

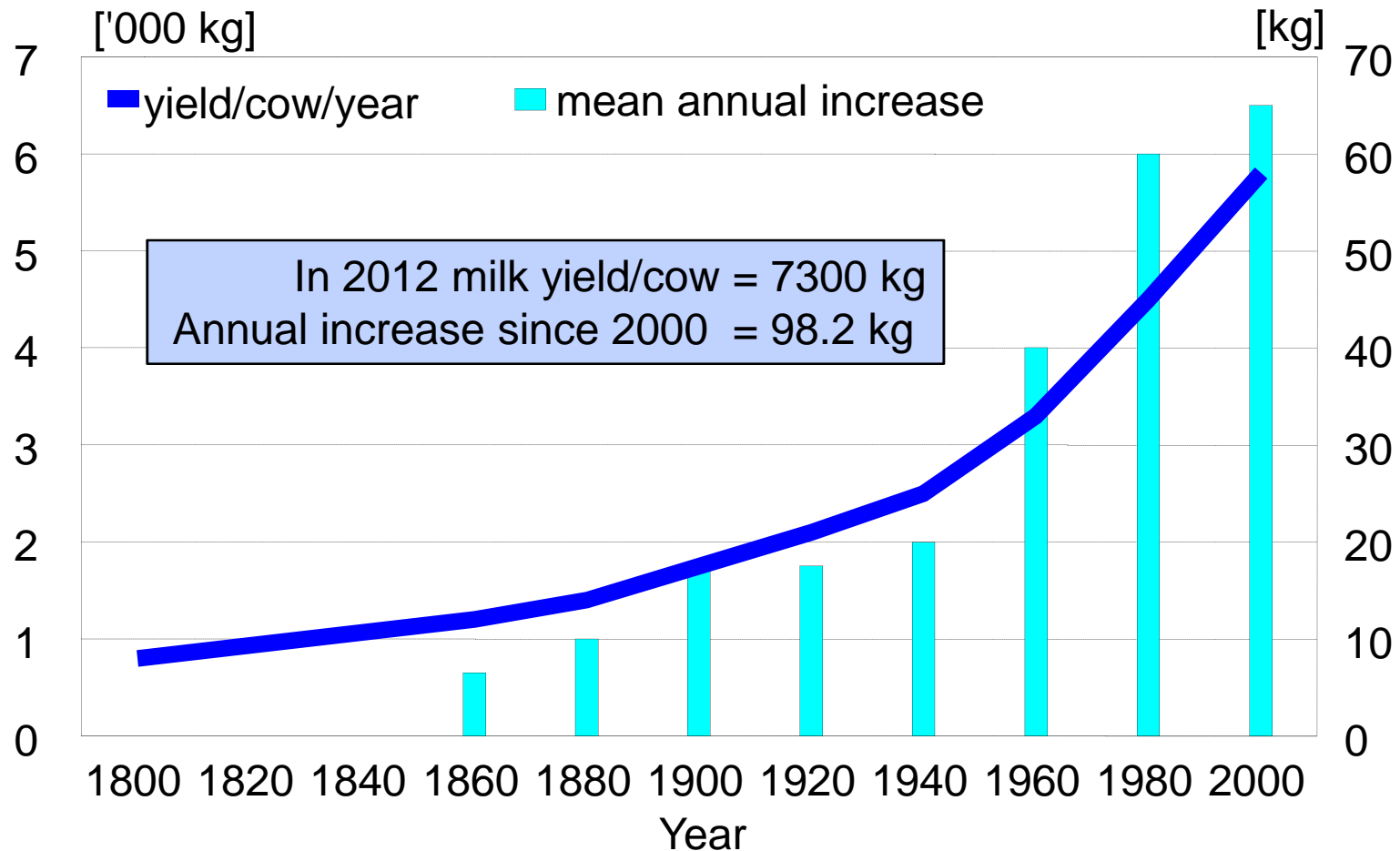
Eco-systems of agricultural landscapes
and sustainable land use: Livestock systems

04 - Livestock Farming Systems - 1

Intensive dairy systems in Western Europe



Development of annual milk yields/cow in Germany since 1800



Three sectors of intensification in milk production

Technical intensification

Biological intensification

Commercial intensification



Brief history of technical developments in milk production

Mid 19 th century	beginning of systematic cattle breeding (characteristics: colour, shape, size)
1860	manually operated milk pump as a first step in the development of milking machines
1895	introduction of the pulsator (Shields)
1903	introduction of two-chambered milking cups
1920 – 30	wider spread of the use of milking machines
1940	concept of heritability as the basis for modern breeding programmes (Lush)
Since 1950	second wave of spread of milking machines self feeding facilities for roughages mechanisation of solid manure collection systems for liquid manure collection and storage developed improving milk yields becomes primary objective of breeding programmes artificial insemination, semen storage
Since 1970	milking parlours in combination with loose box housing of dairy cows mechanisation of feeding, increased use of silage, automatic feeding of concentrates increased use of computers in breeding programmes
Since 1990	expanding automation of animal management computer-based herd management systems computer-controlled milk recording and equivalent feeding
Since 2000	electronic identification of individual animals milking robots



Technical characteristics of a modern dairy cattle system in Western Europe

- Mechanical removal of roughage from stockpile or storage
- Transport of roughage and distribution into the feeding troughs with mobile or fixed mechanical equipment
- Automatic dosing of concentrates in stanchion barns and loose housing systems
- Partially automated mechanical milking in the stanchion barn, milking parlours in loose housing systems
- Intermediate milk-storage in a milk cooler
- Automatic cleaning and rinsing of the entire milking apparatus and all pipes
- Liquid manure removal by gravity or efficient pumps into intermediate storage



