



Midterm Status Report 2002 and Application for Continuation in 2003

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The Directorate for Food, Fisheries and Agro Business
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1. Research program

Research in organic farming 2000-2005 (DARCOF II)

2. Project title and number

Production of raw milk cheese and content of phyto-estrogens from organic produced milk (II-11)

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6. Project period (month, year)

Start of project: May, 2002
End of project: June, 2004

7. Midterm description of the project, its results and progress, and application for continuation in 2003

Project summary

a)

The production of organic cheese is mainly based on the production of a number of cheese types, which are also produced from conventional milk. In order to be able to increase the market share of organically produced cheese, it is important that these cheese types are of a quality that justifies an additional price in relation to the conventionally produced cheese. It is often maintained that cheese made from raw milk can obtain a richer sensory quality than conventional products. However, documentation is needed to demonstrate that the flavour of organic cheese is different from cheeses made from pasteurized milk.

In Denmark, the production of cheese based on unpasteurized milk is subject to a very restrictive policy owing to the potential problems with microbiological safety. In order to be able to evaluate the microbiological safety of cheese manufacturing with raw milk, a number of critical control points in the production from raw material to finished product must be established, and suggestions for their monitoring must be made. This can be solved by using a Hazard Analysis Critical Control Point (HACCP) from stable to table which will provide guidelines for safe processing procedures. The specific data generated in the project will further be used in a risk simulation model which will take into account the variations in prevalence and concentration of specific pathogenic bacteria encountered in the production, as well as the variations observed in the process- and product parameters which may influence growth or inactivation.

The present project will – based on the production of red-lead putty cheese made with raw and pasteurized organic milk, respectively, from a specific dairy - compare the flavour and texture development by means of texture measurements, flavour analyses based on high vacuum distillation, peptide profiling and electronic nose measurements. It will further develop a generic HACCP model and a risk simulation model for the specific cheese which may serve as a tool for public safety managers.

b)

In organic milk production, the use of leguminous plants such as clover, lupin, horse beans and peas has increased because of nitrogen fixation into the ground and as an important energy and protein source for the cow. As an example, clover-grass, on energy basis, has been more than half the total intake in the summer period, and in the winter period, silage from clover-grass covers an average of 2/3 of the total roughage intake. Furthermore, organic dairy cows are given a large amount of cereals.

Especially leguminous plants, but also cereals, nuts, vegetables and berries contain natural high amounts of plant-estrogens, named phyto-estrogens. Phyto-estrogens are a large group of compounds with estrogen-like effects. Recent investigations on the effects of phyto-estrogens on various tissues have suggested that these compounds may improve human health, particularly by protecting against certain chronic diseases.

Phyto-estrogens can be divided in three main groups, isoflavonoids, coumestans and lignans. The concentration of isoflavonoids in clover for example, is more than 20 mg/g dry tissue. Therefore, clover is a potential source of phytoestrogens in cows milk and therefore also in humans as consumers of milk, especially if clovers are used as feed crops in organic milk production. Only a few studies have examined phytoestrogens in milk from cows, including a study from Finland and one from Australia. However, to our knowledge, there are no such studies of the content of phytoestrogens in milk from Danish herds.

The objective of the present project is to determine the concentration of phyto-estrogens in feed- and milk samples collected from different Danish organic herds in relation to the ration composition, especially the content of leguminous plants.

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

No.	Work package title	Participants*	Budget (1.000 DKK)	Start	End	Deliverable no(s):
1	Flavour and texture development in cheeses made from raw and pasteurised milk	DJF, ANF	966	04-02	12-03	D1-6; D10
2	Elaboration of a HACCP and a risk simulation model for a specific raw milk cheese production	KVL, MLI	1273.2	04-02	12-03	D7-11
3	Phytoestrogens in organic milk	DJF, HEF, PVF	500	06-02	12-03	D1.1

* Responsible participants are underlined

Objectives and expected achievements

Main objective (**maximum 10 lines**):

a) The overall aim is to improve the prospects of producing high quality organic cheese with acceptable microbial safety and of high sensory quality from unpasteurized milk.

- To investigate the effect of raw material on the ripening process through the determination of sensory quality and textural parameters
- To investigate the level of contamination with specific cheese-associated foodborne pathogens from the staple to the finished cheeses in a farm dairy
- To evaluate the potential for growth or survival of these pathogens in the cheeses
- To elaborate a HACCP and a risk simulation model
- To compare the sensory quality of cheese prepared from unpasteurized milk with the analogous pasteurized cheese

b) The objective is to study the importance of phyto-estrogens in Danish organic milk production. The specific objective is to determine the concentrations of phyto-estrogens in feed- and milk samples collected from different organic herds in relation to the ration composition, especially the content of leguminous plants

C. Midterm results and progress

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

WP1 & WP2

Methods to analyze flavour components and functional properties of cheeses has been developed. The first lot of Munster-type cheese has been produced in September 2002 and the storage and analysis of the cheeses are on-going. Flow-diagram as well as time, temperature and pH measurements of the production of Munster-type cheese at Hinge have been determined.

WP3. Samples has been collected schedules in the application.

