

Better health through Scottish produce



Derek Stewart

Enhancing Crop Productivity and Utilization – JHI

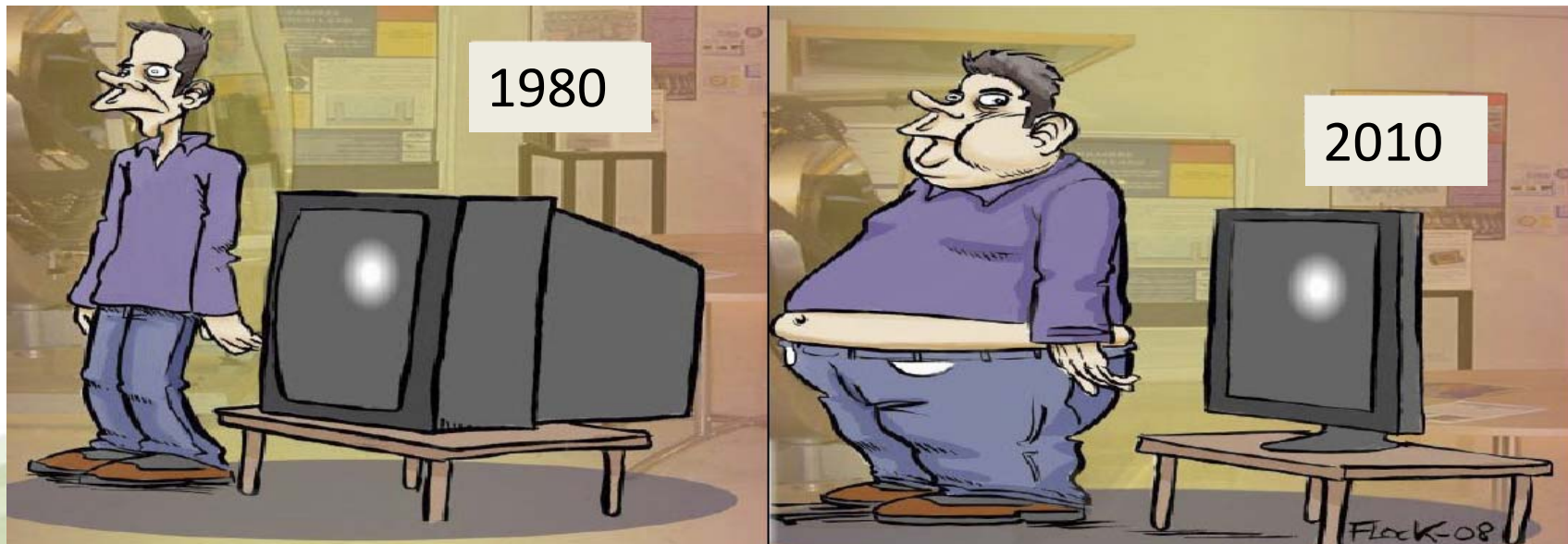
Chair of Food Chemistry – Heriot Watt University

The growing trend of obesity



The problem is not abating

- Mortality ↓ : Morbidity ↑
- Western population is living longer but is sicker.
- CVD, Diabetes, (some) cancers, neuro-degeneration and inflammation associated disorders



