Social and health impact of innovation in Traditional Food Products

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Possibilities for success and sustainability

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DATA AND CONCLUSIONS COMING FROM WP7 ACTIVITIES

Social component

-Identification of patterns of individual and collective innovation processes in TF industry *(territorial)*.

-Identification of critical control points for environmental pollution in existing TF production and processing *(environmental)*.

-Analysis of the practical handling of innovations in TFPs and their impacts in SMEs *(economic)*.

Health component

-Evaluation of the effects of specific nutrient composition changes in TFPs on physiological parameters relevant for human health.

TERRITORIAL HERITAGE

Typical products belonging to different agro-food chains were studied (Corsican Clementine, Corsican pork meat, Corsican Brocciu, Tuscany pork meat and Savoyard Cheese) considering the aspects linked to origin area, product qualification, cost and marketing.

TFP Innovation = How to re-invent tradition?

- **Tradition = interpretation of past from nowadays**
- Continuous process
- Innovate = modify the previous interpretations according to the evolution of society / re-invent tradition
- **Risks** to be denatured and deconstructed, loosing the original nature of the product.

Innovation = impact on competitiveness

- **Evaluation of market pattern changes**
- The global market expressed overall "**expectations**" and not only individual preferences
- Example : salt reduction for Prosciutto Toscano is a positive modification (e.g. Public health) but creating an impossible competition with Parma ham.

ENVIRONMENTAL IMPACT

1. **Food products** selection:
   - TFP 1: CHEESE from raw milk (WP2A, WP2B, WP4) – hard cooked cheese,
   - TFP 2: dry-cured HAM (WP2A, WP2B, WP4),
   - TFP 3: BEER (WP2B),
   - TFP 4: CAULIFLOWER (WP4).

2. **Conceptual models** of TFP production lines were conceptualised (in conjunction with WP2A, WP2B and WP4 and industrial and academic field experts).

3. The **emission inventory** was prepared (based on raw production data provided from WP2A, WP2B and WP4 and public databases s.a. MITERRA-EUROPE, EUSOILS, ...).

4. The **potential contribution** of the separate production steps to the individual environmental impact categories was modeled:
   - using nutrition input-output tables, IPCC and EMEP guidelines and available LCA data (ELCD, GEMIS, ProBas, Plastics Europe, ...,
   - the data was assigned to locations, when possible or relevant, yet the approach enables the generalization/exclusion/modification of the regional values.

CONCEPTUAL RESULTS FOR CHEESE

Environmental impacts successfully assessed in following innovative production steps (quality of data appropriate for assessment**):**

- ✓ ripening room ventilation;
  ↓environmetnal impact (EI) due to reduction of electricity consumption
- ✓ vegetable oil supplementation
  ↑of resources & ↓global warming potential of oil supplementation
- ✓ once daily milking
  per day: ↓EI for low milk yield heard
  per kg of milk: ↓EI for higher milk yield! heard
- ✓ addition of potassium lactate
  no fundamental change of EI
- ✓ fertility management
  organic fertilizer ↑eutrophication, acidification & ↓global warming potential
- ✓ packaging
  ↑EI due to implementation of packaging (traditionally unpacked)

Important result: individual array of calculation procedures paired for each of these production steps observed. Application for construction of national EI inventory guidelines.

MICRO-ECONOMIC IMPACT

Objective: To analyze the practical handling of innovations in TFPs and their economic impacts in SMEs

Company survey: Survey of food industry companies in Germany, Italy, UK and Poland in 2007 and 2008. Additional survey of food industry companies in Austria in 2009.

Methodology:

-Written survey with standardized questionnaire

-Statistical analysis with SPSS

-Sampling:

Country	Number of contacted companies	Number of returned questionnaires (rate in %)	Share of SME (%)
Germany	2,469	226 (9.2 %)	71.0 %
Italy	2,870	100 (3.5 %)	94.0 %
UK	2,603	25 (1.0 %)	72.0 %
Poland	1,127	6 (0.5 %)	100.0 %
Austria	3,375	33 (1.0 %)	93.9 %

METHODOLOGY: CASE STUDIES

Interview of food industry companies in Germany and Italy in 2008 and 2009.

Additional interviews of food industry companies in the UK in 2009.

