Innovatie in gezonde voeding:

“Elk voordeel heb z'n nadeel”

“Innovation in Healthy Nutrition: Every Advantage Has a Disadvantage”

Fred Brouns

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2008... Call from University Board

**Wish to develop new Study Programs in
Bio-business and Innovation?**

Are you interested?

A global producer and marketer of food, agricultural, financial and industrial products and services.

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Go/noGo?

Why would I do that?

What is the advantage

"Elk voordeel heb z'n nadeel"

"Every dvantage has a disadvantage"

Johan Crujff

INTL. SPORTS MEDICINE CONGRESS ON SOCCER. 12-13 Sept. 1986. AFC 'AJAX'

A steak prior to the match gives you
extra power!
Added value?

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In 1983 left Wander Dietetics to start my PhD studies at RUL

- **Critic:** sport drinks supply “empty calories”, thus lead to reduced vitamin intakes in athletes
- **Solution:** add vitamins to sports drink in relation to energy density of the daily diet
- **Dutch Food Law:** Adding vitamins to a sports drink poses a public health risk and is forbidden
- **In Germany drinks with added vitamins were considered safe and legal.....**

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1983 International Court Luxemburg. Case Sandoz Nutrition vs. Dutch Government.

- Case support document "Vitamins and Sport" in laymen language for the lawyers
- Cassis de Dijon decision: goods lawfully produced in one Member State of the European Union (EU) can also be sold in any other EU state"

"Judges do not understand biomedical experts" Prof van Koppen- President European Association of Psychology and Law

- for taking appropriate decisions in many cases, judges are more and more dependent on seeking advice from external experts.
- Judges are lawyers that do not know about the biomedical aspects of the suspect, the DNA traces, etc.
- After the expert has given his advice, a paradoxical situation occurs: the judge has to trust the information and decide whether or not he is going to use that for his evidence review and final ruling.
- Such a judgement, however, is only possible if the judge has knowledge about the working field of the expert.....**BUT, he does not have that!**
- good scientific opinions may be ignored because they are not well understood (**better no decision than a wrong one...**)
- Wrong decisions may be taken based on not knowing the backgrounds of the facts....
The lady went to prison but was not guilty.....!
- This paradoxal situation seems not unsolvable!
- analogy: sales managers ↔ nutrition scientists. How to make that happen?

2008... back to University?

- >25 years in food and beverage R&D
- enriched >200 expert meetings and a long list of communications and publications
- I have a deep passion to connect people and bridge gaps in knowledge

YES

~~Bio-business and Innovation~~

MSc. Health Food Innovation Management

.. complex matter in a "simple context"

Engaged Teachers ↔ Engaged students

- Teaching is not about filling empty spots in knowledge.
- *Onderwijs gaat niet om het vullen van gaten in kennis.*
- It is more about starting a fire inside to feed the eagerness to learn more
- *Het gaat vooral om het ontsteken van een innerlijk vuurtje dat de gretigheid om meer te leren voedt*

Let's put that in perspective

Simpel is moeilijk
"Simple is difficult"

During a life time

- You eat and drink > 50.000 hours
- You consume > 55.000.000 Kcal = 13.750 KG sugar
- You drink > 65.000 liters of fluid
- You produce a fecal weight equivalent to the weight of several big elephants

Yet, what do we know about our food, nutrition and consumption behavior?

Maastricht University *Leading in Learning!*

2010 Freedom to communicate and sell

Below the image of the bottles, the text reads:

“Moving Science”
“Moving Law”
“Moving Consumer Interests”

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Coca Cola was originally marketed as a tonic containing cocaine and being a cure for headaches and other illnesses

A vintage Coca-Cola advertisement. At the top left is a portrait of a man, identified as Eddie Collins. To the right of the portrait is a glass bottle of Coca-Cola. The background is a light yellow with various text elements. A large, stylized 'Coca-Cola' logo is in the center. Above it, the text reads 'Whenver You're Hot, Tired or Thirsty play or weather hot---brain tired or cary---parched dry or just plain thirsty Think of and Drink'. Below the logo, there is more text: 'lightfully cooling and refreshing---relieves of body, brain and nerves---quenches the---not just wet and sweet, but vigorously sifying. Delicious---Refreshing---Wholesome 5c Everywhere'. At the bottom, it says 'THE COCA-COLA CO. ATLANTA, GA.' and 'THE TRUTH About Coca-Cola'.