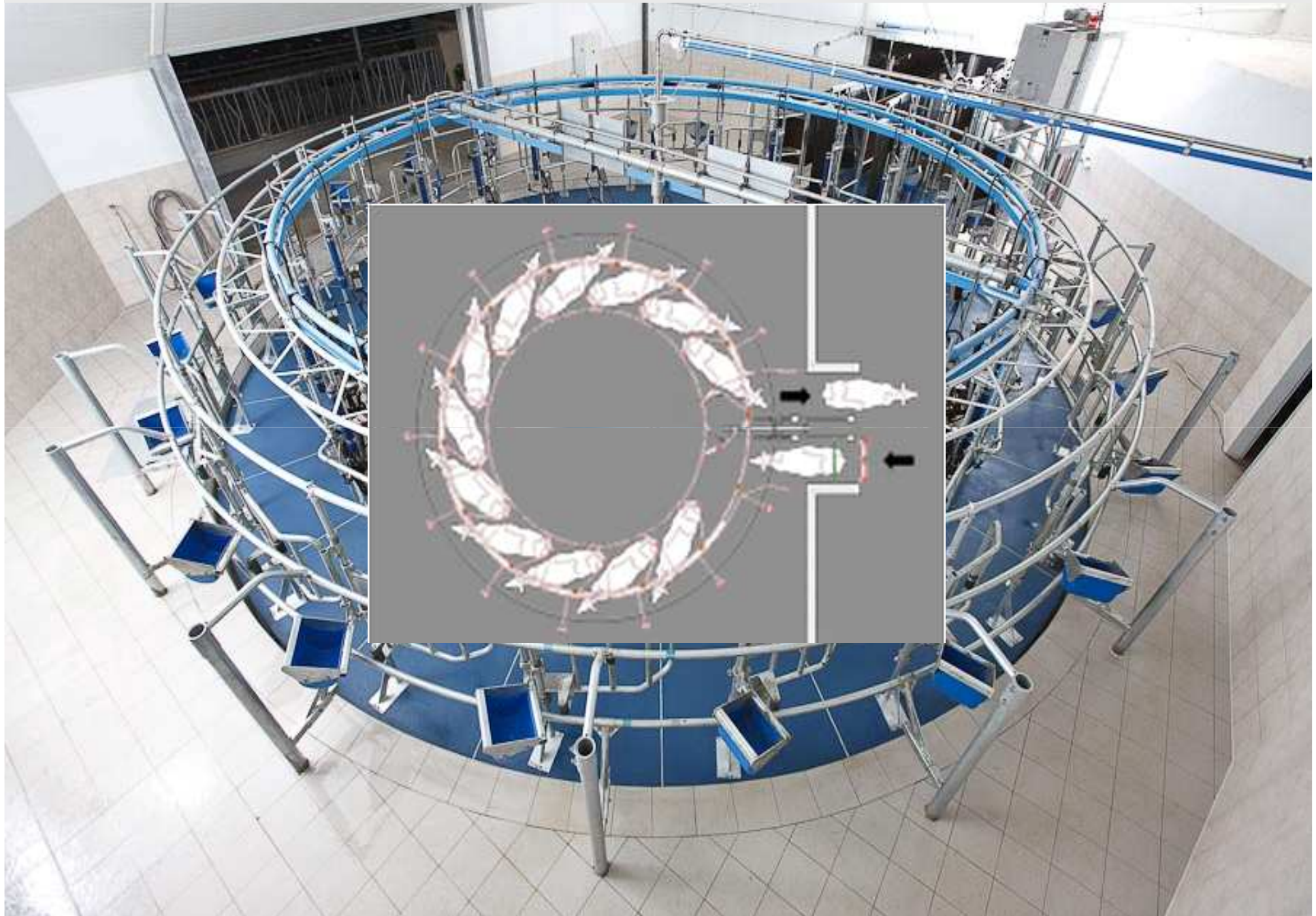
Preparation and distribution of roughage



Loose box cow shed with mechanical dung removal



Rotating milking parlour (Rotolactor)



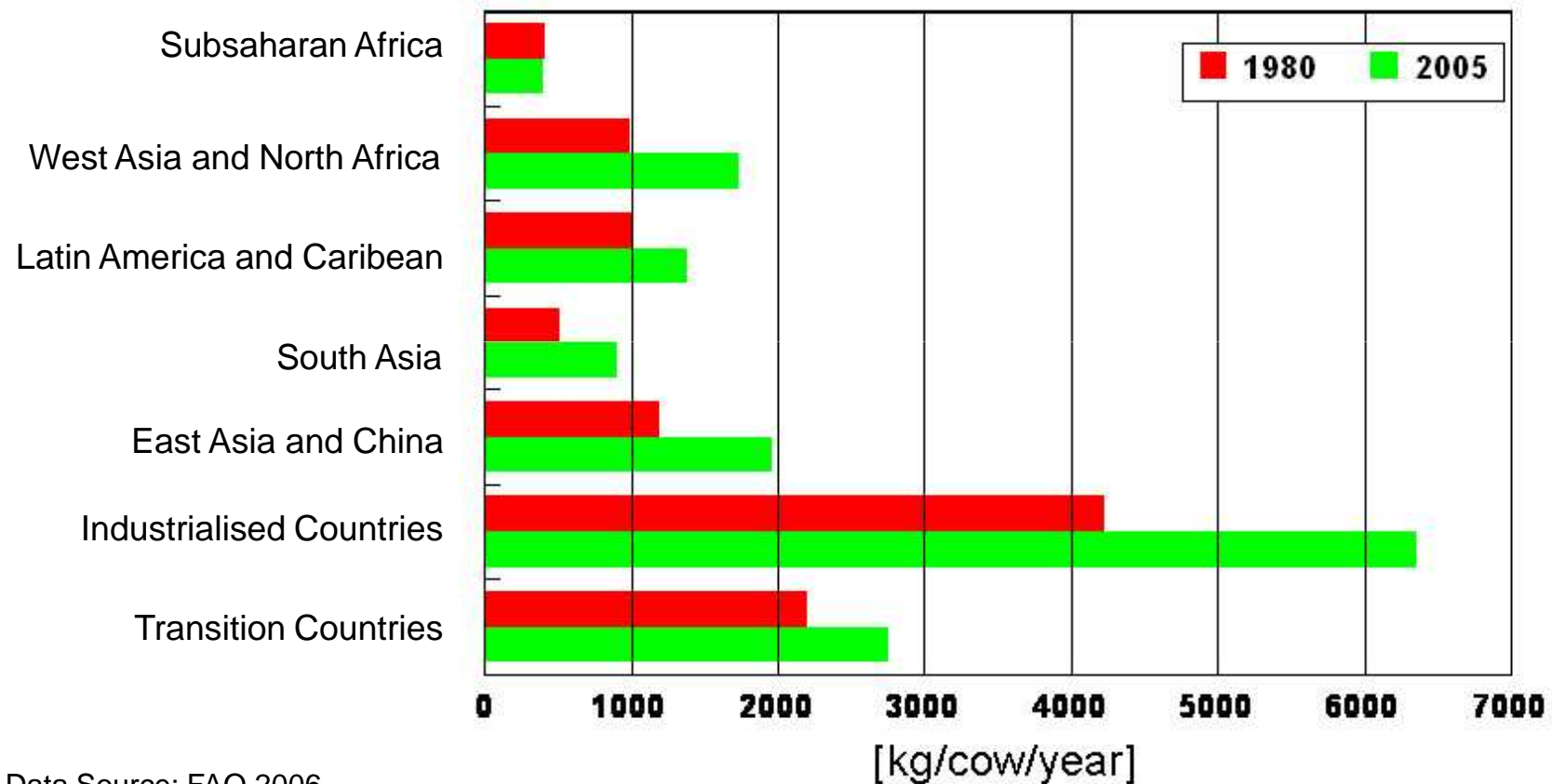
Rotating milking parlour (Rotolactor)