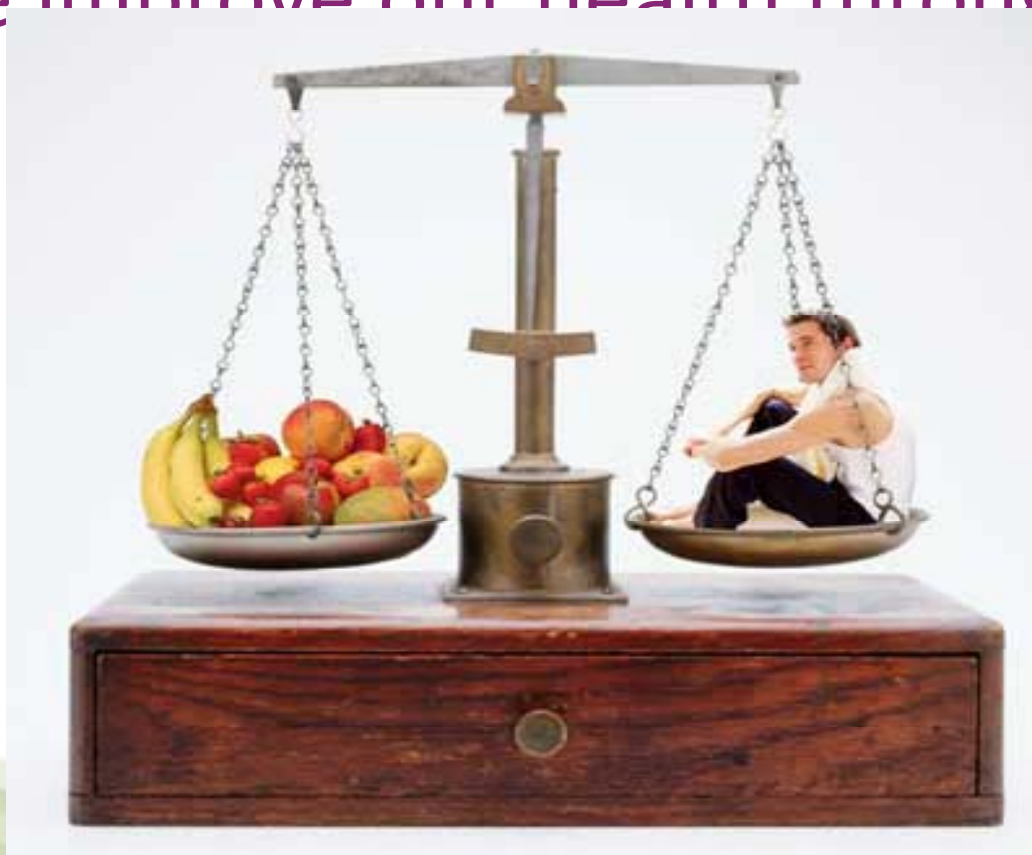
How do we improve our health through food?

1. Less of it!

2. Healthier.

3. Balance

4. All of the above (and work with the experts).

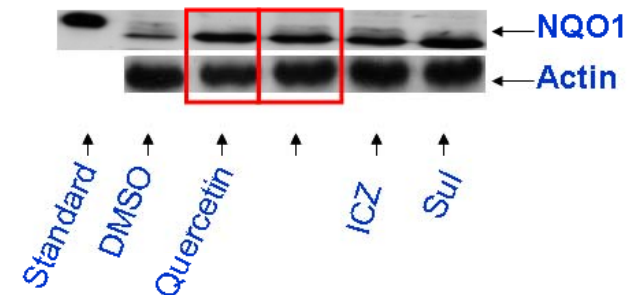


Beneficial Plant Products

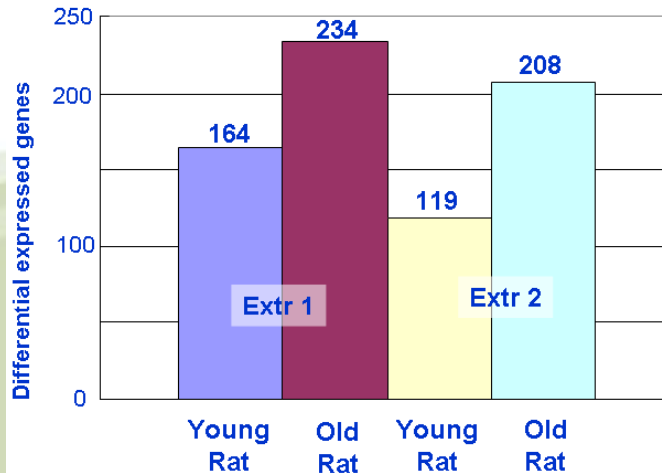
Bioactivity

- Impact of plant products on degenerative diseases (cancer atherosclerosis, neurodegeneration etc).
- Interaction of plant products with digestive processes.
- Interaction of plant products on gut microflora