Ovaltine/Ovomaltine: a health drink *Malt, Barley, Egg, Milk and Cocoa*

1923 Wander starts sports Sponsoring.

Today: a chocolate flavored drink

1900: DROSTE cocoa shows a nurse on the box of cacao powder

- Suggesting the health/healing power of the chocolate milk.

"Health" has always been selling.
Yet, not everything is healthy.

- Can we improve foods to create added value
- Can we prove the benefits

What is innovation ?

- Innovate (latin “**innovare**”), to renew or change, containing **in** → “into” + **novus** → “new”

- The central meaning of innovation relates to renewal or improvement, with novelty being a consequence of this improvement.

<http://en.wikipedia.org/wiki/Innovation>

Amabile & Conti, et al. 1996

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Renewal or Improvement

“The voyage of discovery is not seeking
new landscapes **but having new eyes**”

Marcel Proust

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Arrows formula 1 racing team

Spent 80.000 pounds to reduce the weight of the front wing by 150 grams without compromising strength

..... the bodyweight of the driver? Can we.....

What is innovation ?

- Innovation is the **successful implementation** of **creative ideas** within an **organization**.
- "Innovation is a **management process** that requires specific tools, rules, and discipline."

What is innovation ?

- Innovation is the **successful** implementation of creative ideas within an organization.
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Added Value

Amabile & Conti, et al. 1996

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Innovation process developments

- 1st gen: heavy funding of **R&D**
- 2nd gen: **R&D + marketing**
- 3rd gen: + **consumer insights**
- 4th gen: 'deeper' **business processes**.
- 5th gen: **Align with new technologies** and start **open innovation** to obtain "Fresh Blood" from outside

Less time → less costs → value

www.adl.com/reports.html?view=77

Creating business value through innovation

Arthur D. Little et al. 2011

Too often there is a lack of clarity on:

- what **value creation** innovation is intended to generate:
 - Top line growth → revenues
 - Shareholder value → company value
 - Bottom line optimization → profit
- **organizational and behavioral barriers** to collaboration and cross disciplinary working

www.adl.com/reports.html?view=77

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Complex interrelationships

Understanding the key elements of innovation and their interrelationships is a must to appreciate for our students.

"De waarheid is nooit precies zoals je denkt dat hij zou zijn."

"The truth is never exactly as you thought it would be"

The truth and the confused consumer

Foods With Benefits, or So They Say

The New York Times

May 14, 2011

- Are all these products really healthy, or are some of them just hyped? The answer to that question matters to millions of Americans who are wagering their money and their waistlines on hot new products in the grocery aisles called "functional foods."
- Food companies market functional foods with health-promoting or wellness-maintaining properties. Such claims are perfectly legal, **provided that they are backed up by some credible science.**

<http://www.nytimes.com/2011/05/15/business/15food.html?pagewanted=1&r=1&hp>

Consumers took Danone to court in USA

- Danone has marketed [Activia and DanActive](#) yogurt products as "clinically" and "scientifically" proven to regulate digestion and boost immune systems.
- Wiener, who suffers from stomach problems, told ABC News, "I saw the ad on TV, and I went to the market specifically to buy it"... "And there was absolutely no change whatsoever in my digestive system."
- "The judge agreed that the marketers were making claims they simply hadn't proven". → \$45 million settlement

Confused consumers

- Understanding the sources of consumer confusion is essential for the establishment of effective communication strategies that tell the simple truth.
- Misleading claims may cost more than the product development itself

Confusing scientific news

Do .. Scientists overturn accepted theory of disease? 26/02/2004

- ..thinking that oxygen free radicals are responsible for the development of numerous diseases may be a red herring, says a team of UK scientists.
- Millions were "misspent by the pharmaceutical industry in chasing the red herring of the involvement of oxygen free radicals in the causation of many diseases".
- "Many patients might be using expensive antioxidant drugs based upon completely invalid theories as to their therapeutic potential,"

Food antioxidants ?

Segal, Nature (vol 427, no 6977, p853)

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Folic acid controversy

Folium zuur controverse

- FA was "the first functional food ingredient that effectively was shown to reduce a disease risk (spina bifida)"

- But, FA may induce positive or negative effects depending on FA status, tissue type and timing

Smith D. et al Am J clin nutr 2008; 87, 517-533

Folic acid controversy

What to do?

Kim YI. J Nutr. 2003;133:3731S–3739S, Stolzenberg et al. Am J Clin Nutr. 2006; 83:895–904.