C.2 Fulfilment of deliverables and milestones

(To be completed for each work package)

WP1 Flavour and texture development in cheeses made from raw and pasteurised milk	Time schedule	Deviations, if any*
Deliverables		
1 Production of cheeses	9/2002	
2 Production of cheeses	12/2002	
3 Production of cheeses	4/2003	
4 Production of cheeses	9/2003	
5 International paper	12/2003	
6 End report	12/2003	
10 Discussion meeting with stakeholders	11/2003	
Milestones		

* *Deviations are to be further discussed in D*

WP2 Elaboration of a HACCP and a risk simulation model for a specific raw milk cheese production	Time schedule according to application	Deviations, if any*
Deliverables		
7 Review of pathogenic bacteria in raw milk and raw milk cheeses	4/2003	
8 Suggestion for a generic HACCP	7/2003	
9 Elaboration of a risk simulation model	10/2003	
10 Discussion meeting with stakeholders	11/2003	
11 Final manuscript	12/2003	
Milestones		

WP3 Phytoestrogens in organic milk	Time schedule according to application	Deviations, if any*
Deliverables		
1 Report	December 2003	
2		
Etc.		
Milestones		
1 Sampling	June 2003	
2 Laboratory analyses	October 2003	
3. Evaluation and report	December 2003	

D. Description of deviations and subsequent adjustments of plans

Due to delay of start of the project with 4 months in relation to the application . The project part at DJF is still expected to finish 12/2003 due to an increased effort in the last month of 2002 and

in 2003. The project part at KVL will run for the time originally scheduled with adjustment for the time delay, i.e. medio 2004.

E. Project publications and other products

1. Articles in international, scientific journals with review procedures
2. Papers presented at congresses, symposiums, etc.
3. Reports, articles in agricultural journals, etc.
4. Oral presentations, public meetings, field days, etc.

F. Scientific education

At KVL two students are now associated with the project.

G. National and international cooperation

Critical reflection on the project

8. Budget

A. Account for any change in budgets

As a result of the delay of the project some time-related changes have been made in the budget.

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 2002	Expected consumption 2002	2003	2004	2005	Total
Man-months						
Scientific personnel		10	20	4		34
Technical personnel		11	13			24

Year:	Consumption before 2002	Expected consumption 2002	2003	2004	2005	Total
Salaries						
Scientific personnel		358.6	769.1	208		1335.7
Technical personnel		253.8	305			558.8
Other operational costs		168	200.2	20		388.2
Equipment						
Others (please specify)						
Direct costs		780.4	1,274.3	228		2,282.7
Indirect costs (20% of direct costs)		156	254.9	45.6		456.5
Total		936.4	1,529.2	273.6		2,739.2

Comments:

Budget is justified in relation to the delayed project start

9. Signatures and stamps

Name	Institute	Date	Signature
Head of project			

Appendix I. Detailed budget

A. Budget for each participating institute (1.000 DKr)

Name of Institute: Department of Animal Product Quality, DIAS

Year:	Consumption before 2002	Expected consumption 2002	2003	2004	2005	Total
Man-months						
Scientific personnel		4	6			10
Technical personnel		10	5			15

Year:	Consumption before 2002	Expected consumption 2002	2003	2004	2005	Total
Salaries						
Scientific personnel		144	216			360
Technical personnel		230	115			345
Other operational costs		60	40			100
Equipment						
Others (please specify)						
Direct costs		434	371			805
Indirect costs (20% of direct costs)		86.8	74.2			161
Total		520.8	445.2			966

Name of Institute: KVL

Year:	Consumption before 2002	Expected consumption 2002	2003	2004	2005	Total
Man-months						
Scientific personnel		4	11	4		19
Technical personnel		0	6			6

Year:	Consumption before 2002	Expected consumption 2002	2003	2004	2005	Total
Salaries						
Scientific personnel		135	428	208		771
Technical personnel		0	140			140
Other operational costs		30	100	20		150
Equipment						
Others (please specify)						
Direct costs		165	668	228		1061
Indirect costs (20% of direct costs)		33	133.6	45.6		212.2
Total		198	801.6	273.6		1273.2

Comments:

B. Budget for each participating department (1.000 DKK)

Name of Institute and department: DJF – Department of Animal Nutrition & Physiology

Year:	Consumption before 2002	Expected consumption 2002	2003	2004	2005	Total
Man-months						
Scientific personnel		1	2			3
Technical personnel		1	1			2

Year:	Consumption before 2002	Expected consumption 2002	2003	2004	2005	Total
Salaries						
Scientific personnel		39,8	83,4			123,2
Technical personnel		23,8	25			48,8
Other operational costs		47	30,2			77,2
Equipment						
Others (please specify)						
Direct costs		110,6	138,6			249,2
Indirect costs (20% of direct costs)		22,1	27,7			49,8
Total		132,7	166,3			299

Comments:

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

Name of Institute: DJF-Department of Horticulture

Year:	Consumption before 2002	Expected consumption 2002	2003	2004	2005	Total
Man-months						
Scientific personnel		1	1			2
Technical personnel			1			1

Year:	Consumption before 2002	Expected consumption 2002	2003	2004	2005	Total
Salaries						
Scientific personnel		39.8	41.7			81.5
Technical personnel			25			25
Other operational costs		31	30			61
Equipment						
Others (please specify)						
Direct costs		70.8	96.7			167.5
Indirect costs (20% of direct costs)		14.2	19.3			33.5
Total		85	116			201

Comments: