \*

Bennedsgaard T. W., Thamsborg S. M., Vaarst M., Enevoldsen C. 2003. Eleven years with organic dairy production in Denmark – herd health and production related to time of conversion and compared to conventional production. *Livestock Production Science*. 80, 1-2, 121-131.\*\*

Bennedsgaard, T. W., Thamsborg, S. M., Aarestrup, F. M., Enevoldsen, C., Vaarst, M., Larsen, P. B. Use of veterinary drugs in organic and conventional dairy herds in Denmark with emphasis on mastitis treatment. (Submitted)\*

Bennedsgaard, T. W., Thamsborg, S. M., Aarestrup, F. M., Enevoldsen, C., Vaarst, M. Antibiotic resistance of *Escherichia coli* in conventional and organic dairy herds in Denmark. (Submitted)\*

#### PAPER V

Bennedsgaard, T. W., Thamsborg, S. M., Aarestrup, F. M., Enevoldsen, C., Vaarst, M., Christoffersen, A. B. Resistance of *Staphylococcus aureus* isolates from cows with high somatic cell counts in organic and conventional dairy herds in Denmark. (Submitted)

### 2. Papers presented at congresses, symposiums, etc.

#### 3. Reports, articles in agricultural journals, etc.

#### 4. Oral presentations, public meetings, field days, etc.

“Reduced use of veterinary drugs in organic dairy herds – potentials and consequences”, Midterm seminar for ph.d. student Torben Werner Bennedsgaard, October 1, 2001, KVL \*

Vaarst, M. 2002. Strategi i stedet for antibiotika [Strategy instead of antibiotics. In Danish]. *Økologisk Jordbrug*, 14. Juni 2002, s. 11.

Nielsen, K.M. Mange yverbetændelser er forudsigelige. [Many mastitis cases are predictable. In Danish]. *Økologisk Jordbrug*, 14. Juni 2002, s. 11.

Bennedsgaard, T. W. “Mastitis treatment, success or failure” Presentation at meeting for farmers and veterinarians, The Danish Dairy Board, Rødding, 30. January 2002.

Bennedsgaard, T. W.. 2003. “Reduced use of veterinary drugs in organic dairy herds – potentials and consequences”. Ph.D. dissertation, The Royal Veterinary and Agricultural University, Frederiksberg, Denmark. \*

## F. Scientific education

Elements of the project is part of Torben Werner Bennedsgaards ph. d. study.

Arno de Snoo, Scottish Agricultural College, completed a Master thesis within the project with Mette Vaarst as supervisor during two stays (4½ months in total) in 2002 at Danish Institute of Agricultural Sciences, Department of Animal Health and Welfare. Master thesis: Farming styles in Danish organic dairy farming and the relations to health strategies with an emphasis on mastitis treatments. DIAS, pp. 89.

## G. National and international cooperation

Research stay at Professor Paul Bartlett, Michigan State University by Torben Werner Bennedsgaard March-April 2001.

Thorkild Nissen, Økologiens Hus (WP4)

## H. Critical reflection on the project

The monitoring of antimicrobial resistance has been successful giving new information on the dynamics of resistance of commensal *E. coli* on herd level and in relation to age of dairy calves. The ability to change in sampling scheme has given a data set which is better suited for describing the marked variation in prevalence of resistance with age. However, to describe the level of resistance in a given herd a sampling scheme in which a few calves at a given age (2-3 weeks old would be optimal) was sampled would give a more comparable picture. Such a sampling scheme is not easy to implement in the actual research project since it would required a largely increased number of herd visits which should be planed after the birth of calves in the single herd. The budget of the project does not allow such a change.

The rapid decrease in prevalence of antimicrobial resistance means that only a limited number of animals can be used in the analysis of relations between antibiotic treatment and antimicrobial resistance.

Based on interviews with farmers and results from another project isolation of *S. aureus* from milk samples will be used in the last part of the project. Penicillin resistance of *S. aureus* may have impact of the choice of antibiotics for mastitis treatment, the disease that accounts for the largest part of the use of antibiotics in dairy herds.

