

Change in milk Components according to feeding strategies



®

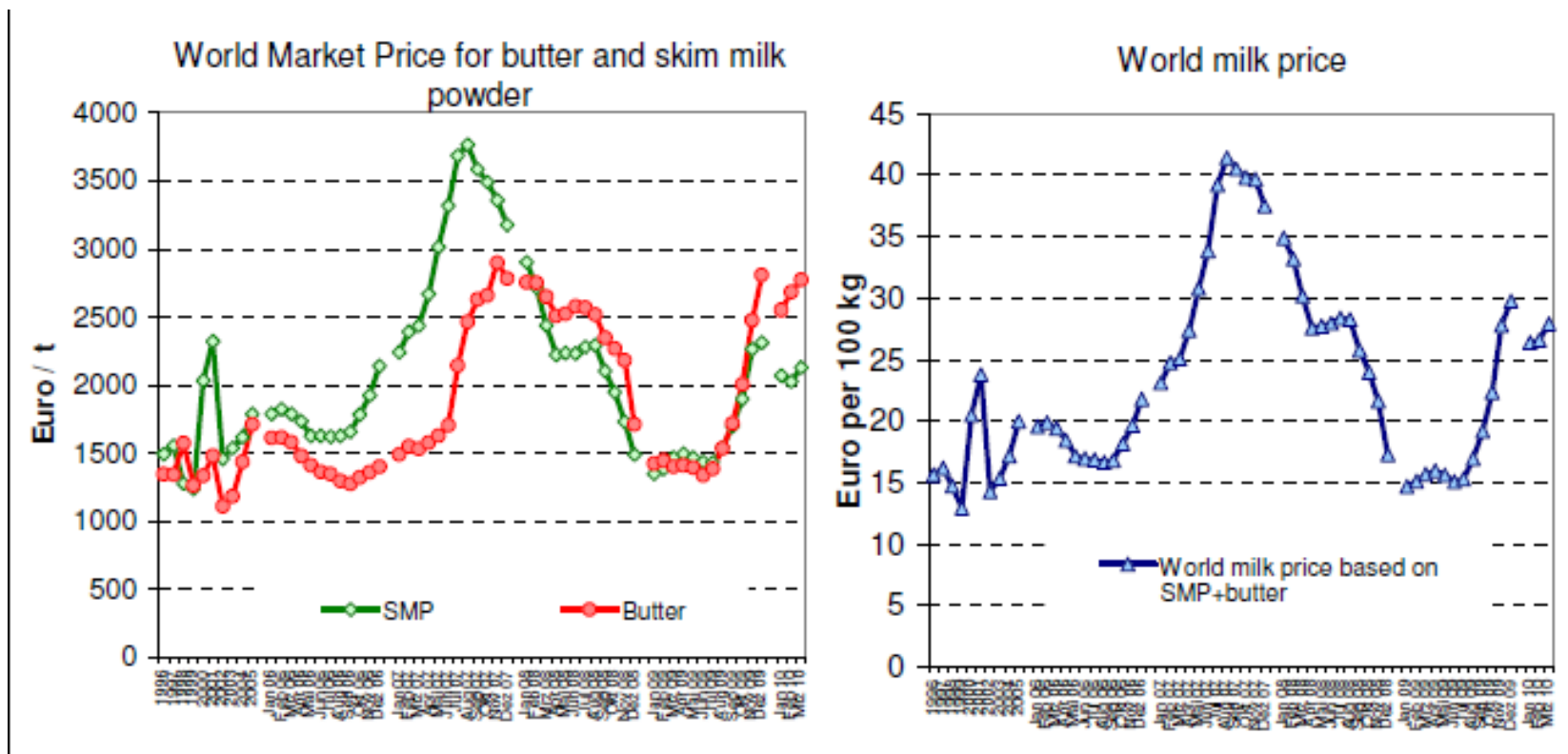
Marchio e logo Purina® utilizzati su licenza di Nestlé Purina® Pet Care Company

A challenge for the future of dairy producers in Europe

Gustavo Napoli
Marketing Director Cargill

Macro Trends

- Milk Price Volatility
- Feed Price Volatility



What is milk quality ?

- Fat % ?
- Protein % ?
- Somatic Cell Count ?
- No mycotoxins ?

**This is what the dairy industry pays for, but...
Is it strategic for the farmer's profits?**

How to increase dairy farm profit ?

- Protect against milk price volatility
- Obtain a higher milk price
- Reduce costs
- Increase farm efficiency

Obtain a higher milk price

- **Make your milk unique compared to other producers.**
- **Produce a milk that can be recognized as superior**
- **Sell to industry or sell direct to consumer ?**

Why Milk?

- Milk and honey are the only natural foods
- Milk has been “designed” for young mammals’ growth
- Milk contains 10.000 different substances most of them of high nutritional value for humans

Do you know that milk

- Can act in prevention and sometimes as a therapeutic substance against certain diseases in humans
- Nutrients in milk are active in:
 - Modulation metabolic and digestive process
 - Prevention of cancer and other degenerative diseases
 - Control of blood pressure and cholesterol



And also Milk has...

- Milk has a watersoluble and a lipid soluble phase
- A tremendous potential to become a vehicle of key nutrients for humans:
 - Prevention of diseases
 - Development
 - Carrier of therapeutic substances
 - Supply vitamins, minerals and other metabolic key nutrients





Milk naturally occurring substances and their action on human health

Milk protein components	Milk fat components	Other
Cancer		
Whey proteins Casein Lactoferrin α -Lactalbumin Peptides	Conjugated linoleic acid Vaccenic acid Sphingolipids Butyric acid 13-Methyltetradecanoic acid Other lipids	Calcium Lactose Vitamins A and D Oligosaccharides Nucleosides Probiotics
Cardiovascular Health		
Whey proteins Casein	Conjugated linoleic acid Oleic acid Omega-3 fatty acids	Calcium Vitamin D
Hypertension		
Whey proteins		Calcium Potassium
Immune Response		
Whey proteins Milk-fat-globule membrane proteins	Conjugated linoleic acid	Probiotics
Bone Health		
Peptides	Conjugated linoleic acid	Calcium Phosphorus Vitamin K

Consumers began to know it!

- Increased demand of probiotics and yoghurts vs. raw milk
- Consumer's look for:
 - milk chain control,
 - absence of harmful substances and bacteria
 - good taste