Methodology

-Guideline-based telephone interviews

-Mainly qualitative analysis

-Sampling:

Country	Industry branch	Number of interviews
Germany	Dairy Beverages Fruit and vegetables Meat	3 2 4 1
Italy	Dairy Fruit and vegetables	1 3
UK	Dairy Beverages Fruit and vegetables Meat	1 2 1 2

MAIN RESULTS AND CONCLUSIONS

- Survey/interviews support many of the success factors identified in literature

- Relevant success factors in the fields of „product “and „marketing “ are already implemented in many companies

- Room for improvement particularly exists in the fields of „staff“ and „market research“ (with realization clearly higher probability of success for companies)

HEALTH IMPACT

Methodology: **Randomised clinical case-control trials.**

Indicators: **Physiological parameters, selected as biomarkers of risk for chronic degenerative diseases.**

Physiological Actions	*Food*	*Properties*	*Outcome indicators*
Functionality	***Dairy product***	**Low saturated fat vs control**	**-Plasma lipid profile -Plasma antioxidant levels**
Bioavailability	***Strawberry***	**Fresh vs Stored**	**-Plasma antioxidant levels**
Biochemical action	***Beer***	**Alcoholic vs non alcoholic**	**-Plasma antioxidant levels**
Metabolic action	***Strawberry Jam***	**Sweetened with fructose vs control**	**-Blood glucose and insulin**

FUNCTIONALITY TRIAL

Aim: To investigate the modifications on blood profile of selected healthy normolipidemic volunteers following the ingestion of modified/unmodified (low SFAs/control) dairy product.

No significant changes were observed except for myristic acid (C14:0) that increased significantly in control cheese consumers.

Consumption of cheese with reduced SFAs can limit the increased blood concentration of atherogenic fatty acids.

	Control cheese consumers		Modified cheese consumers	
	Start of the study	End of the study	Start of the study	End of the study
SFAs				
C12:0 (%)	1.35±1.59	1.75±2.58	0.15±0.13	0.17±0.12
C14:0 (%)	0.85±0.36[a]	1.00±0.39[a]	0.69±0.24	0.76±0.30
C16:0 (%)	12.75±2.18	12.55±1.58	15.25±7.03	15.02±8.05
C18:0 (%)	5.54±1.79	5.99±1.95	4.69±2.45	5.91±4.23
MUFAs				
C16:1 (%)	1.69±0.66	1.56±0.51	1.72±0.71	1.71±0.74
C18:1 (%)	23.1±3.4	21.85±3.09	22.68±5.03	23.16±5.14
PUFAs				
C18:2 (%)	44.00±6.76	45.70±3.82	42.63±9.94	42.30±8.94
C20:4 (%)	10.71±2.84	9.60±2.31	9.93±2.69	10.05±2.17
SAT/INS	0.26±0.07	0.27±0.05	0.29±0.20	0.33±0.33

CONCLUSIONS: the extrapolation of this result in public health advice for promotion of modified cheese consumption should require further confirmation; however changing lipid profile of dairy products maintaining as much as possibly their characteristics could be an area of interest in term of potential functionality of these foods.

BIOAVAILABILITY TRIAL

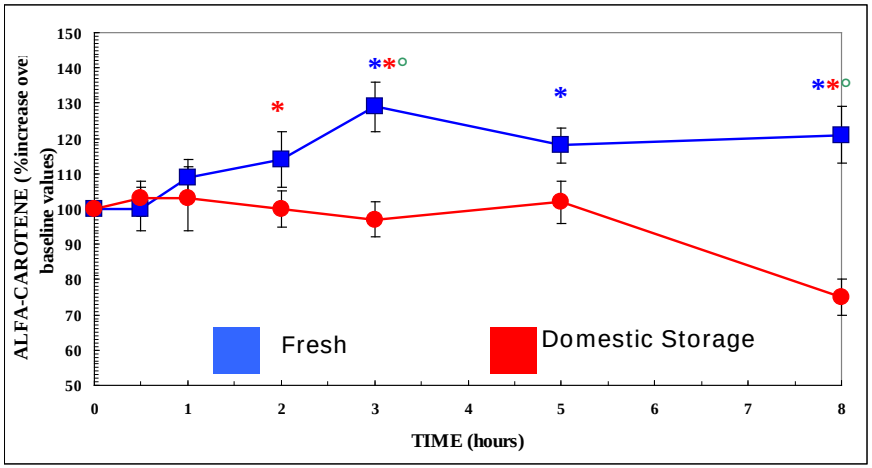
Aim: To examine the effect on humans of acute consumption of fresh and stored strawberries (home refrigeration at +4° C for 4 days), detecting plasma antioxidant levels and total antioxidant capacity as indicators of chronic disease risks.

