

OPUS



The OPUS School Meal Study

New Nordic Diet for children



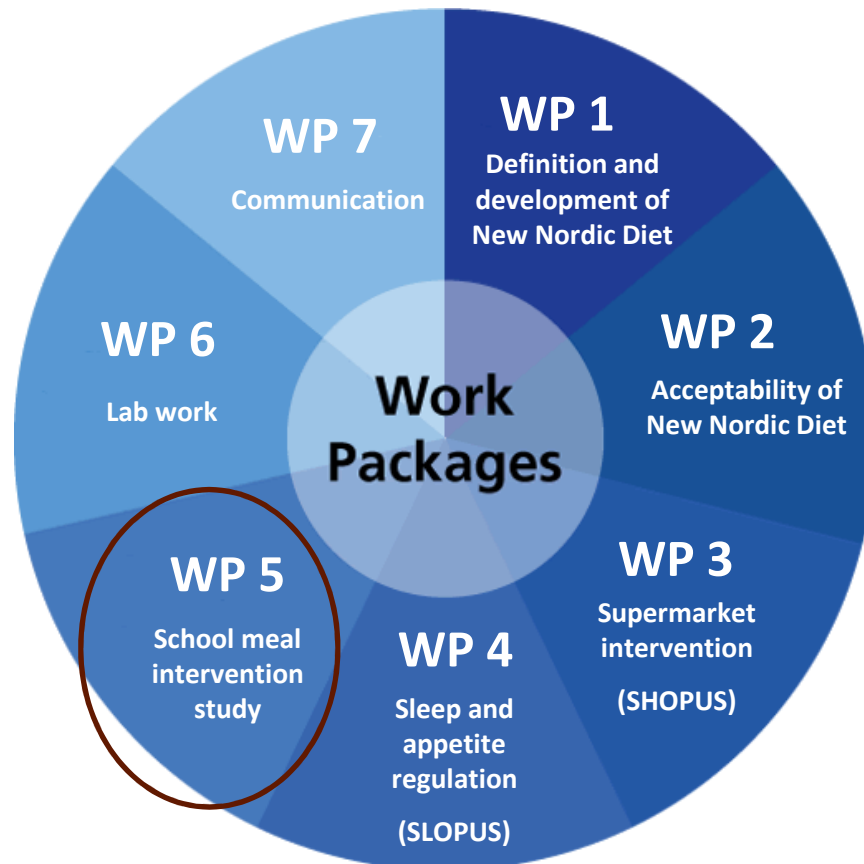
Rikke A. Petersen
PhD stud
rap@life.ku.dk

NORDEA
FONDEN

Department of
Nutrition, Exercise
and Sports



Background of the OPUS School Meal Study



WP 5 leader: Professor Kim Fleischer Michaelsen

The OPUS center is funded by **NORDEA FONDEN**



Background of the OPUS School Meal Study

OPUS

OPtimal trivsel, **U**dvikling og **S**undhed for danske børn gennem en sund Ny Nordisk Hverdagsmad

Optimal well-being, development and health for Danish children through a healthy New Nordic Diet

Aim of the OPUS School Meal Study

To investigate the impact of serving Nordic school meals on:

- Dietary intake and nutrient status
 - Food acceptance and costs
 - Growth and body composition
 - Academic performance, attention and well-being
 - Social and cultural changes
 - Sleep
 - Markers of the metabolic syndrome
-in Danish children aged 8-11 years.