Probiotic Yoghurt: *Global Volume Sales 2003-2015*

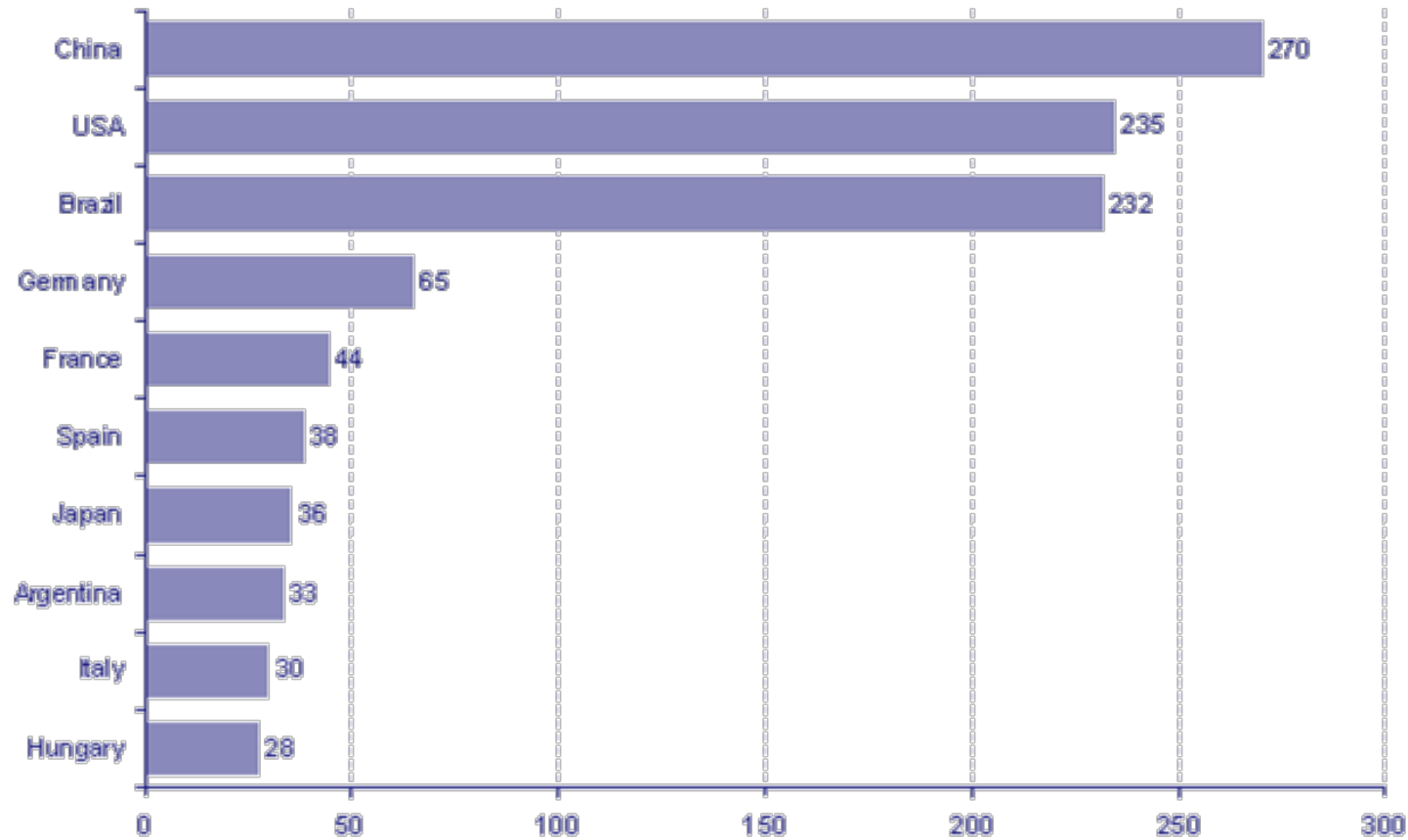
'000 tonnes



Source: Euromonitor International

Probiotic Yoghurt: *High Growth Market 2007-2013*

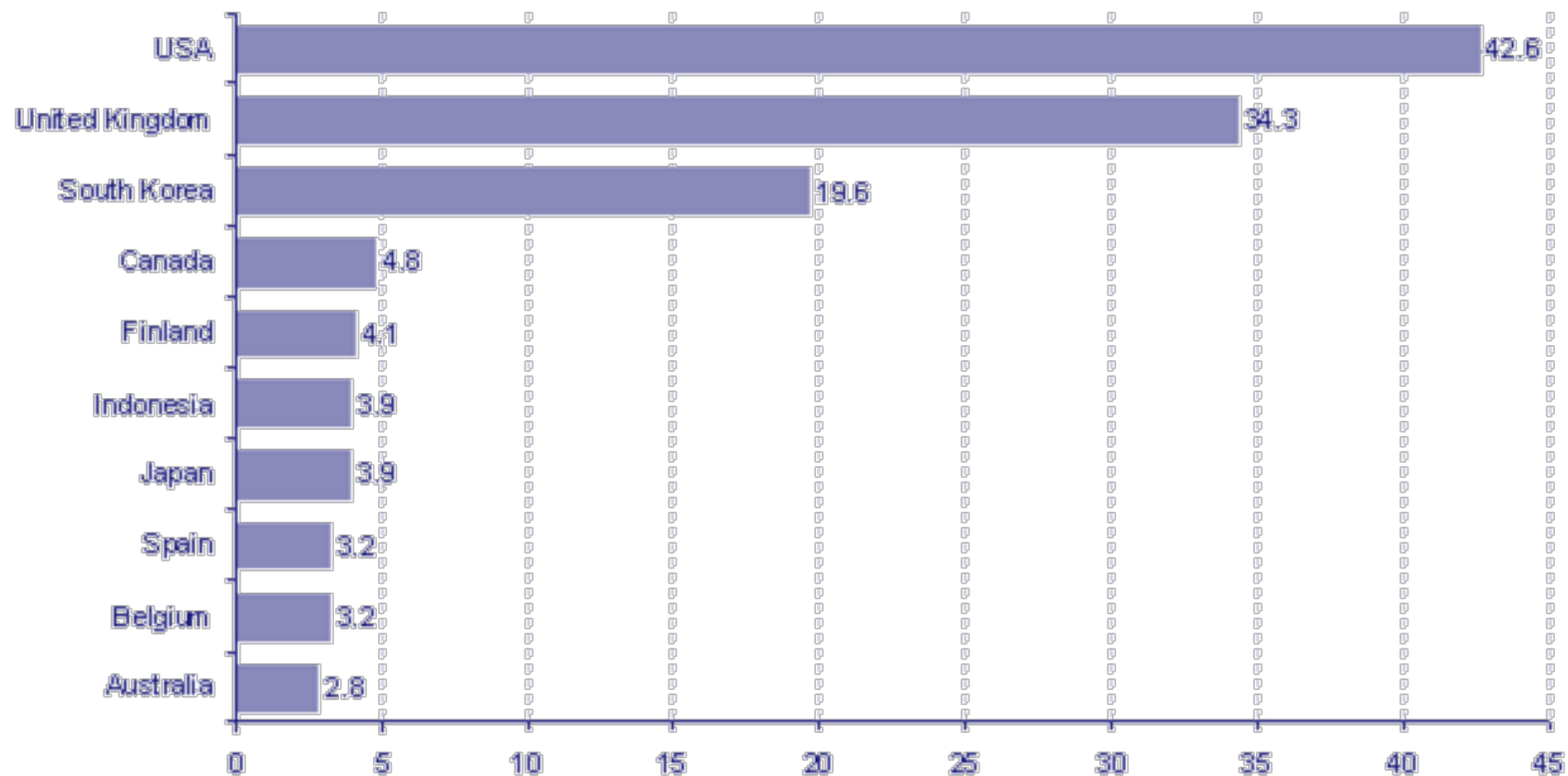
Absolute volume growth 2008-2013, '000 tonnes



Source: Euromonitor International

Fortified/Functional Cheese: *High Growth Market 2007-2013*

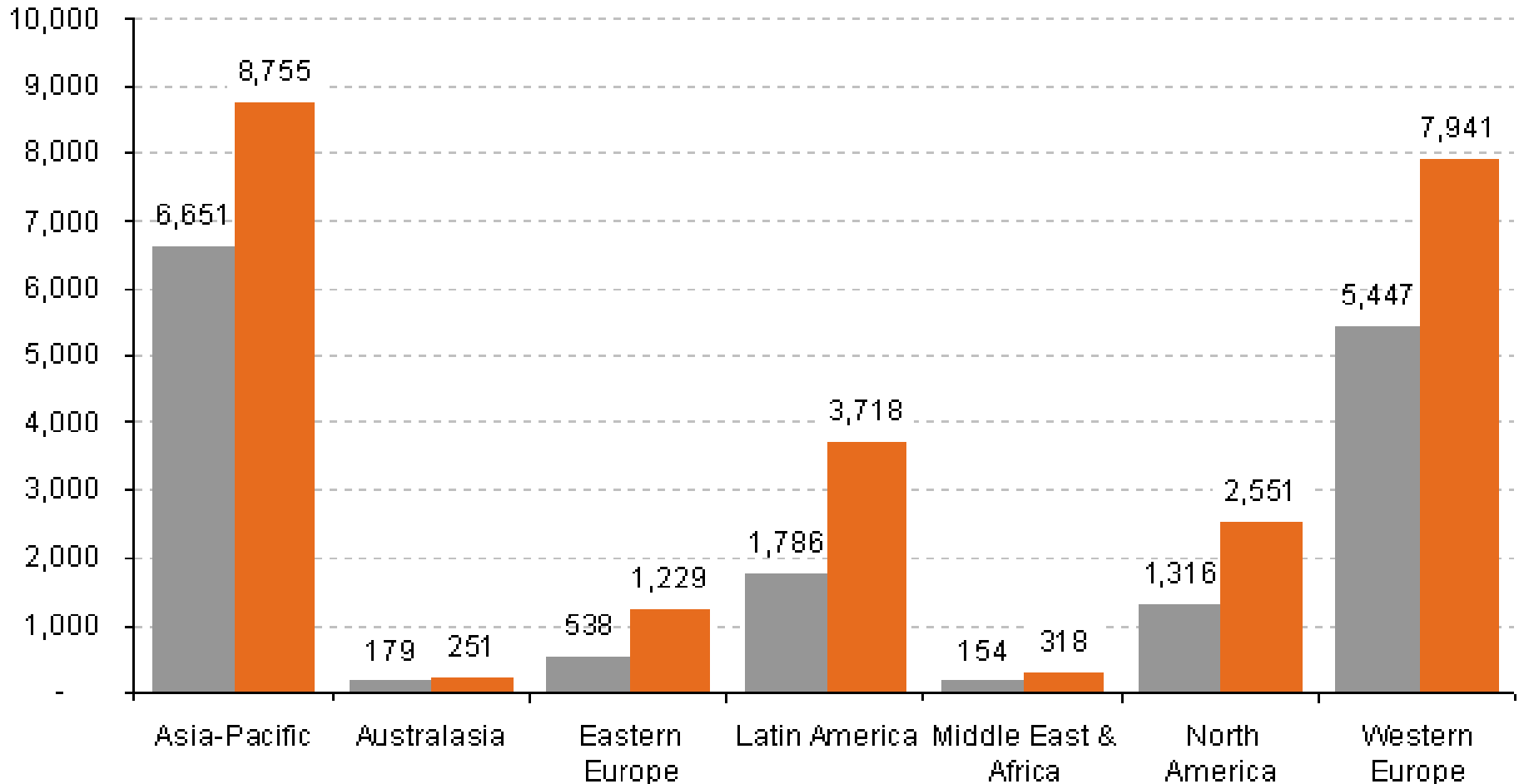
Absolute value growth 2007-2012, US\$ million



