



Danish Research Centre for Organic Farming



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## Application

for research funding under the research programme:

### Research in Organic Food and Farming

International Research Co-operation and Organic Integrity

#### (DARCOF III 2005-2011)

Funded by the Ministry of Food, Agriculture and Fisheries  
under the Finance and Appropriation Act, Sections 24.33.02.10

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**1. Project title and acronym** (acronym max. 10 letters):

Potential improvement of the salutary effect of organic dairy milk by forage species and by supplementation (PHYTOMILK)

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**2. Danish coordinator.** For projects with more than one participating Danish institute a coordinator should be appointed to coordinate the project. (name, title, institute, address, telephone, fax and e-mail):

Søren Krogh Jensen, Senior scientist  
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Dept. of Animal Health, Welfare and Nutrition  
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**Please submit 1 hard copy and 1 electronic version to:**

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Web site: [www.darcof.dk](http://www.darcof.dk)

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3. **The project is within the following research topic of the CORE Organic Pilot Call:**

Animal

Quality

Marketing

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4. **Participating Danish institute(s):**

	Name	Contact person/e-mail
1.	UNIVERSITY OF AARHUS, Faculty of Agricultural Sciences Dept. of Animal Health, Welfare and Nutrition Blichers Allé 20, P.O. BOX 50, DK-8830 Tjele, DENMARK	Søren Krogh Jensen <a href="mailto:SorenKrogh.Jensen@agrsci.dk">SorenKrogh.Jensen@agrsci.dk</a>

Annex 1 should be completed for each participating Danish institute.

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5. **Project duration:**

From: month 07                      year 2007

To:    month 07                      year 2010

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6. **Main objective(s) for the entire project** (maximum 10 lines):

The main objective for the entire project is to optimise the production of organic milk with salutary effects due to an optimised choice of forage species.

The objective of proposed project is to:

- investigate how different forage species affect the fatty acid composition of organic dairy milk, and the milk content of bioactive components such as tocopherols, carotenoids, selenium (Se) and phytoestrogens.
- investigate the biological activity of the collected dairy milk samples from the Nordic countries on normal and cancer cells

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7. **Project summary for the entire project in Danish** (approximately 1 page, suitable for publication):

Undersøgelser har vist at mælk indeholder mange forskellige stoffer som kan have indflydelse på den ernæringsmæssige og sundhedsmæssige værdi af mælkeprodukter. Disse stoffer kaldes under et for bioaktive komponenter. Mælkens indhold af disse bioaktive komponenter afhænger for en stor dels vedkommende af det foder kørerne æder, idet stoffer som tokoferoler (E-vitamin), karotener (provitamin A), karotenoider (antioxidant), selen, fedtsyrer og fytoøstrogener findes i køernes foder og overføres direkte eller i omdannet form til køernes mælk. Forskellige græsser, bælgeplanter samt visse naturligt forekommende vilde urter indeholder store mængder af flere af disse for sundheden interessante biologisk aktive komponenter. Det er således muligt at producere mælk

med et højt indhold af de ønskede stoffer ved at lade køerne græsse marker med den rette sammensætning af de ønskede planter. Foruden de almindelige kultiverede græsser og bælglplanter drejer det sig om vilde planter som mælkebøtter, vejbred og kvikgræs.

Projektet her er et samarbejdsprojekt mellem Norge, Sverige, Finland og Danmark . Målet med dette projekt er at producere mælk i de forskellige lande baseret på en meget høj grad af afgræsning om sommeren og ensilerede græsmarksafgrøder om vinteren, således at det sikres at mælkens indhold af potentielt sundhedsfremmende biologisk aktive komponenter bliver så højt som muligt og med en så ønsket sammensætning som muligt.

Projektet er opdelt i 5 delprojekter:

1. Sammenhængen mellem den botaniske sammensætning af afgræsningsplanterne om sommeren og vinterens ensilage på mælkens sammensætning og kvalitet.
2. Betydningen af ensilagens botaniske sammensætning på biohydrogeneringen af fedtsyrer i vommen og på mælkens fedtsyresammensætning og kvalitet.
3. Betydningen af selenforsyningen på mælkens indhold af selen.
4. Betydningen af breddegrad og høsttidspunkt på fedtsyresammensætning og fytoøstrogenindhold i fire økologisk dyrkede græsmarksarter.
5. Betydningen af lagring og ensileringsmetode på fedtsyresammensætning og indhold af tokoferoler og carotenoider i fire økologisk dyrkede græsmarksarter.

Hovedparten af forsøgene vil foregå i Norge, Sverige og Finland, mens den danske indsats i projektet primært vil omhandle analyser af fedtsyrer, fytoøstrogen og vitaminer samt undersøgelser af de indsamlede mælkeprøver vedrørende den biologiske aktivitet på normale celler og cancercelle linjer.

