



## **Progress Report 2007 and Application for Continuation in 2008**

for research funding under the research programme:

**Research in Organic Food and Farming**  
International Research Co-operation and Organic Integrity  
(DARCOF III 2005-2010)

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### 1. Project title and acronym

**Pig health and pork quality related to fructan rich feedstuffs in the diet – a subproject of QEMP (Acronym PRE-QEMP)**

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Project journal number

**3304-FOJO-06-57-01**

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Project period (month, year)

**Start of project: 1/1 2006**

**End of project: 31/12 2007**

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Head of project:

John E. Hermansen, Dept. of Agroecology and Environment, Faculty of Agricultural Sciences,  
University of Aarhus

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### 2. Participating institutes:

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### 3. Project staff

Associate Professor Allan Roepstorff, Institut for Veterinar Patobiologi, Faculty of Life Sciences, University of Copenhagen (WP 1)

Research assistant Maria Langkjær, Institut for Veterinar Patobiologi, Faculty of Life Sciences, University of Copenhagen (*Replaced Lisbeth Thomsen from the same institute*)

PhD. Student Annette Nygaard Jensen, National Food Institute, Technical University of Denmark

Scientist Lars Mølbak, National Veterinary Institute, Technical University of Denmark

Senior scientist Tim K. Jensen, National Veterinary Institute, Technical University of Denmark

Professor Stig Milan Thamsborg, Danish Centre for Experimental Parasitology, Faculty of Life Sciences, University of Copenhagen

Senior Scientist Laurits Lydehøj Hansen, Dept. of Food Science, Faculty of Agricultural Sciences, University of Aarhus (WP 2)

Head of Section Dorte Lau Baggesen, National Food Institute, Technical University of Denmark

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### 4. Midterm description of the project, its results and progress, and application for continuation in 2008

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#### A. Project summary

The organic pig and poultry production of today in Denmark is typically characterized by 1) compromises with regard to animal welfare issues e.g. environments that restrict the animals possibility of performing natural behaviour, 2) the use of specialised genotypes not necessarily well-suited for outdoor conditions nor of a particular gastronomic quality, 3) a heavy price competition with egg, chicken meat and pork products produced in conventional farming, and 4) little or no objective quality differences compared with conventional products. These constraints may be the reason for the current low production and consumption of organic chicken meat and pork and call for new ways of production.

Thus, it is a key challenge to establish the knowledge base for development of new organic products which have a high credibility, a high eating quality, and – not least – have a particular appearance in the final presentation for the consumers, hereby making them recognize the products as organic and in consequence be willing to pay a premium price. The establishment of such knowledge is the basic idea of the project cluster QEMP of which this project is a forerunner focussing on the effect of fructan rich feedstuffs on pig health and product quality.

The work is organized into two work packages.

WP1 focuses on the intestinal health of piglets born under free-range conditions. Of particular interest is whether fructan rich feedstuffs (FRF) may limit parasite and zoonotic infections and

post-weaning diarrhoea, which are common problems in organic pig herds.

The emphasis of WP2 is to avoid castration of male piglets, practiced at present to reduce the development of the off-odour and flavour known as Boar taint, due to animal welfare and ethical considerations. Work package 2 investigates whether it is possible to avoid boar taint in entire male and also in female pigs by feeding the animals FRF for a short period just before slaughtering at normal slaughter weight. It is hypothesized that this may improve the sensory properties of pork from entire male as well as female pigs via a reduction in the development of Boar taint related off-odours and flavours and thus, remove the need for castration, thereby enhancing animal welfare. Furthermore, the probiotic effects of inulin and fructo-oligo-saccharides mean that chicory diets may help to reduce the level of pathogenic bacteria as e.g. *Campylobacter*.

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

WP No.	WP title	Responsible scientist	Budget DKK	Start	End	Deliverable No.
1	Effect of FRF on intestinal pathogens in post-weaned pigs	Allan Roepstorff	1.179.960	01.04.06	31.03.07	D1.1-D1.2
2	Meat quality and food safety in organic productions systems utilising FRF	Laurits Lydehøj Hansen	756.153	01.04.06	31.03.07	D2.1-D2.2
3	Coordination incl. co-ordination with QEMP	John E. Hermansen	41.750	01.04.06	31.03.07	D3.
<b>Total</b>			<b>1.977.863</b>			

## B. Objectives and expected achievements

The overall objective is to establish new methods of production of pork, which support the health of the animals and which can form the basis for new high quality products differing in characteristics from conventional products. The specific objectives are to investigate:

- how an improved health of the intestine in piglets can be supported under free range condition through use of fructan rich feedstuffs and how this can influence the occurrence of parasite and zoonotic infections and post-weaning diarrhoea caused by *E. coli*.
- how final feeding – 1 and 2 weeks before slaughter - with fructan rich feedstuffs (dried chicory and lupine) decrease boar taint (and improve sensory eating quality of both female and entire male pigs) and influences *Campylobacter* populations.

## C. Midterm results and progress

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

The main results from each WP is given in the following:

#### WP1. Effect of FRF on intestinal pathogens in post-weaned pigs.

The practical part of the experiment was completed ultimo 2006 according to the research plan, resulting in a high number of samples stored for analyses in 2007 (D1.2). In 2007, initial analyses have been conducted within the present subproject, while most analyses have been carried out within the main project (QEMP– WP5, see Progress Report of QEMP).

## WP2. Meat quality and food safety in organic production systems utilising FRF

The practical part of the experiment was completed ultimo 2006 according to the research plan. Samples for analyses of campylobacter (at a later stage) and samples for assessing meat quality have been sampled according to plans. The results shows, that including lupine or chicory in the diet for slaughter pigs reduce boar taint and improve the eating quality of pork meat even when fed for a limited period (1-2 weeks before slaughter) like in this experiment.

The main results on meat quality have been published in a popular paper (klumme), in a research report (Organic eprint) and as an oral presentation "Pork quality related to the diet content of fermentable fibre-rich feedstuffs (chicory and lupine) with emphasis on the effect on boar taint and meat quality' at 23rd NJF congress 2007, Trends and Perspectives in Agriculture, Copenhagen, June 26-29, 2007.

## C.2 Fulfilment of deliverables and milestones

Workpackage 1						
Deliverable No	Deliverable title	Lead scientist	Delivery date	Allocated scientific person moths	Type of deliverable	Fulfilled (ok) or deviations (d)*
D1.1	Newsletter with preliminary results of the effect of FRF on pig performance and clinical health	Maria Langkjær	12/2006	5	O	OK
D1.2	Samples prepared for subsequent study of helminth infection pathology and bacterial community composition in QEMP	Maria Langkjær	12/2006	5	O	OK

\* Deviations are to be further discussed in D

Workpackage 1			
Milestone No	Milestone title	Delivery date	Fulfilled (ok) or deviations (d)*
M1.1	Experimental pastures are established	06/2006	OK
M1.2	Termination of animal trials	11/2006	OK

\* Deviations are to be further discussed in D

Workpackage 2						
Deliverable No	Deliverable title	Lead scientist	Delivery date	Allocated scientific person moths	Type of deliverable	Fulfilled (ok) or deviations (d)*
D2.1	Newsletter with preliminary results of the effect of final feeding FRF on boar taint	Laurits Lydehøj Hansen	12/2006	3	O	OK
D.2.2	Report on the effect of final feeding FRF on boar taint	Laurits Lydehøj Hansen	4/2007	3	R	OK

Workpackage 2			
Milestone No	Milestone title	Delivery date	Fulfilled (ok) or deviations (d)*
M2.1	Termination of the animal trials on final feeding with FRF	12/2006	OK

(The nature of the deliverables must be indicated by S = publication in scientific journal with peer review; P = publication in journals without peer review; R = reports; C = presentation at meetings and congresses or O = other types of deliverables, e.g., prototypes, models, websites, etc.).

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

No deviations from planned activities

#### E. Project publications and other products

##### Products from Organic Eprints archive

Hansen, Laurits Lydehøj (2007) [Lupin i svinefoder mindsker ornelugt](#). In *Økologisk Jordbrug*, 7. September, No 391, page 16. Økologisk Landsforening.

Hansen, Laurits Lydehøj; Jensen, Jens Askov; Henckel, Poul; Hansen-Møller, Jens; Byrne, Derek V. and Syriopoulos, Kostas (2007) [Pork quality related to the diet content of fermentable fibre-rich feedstuffs \(chicory and lupine\) with special emphasis on the effect on boar taint and meat quality](#) [Korttidsindflydelsen af fodring med fermenterbare fiberrige fodermidler (lupiner og cikorie) før slagtning med særligt henblik på indflydelsen på kemisk ornelugt og teknologisk kødkvalitet]. [oral] Presentation at *23rd NJF congress 2007, Trends and Perspectives in Agriculture*, Copenhagen, June 26-29, 2007.

Hansen, Laurits Lydehøj; Jensen, Jens Askov; Henckel, Poul; Hansen-Møller, Jens and Syriopoulos, Kostas (2007) [Effect of feeding fermentable fiber-rich feedstuffs lupin and chicory prior to slaughter with special emphasis on the effect on chemical boar taint in organic entire male and female pigs and technological meat quality](#) [Korttidsindflydelsen af fodring med fermenterbare fiberrige fodermidler (lupiner og cikorie) før slagtning med særligt henblik på indflydelsen på kemisk ornelugt og teknologisk kødkvalitet]. Report, Department of Food Science, Faculty of Agricultural Sciences, University of Aarhus.

##### Other products (oral presentations, public meetings, field days, etc.)

Langkjær, M., Baggesen, D.L., Nygaard Jensen, A., Jensen, T.K., Mølbak, L., Roepstorff, A., Thamsborg, S.M. 2007. Effekt af cikorieødder på fravænningsdiarré, tarmparasitter og zoonotiske parasitter hos svin. Nyhedsbrev på projekthjemmeside

#### F. Scientific education

Student Kostas Syriopoulos from University of Wageningen has made his Master thesis within this project and has finished this summer 2007 at the University of Wageningen.