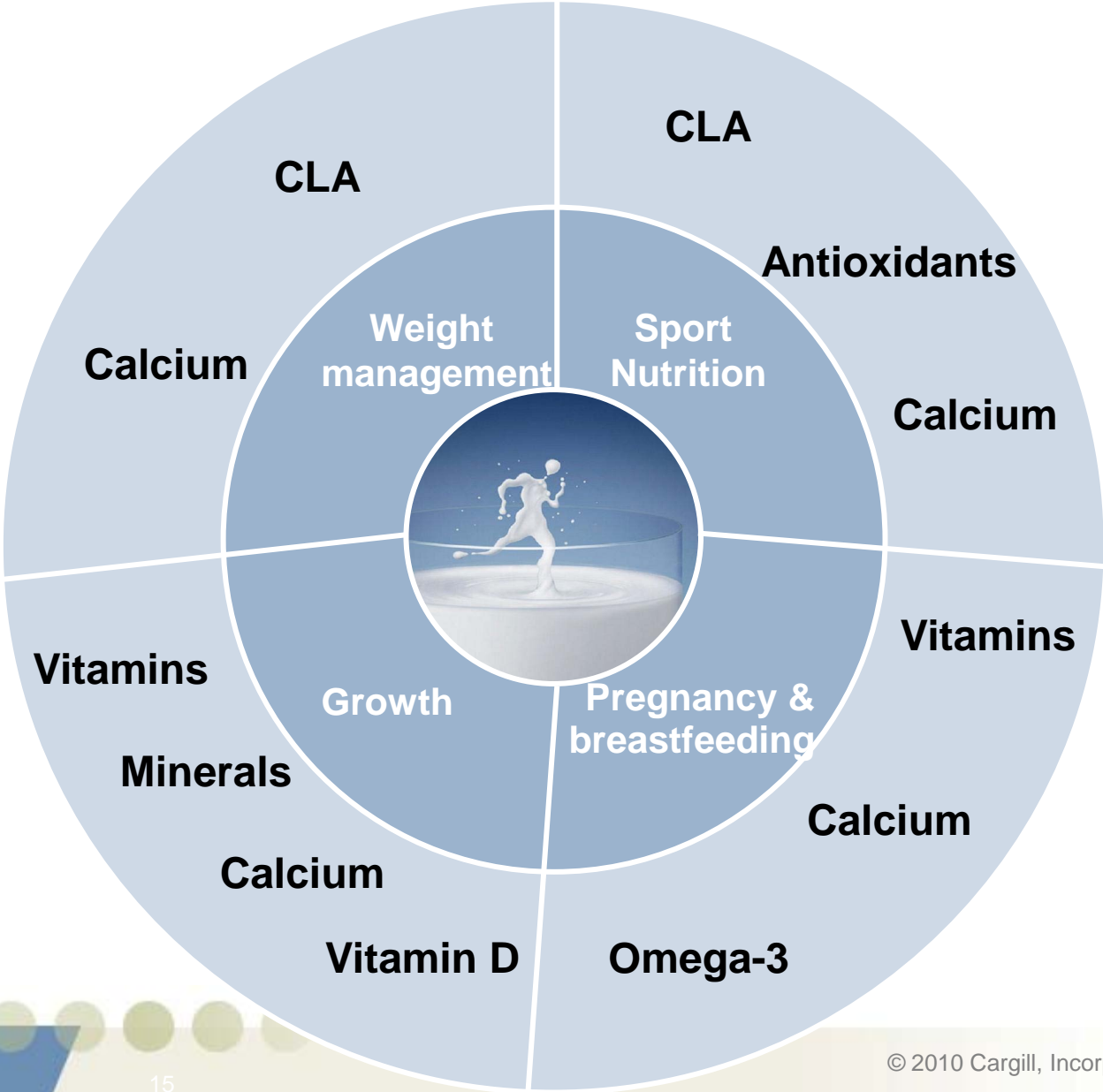
Source: Euromonitor International

Probiotic Yoghurt: *Value Sales by Region 2007-2012*

US\$ million



Health promotion through milk



**IS IT POSSIBLE TO ADJUST
COW'S FEEDING REGIMES TO
DEVELOP MILK WITH
INCREASED CONTENT OF
HEALTHY COMPONENTS?**

Table 2: Components in bovine milk and their chances to be modified according to feeding strategies, substrates involved in their synthesis and feeding strategies that may be used

Milk component	Possibility for modification ¹	Substrates involved in synthesis	Feeding strategies
Fat	Moderate	↓Acetic-and butyric acid for de novo synthesis ↓Long unsaturated FA	High intake and proportion of concentrates High intake and proportion of unsaturated fatty acids
Saturated fatty acids	Minor to moderate	↓Acetic-and butyric acid for de novo synthesis.	Low intake and proportion of roughages
Oleic acid	Moderate	↓Long saturated FA ↑Oleic acid ↑Stearic acid ↑Stearic acid	Low proportion saturated/unsaturated fatty acids High intake/proportion of oleic acid High intake/proportion of stearic acid High intake/proportion of polyunsaturated C18-acids Pasture
CLA	Considerable	↑CLA ↑Vaccenic acid	High intake/proportion of linoleic acid. High intake/proportion of unsaturated FA. Pasture
Vaccenic acid	Considerable	↓Vaccenic acid	Low intake of oleic- and linolenic acid
Ratio omega 6/3	Moderate	↓Omega 6:3 FA	High intake/proportion of linolenic acid. Pasture
Protein	Minor	↑Energy supply ↑Amino acid supply	High intake of diet with relatively low content of fat, but high energy concentration Favourable conditions for microbial protein synthesis in the rumen. High intake/proportion of dietary by-pass protein
Calcium	Minor		
Magnesium	Minor		
Zinc	Minor		
Iodine	Considerable		Supplementation
Selenium	Considerable		Supplementation
Vitamin E	Considerable	Vitamin E	Pasture, well preserved silages, concentrates with naturally high content, mineral supplementation
Carotene/Vitamin A	Considerable	Carotene/Vitamin A	Pasture, well preserved silages, concentrates with naturally high content, mineral supplementation
Folate	Minor		
Riboflavin	Minor		
Vitamin B ₁₂	Minor		