Results

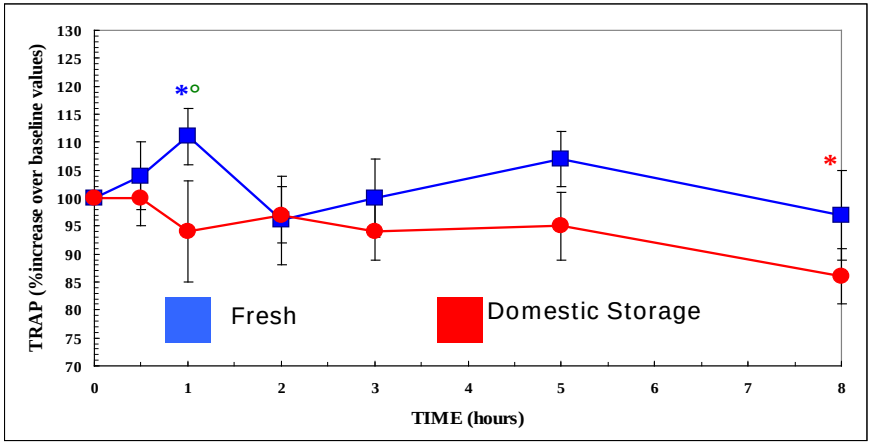
- Domestic storage affected the bioavailability of antioxidant, e.g. a-carotene, resulting lower in stored than in fresh strawberry.

-Total antioxidant capacity increases after consumption of fresh food.

Plasma α-carotene levels



TRAP (measure of TAC)



CONCLUSIONS: domestic storage affects food nutritional value in term of determinants of the global quality of strawberry. To be further evaluate alternative storage methods (e.g. modified atmosphere) able to preserve native nutritional value of perishable foods.

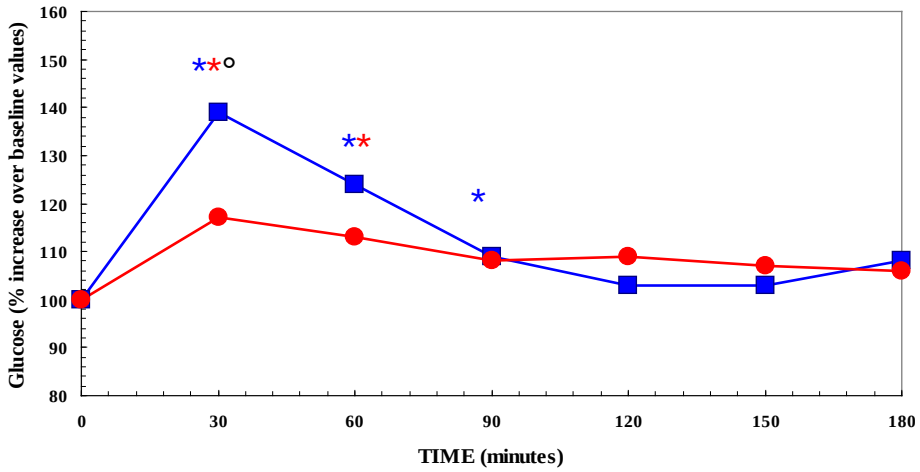
METABOLIC ACTION TRIAL

Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione

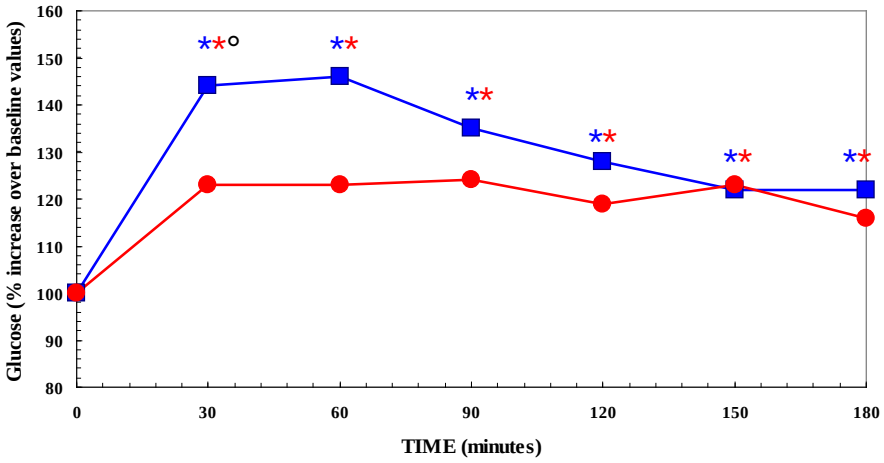
Aim: To evaluate the impact of innovations of processed fruit (strawberry jam) on the glucose levels in non-complicated obese and type II diabetic obese volunteers eating 50 g of low sugar strawberry jam. Strawberry jam containing standard quantity of sugar is used as control.