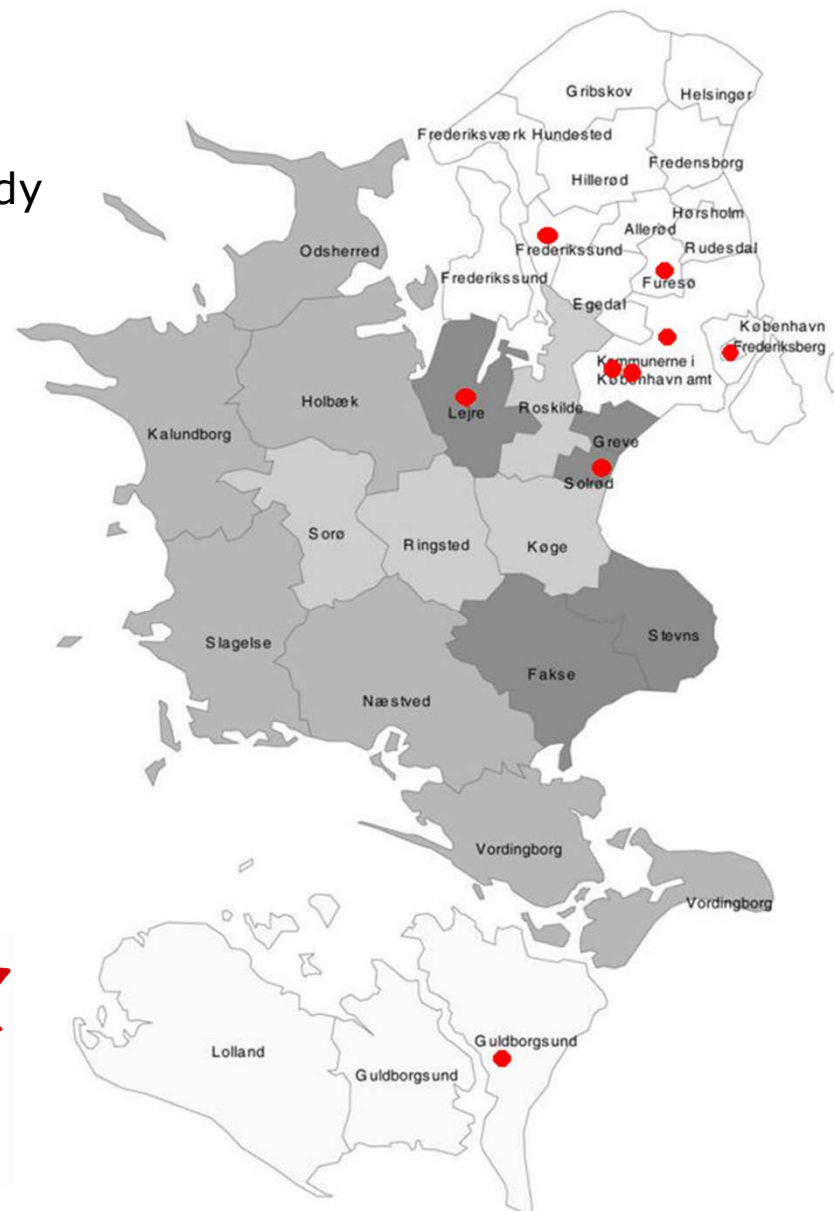
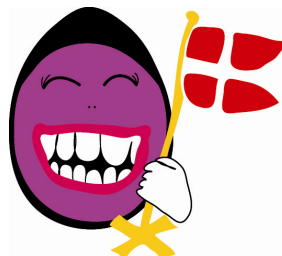
The where and when of the OPUS School Meal Study

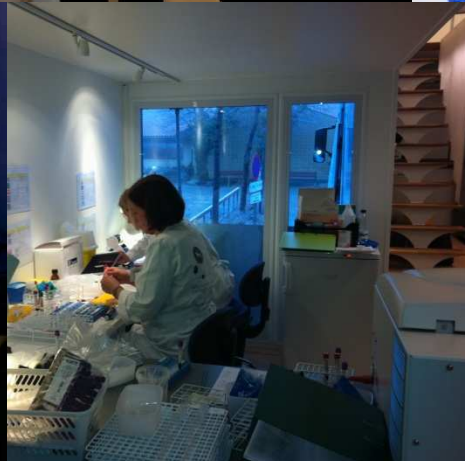
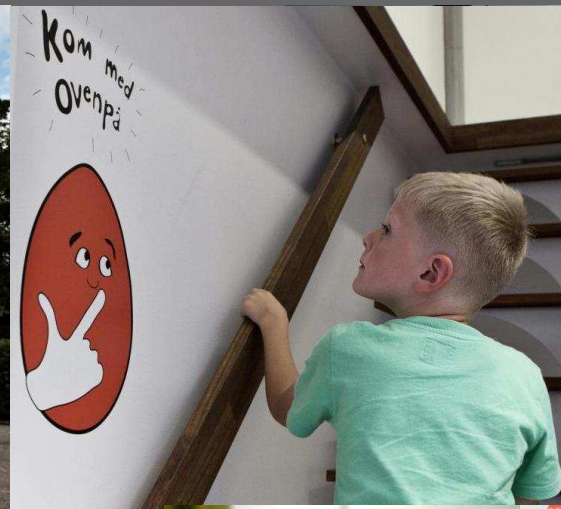
Ran from August 2011 to June 2012