Stimulation of liver NQO1 by fruit flavonols

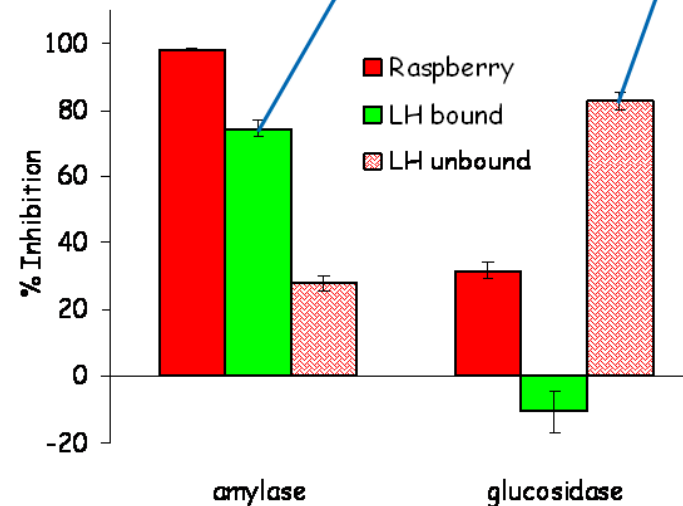


Age-related Rat Liver Gene Expression Following Blackcurrant Consumption



Anthocyanin-derived

Ellagitannin-derived



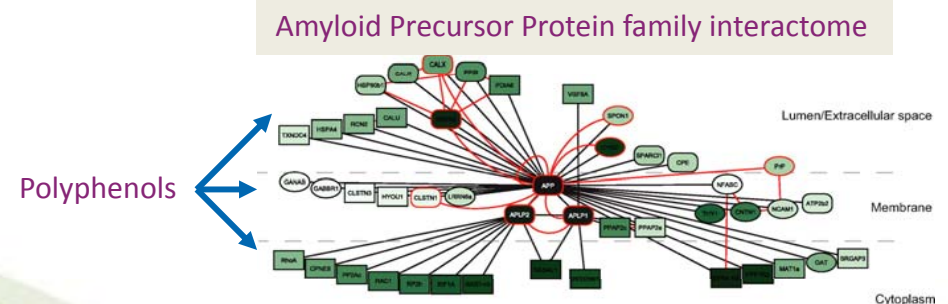
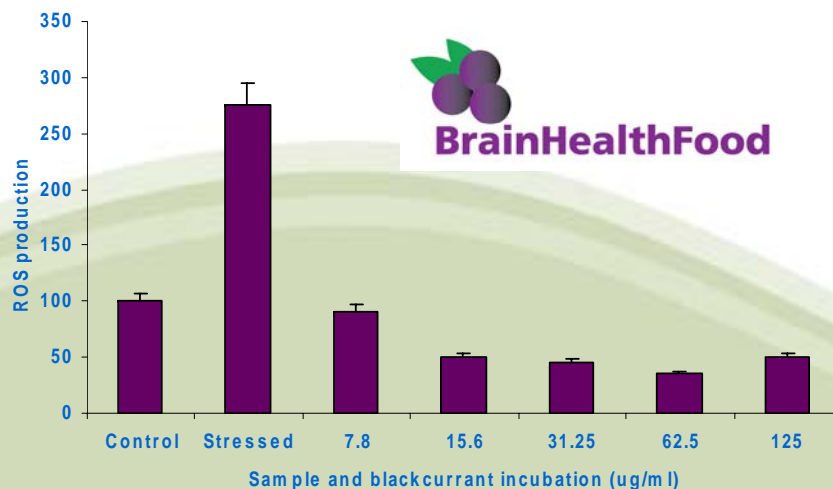
Plant Products

Functionality

- Development of a bioactive bread – Barleybread.
- Development of fruit waste as a functional aid for neuroprotection.
- Anti-obesity functionality from developed plant products and historical folk medicine.