Biological intensification



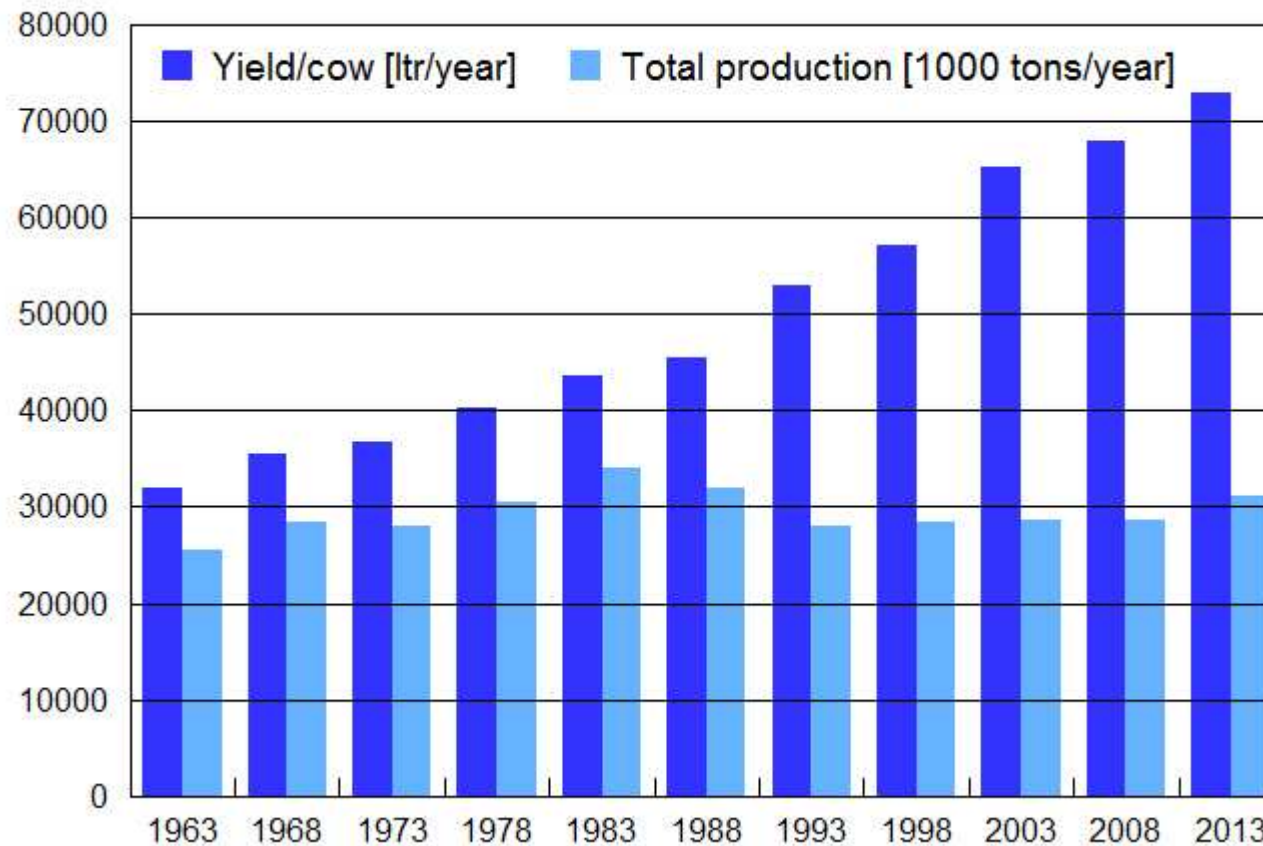
Change of Biological Productivity in **MILK** Production [kg/cow/year]



Data Source: FAO 2006



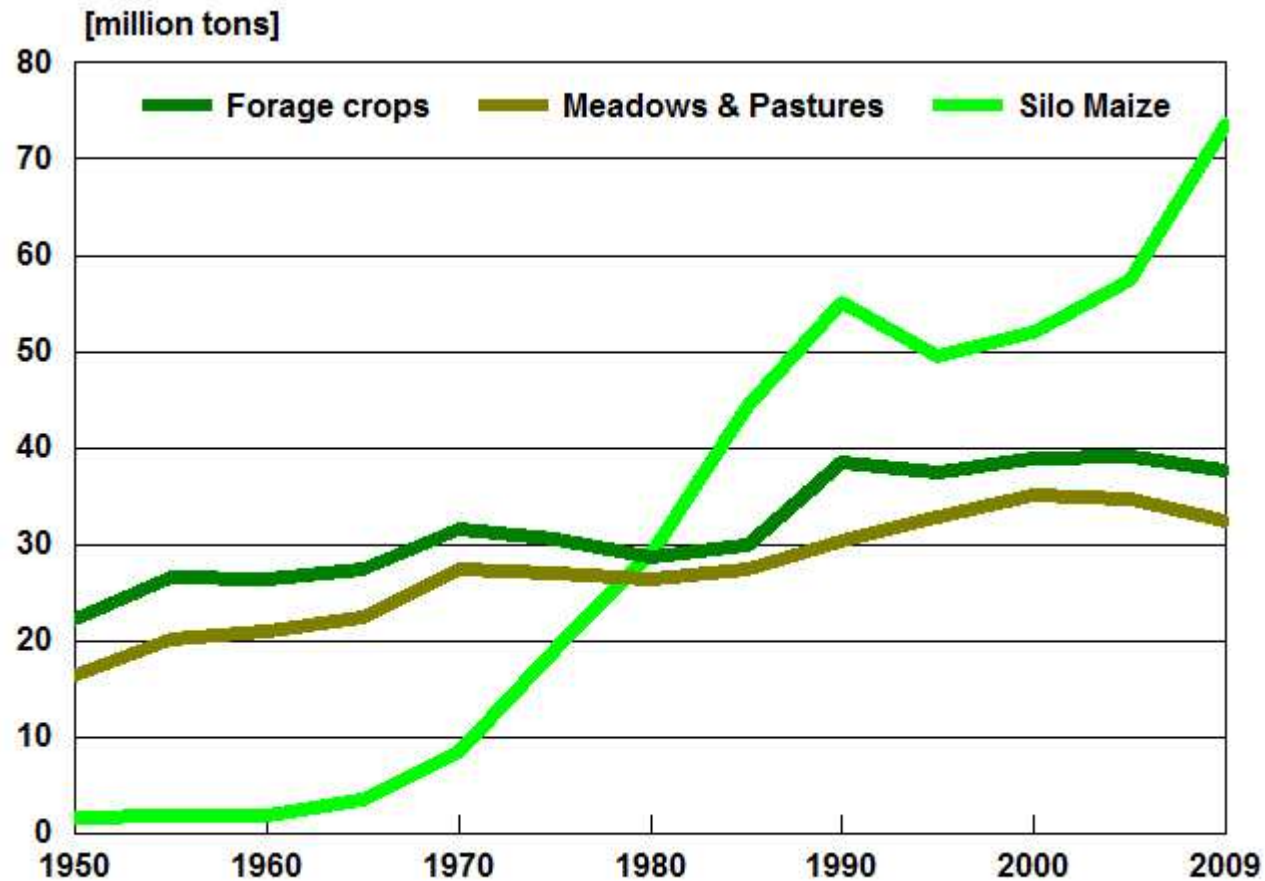
Milk yield/cow/year and total annual milk production in Germany since 1963