**G. National and international cooperation**

The research group is attached to the project group around the company DanCikorie ApS, which produces dried chicory products ([www.cikorie.com](http://www.cikorie.com)) as feed ingredient and related concept and product development. I.e. Tim Kåre Jensen co-operates in investigating the effect of dried chicory on Lawsonia infections in pigs. Thus, this contact ensures an immediate dissemination of the research results.

**H. Critical reflection on the project**

The project is now in its final stage. No deviations from planned activities were necessary.

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## 5. 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:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Man-months							
Scientific personnel	16,5	14,16	4	0	0	0	18,16
Technical personnel	10,1	10	1,33	0	0	0	11,33

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Salaries							
Scientific personnel	697	527	115	0	0	0	642
Technical personnel	288	321	38	0	0	0	359
Other operational costs	638	617	26	0	0	0	643
Equipment	0	0	0	0	0	0	0
Others (please specify)	25	0	5	0	0	0	5
Direct costs	1648	1465	184	0	0	0	1649
Indirect costs (20% of direct costs)	330	293	36	0	0	0	329
Total	1978	1758	220	0	0	0	1978

**Comments:**

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## 6. Signatures and stamps

Name	Institute	Date	Signature
Head of project			

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## Appendix I. Detailed budget

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

Name of Institute and department:

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Man-months							
Scientific personnel							
Technical personnel							

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Salaries							
Scientific personnel							
Technical personnel							
Other operational costs							
Equipment							
Others (please specify)							
Direct costs							
Indirect costs (20% of direct costs)							
Total							

**Comments:**

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

Name of Institute and department: Faculty of Agricultural Sciences  
Department of Agroecology and Environment

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Man-months							
Scientific personnel	0,5	0,5	0	0	0	0	0,5
Technical personnel	0,1	0	0	0	0	0	0

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Salaries							
Scientific personnel	30	31	0	0	0	0	31
Technical personnel	1	0	0	0	0	0	0
Other operational costs	4	4	0	0	0	0	4
Equipment	0	0	0	0	0	0	0
Others (please specify)	0	0	0	0	0	0	0
Direct costs	35	35	0	0	0	0	35
Indirect costs (20% of direct costs)	7	7	0	0	0	0	7
Total	42	42	0	0	0	0	42

**Comments:**

Name of Institute and department: Faculty of Agricultural Sciences  
Department of Food Science

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Man-months							
Scientific personnel	6	6	0	0	0	0	6
Technical personnel	2	2	0	0	0	0	2

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Salaries							
Scientific personnel	266	262	0	0	0	0	262
Technical personnel	54	58	0	0	0	0	58
Other operational costs	290	295	15	0	0	0	310
Equipment	0	0	0	0	0	0	0
Others (please specify)	20	0	0	0	0	0	0
Direct costs	630	615	15	0	0	0	630
Indirect costs (20% of direct costs)	126	123	3	0	0	0	126
Total	756	738	18	0	0	0	756

**Comments:**

Name of Institute and department: RVAU  
DCEP

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Man-months							
Scientific personnel	9	6,66	4	0	0	0	10,66
Technical personnel	6	6	1,33	0	0	0	7,33

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Salaries							
Scientific personnel	355	191	115	0	0	0	306
Technical personnel	183	207	38	0	0	0	245
Other operational costs	290	304	-26*	0	0	0	278
Equipment	0	0	0	0	0	0	0
Others (please specify)	5	0	5	0	0	0	5
Direct costs	833	702	132	0	0	0	834
Indirect costs (20% of direct costs)	167	140	26	0	0	0	166
Total	1000	842	158	0	0	0	1000

\* See comments below

#### Comments:

As a correction to the 2006 financial report the 'operational costs' of 2007 received an income of 9.000 DKR from selling the culled sows. Furthermore, a credit note on 25.000 DKR for fodder to the pigs was received from DLG in 2007.

Name of Institute and department: DFVF

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Man-months							
Scientific personnel	1	1	0	0	0	0	1
Technical personnel	2	2	0	0	0	0	2

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Salaries							
Scientific personnel	45	43	0	0	0	0	43
Technical personnel	50	56	0	0	0	0	56
Other operational costs	55	14	37	0	0	0	51
Equipment	0	0	0	0	0	0	0
Others (please specify)	0	0	0	0	0	0	0
Direct costs	150	113	37	0	0	0	150
Indirect costs (20% of direct costs)	30	23	7	0	0	0	30
Total	180	136	44	0	0	0	180

**Comments:**

**C. Budget for co-financing from each participating institute (1.000 DKK)**

Name of Institute and department:

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Man-months							
Scientific personnel							
Technical personnel							

Year:	Original budget	Consumption 2005/2006	Expected consumption 2007	2008	2009	2010	Total
Salaries							
Scientific personnel							
Technical personnel							
Other operational costs							
Equipment							
Others (please specify)							
Direct costs							
Indirect costs (20% of direct costs)							
Total							

**Comments:**