8. **Budget** (note that budget should be made for the entire Danish part of the project (below) as well as for each participating Danish institute (annex 1)):

#### Budget for the entire Danish part of the project

Budget line		1. calendar year 2007		2. calendar year 2008		3. calendar year 2009		4. calendar year 2010		Total	
		Months	DKK	Months	DKK	Months	DKK	Months	DKK	Months	DKK
Project in total	Salaries/academic staff	2	90.000	4	180.000	5	230.000	2	125.000	13	625.000
	Salaries/techn.-adm. Staff	4	120.000	9	250.000	7	200.000	4	100.000	24	670.000
	Equipment over 40.000 kr.										
	Operating costs		65.000		110.000		110.000		55.000		340.000
	Others (Travelling)		20.000		35.000		35.000		25.000		115.000
	General expenses (20%)		59.000		115.000		115.000		61.000		350.000
	<b>Total</b>		<b>354.000</b>		<b>690.000</b>		<b>690.000</b>		<b>366.000</b>		<b>2.100.000</b>
<b>Budget line</b>		<b>1. calendar year 2007</b>		<b>2. calendar year 2008</b>		<b>3. calendar year 2009</b>		<b>4. calendar year 2010</b>		<b>Total</b>	

		Months	DKK	Months	DKK	Months	DKK	Months	DKK	Months	DKK
<b>Work package 1</b>	Salaries/academic staff	0.5	22.500	1	45.000	1.5	57.500	0.5	31.250	3.5	156.250
	Salaries/techn.-adm. Staff	1	30.000	2	62.500	2	50.000	1	25.000	6	167.500
	Equipment over 40.000 kr.										
	Operating costs		16.250		27.500		27.500		13.750		85.000
	Others (Travelling)		5.000		8.750		8.750		6.250		28.750
	General expenses (20%)		14.750		28.750		28.750		15.250		87.500
	<b>Total</b>		<b>88.500</b>		<b>172.500</b>		<b>172.500</b>		<b>91.500</b>		<b>525.000</b>

Budget line		1. calendar year		2. calendar year		3. calendar year		4. calendar year		Total	
		Months	DKK	Months	DKK	Months	DKK	Months	DKK	Months	DKK
Work package 2	Salaries/academic staff	0.5	22.500	1	45.000	1.5	57.500	0.5	31.250	3.5	156.250
	Salaries/techn.-adm. Staff	1	30.000	2	62.500	2	50.000	1	25.000	6	167.500
	Equipment over 40.000 kr.										
	Operating costs		16.250		27.500		27.500		13.750		85.000
	Others (Travelling)		5.000		8.750		8.750		6.250		28.750
	General expenses (20%)		14.750		28.750		28.750		15.250		87.500
	<b>Total</b>		<b>88.500</b>		<b>172.500</b>		<b>172.500</b>		<b>91.500</b>		<b>525.000</b>
Budget line		1. calendar year		2. calendar year		3. calendar year		4. calendar year		Total	
		Months	DKK	Months	DKK	Months	DKK	Months	DKK	Months	DKK
Work package 3	Salaries/academic staff	0	9000	0.5	18.000	0.5	23.000	0	12.500	1	62.500
	Salaries/techn.-adm. Staff	0.5	12.000	1	25.000	0.5	20.000	0.5	10.000	2	67.000
	Equipment over 40.000 kr.										
	Operating costs		6.500		11.000		11.000		5.500		34.000
	Others (Travelling)		2.000		3.500		3.500		2.500		11.500
	General expenses (20%)		5.900		11.500		11.500		6.100		35.000
	<b>Total</b>		<b>35.400</b>		<b>69.000</b>		<b>69.000</b>		<b>36.600</b>		<b>210.000</b>

Budget line		1. calendar year		2. calendar year		3. calendar year		4. calendar year		Total	
		Months	DKK	Months	DKK	Months	DKK	Months	DKK	Months	DKK
Work package 4	Salaries/academic staff	0.5	18.000	0.5	36.000	1	46.000	0.5	25.000	2.5	125.000
	Salaries/techn.-adm. Staff	1	24.000	2	50.000	2	40.000	1	20.000	5	134.000
	Equipment over 40.000 kr.										
	Operating costs		13.000		22.000		22.000		11.000		68.000
	Others (Travelling)		4.000		7.000		7.000		5.000		23.000
	General expenses (20%)		11.800		23.000		23.000		12.200		70.000
	<b>Total</b>		<b>70.800</b>		<b>138.000</b>		<b>138.000</b>		<b>73.200</b>		<b>420.000</b>