9 Danish public schools participated in the study

Located in eastern part of Denmark

3rd and 4th grade students only





Data from the OPUS school meal study

Category	Analysis	Lab
CVD / MS markers	Total cholesterol	Gentofte Hospital Truck Gentofte Hospital
	LDL cholesterol	
	HDL cholesterol	
	Triacylglycerol	
	Glucose	
	Insulin	
Inflammatory markers	CRP	Gentofte Hospital
	IL-6	Gentofte Hospital
	TNF-alpha	Gentofte Hospital
	Adiponectin	Gentofte Hospital
Appetite hormones	Ghrelin	Gentofte Hospital
	(Active ghrelin)	Gentofte Hospital
	Leptin	Gentofte Hospital
Growth and bone	IGF-1	Dep. Human Nutrition
	(IGF-BP3)	Dep. Human Nutrition
	Osteocalcin	Dep. Human Nutrition
	PTH	Gentofte Hospital
Diet & nutrition status biomarkers	25-(OH)Vitamin D	Ålborg Hospital
	Whole-blood FA-composition (n-3 PUFA status, fish intake)	Canada
	Hemoglobin (iron status)	Truck
	Ferritin (iron status)	Gentofte Hospital
	Carotenoids (fruit + vegetables)	DTU-FOOD
	Flavonoids (fruit + vegetables)	DTU-FOOD
Metabolomics	Plasma for metabolomics	Dep. Human Nutrition/LDra
Biobank	Buffy coat (DNA)	xxx
	Buffy coat (RNA)	xxx
	RBC	xxx
	Plasma	xxx

Other measurements

- **Interviews (SES, habits etc)**
- **7-day web-based dietary recording**
- **7-day physical activity & sleep**
- **Academic performance & attention**
- **Well-being and illnesses**
- **Food culture and social impact**
- **Food waste (plate-, kitchen-) at 2 schools**





The school meals

Based on the principles of the New Nordic Diet

Morning snack
Hot lunch
Afternoon snack

Ad libitum lunch

Monday: **Soup day**
Tuesday: **Meat day**
Wednesday: **Vegetarian day**
Thursday: **Fish day**
Friday: **"Buffet" day**



Morning



Lunch



Afternoon



Challenges in the OPUS School Meal Study

Examples:

- Motivate teachers and school leaders to invest time and effort
- Make all activities fit class schedules
- Cooking at the schools
- Make meals similar from school to school
- Communication
 - 9 school leaders
 - ~ 100 teachers
 - ~ 1600 parents
 - ~ 18 cooks
 - ~ 10 daily staff in the truckcleaning, disposal, deliverance, supply, electricity etc.



Challenges in the OPUS School Meal Study

Examples:

- Include as many children as possible
- Create "safe" environment around the measurements
- Motivate the children to eat the food



NORDEA
FONDEN

november 2012
Dias 13

Motivate children to eat the New Nordic Diet school meals

1-2 chefs at each school

4-6 children cook/present lunch every day

25 minutes for lunch.

Table is set

Eating with a knife and fork

Snacks "to go"

Served "as preferred"



november 2012
Dias 14

The OPUS school meal "universe"



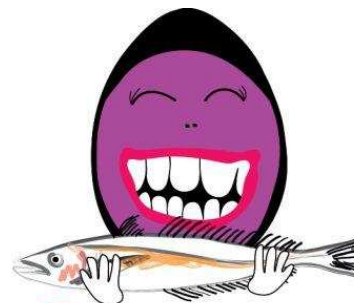
nr.1

Mere frugt og grønt hver dag. Især bær, kål, rodfrugter, bælgfrugter, kartofler og urter