Source: <http://faostat3.fao.org/download/>



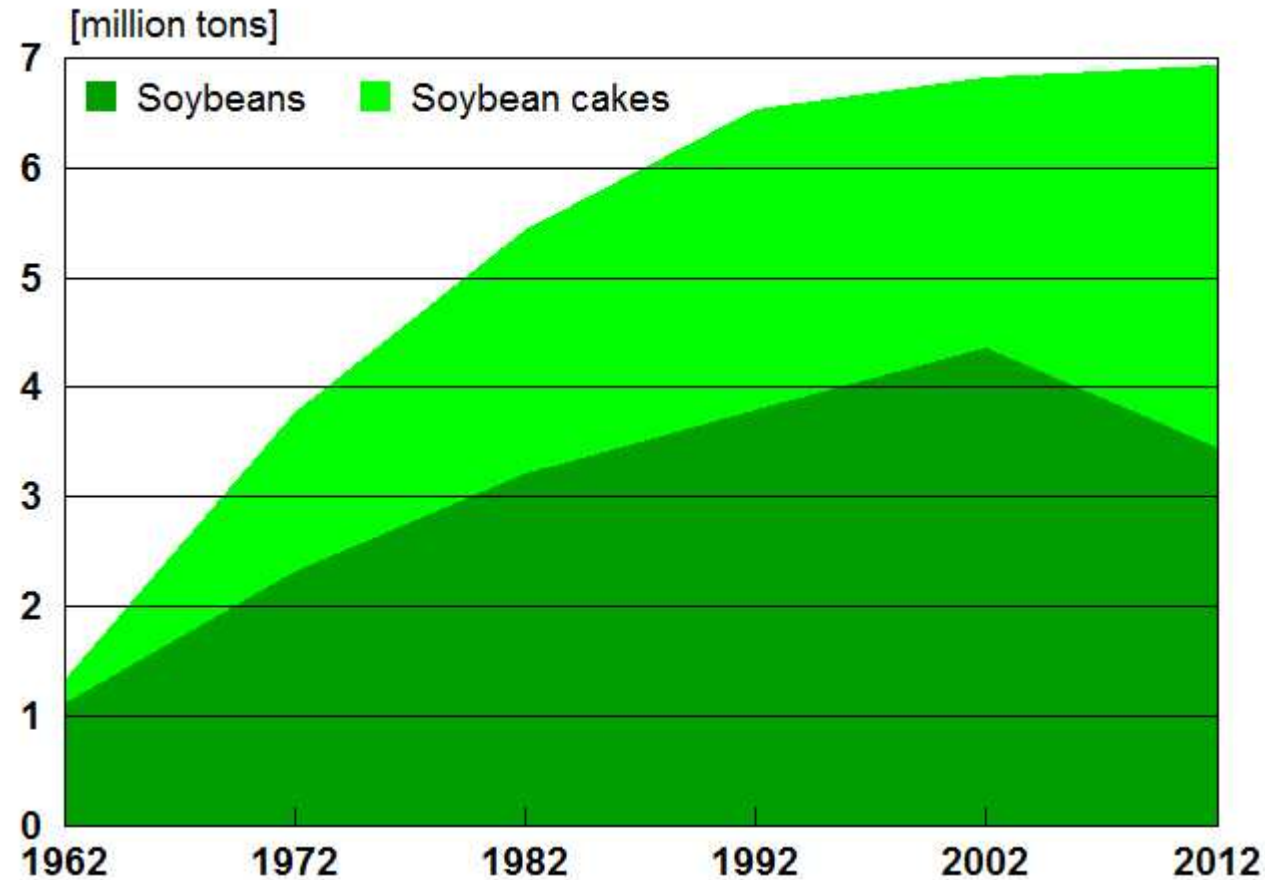
Total cattle feed production in Germany since 1950



Source: <https://www.genesis.destatis.de/genesis/online>



Import quantity of soybeans and soybean cakes in Germany since 1962



Source: <http://faostat3.fao.org/download/T/TP/E>



Lactation yields, number of lactations, and life time performance of dairy cows in Lower Saxony

Time Period	Lactation Performance [kg]	Number of Lactations	Life Time Performance [kg]
1958 - 1967	4397	4,45	19 567
1968 - 1977	4862	3,05	14 829
1978 - 1987	5881	2,98	17 525
1988 - 1997	6836	2,96	20 335
1998 - 2007	8000	2,5	20 000

W. von Engelhardt and G. Brevis (2009)





Annual culling rates [%] and causes for culling [%] in German dairy cows

Year	Annual culling rate	Impaired fertility	Mastitis	Hoof damage	Metabolic problems
1970	30.9	31.0	4.7	2.9	1.2
1975	29.9	33.6	6.6	3.5	1.3
1980	29.8	29.3	8.7	4.4	1.2
1985	33.4	28.5	8.2	4.6	1.3
1990	33.7	26.4	12.3	6.8	-
1995	32.0	21.8	15.3	8.3	-
2000	39.9	19.6	15.2	9.4	-
2005	39.6	20.8	14.1	9.7	3.2
2010	37	20.5	14.6	10.7	3.7

ADR Yearbook 2011

M.Sc. Integrated Natural Resource Management
Ecology and Sustainable Livestock Systems
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Winter Semester 2016/17