The initial meetings with farmers and veterinarians have given important knowledge in the different roles in the decision process before eventual antibiotic treatment. The risk of development of antimicrobial resistance is normally not a subject in this decision process, and the research group places an important role in the introduction of this new problem to the process. The role of the research group in the process in the single herd will have to be evaluated together with the contributions from the farmer and the veterinarian in the evaluation of the project.

The combination of research methodology (quantitative and qualitative) and the use of participatory methods are very depending on the collaboration between researches, an well-described distribution of tasks and responsibilities, and a group of farmers and veterinarians, who contribute to the project in the way which is beneficial for the project.



## 8. Budget

### A. Account for any change in budgets

### B. Budget for the whole project (1.000 DKK)

Total consumption of funds from DARCOF and expected consumption this year and coming years

Year:	Consumption before 2003	Expected consumption 2003	2004	2005	Total
Man-months					
Scientific personnel	9,75	1,75	3,5		15
Technical personnel	13,5	16	0,5		30

Year:	Consumption before 2003	Expected consumption 2003	2004	2005	Total
Salaries					
Scientific personnel	343.500	74.000	135.000		552.5
Technical personnel	241.411	299.805	10.000		551.2
Other operational costs	102.000	73.000	10.000		185
Equipment					
Others (please specify) Travel (RVAU)	16.000	22.000	2.000		40
Direct costs	702.911	468.805	157.000		1328.7
Indirect costs (20% of direct costs)	140.582	93.761	31.400		265.740
Total	843.493	562.566	188.400		1.594.440

**Comments:**

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## 9. Signatures and stamps

Name	Institute	Date	Signature
Head of project Frank M. Aarestrup	Danish Veterinary Institute	19/12-03	

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## Appendix I. Detailed budget

### A. Budget for each participating institute (1.000 DKr)

Name of Institute: Den Kgl. Veterinær og Landbohøjskole

Year:	Consumption before 2003	Expected consumption 2003	2004	2005	Total
Man-months					
Scientific personnel	5,5	0,25	3,5		9,25
Technical personnel	0	4,5	0		4,5

Year:	Consumption before 2003	Expected consumption 2003	2004	2005	Total
Salaries					
Scientific personnel	187	17	135 (+135)		339 (-7)
Technical personnel	0	100	0		100 (+7)
Other operational costs	22	23	0		45
Equipment					
Others (please specify) rejser	16	22	2		40
Direct costs	225	162	137		524
Indirect costs (20% of direct costs)	45	32	28		105
Total	270	194	165		629

#### Comments:

Due to the delays in the consumption in 2001 and 2002 have been reduced and the budget for 2003 increased.

Changes in budget in parenthesis (Revised overall budget as approved by DFFE, August 2003 (J. nr. 3501-62-03-80))

Consumption in 2003 results in over-expenditure on technical personnel of ca. 8%

**B. Budget for each participating department (1.000 DKK)**

Name of Institute: Danmarks Jordbrugsforskning,

Year:	Consumption before 2003	Expected consumption 2003	2004	2005	Total
Man-months					
Scientific personnel	4,25	1,5			5,75
Technical personnel					

Year:	Consumption before 2003	Expected consumption 2003	2004	2005	Total
Salaries					
Scientific personnel	156,5	57			213,5
Technical personnel					
Other operational costs	30	10			40
Equipment					
Others (please specify)					
Direct costs	186,5	67			253,5
Indirect costs (20% of direct costs)	37,3	13,4			50,7
Total	223,8	80,4			304,2

Name of Institute: Danish Veterinary Institute

Year:	Consumption before 2003	Expected consumption 2003	2004	2005	Total
Man-months					
Scientific personnel					
Technical personnel	13,5	11,5	0,5		25,5

Year:	Consumption before 2003	Expected consumption 2003	2004	2005	Total
Salaries					
Scientific personnel					
Technical personnel	241.411	199.805	10.000		451.216
Other operational costs	50.000	40.000	10.000		100.000
Equipment					
Others (please specify)					
Direct costs	291.411	239.805	20.000		551.216
Indirect costs (20% of direct costs)	58.282	47.961	4.000		110.243
Total	349.693	287.766	24.000		661.459

**Comments:**