

Sustainable food production:

The sustainable hospital foodservice chain *decreasing waste, improving energy efficiency, greening the food supply, improving patients food intake*

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ABSTRACT: Danish hospital foodservice is responsible for the production of 200,000 meals that are served to patients, relatives and staff every day - an activity with considerable environmental implications . Processing in the foodservice production units emits 200 tons of CO₂/day and evidence shows that food waste in hospitals food service is 40- 45% resulting in a total waste of 4*10⁷ kg of food waste/year. The paper reports from the FoodServInSPIRe project – part of the InSPIRe program and presents a environmental model that will be used for developing an intervention in the case of Aalborg Hospital. Data for environmental impact of processing in foodservice will be presented as well as results from a screening of the food service unit in the research case. The model will be used for the intervention improving the utilization of food, water, and energy resources. The intervention will contain a local food sourcing strategy that will contribute to increase patient perception. The intervention will use data on patient preferences and food data to predict and forecast demand precisely thereby contributing to decreasing waste and decrease the environmental impact. The intervention will integrate existing patient, food and processing data into one ICT system, through real-time hospital food flow monitoring.

Challenges: Hospital Food service

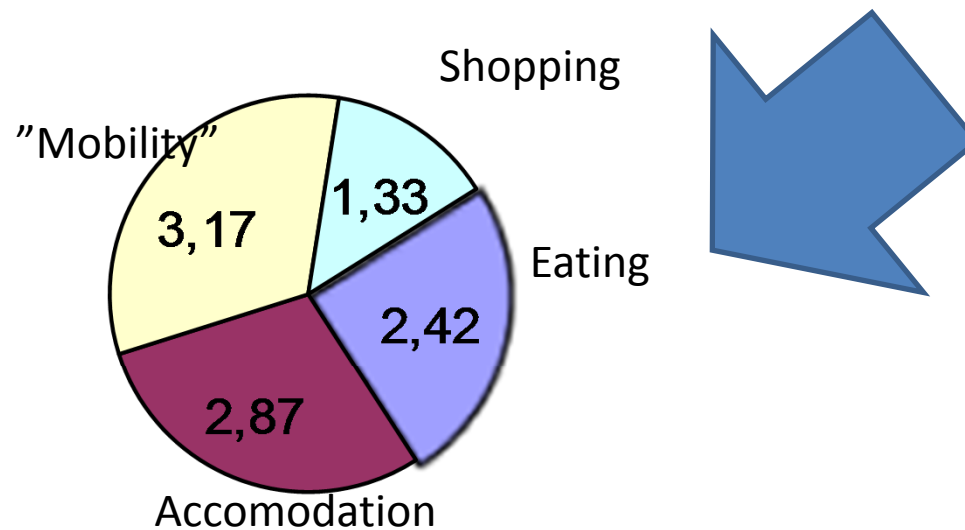
- Six new super hospitals being built during next decade
- FAM – acute 48 hour admission
- Move from traditional benchmarking approach (meals/employ or cost/employee)
- From trial & error to research based evidence

Undernutrition at hospital

- Approx 1/3 of the hospitalized patients in Danish hospitals are undernourished
- Approx 1/5 is at risk of developing malnutrition during hospitalization.
- Medical Technology Assessment (MTA, 2005) estimates that improving nutritional care can reduce hospital stays for medical patients by 3.4 days.
- Potential annual savings of 143.6 million DKR by optimizing nutritional support

Climate & food activity

Estimated CO₂ impact of DK citizens, public consumption not incl.(2t/y)



Data from Jørgensen modified after Chrintz, 2009. One third of man made climate impact can me traced to food production or consumption = our FoodPrints . Denmark's National Inventory Report 2009 to UNFCCC; IDA 2009

Environmental key figures

- Processing in Danish hospital CPU is estimated to
- emit over 200 t of CO₂/day
- consume $1,2 \cdot 10^8$ Wh/day
- consume $8,8 \cdot 10^6$ litre of water/day

Estimates based on Buhl, Frandsen & Mikkelsen, 1992 and Mikkelsen, 1998. All estimates based on production of 90.000 daily meals

The greening of hospital foodservice



Økologiske fødevarer i offentlige institutioner og storkøkk'

Grønne indkøb

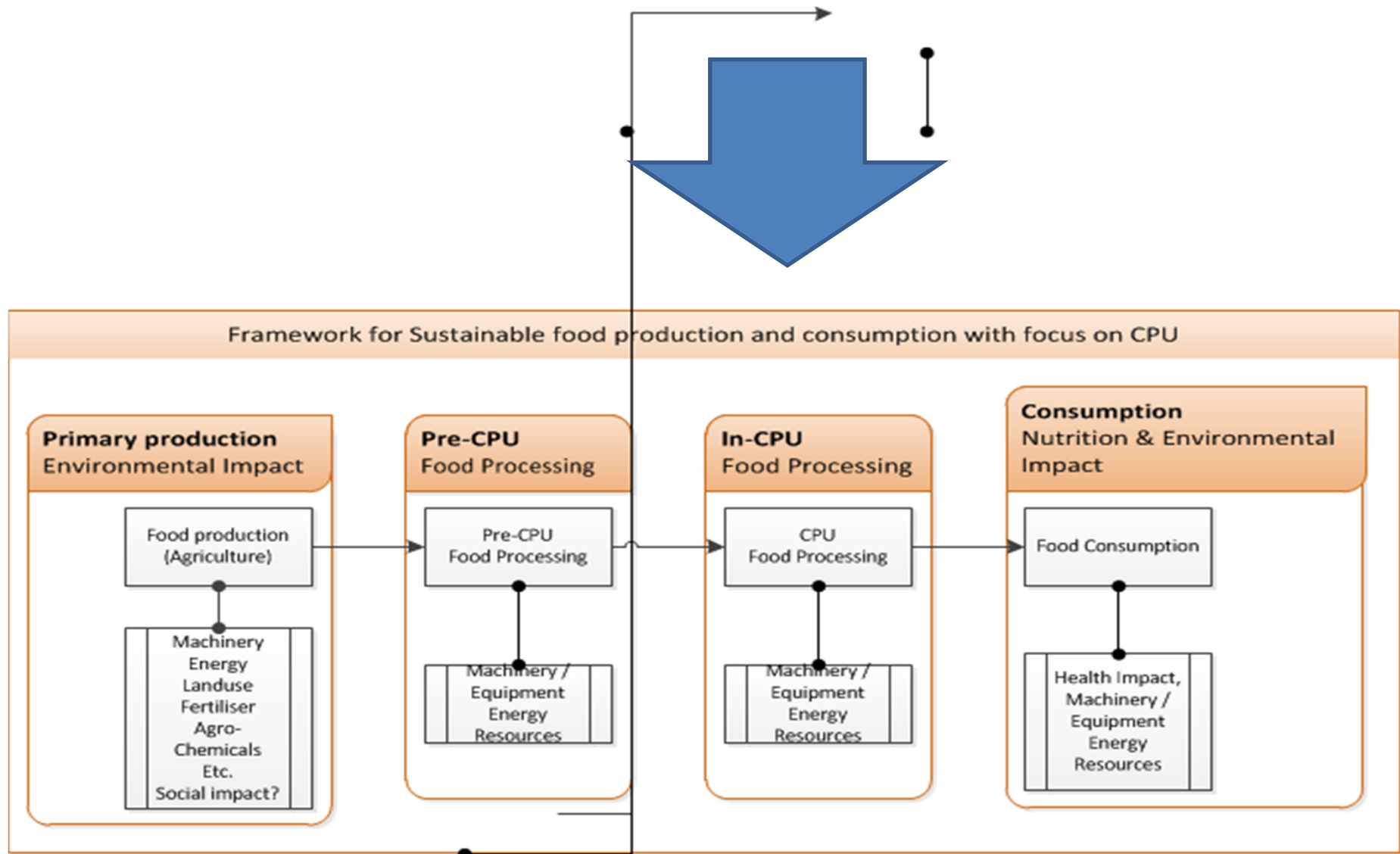


Nyt Universitetshospital - Det første CO2-neutrale hospital i verden?

"Velkommen til Hollufgård, og konferencen om det CO₂-neutrale nye universitetshospital. Ovre på den anden side af vejen er der nu en kæmpe rapsmark. Om få år er det en byggeplads. Om ti år har vi færdigbygget sygehus - på den mark," sådan bød regionsrådsformand Carl Holst (V) deltagerne i konferencen om CO₂-neutralt Nyt OUH velkommen på Hollufgård tirsdag formiddag.



CPU environmental model



Sustainable hospital food strategies

Strategy

Menu redesign (less meat, more veggies)

Organic public procurement

Local food policies

Seasonal food policies

Curtailing food waste (procurement planning, inventory management, monitoring, forecasting)

CPU CleanTech, Energy efficiency of CPU, (direct & indirect)

CPU, Behavioural change (Energy efficiency of CPU, direct & indirect)

Preferences, liking & waste

Table 1. Mean amount of food delivered to the wards, mean amount of food eaten, and mean amount of food returned and not eaten (and thus wasted) during three study periods

	Amount of food (g) (% of food delivered)		
	1st period	2nd period	3rd period
Amount delivered per patient	580	394	379
Amount eaten per patient	305 (52)	276 (70)	301 (79%)
Amount not eaten and wasted per patient	276 (48)	118 (30)	78 (21%)

Period 1: prefixed meals; period 2: possibility of composing the meal individually served by specially trained staff; period 3: possibility of composing the meal individually served by routine staff. All figures are given as grams per meal per patient.

Original article

Reorganization of a hospital catering system increases food intake in patients with inadequate intake

Morten Freil¹, Michael Allerup Nielsen², Camilla Biltz², Rikke Gut¹, Bent Egberg Mikkelsen³ and Thomas Almdal^{4,5}

DK: Food waste all sectors

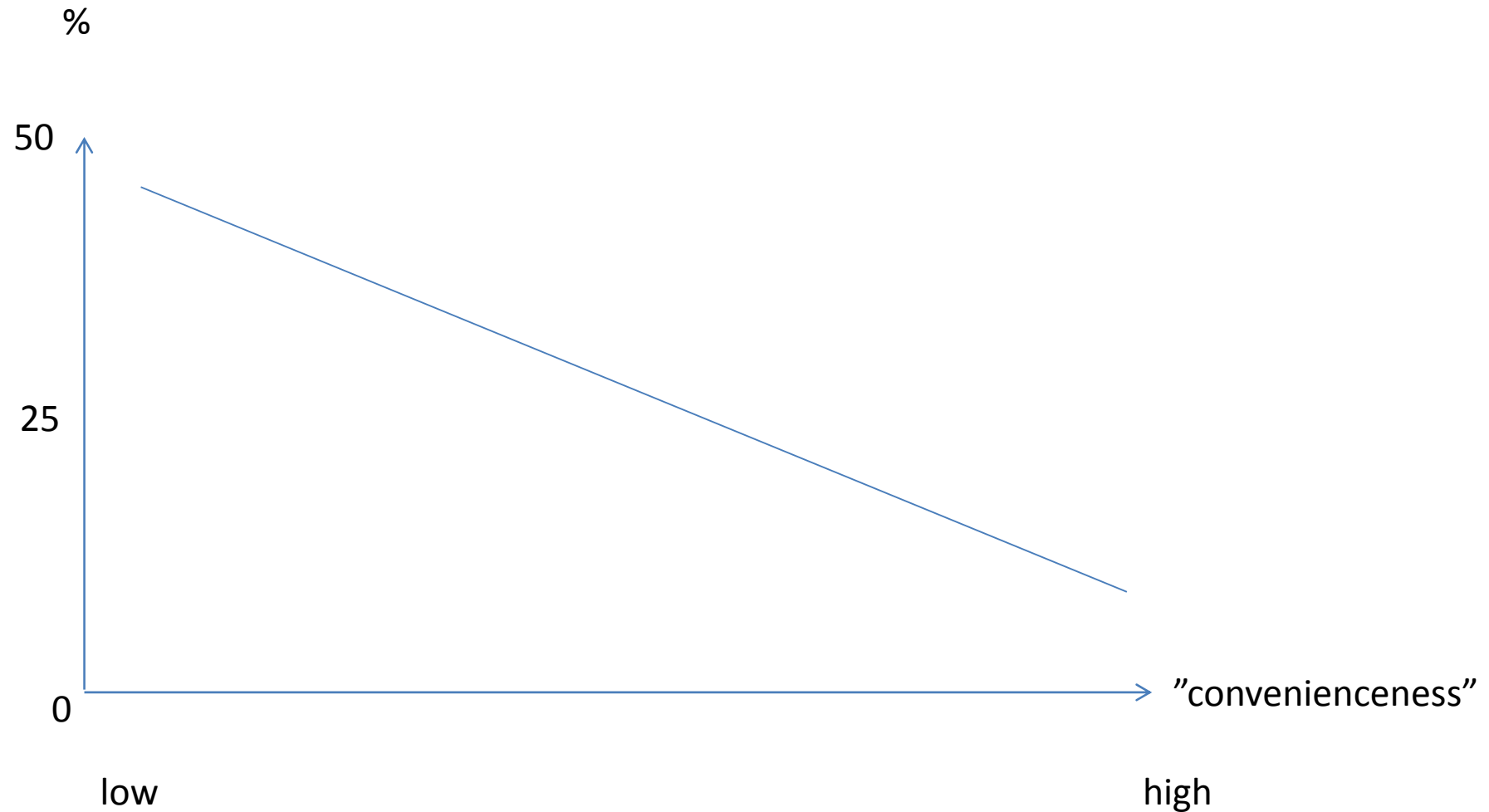
retail, foodservice & domestic

- Edible: 300.450 t/year¹
- Total food waste 542.000 t/year¹
- Value²: $6,7 * 10^9$ DKR.

1. Kjær & Werge, 2010, s. 53, table 18,
Forundersøgelse af madspild i Danmark,
Miljøministeriet, Miljøprojekt Nr. 1325 2010)

2. Jørgen Deigård, konferencen 'Det skjulte
madspild'. CONCITOs og Fødevareministeriets
konference om det skjulte madspild d. 12. maj
2011

Food waste & "convenienceness"



Illustrated with data from Kjær & Werge, 2010, s. 53, table 18, *Forundersøgelse af madspild i Danmark*, Miljøministeriet, Miljøprojekt Nr. 1325 2010. Edible foodwaste estimated at 40-75 % of foodwaste depending on level of semi preparednes – "convenienceness". High "convenienceness" 9% of served amount/20% of procured amount. Low "convenienceness" : 20-38%

Food waste food service

- **Foodservice incl. hospital:** 25.000-50.000 t/y. No distinction between edible and non edible due to lack of monitoring. ¹
- Min 21.000 t/y. 40-75% edible = 8.6-15.8 t/y ²
- **Scientific litterature, hospitals % ²:**
- UK hospitals: 35-58 % ⁴
- DK Hospital: 55 % ⁵
- Value: 750 mill/year (food service). ³

1. Petersen og Kielland, 2003, *Statistik for Madaffald 2001*, Miljøstyrelsen

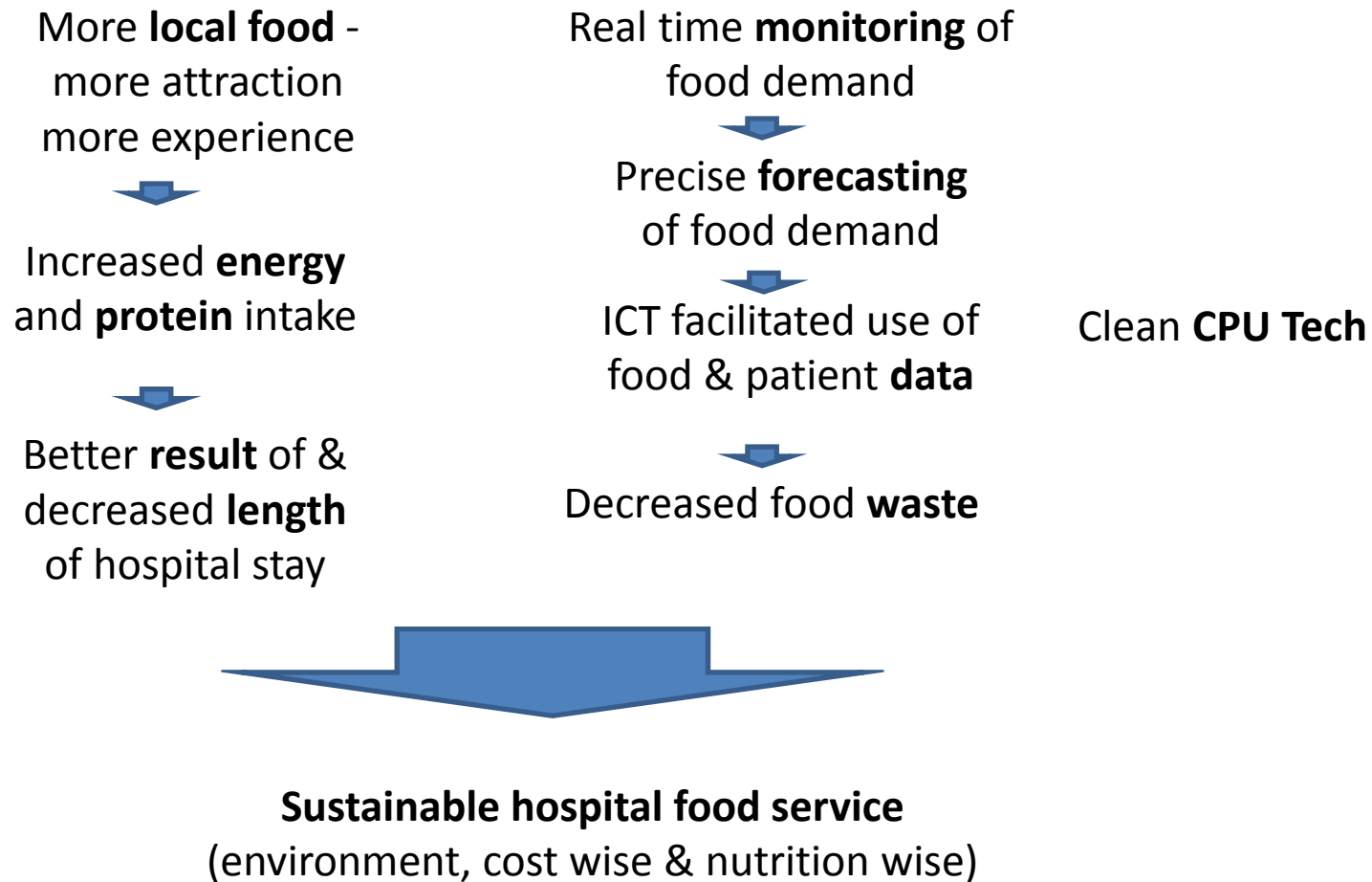
2. Lisbeth Mogensen, konferencen 'Det skjulte madspild'. CONCITOs og Fødevareministeriets konference om det skjulte madspild d. 12. maj 2011

3. Jørgen Deigård, konferencen 'Det skjulte madspild'. CONCITOs og Fødevareministeriets konference om det skjulte madspild d. 12. maj 2011

4. Edwards:& Nash. *The nutritional implications of food wastage in hospital food service management Nutrition & Food Science, Number 2 · March/April 1999 · pp. 89–98*

5. Effect of changed organisation of nutritional care of Danish medical inpatients. Karin O Lassen, Edvin Grinderslev[†]2 and Ruth Nyholm, *BMC Health Services Research* 2008, **8**:168

FoodServInSPIRe project conceptual framework



FoodServInSPIRe project

the idea of Personas

- Reduce complexity through archetypes
- Originates from marketing (Ogilvy) & IT development Cooper: The Inmates are Running the Asylum. SAMS, 1999.
- Demographics (SES etc)
- Psychographics (preferences, personality, values, attitudes, interests, or lifestyles etc.)
- Health & nutritional status

FoodServInSPIRe project

workplan 1/2

- Identification of sources of food waste in selected hospital foodservice environments
- Investigation on legal aspects of local food supply concepts
- Investigation on cooking routines in hospital catering production unit (HCPU)
- Development of local food supply concept in cooperation with FoodServInSPIRe
- Mapping of IKT routines in selected hospital foodservice environments
- Development project: Alternative use of by products
- Study: waste dependancy of "convenienceness"

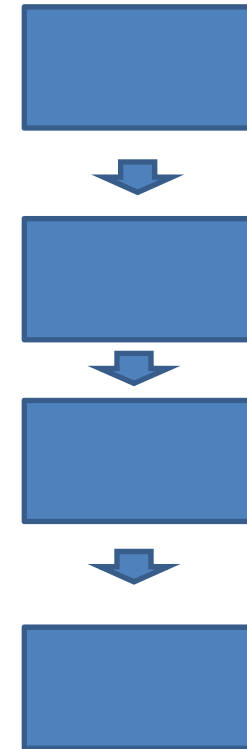
FoodServInSPIRe project

workplan 2/2

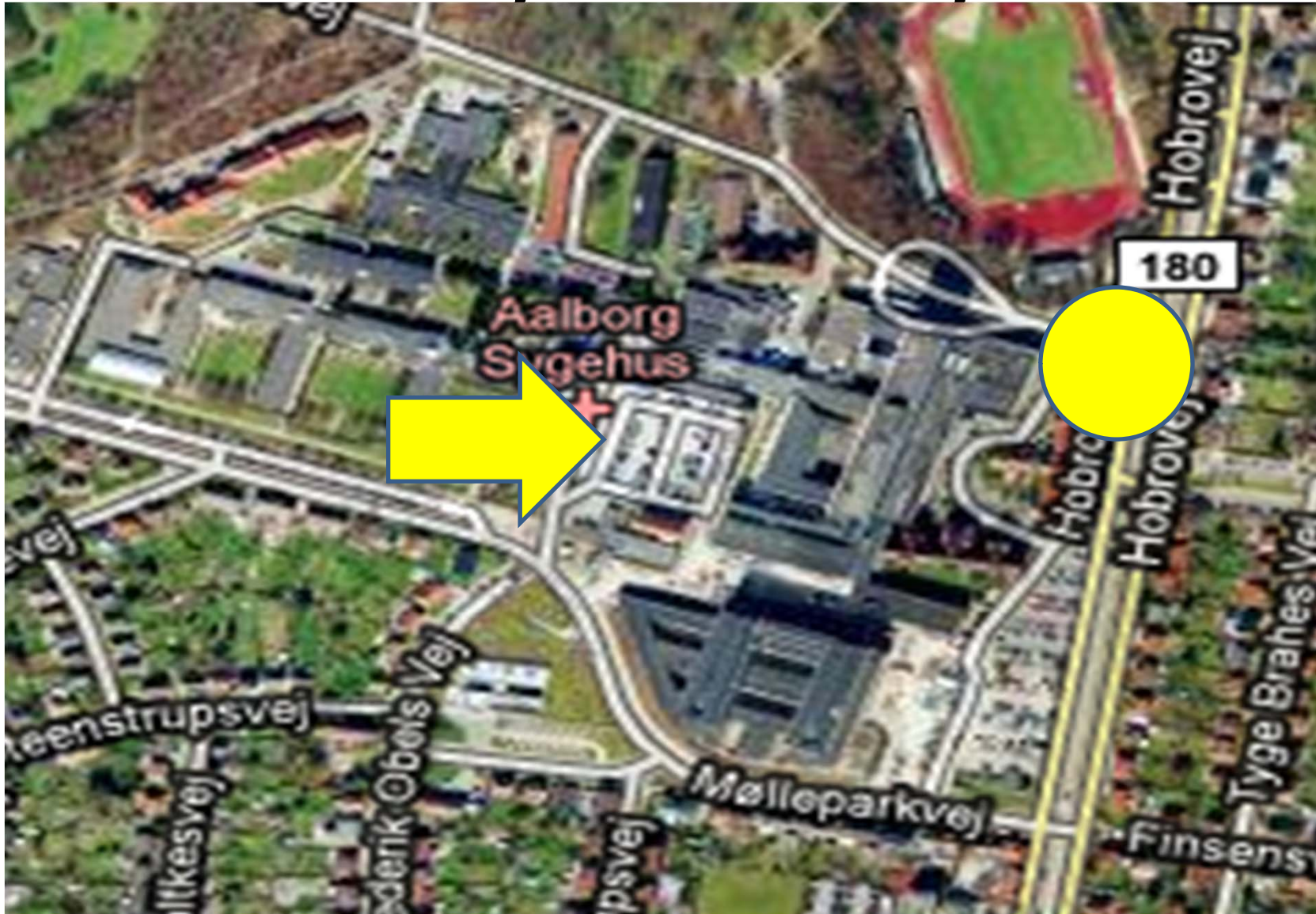
- Development of model for realtime monitoring of food demand based on
 - Food status: Remote food outlets at ward
 - Patient status: Preferences & nutritional status on admission
- Development of intervention
- Baseline study (pre – intervention)
- Follow-up study (pre – intervention)