Satiation power
Protein > Carbohydrate > Fat

Are you overweight? Eat more protein!

High-protein, reduced-carbohydrate weight-loss diets promote metabolite profiles likely to be detrimental to colonic health^{1–4}

Wendy R Russell, Silvia W Gratz, Sylvia H Duncan, Grietje Holtrop, Jennifer Ince, Lorraine Scobbie, Garry Duncan, Alexandra M Johnstone, Gerald E Lobley, R John Wallace, Garry G Duthie, and Harry J Flint

Am J Clin Nutr 2011;93:1062–72.

Down the hatch

SIR – Last week (February 25) *The Daily Telegraph* reported that even one small glass of wine greatly increased the risk of mouth cancer. This week (March 2) we read that a glass of wine reduces the risk of cancer of the oesophagus.

Pray tell us, how do we get the wine to the oesophagus, without first passing it through the mouth?

Rosie Rushton
Northampton

- Do you know the unintended consequences, the counter side of increase intakes & supplementation?
- What other biological processes can be influenced?
- Are you prepared for the unexpected?

**Consumers buy “on belief”
Marketing managers “buy and sell belief”**

**"Ik laat me betalen voor mijn Naam en Faam,
het liefst door onnozelen"**

"I am being paid for my Name and Fame, favorably by silly people"

Large company- big name, big sales, big beliefs...

- In B2B anything seems possible...
- “heavy air” can be sold
 - *beneficial* to the confused consumer
 - for a good profit
 - all within the law.....

Example Ribose Sugar

Ribose: a pentose sugar in adenine nucleotides

Energy rich phosphates = “super fuel” required for sprinting

Muscle fuel changes after one 30 sec treadmill sprint

Nevill et al J Appl Physiol 67 (6) 2376-2382 ;1989)

Adenine nucleotide metabolism in muscle

- Maximal sprint → Decrease in super fuel
- Post exercise → Reduced super fuel
- Recovery → "Refilling" is slow
→ May last > 3 days

Search for measures to improve recovery and repeated sprints

Synthesis of adenine nucleotides

Recovery in TAN-super fuel before and after lack of oxygen

Condition	Pre-test	24 hrs	% Recovery
Placebo (n=7)	5.06±0.18	2.58±0.26	51
Ribose (n=9)	4.67±0.30	4.46±0.33*	96 (*P,0.001)

12 mongrel dogs,
20 min global myocardial ischemia,
80 mmol/L ribose perfusion.

J St Cyr et al. Adv Exp Med Biol 194 ; 471-481, 1986

Testing in human cardiac patients

» Ribose improved mean ST time. Placebo no effect $p < 0.06$

- » not randomized, no cross over, statistics
- » plasma ribose was not measured
- » TAN metabolites were not measured
- » Oral intake of 135 g. needed to obtain a level of 80 mmol/L

The truth and the confused manager

W. Pliml et al, The Lancet Vol 340, 1992, 507-510

0.3 vs. 80 mmol/L

Op t Eijnde et al J Appl Physiol 91: 2275-2281, 2001.

Muscle power output

Yet, ribose business is blooming

Op t Eijnde et al J Appl Physiol 91: 2275-2281, 2001.

China Set to Lead L-Carnitine business

- L-carnitine is claimed to enhance lipid burning, sports performance and weight loss.
- The U.S. market, driven by issues of obesity and related diseases, is the largest market for L-carnitine products.
- Doubts are increasingly being raised by scientists and regulatory authorities regarding the false and hyped health benefits of L-carnitine and its derivatives.
- In certain cases, L-carnitine health claims were found misleading based on false advertisements and public misinformation
- Yet, it is a multi-million business

<http://www.naturalproductsinsider.com/news/2011/04/china-set-to-lead-l-carnitine-market.aspx>

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- Employee ethics ↔ company ethics
- Being able to separate good science from bad science and substantiated claims from quackery is a key-skill

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EFSA- Industrial health benefit claims evaluation

- ≈ 44.000 **article 13 health benefit dossiers** were submitted
- 40.000 rejected at first hand...!
- Compilation for review ≈ 4.000
Only a limited number have been approved

What went wrong?

- Academic choice of biomarkers and clinical endpoints
- Industrial interpretation of data?

Search for low-glycemic foods

Low glycemic carbohydrates: assessment flow

basic question

Does the new carbohydrate show a low blood glucose response?

NO → stop

YES ↓

Fully digestible?

NO → stop

YES ↓

Health Benefits?