nr.2

Mere fuldkorn. Især havre, rug og byg



nr.3

Mere mad fra havet og søerne



nr.4

Kød af højere kvalitet, men mindre af det



nr.5

Mere mad fra de vilde landskaber



nr.6

Vælg økologisk, hver gang du kan



nr.7

Undgå tilsætningsstoffer i maden



nr.8

Flere måltider tættere på sæsonen



nr.9

Mere hjemmelavet mad

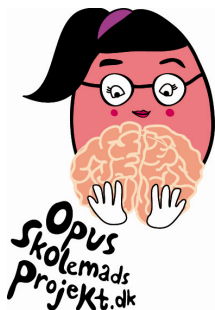


nr.10

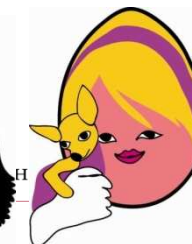
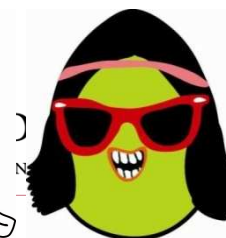
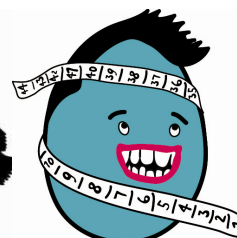
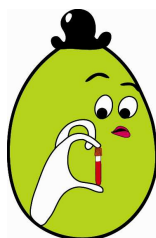
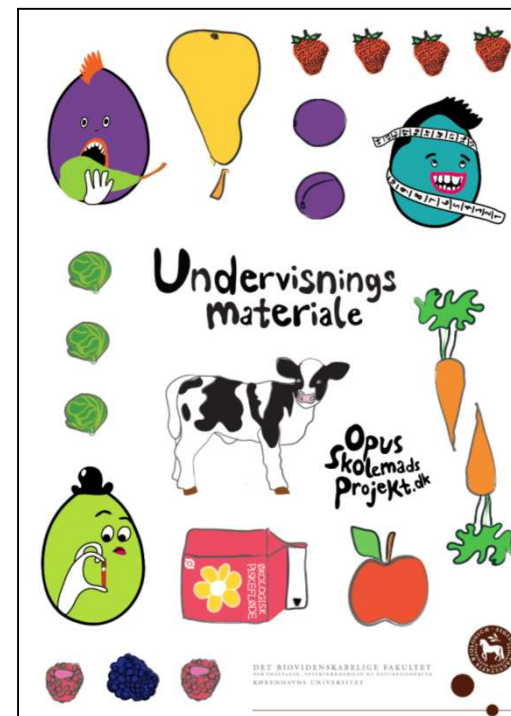
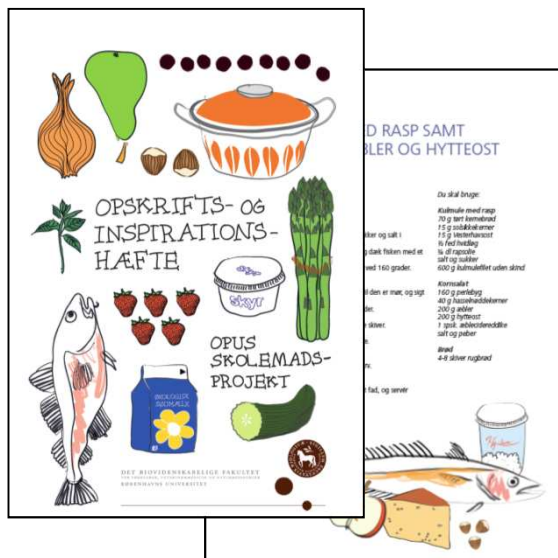
Smid mindre ud