Results: Glucose absorption curves and peaks were significantly lower after the ingestion of the sweetened strawberry jam in both types of volunteers. Insulin resistance of diabetic patients resulted in higher glucose uptake in this group administrated with low sugar jam.

Glucose absorption curve (mean±sd) in non-complicated volunteers (■ control; ● low sugar



Glucose absorption curve (mean±sd) in diabetic volunteers (■ control; ● low sugar jam)

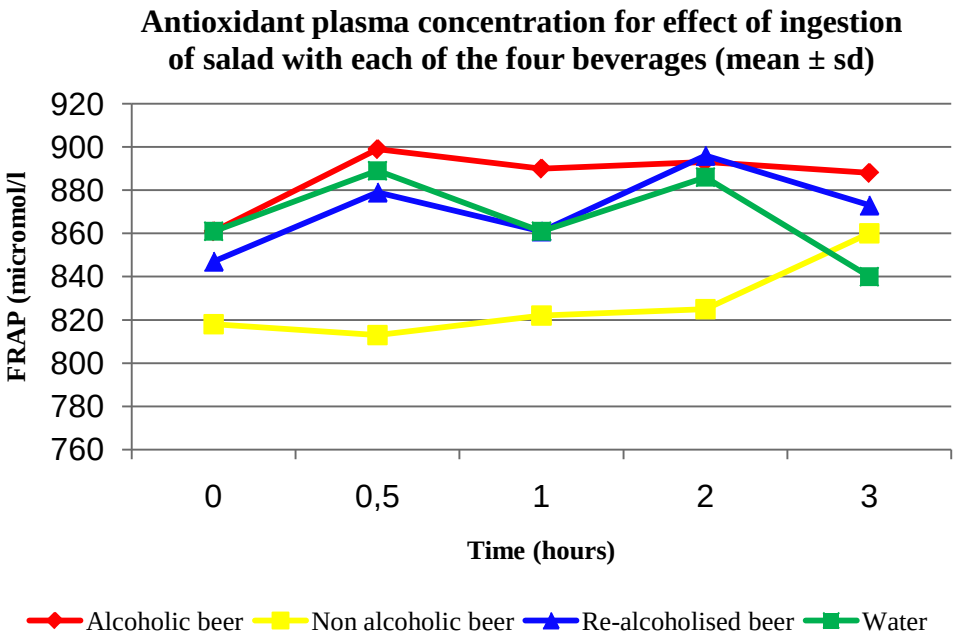


CONCLUSIONS: improving traditional processes to obtain modified products could be a strategy to enhance the quality of life of diabetics helping them with a better compliance to a dietary regimen including highly accepted food.

BIOCHEMICAL ACTION TRIAL

Aim: to examine the effect on humans of concomitant consumption of an alcoholic beer or a dealcoholized beer and fresh salad. Plasma antioxidant levels and total antioxidant capacity in humans will be studied as dietary indicators of chronic disease risk.

Results: The administration of salad in combination with beer is not able to produce an additional effect on antioxidant uptake in comparison with the combination of salad with water (red vs green line). However alcohol is significant a promoter of antioxidant uptake (red vs yellow line). Re-alcoholisation of beer did not have a specific effect on plasma antioxidant (blu vs red and green lines)



CONCLUSIONS: Water has the same effect on plasma antioxidant than beer that did not potentiate the effect of high protective meal ingestion. This result, further confirmed with largest studies should be taken into account considering the public health impact of alcohol consumption.

CONCLUSIVE OVERALL REMARKS

Social component:

The need of combination of protection of territorial heritage and innovation could be at risk of product distortion of the traditional nature of the product; this risk should be minimised.

Modification of traditional product, e.g. Cheese, change its environmental impact profile with some aspect having a higher EI and some procedure reducing their EI; evaluation case by case.

SMEs already developed the valorisation of traditional product and the capacity of marketing; to be improved their capacity in term of research of new market approaches.

Health component:

Difficult to provide an univocal conclusions on the basis of WP7 nutritional trials results. Modifications could have provide an impact on health, e.g. potential functionality of modified cheese, however this results should be further demonstrated with large scale studies.

The most important finding coming from the trials is that more than addition of single nutrient it could be important to have production line protecting the nutrient value of fresh food or able to modify the nutritional profile of row material.

Thanks for your attention!