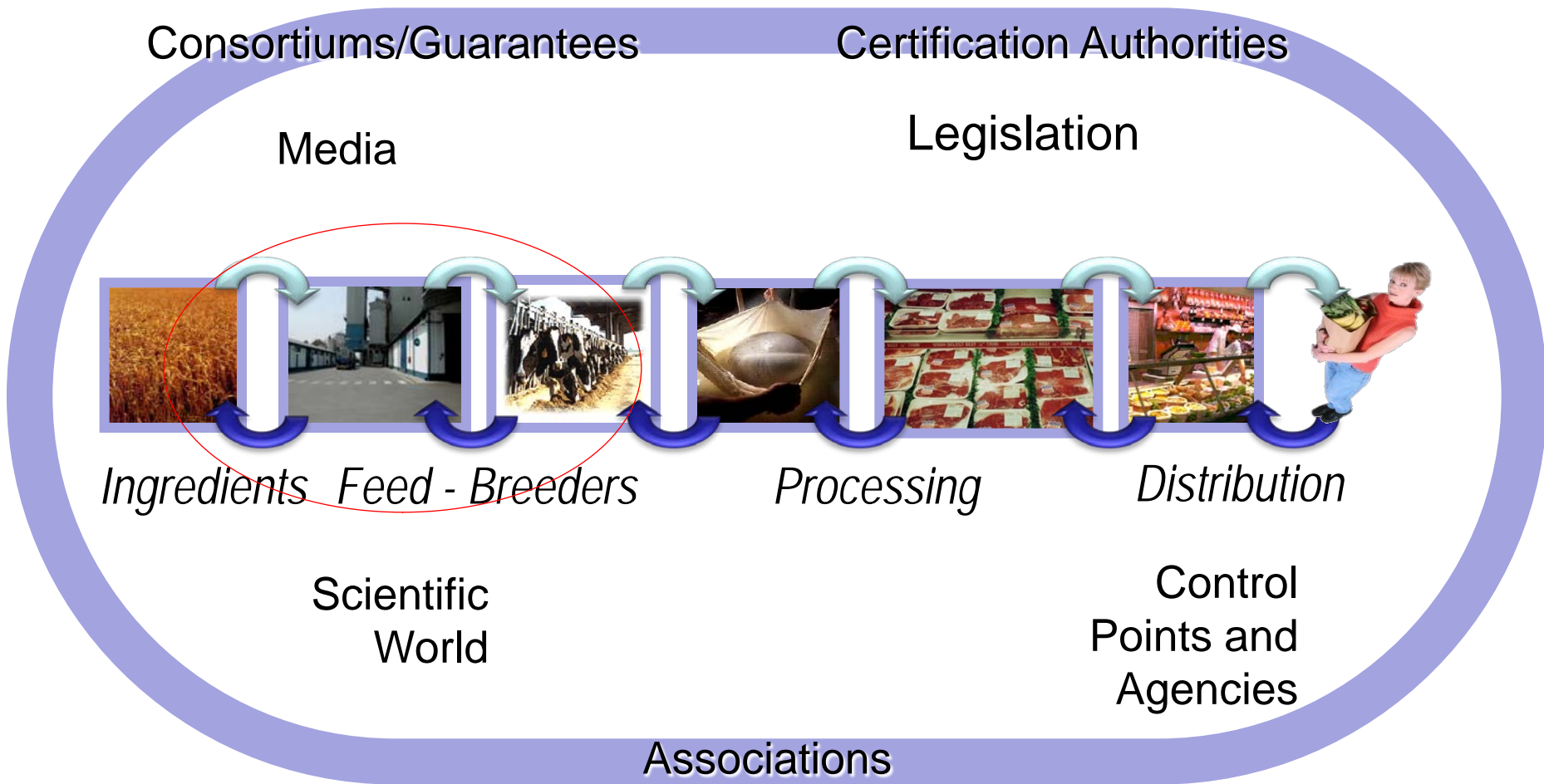
¹Minor; ≈ < 25 % change. Moderate; ≈ 25–100 % change. Considerable; ≈ > 100 % change.

The role of the feed industry

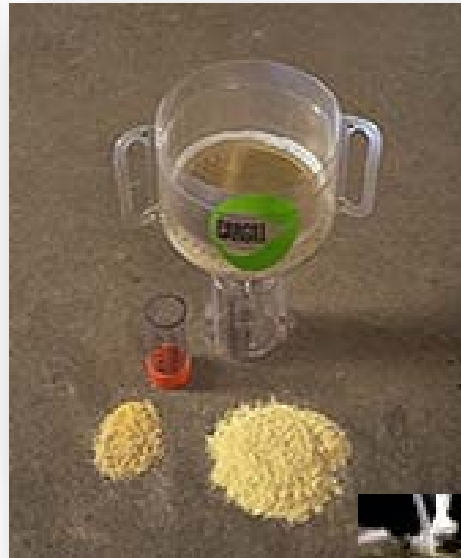
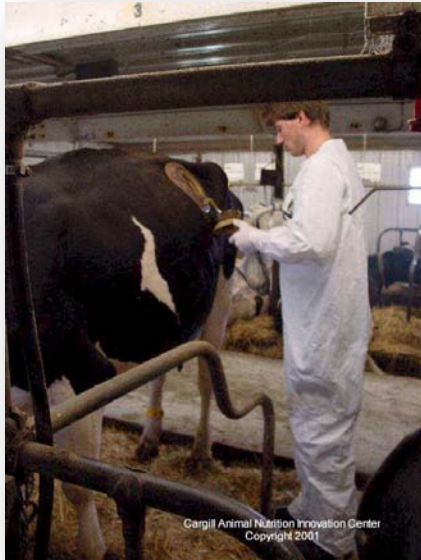
Helping farmers
to reach their goals



Dairy Food Chain: feed industry at the beginning.

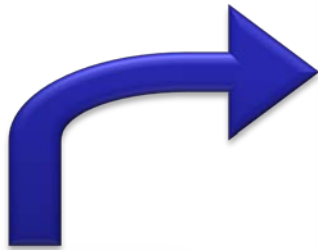


Research & Technology



The Challenge

How to best contribute to the process and create sustainable competitive advantages?



Feed for.... future

- **Collaboration with Human Nutritionists**
- **Functional foods to prevent food related pathologies**
 - **Heart diseases (1 cause of death cause in USA)**
 - **Cancer (n.2 cause of in USA)**
 - **Obesity**
 - **Osteoporosis**
 - **Diabetes**

Areas of milk improvement through feeding



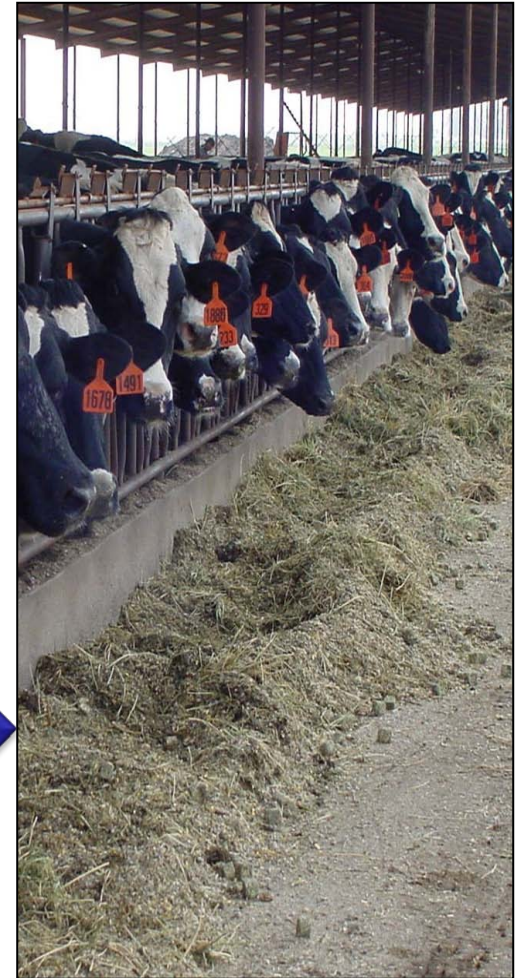
- Modification of Omega 6 to Omega 3 fatty acids upto 2:1 ratio.
- Increase the proportion of oleic acid in milk by 30% at expense of palmytic acid.
- Increase concentration of CLA in milk.
- Increase concentration of Selenium and Iodine



SOME EXAMPLES

Italian Strategic Marketing initiative linked to Omega 3:

- Enriched food with Omega reduces cholesterol and heart diseases
- Produce naturally enriched food through nutritional management
- Research sources of Omega 3 to use in Feed Industry





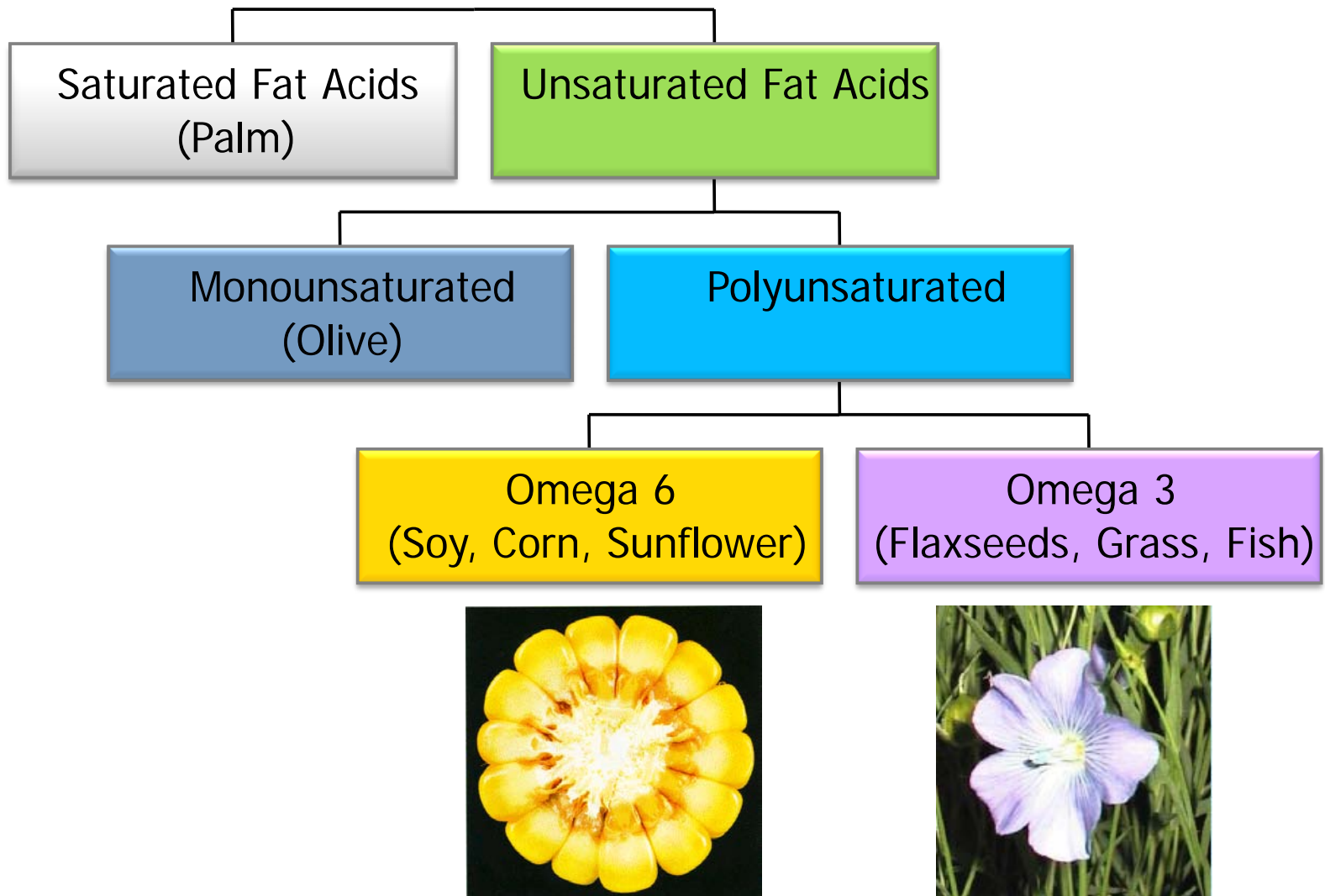
**...Because vernal grass is rich in Omega (Ω)
3 fatty acids!**

...how can we maintain the effect
all year long?

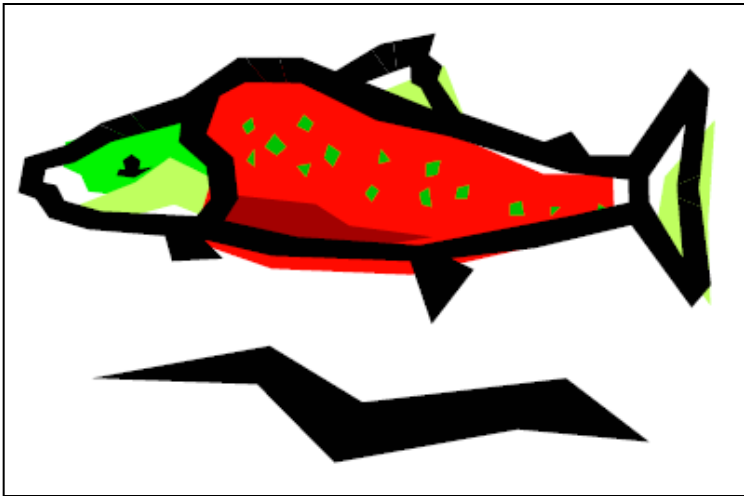


And when spring pastures run out...

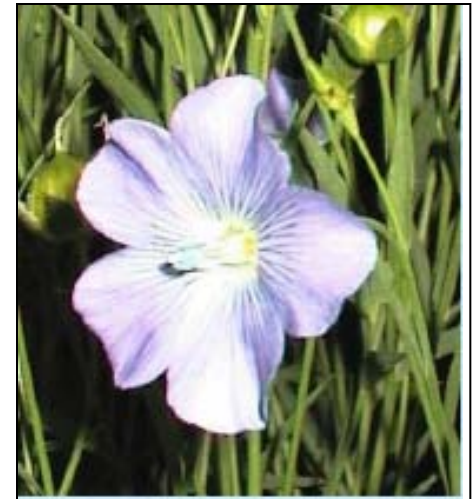
Fatty Acid distribution scheme



Two different sources of Ω 3



Fish oil



Flaxseeds

Our research has found:

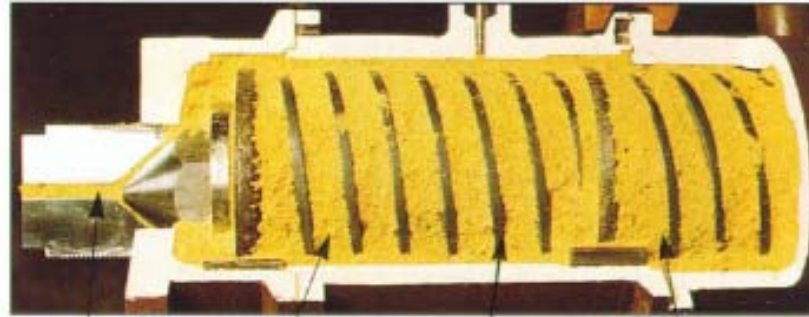
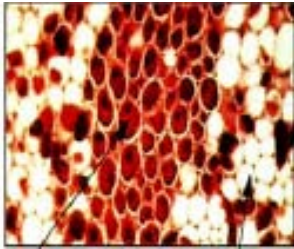
- A better way to introduce linseed in dairy cow rations which:
 - Allows correct interaction between linseed and rumen metabolism.
 - Maintains “Vernal grass effect” on the reproductive system



How to correctly utilize linseed?

- Don't waste the seeds during the feeding;
- Avoid negative interactions with the rumen;
- Increase intestinal absorption;
- Guarantee a correct daily intake.