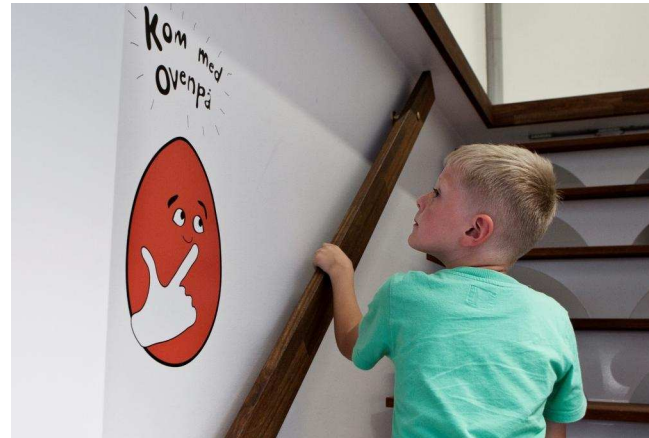
NORDEA FONDEN





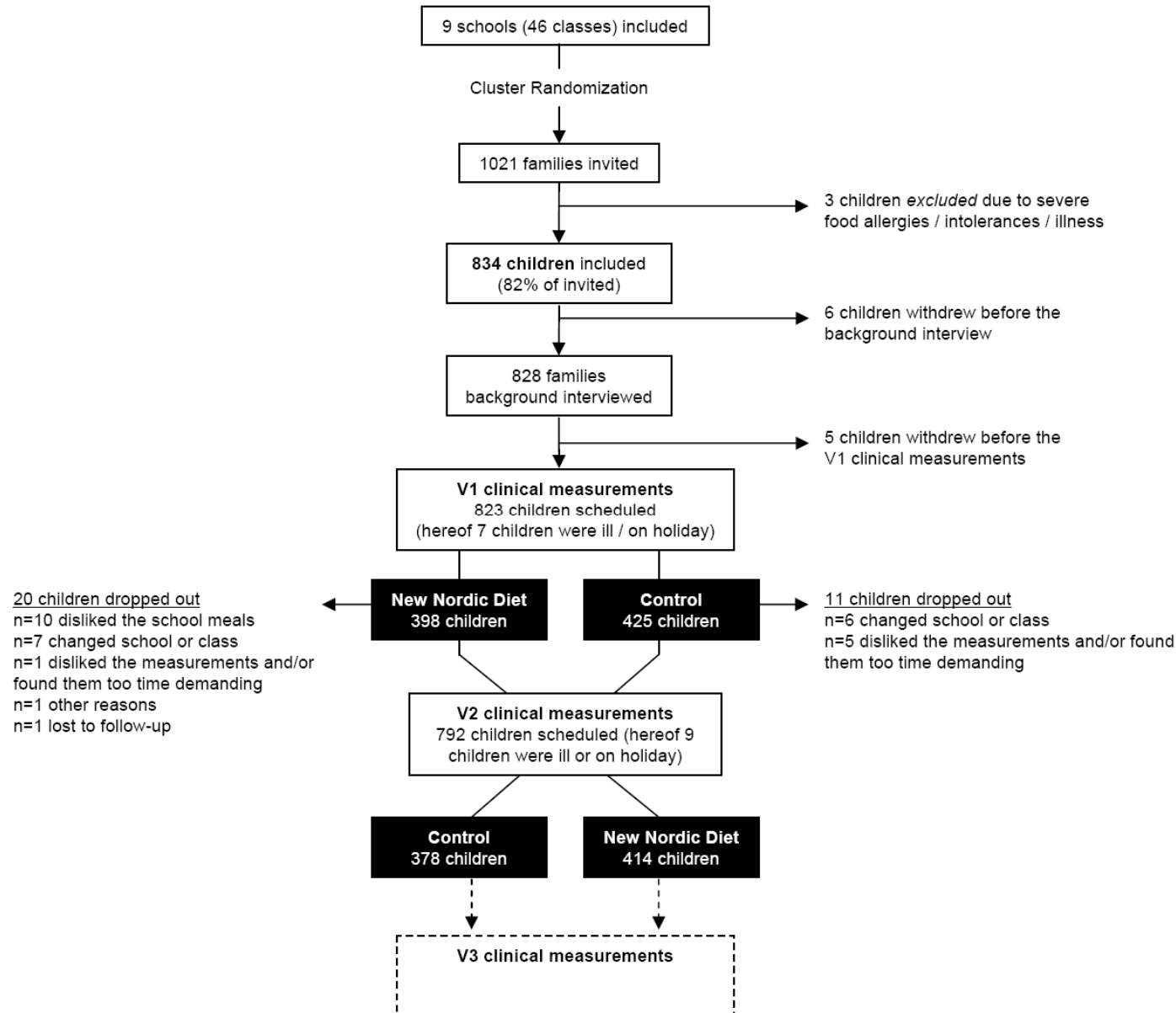
The OPUS school meal "universe"