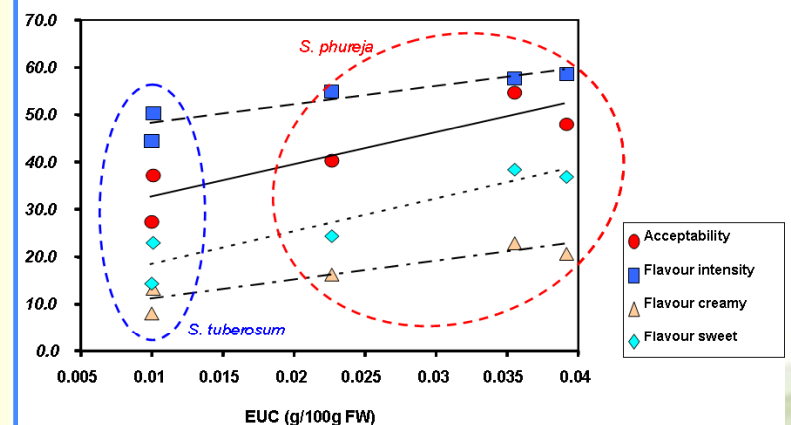
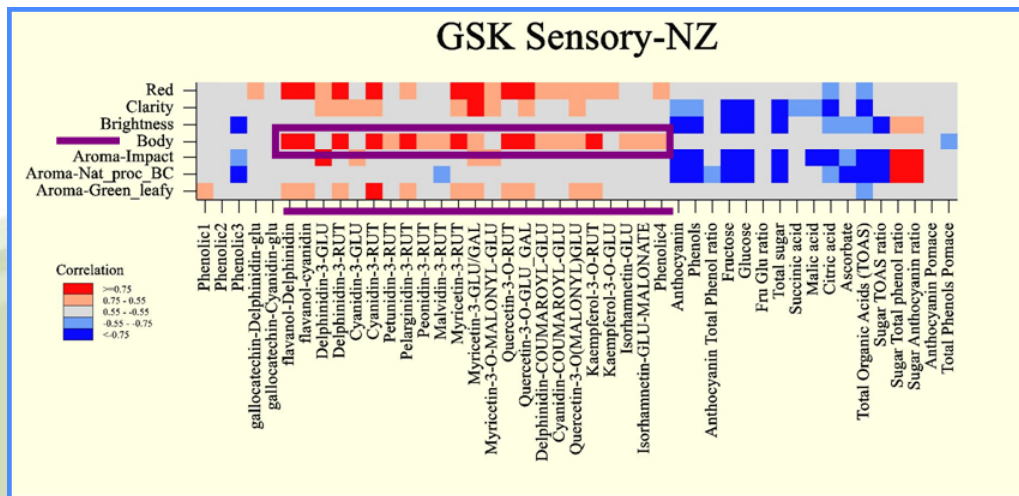
Neuroprotection via blackcurrant polyphenol pre-incubation



Food Quality

Main Research Areas

- The translation of raw material composition through to processed quality.
- Methods for the early prediction of quality in potato.
- Mechanisms of quality generation: taste/umami etc.
- Identification of key pathways/genes in organoleptic properties.

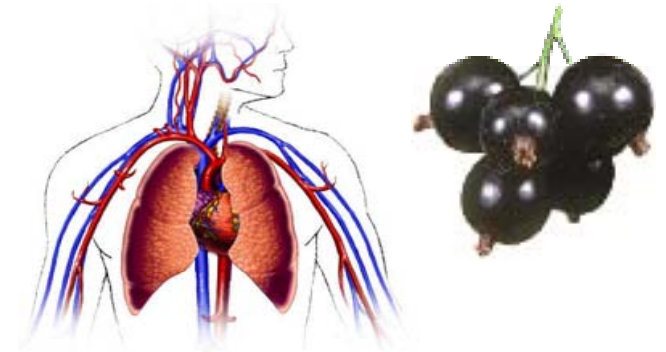


Case Study 1

Cardiovascular function and intake of soft fruit

Intervention trial – assess effects of six week ingestion of

- Blackcurrant berries with low vitamin C content
- Blackcurrant berries with high vitamin C content
- Blueberries (No vitamin C)
- Coloured flavoured water (control)



Effects on cardiovascular function

Assess Micro-circulation & macro-circulation, arterial stiffness, (SphygmoCor Pulsewave Analysis System) and carotid intima media thickness (Accuson Sequoia).

Relate to *In vivo* markers for endothelial cell function and oxidative stress. Assess bioavailability of fruit derived antioxidants.

- Blueberry group showed a modest reduction in carotid intima-media thickness
- Both blackcurrant groups showed reductions in isoprostanes.

Case Study 2



Bread → Health(ier) Bread

- Glucan has an approved health claim.
- Preference surveys were done to determine peoples likes and wants for bread.
- Optimised milling process to retain nutrients and β -glucan (~75%).
- A baking process was developed to give a bread with $\leq 60\%$ barley and $\leq 0.4\%$ salt.
- Blind preference testing in Scotland: SCRI (now JHI) Open day and Kingsway technical college (800 and 700 people respectively).
- Results showed a 80% preference for BarleyBread (25% barley).
- Being further developed.