Linseed before



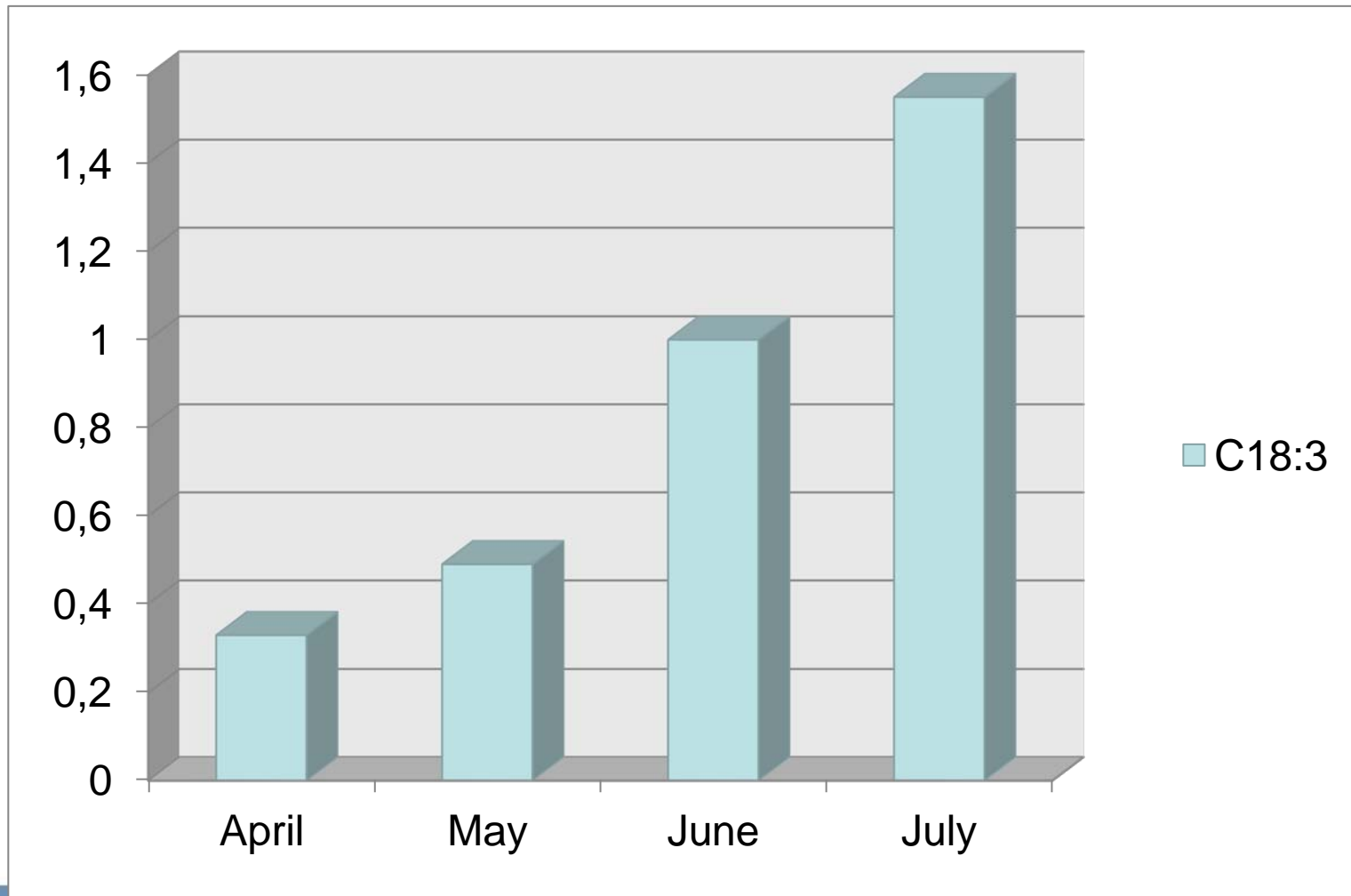
Linseed after



- **Destroy anti-nutritional factors present in crude flaxseed (f.i. Linostatin)**
- **Free up oil fractions of linseed in the intestine;**
- **Increase linseed digestibility**

Dairy farm Bandioli (Mantova, Italy)

Trend of C18:3 Omega 3 in delivered milk



Italy: Omega 3 Enriched milk

- ALA content from 0.33% to 1.55% of TFA
- Enhance end product nutritional value
- Milk Automatic Distributors



Table 1. CLA content of various foods

Foodstuff	Total CLA content (mg/g fat)
Dairy products	
Homogenized milk	5.5
Butter fat	4.7
Mozzarella cheese	4.9
Plain yogurt	4.8
Ice cream	3.6
Meats	
Ground beef	4.3
Lamb	5.6
Pork	0.6
Chicken	0.9
Salmon	0.3
Ground turkey	2.5

Source: Chin et al., 1992

Bell J.A. and Kennelly J.J. 2000. Conjugated Linoleic Acid Enriched Milk: A Designer Milk with Potential. Advances in Dairy Technology (2001) Volume 13, page 213

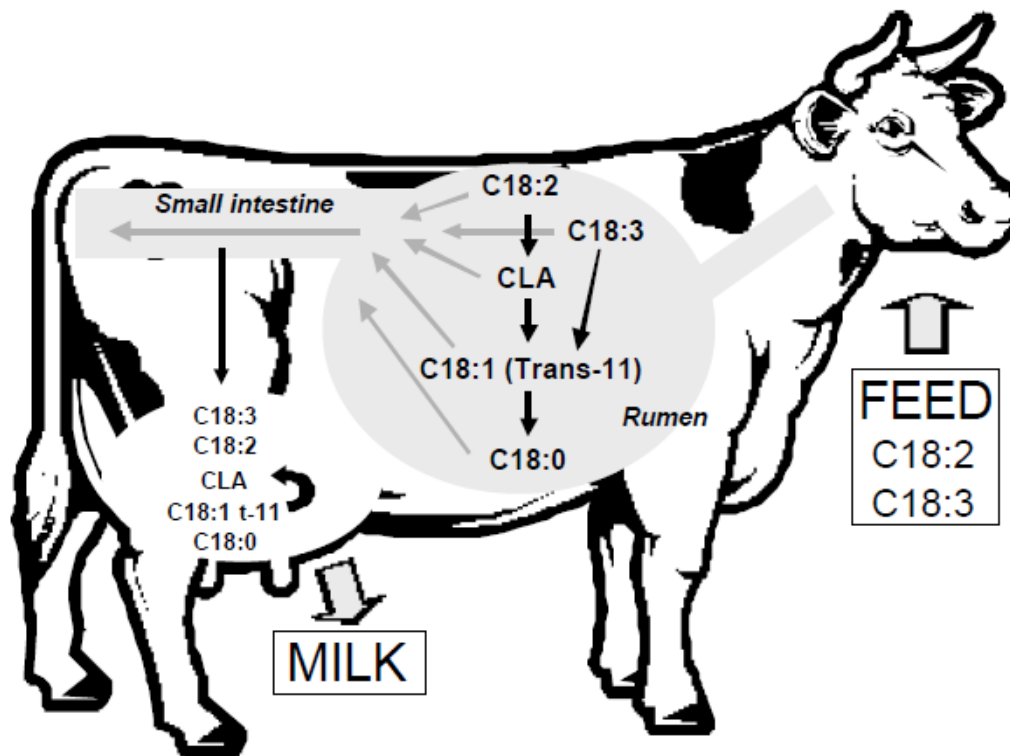


Figure 1. Formation of CLA in the cow

Bauman, D.E., Mather, I.H., Wall, R.J., Lock, A.L., 2006. Major advances associated with the biosynthesis of milk. *J. Dairy Sci.* 89, 1235–1243.

Se and I

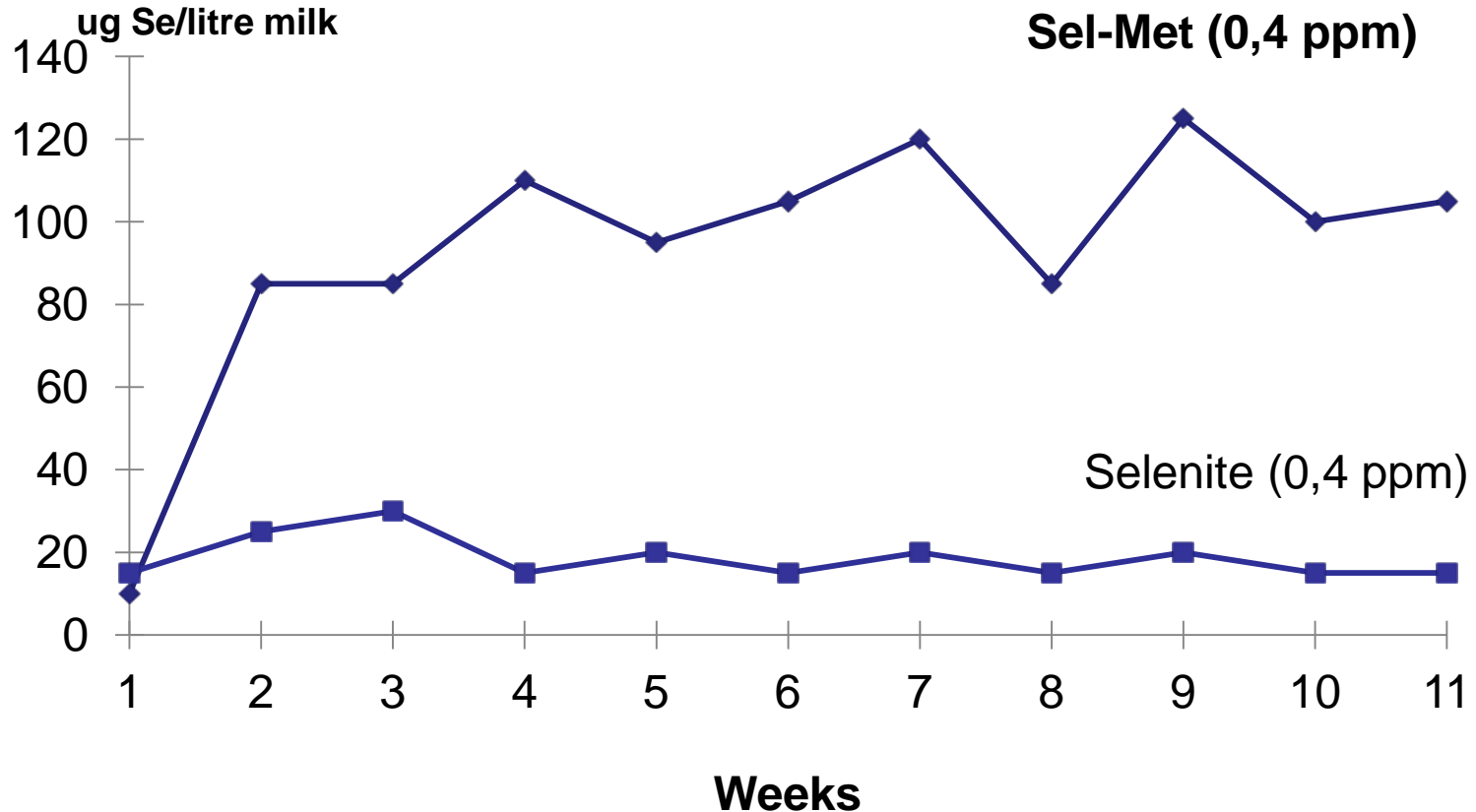
- *In vivo* trials in lactating dairy cows estimated the carry-over of iodine and selenium in milk (and cheese).
- There was an enrichment that would cover more than 70% of RDA for I and about 50% for Se (considering an intake of 150 ml/d).