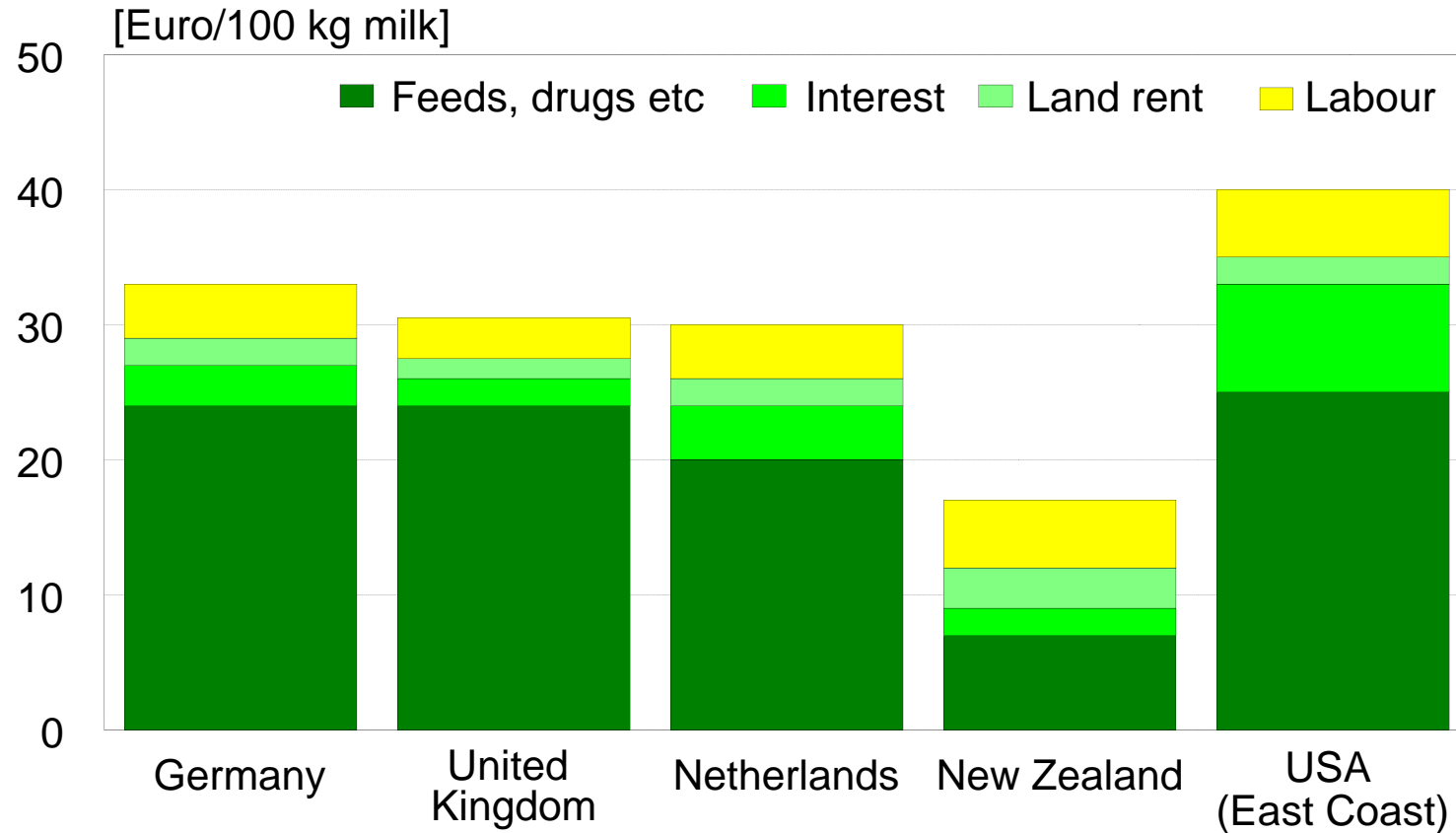
Faculty of Life Sciences
Albrecht-Daniel-Thaer Institute for Agricultural
and Horticultural Sciences
Prof. (retired) Dr. agr. H. J. Schwartz