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Isomaltulose

Isomaltulose occurs naturally in minor quantities in sugar cane and honey

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Glycemic/Insulinemic response

Glycemic Index (mean $\pm$ SEM) based on 3 studies, 32 persons

$$GI = 51.9 \pm 10.2$$

Insulinemic Index (mean $\pm$ SEM) based on 2 studies, 23 persons

$$II = 50.0 \pm 3.4$$

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Absorption in humans

8 Ileostomy patients
nearly complete absorption

UM-Nutriscience, R.J. Brummer, 2002

54

Slower absorption rate should result in a sign lower oxidation rate!

A. Jeukendrup et al 2005 Univ. of Birmingham, UK

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Isomaltulose is tooth friendly

Mühlmann - intra-oral plaque pH telemetry test. Zurich 2005

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Intellectual property: patent coverage

CER03-00005

- Isomaltulose containing comestibles for sustained carbohydrate energy release and reduced glycemic / insulinemic responses. WO 05/013720

CER03-0008

- Comestibles containing Isomaltulose and Trehalose for sustained carbohydrate energy release and reduced glycemic/insulinemic responses. WO 04/084655

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Isomaltulose as a healthy sugar substitute..

- Slowly digested and absorbed
- Low blood glucose and insulin response
- Tooth friendly
- Patents in place
- **Golden Award for Health Ingredient Innovation Frankfurt, 2007**

SUCCESS ?

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- Food law- labelling: it is a “sugar”
- **More expensive** than sugar

NO GO!

Understanding the business in its regulatory context and competitive price elements is a key issue for the creation of a profitable business

“Voetbal is een spel van fouten”
“Wie de minste fouten maakt wint”

“Soccer is a game of mistakes”
“The team making the least mistakes wins”

From Knowledge through Skills to Profit

Van kennis naar kunde en kassa

- Build knowledge
- Learn skills
- Do profitable business

An Integrated Academic-Industrial Learning Program to:

- acquire essential knowledge,
- to understand “how to play the game”
- master the skills to “play”
- learn how to make a profit.

Why Industry involvement?

A student cannot learn the “complexity of food innovation process” in a non-food business environment.

Why Industry involvement?

In a sales driven environment commercial priorities mostly outweigh technical & research priorities.

Success factors

- 1) A science climate that also has entrepreneurial focus and understanding
- 2) Elimination of organizational and behavioral barriers to collaboration and cross disciplinary working
- 3) Defining common interests and acting on them jointly, moving from “I did it my way” → we did it our “consensus way”

Managing innovation

- The best in class are those companies focused on the quality of their innovation management, in a way that reflects a clear understanding of:
 - Consumers
 - Market place
 - Technologies

Acquiring knowledge and success

- Take 100% personal responsibility for what you decide. (Jack Canfield, success principles)
- Believe nothing!
No matter where you read it or who said it, even if I said it, unless it agrees with your own reason and your own common sense (Buddha)

*Most failure in **business** is due to NOT understanding **it***

HIE Madrid Nov 2010

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- Olympic athletes and their medical teams
- Faculty Law, SBE, PNS, FHML, NIZO, TNO, HAS

Inaugureële rede

- Mother: field study to check anecdotal evidence
- Father: my first presentation in public

Kim, Ingmar, Gaya, Rubina,

- Waar ben je niet geweest?
- “Fred-luister club” .. altijd met 3 dingen tegelijk bezig...
- Ingmar 7 jaar: “ik heb gesproken”

Martina

PYTHAGORAS
Brons, 2010

**No mechanism known.
Yet observed.
Thus true!**

- Het menselijk hart begint al na 22-23 dagen te kloppen, als de foetus nog maar 2-3 mm groot is
- *The human fetal heart begins beating at about 22-23 days after conception when the fetus between 2 and 3 mm in size!*
- Wat initieert de allereerste slag?
- What initiates the very first beat?

Martina

- Wetenschappelijke waarnemingen zijn altijd “het verleden”
- *Scientific observations always are “the past”*
- Vormt “wetenschap” voor het innovatie proces niet “een verstandelijke beperking” ?
- *Is “science” an intellectual limitation for the process of innovation?*

Martina

- Zou “houden van” ooit significant kunnen worden?
- *Would “love” ever become significant?*

”Als ik zou willen dat je dit begreep, zou ik het wel beter uitleggen”.

Johan Cruyff

”If I wanted you to understand this I would have explained it better”

Mother Teresa

“Intense love does not measure, it just gives”.