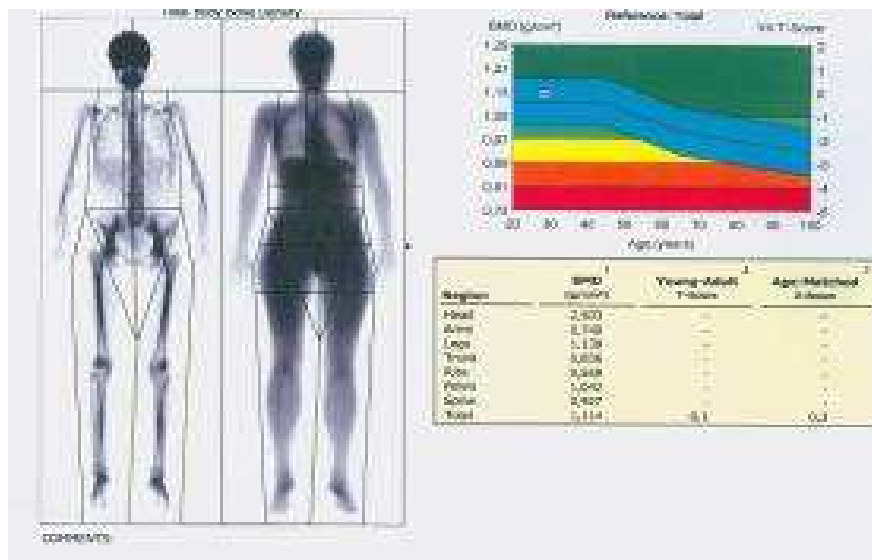
november 2012
Dias 17

Participation in the OPUS school meal study



Data from the OPUS school meal study

- > 2000 blood samples
 - > 2000 DXA scans
 - > 2000 academic performance and attention tests
 - > Data on physical activity, dietary recordings, food culture, well-being etc.
-to be analyzed according to the aim



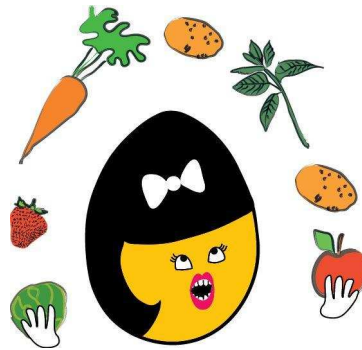
Aim of the OPUS School Meal Study

To investigate the impact of serving Nordic school meals on:

- Dietary intake and nutrient status
 - Food acceptance and costs
 - Growth and body composition
 - Academic performance, attention and well-being
 - Social and cultural changes
 - Sleep
 - Markers of the metabolic syndrome
-in Danish children aged 8-11 years.

Visit the OPUS School Meal study at:

<http://www.foodoflife.dk/Opus/English/wp/school.aspx>



Many thanks to.....

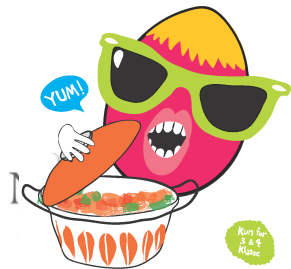
Kim F. Michaelsen, NEXS
Christian Mølgaard, NEXS
Camilla Trab Damsgaard, NEXS
Lotte Lauritzen, NEXS
Louise B. Sørensen, NEXS
Stine-Mathilde Dalskov, NEXS
Mads F. Hjorth, NEXS
Anders M Sjödin, NEXS

Anja Bilotft-Jensen, DTU
Rikke Andersen, DTU
Majken Ege, DTU
Anne-Vibeke Thorsen, DTU
Inge Tetens, DTU

Louis N Havn, FOI
Christian J. Jensen, FOI
Naja B Stamer, FOI
Sidse S. Andersen, FOI
Ditte Vassard, FOI
Lotte Holm, FOI

Camilla B. Dyssegård, DPU
Niels Egelund, DPU

Stine Norup Poulsen, Graphical Design
Marie Willumsen, Graphical Design



november 2012
Dias 22



...and our fantastic colleagues in the field!

Birgitte Hermansen, *Ernæringskonsulent*

Vivian J Anker *Bioanalytiker*

Inge Rasmussen *Bioanalytiker*

Ümmühan Celik *Bioanalytiker*

Hanne Ring-Larsen *Bioanalytiker*

Nevin Kisa *Bioanalytiker*

Rikke Laursen *Forskningsassistent*

Bente Maribo, *DPU*

+ our 15 students and interns :o)



Mathias Krog Holt *Køkkenchef*

Jonas Kousholt *Kok*

Michael Rosenberg *Kok*

Mikkel Anker-Hansen *Kok*

Simon Aagaard Philipsen *Kok*

Tine Kardos *Kok*

Janne Møller *Kok*

Ulla Petersen *Madmor*

Maja Hansen *Madmor*

Charlotte Klit Nørlem *Pædagog*

Birgit Andersen *Madmor*

Mette Jantzen *Madmor*

Elsebeth Palsgaard-Jensen *Kok*

Bart Stofregen *Kok*

Ann-Sofie Munk Hansen *Madmor*

Anne Naya Ryberg Johansen *Madmor*

Mona Pedersen *Madmor*

Ea Christensen *Madmor*

Detlef Höper *Kok*

Kasper, Elin og Dorthe *Pædagoger*

Janne Jensen Declerck *Kok*

Lone Jensen *Madmor*

Thank you for your attention!

rap@life.ku.dk