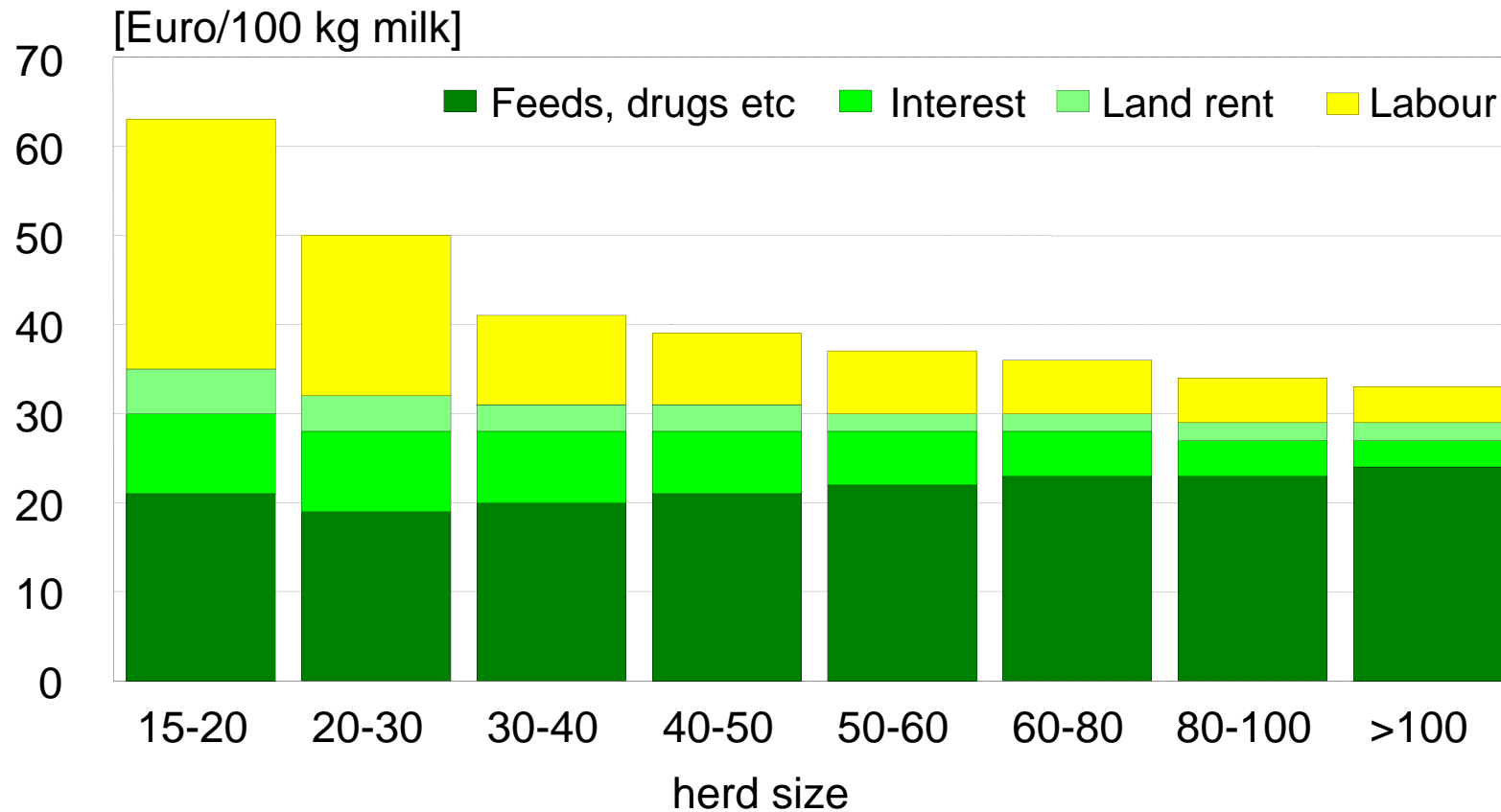
Commercial intensification



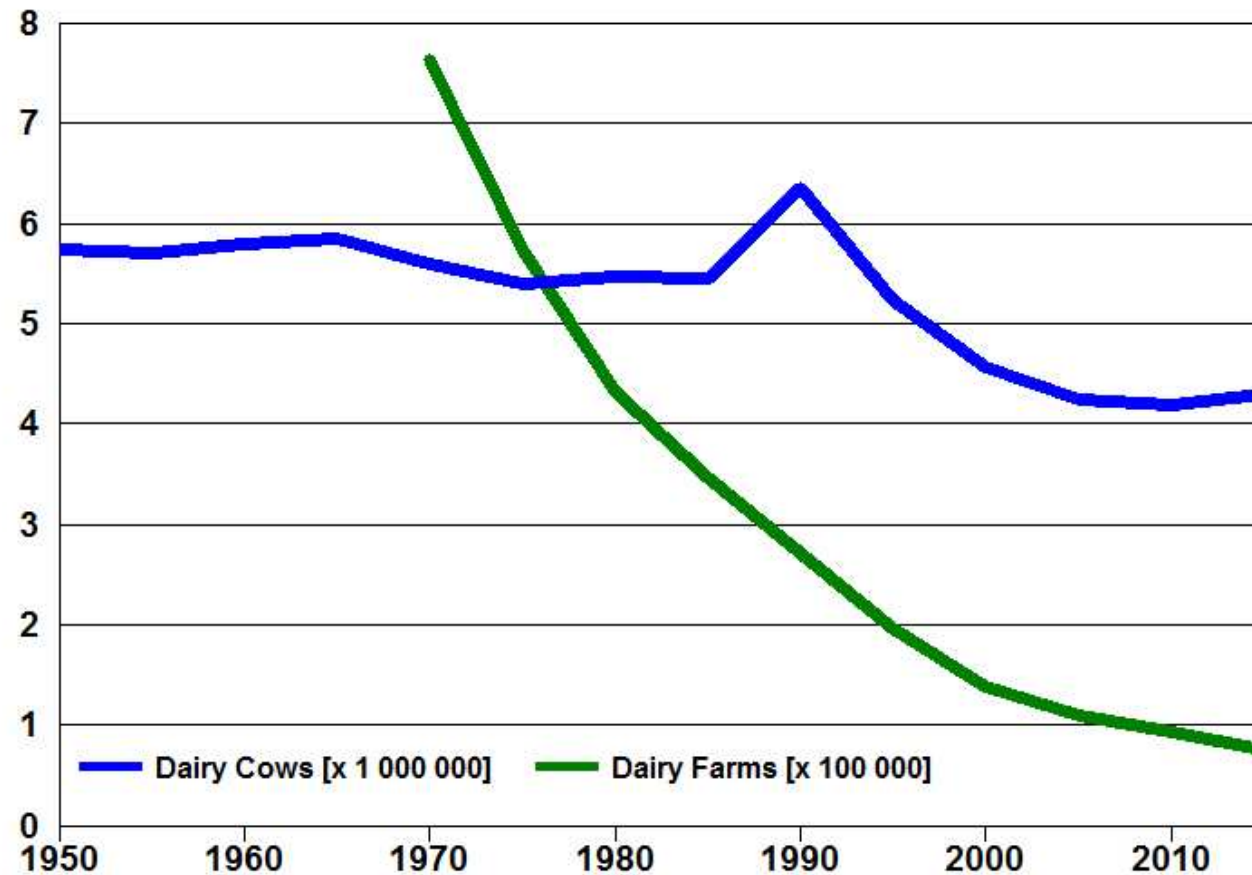
Production costs of milk in various countries in herds over 100 cows (2007)



Production costs of milk in Germany in relation to herd size (2007)



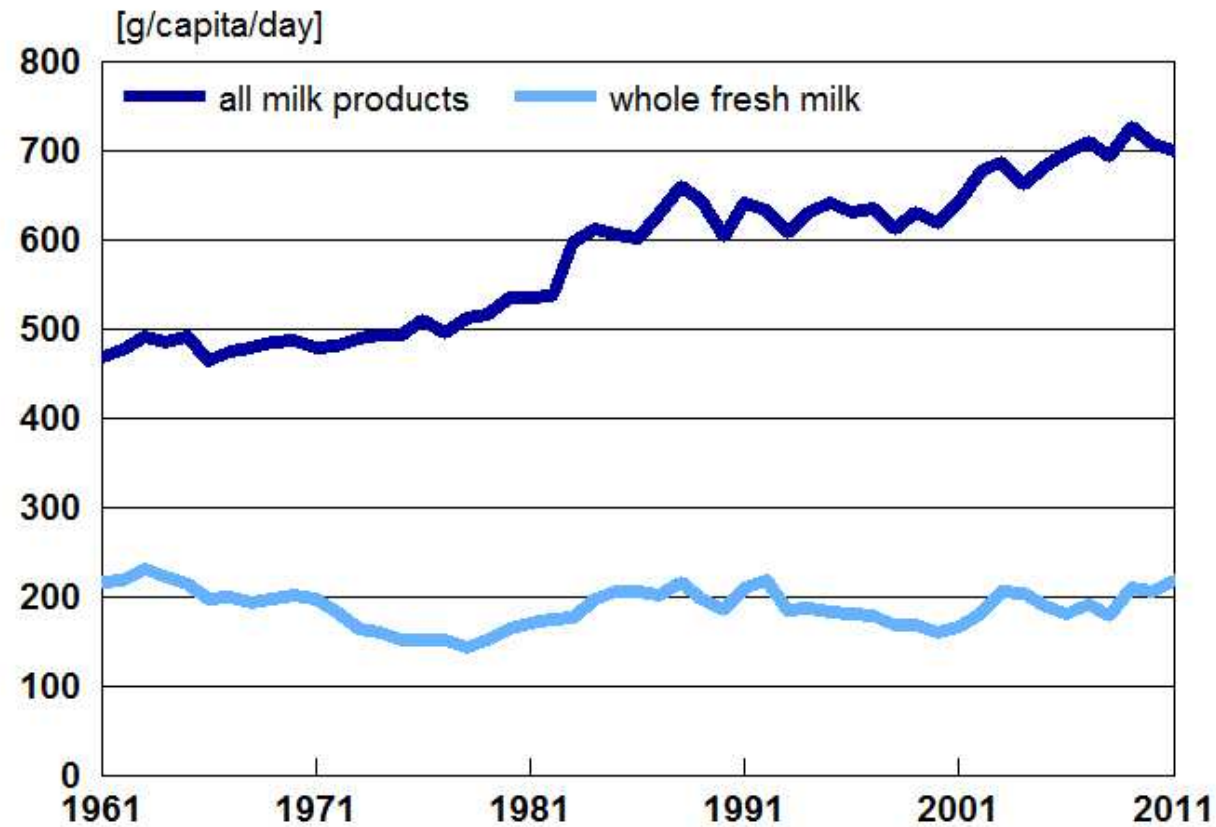
Number of dairy cows & dairy farms in Germany since 1950