Could milk be the solution?

- **25% of our selenium intake comes from milk and cheese**
- **Selenium intakes for humans in many countries are now 50% of the RDA**
- **It is known that dairy cows fed Sel-Met have 3 - 6 times more selenium in their milk. This is not only good for the cow and her calf, but also for humans.**

Sel-Met improves Milk Selenium concentration



* *Selenite = traditional source of selenium supplementation*

Pehrson, 1993

Seoul National Dairy Korea



- SELK, milk enriched with Selenium, Calcium and Vitamins A,D,E launched 2003.
- Sel-Plex inclusion: 0,4 ppm in dairy feed results in Se levels of 0.05ug/ml in milk, much higher than normal milk (0.02ug/ml).
- Seoul dairy using media campaign to raise awareness of the importance of selenium in human health: immunity, cancer protective effect, antioxidant etc..
- Price – 20% higher than normal milk.

THE INDEPENDENT

THE BROADER VIEW

JANUARY 2003

Health

tips for the new year



...ing overweight, ...
...weight people cut 20 wt
...aces kilogram, a
...Ouch, your hea
...t to see if you are ov
...ght. Your body mass ind
...ness divided by yo
...and probably just an
...25. If you are overweight,
...at and you should have
...range of problems, from t
...and arthritis.

건강하게 사는 30가지 방법

- 셀레늄을 섭취하라
- 규칙적으로 운동하라
- 체중관리에 신경써라
- 담배를 끊어라
- ...

Lower your cholesterol

This can reduce the risk of heart attack and stroke when your level is not high. Exercise to reduce weight, eat more foods low in saturated fat and cholesterol, and cut down high-fat ones. The American Heart Association recommends a limit of 300mg of cholesterol a day. A three-ounce portion of salmon steaks has 70-75mg of cholesterol; a smaller portion of fish has 20-60mg.

And tea is even better

Being a heavy tea-drinker, not of doing after a heavy meal, can reduce the risk of heart attack. And people who drink the most tea are the least likely to die during the three or four years after a heart attack. A Harvard Medical School study found that among people who reported having tea consistently, the premature death rate was 34 per cent lower.

Aspirin is a wonder drug

This old standby for aches and pains may help to reduce the risk of cardiovascular disease, heart disease and stroke, including of the heart. Aspirin is a blood thinner, and it may help to prevent blood clots from forming in the arteries.

Coffee is good for you

Drinking coffee may help to reduce the risk of heart disease and stroke. A study of 12,000 people found that those who drank the most coffee had the lowest risk of heart disease and stroke. The study also found that coffee drinkers had a lower risk of death from heart disease and stroke than non-drinkers.

국내 최초 천연 셀레늄 우유 셀크 탄생!

지금, 세계가 주목하는 셀레늄!
우리 나라에서는 간편하게 우유로 드십시오
국내 최초의 천연 셀레늄 우유, 셀크!
66년 전통의 서울우유가 만듭니다

"셀레늄을 섭취하라 (Your Diet Needs Selenium)"
(영양 조교 레디스 셀레늄이 함유된 천연 우유 30가지를 위한 용어)



Selk in Korea: 20,000 litres per day at launch




Good for the cow - Very good for you
 Naturally Enriched Selenium Semi-Skimmed Milk

Selenium and Dairy Cow Diets.

- In the UK soils are generally deficient in **Selenium**.
- Dairy cows diets are still predominantly produced using materials grown on the farm and are therefore need to be supplemented with **Selenium** to meet the cows nutritional requirements.
- Diets short of **Selenium** are associated with increased risk and severity of infections associated with
 - The Udder
 - Feet
 - All hard working or gains.
 - Reducing cow's problems infections give her a longer and happier life.
- Diets short of **Selenium** are associated with Reproductive-Health problems. Reducing the incidence of reproductive problems gives a longer and happier herd life.
- **Selenium** derived from **Selenium** enriched yeast is more effectively utilised by the cow.
- Cows freely transmit selenium derived from yeasts and other natural sources into the milk. Nature's way of looking after the young calf.

Selk - Naturally Enriched Selenium Milk.

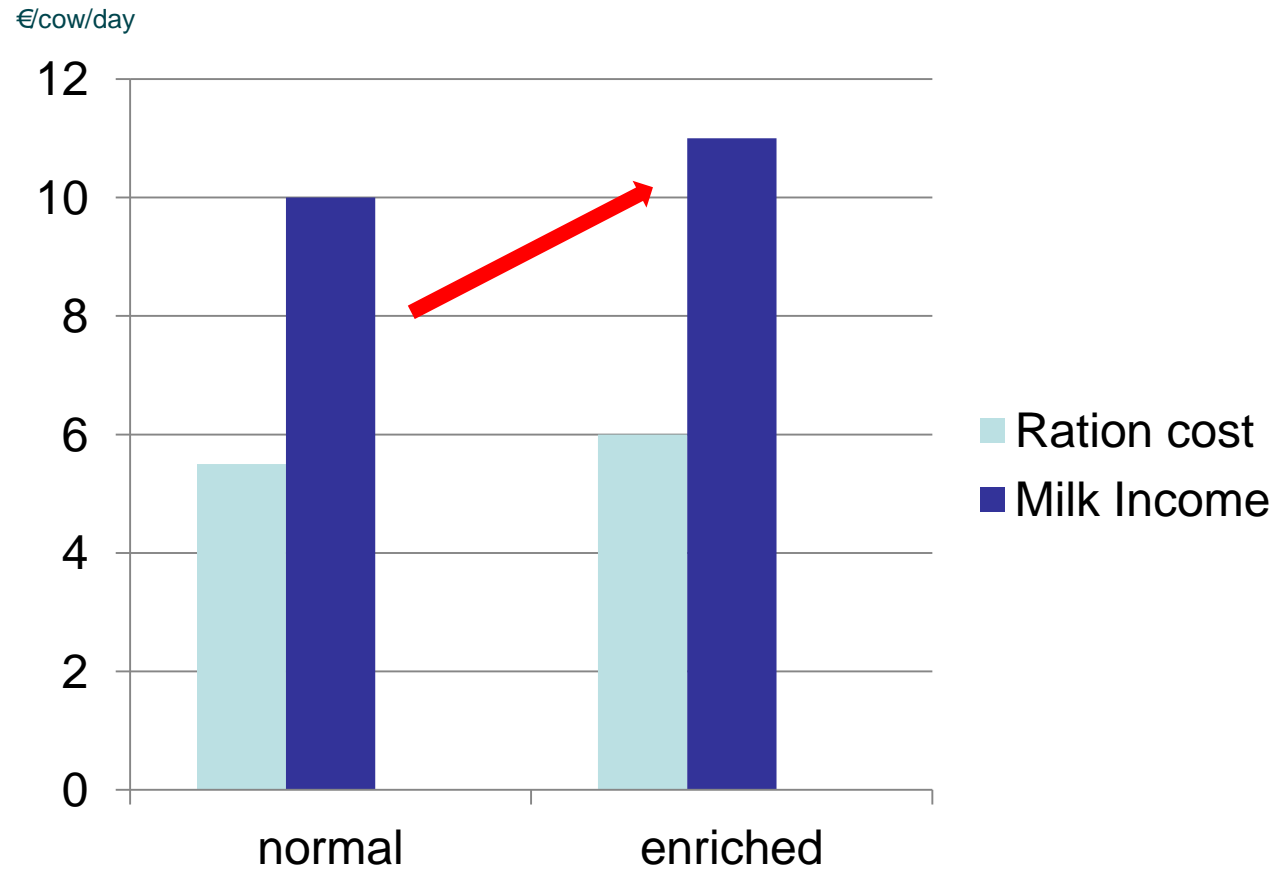
- **Selk** Cows are fed a special healthy diet containing a yeast product with exceptionally high levels of the effective forms of **Selenium** associated with it's protein content.
- **Selk** Cows produce milk naturally rich in **Selenium** which is associated with the valuable proteins found in milk.
- **Selk** Cows have much higher levels of **Selenium** in their bodies protecting them against infections and stress.
- **Selk** looks and tastes exactly the same as regular semi-skimmed milk.
- **Selk** 1 Pint of Semi-skimmed per day increases the daily intake of **Selenium** to well over the minimum recommended level of 70 micrograms per day.