Food waste sources

- Non edible (yet) peel, traditional by products
- Edible
- CPU
- Exeding shelf life
- More produced than ordered
- Distribution
- Ward
 - Received not served or plated
 - Eaten by others than intended
 - Portioning
 - Served not eaten – plate waste



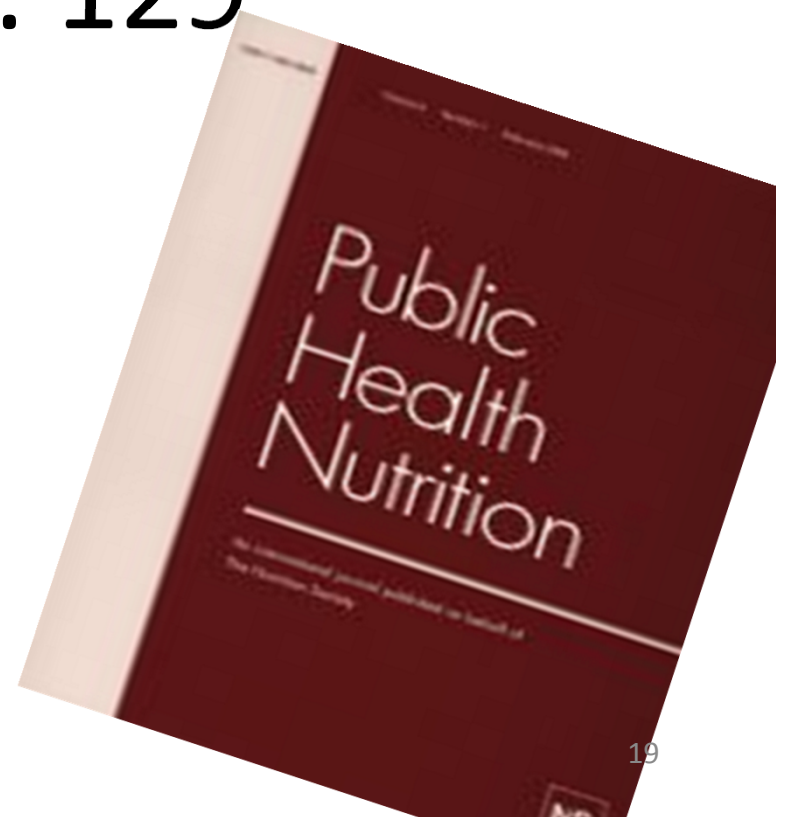
The location of food service in the hospital landscape