Source: <https://www-genesis.destatis.de/>



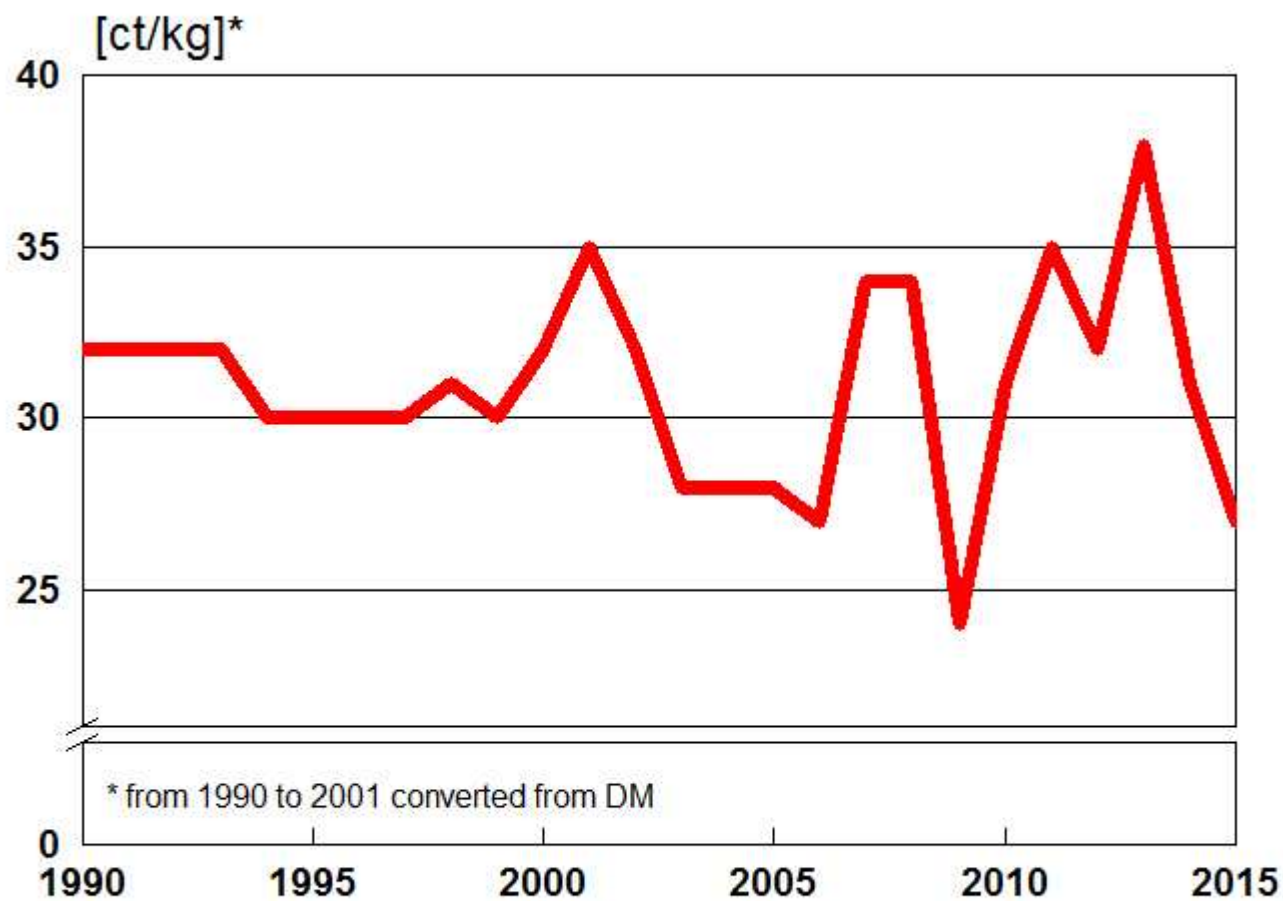
Consumption of whole fresh milk and milk products* in Germany since 1961