For more information call our information line on
01270 812433

Sponsored by AB Nutrition Ltd., Lloyds Animal Feeds Ltd., Independent Feeds Ltd., British Denkavit, Ecosyl Products Ltd., Alltech UK Ltd., CMD Agribusiness Ltd. & Premier Nutrition

A discussion around costs...

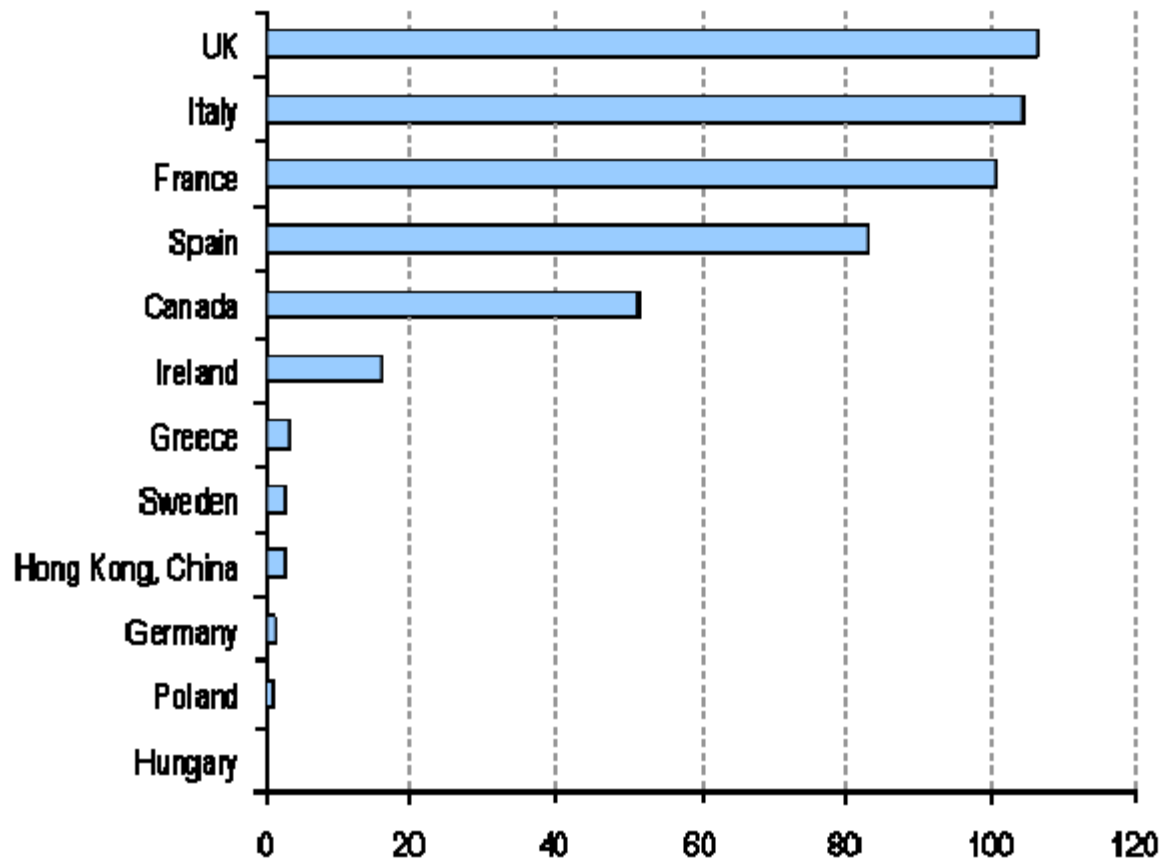
Higher feeding costs must be covered by extra milk price



Growing interest in Omega-3 milk

Chart 9 Value Sales of Omega-3 Enhanced Milk: Key Markets 2006

US\$ million



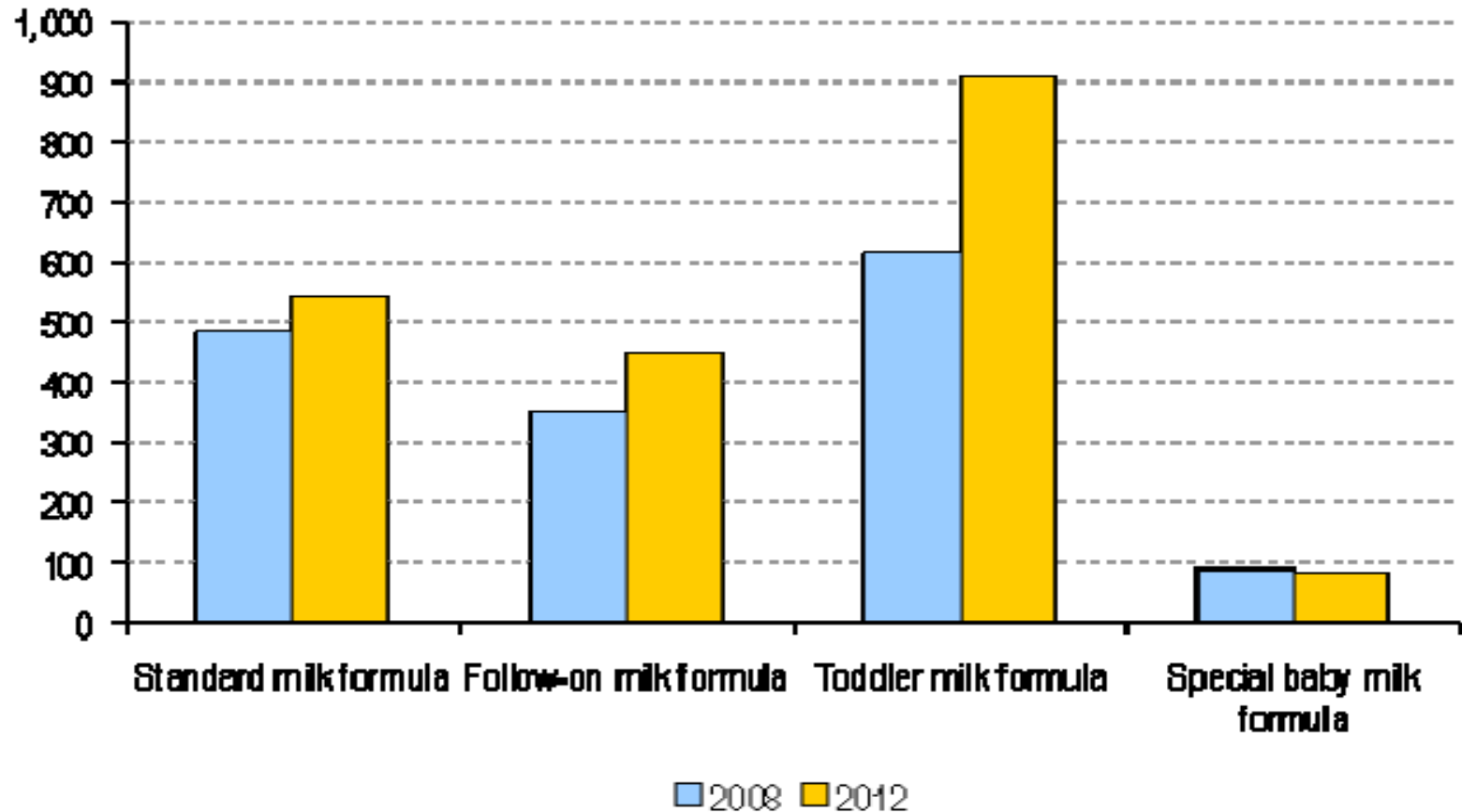
Source: Euromonitor International

Growing interest in Omega-3 milk

Chart 7

Opportunities for Omega-3 in Milk Formula: Global Milk Formula Sales by Type 2008-2012

Retail volume, '000 tonnes



Source: *Euromonitor International*

Essential Bibliography

- Bovine milk in human nutrition – a review, 2007 Haug A.; Hostmark A.; Harstad O. In Lipids in Health and Disease or www.lipidworld.com.
- Bauman D. and Lock A., 2006 Animal Production and Human Health. Proc. Cornell Nutr. Conf. Pp 45-46
- Moussavi A., Gilbert R., Overton T., Bauman D., Butler W., 2007 Effects of feeding fish meal and n-3 fatty acids on milk yield and metabolic responses in early lactating dairy cows. J. Dairy Sci. 90:136-144