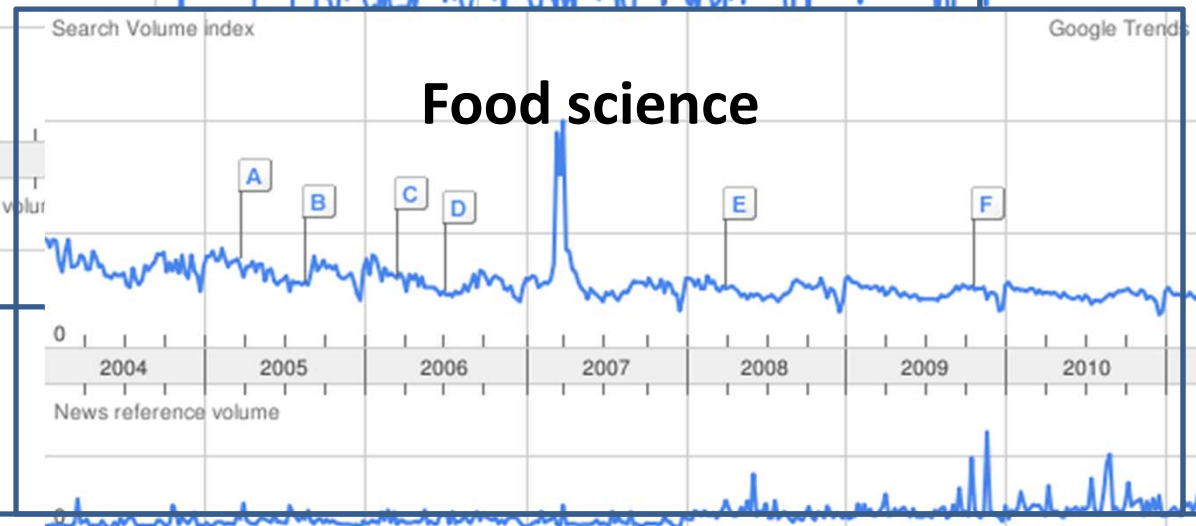
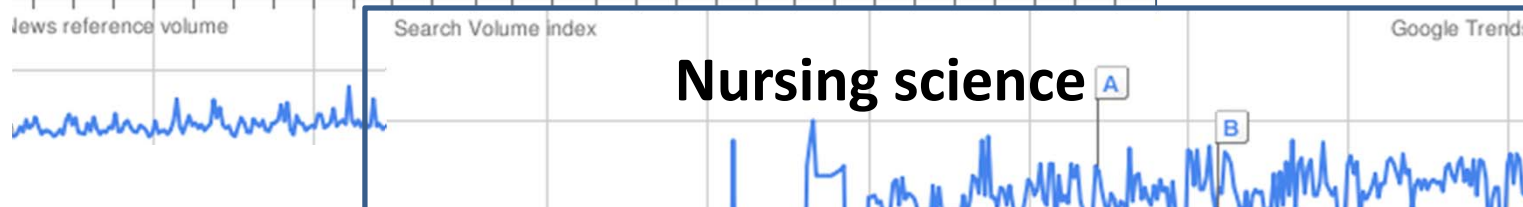
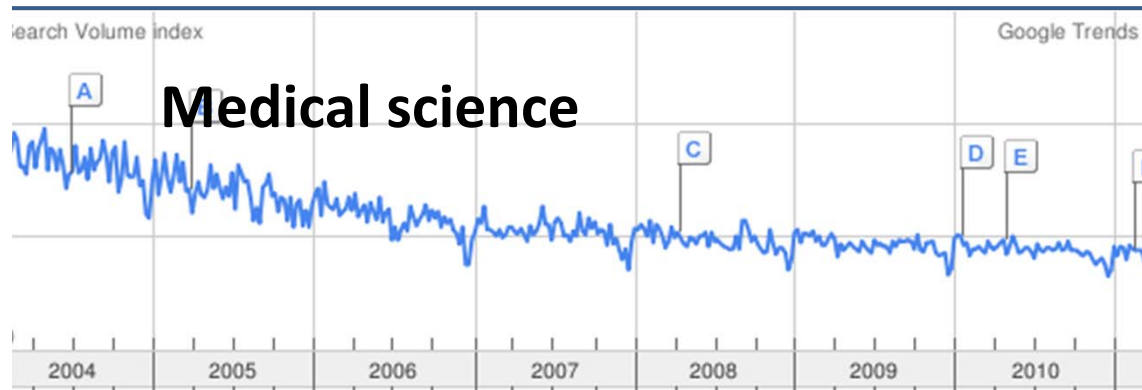
Scientific papers on catering

Case of Public Health Nutrition 2000-2011

- Before 2007: 0
- From 2007 and on: 129



Is foodservice a science?



Your terms - **catering science** - do not have enough search volume to show graphs.
Your terms - **foodservice science** - do not have enough search volume to show graphs

Creating the idea of a local hospital foodscape



Agrowise



SØVIND MEJERI



In conclusion

- Huge potential savings in waste reduction
- Need for environmental focused food science
- Focus on "metaproduct" features
- Need for holistic benchmarking
- Intelligent ICT
- Role of story telling experience economy
- Strengthening evidence driven innovation in food service

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Thanks for your attention

**Thanks to my co authors
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