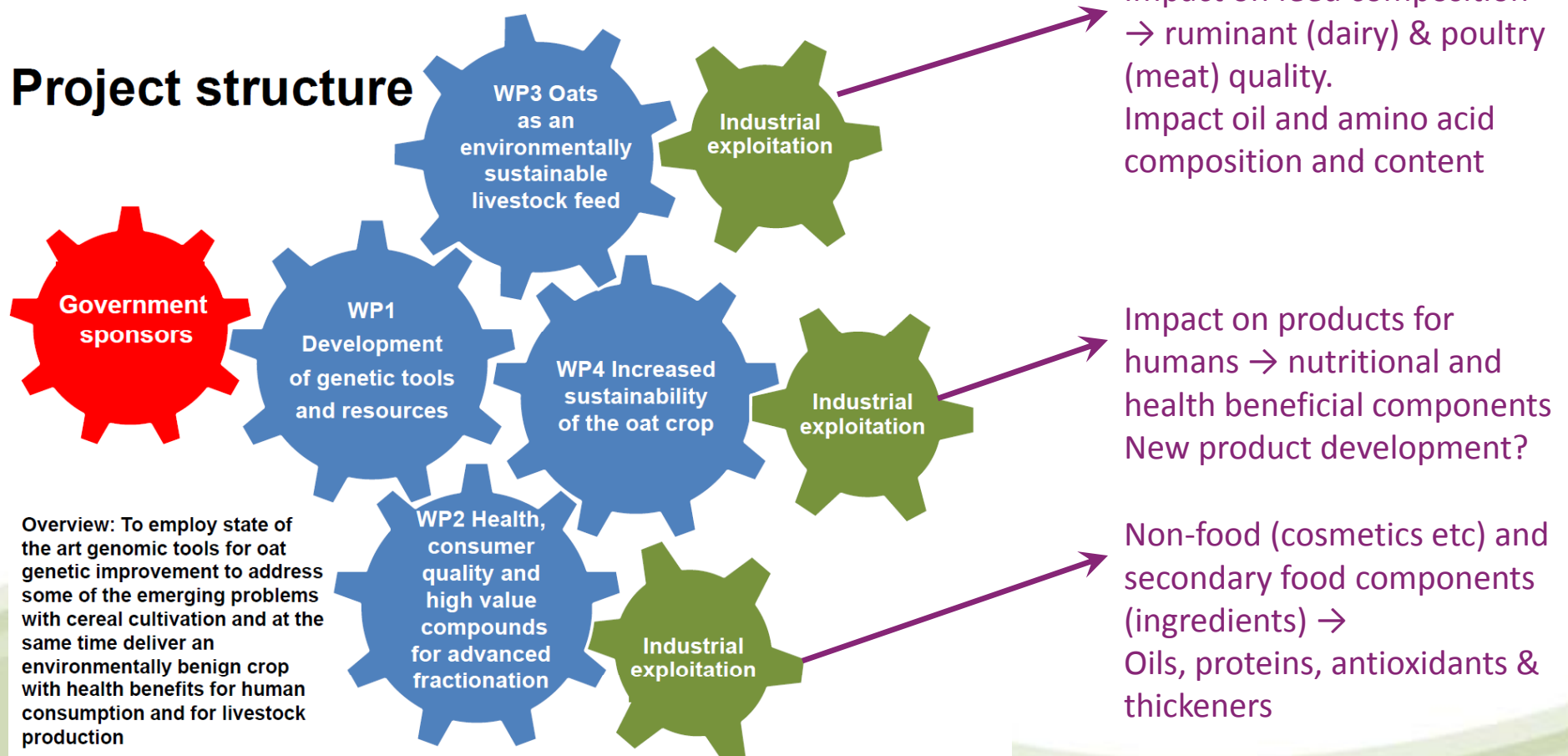




Case Study 3



Project structure



Food Quality and Health: Ongoing Areas

- Fruit and degenerative disease prevention: cancer, cvd, neurodegeneration.
- Maintenance of nutritive value through the food chain: planting-to-produce chain analysis of wheat, tomato potato etc.
- Development of functional food ingredient: high health Scottish rapeseed oil, broccoli, thickeners from leek etc.
- Crop-derived antibacterial compounds from crops for inclusion in processed foods.
- Fat replacement by modified proteins and polysaccharides: maintain mouth feel but reduced saturated fat content.
- Reduction of acrylamide in food derived from the high temperature processing of potato (and wheat).



Develonutri
CROP-BASED NUTRITION

Thanks to

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Commercialisation and Outreach