Budget line		1. calendar year		2. calendar year		3. calendar year		4. calendar year		Total	
		Months	DKK	Months	DKK	Months	DKK	Months	DKK	Months	DKK
Work package 5	Salaries/academic staff	0.5	18.000	0.5	36.000	1	46.000	0.5	25.000	2.5	125.000
	Salaries/techn.-adm. Staff	1	24.000	2	50.000	2	40.000	1	20.000	5	134.000
	Equipment over 40.000 kr.										
	Operating costs		13.000		22.000		22.000		11.000		68.000
	Others (Travelling)		4.000		7.000		7.000		5.000		23.000
	General expenses (20%)		11.800		23.000		23.000		12.200		70.000
	<b>Total</b>		<b>70.800</b>		<b>138.000</b>		<b>138.000</b>		<b>73.200</b>		<b>420.000</b>

### Financing of the entire Danish part of the project

Budget line		From Ministry of Food, Agriculture and Fisheries		From work place		From other sources		Total	
		Months	DKK	Months	DKK	Months	DKK	Months	DKK
Entire project	Salaries/academic staff	13	625.000					13	625.000
	Salaries/ techn.-adm. Staff	24	670.000					24	670.000
	Equipment over 40.000 kr.								
	Operating costs		340.000						340.000
	Others (Travelling)		115.000						115.000
	General expenses (20%)		350.000						350.000
	<b>Total</b>		<b>2.100.000</b>		<b>0</b>		<b>0</b>		<b>2.100.000</b>

**Comments to the budget including specification of the budget line "Others":**

### 9. Mile stone table for the Danish part of the project

Each mile stone should be accompanied with a short text concerning the activity it relates to.

Activity (with mile stone number) Quarterly	Year 1 2007				Year 2 2008				Year 3 2009				Year 4 2010			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>M1:</b> Workshop planning animal production experiments and survey Task 1-3 and task 6	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>M2:</b> Task 4: Effects of latitude and harvest time on FA composition and phytoestrogen concentrations on four organically managed forage species. <b>Anal. of Phytoestr. and FA</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>M3:</b> Task 1: Pasture and silage botanical composition – effect on milk quality <b>Anal. of Vit. Phytoestr. and FA</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>M4:</b> Task 2: Silage botanical composition - effect on rumen FA hydrogenation and milk FA composition. <b>Anal. of Vit. And FA</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>
<b>M5:</b> Task 5: Effects of storage time and silage preservation methods on FA composition and concentration of tocopherols and carotenoids on four organically managed forage species. <b>Anal. of Vit. And FA</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>
<b>M6:</b> Task 6: Bioactive components in organic milk with suggested health beneficial effects. <b>In vitro cell-based models for assessing the biological activity in specific human tissues.</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>

### 10. List of deliverables from the Danish part of the project to CORE Organic Pilot Call

Deliverable No.	Deliverable title	Lead scientist	Delivery date	Allocated scientific person moth	Type of deliverable
1	Workshop - project meeting - coordination	All	22-24 May 07	1	Meeting
2	Task 4: Effects of latitude and harvest time on FA composition and phytoestrogen concentrations on four organically managed forage species. <b>Anal. of Phytoestr. and FA</b> (Vit. anal. are financed from other projects including FØJO III)	SKJ/SP	May 08	3	S, C
3	Task 1: Pasture and silage botanical composition – effect on milk quality <b>Anal. of Vit. Phytoestr. and FA</b>	SKJ/SP	May 09	3	S, C
4	Task 2: Silage botanical composition - effect on rumen FA hydrogenation and milk FA composition. <b>Anal. of Vit. And FA</b>	SKJ	June 09	2	S, C
5	Task 5: Effects of storage time and silage preservation methods on FA composition and concentration of tocopherols and carotenoids on four organically managed forage species. <b>Anal. of Vit. And FA</b>	SKJ	June 09	1	S, C
6	Task 6: Bioactive components in organic milk with suggested health beneficial effects. <b>In vitro cell-based models for assessing the biological activity in specific human tissues.</b>	SP	June 09	3	S, C

(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, model, websites, etc.)

11. **Annex 1 - Information and budget for each participating institute**
12. **Annex 2 - Original application**
13. **Signature** (the coordinator confirms that the given information is correct):

Søren Krogh Jensen

Date 2. May 2007      Signature \_\_\_\_\_



Danish Research Centre for Organic Farming



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## Annex 1

### Information and budget

(Annex 1 shall be completed for each participating Danish institute)

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1. **Project title and acronym** (acronym max. 10 letters):

PHYTOMILK

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2. **Institute:**

Institution <b>University of Aarhus</b>
Institute <b>Faculty of Agricultural sciences</b>
Address Dept. of animal health, welfare and Nutrition
CVR-number (shall be in conformity with the institution and address) <b>57607556</b>

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3. **Contact person:**

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6. **Specification of the budget line “Others”:**

**Travelling expenses**

**A general comment to the budget is that the whole Danish part of the project is financed from the Ministry of Food, Agriculture and fisheries through CoreOrganic. This statement is listed here since it was not possible to write in table above!**

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7. **Signature** (the signature confirms the above given information and the budget):

Date \_\_\_\_\_ Stamp of the institute

Name \_\_\_\_\_ Signature \_\_\_\_\_