Source: <https://faostat3.fao.org/download/FB/CL/E>



Producer prices for milk in Germany without VAT



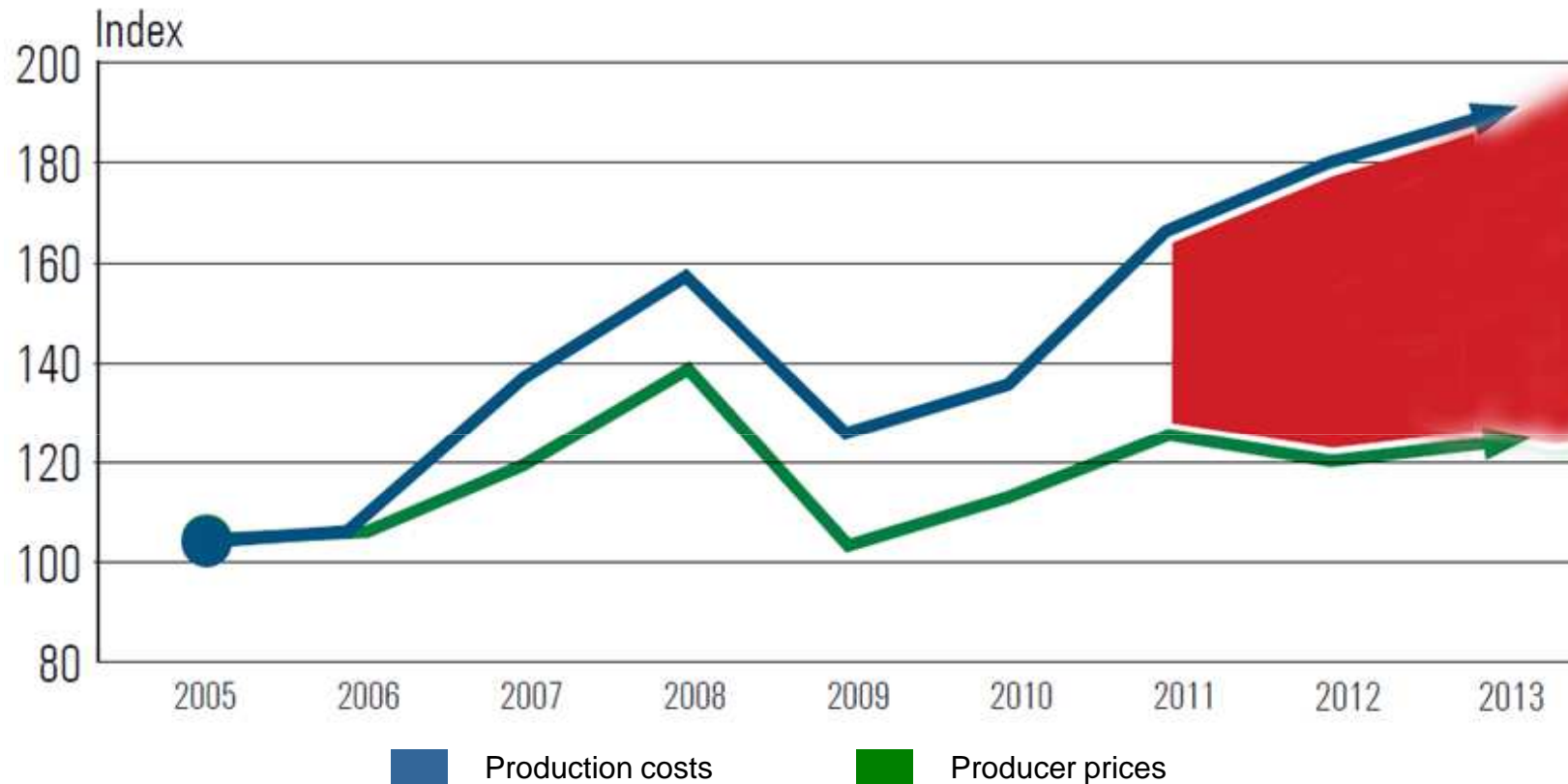
Source: <http://faostat3.fao.org/download/>



Development of German producer prices of conventional and organic milk during since 2013



Relative development of production costs and producer prices for milk in Austria (2005 = 100%)



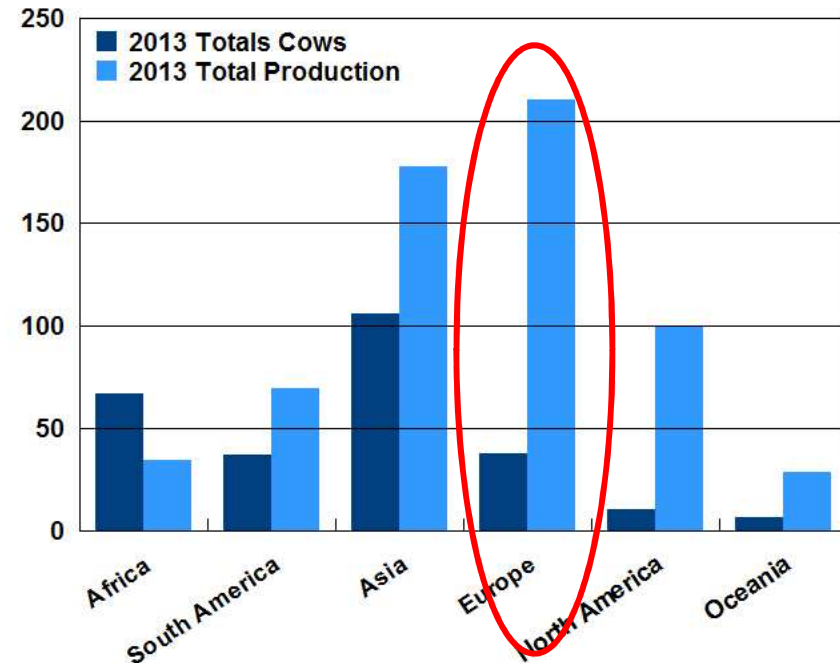
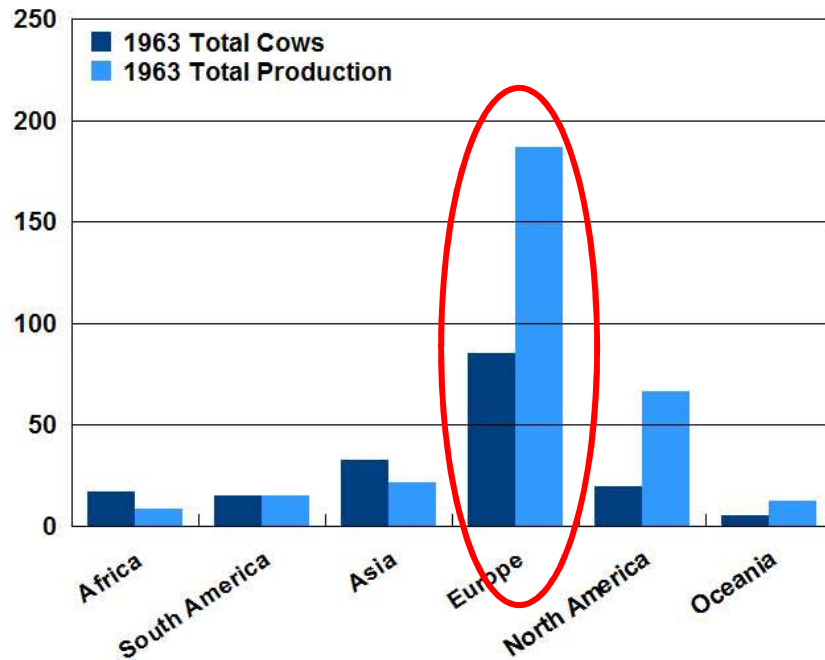
Source: Landwirtschaftskammer Steiermark



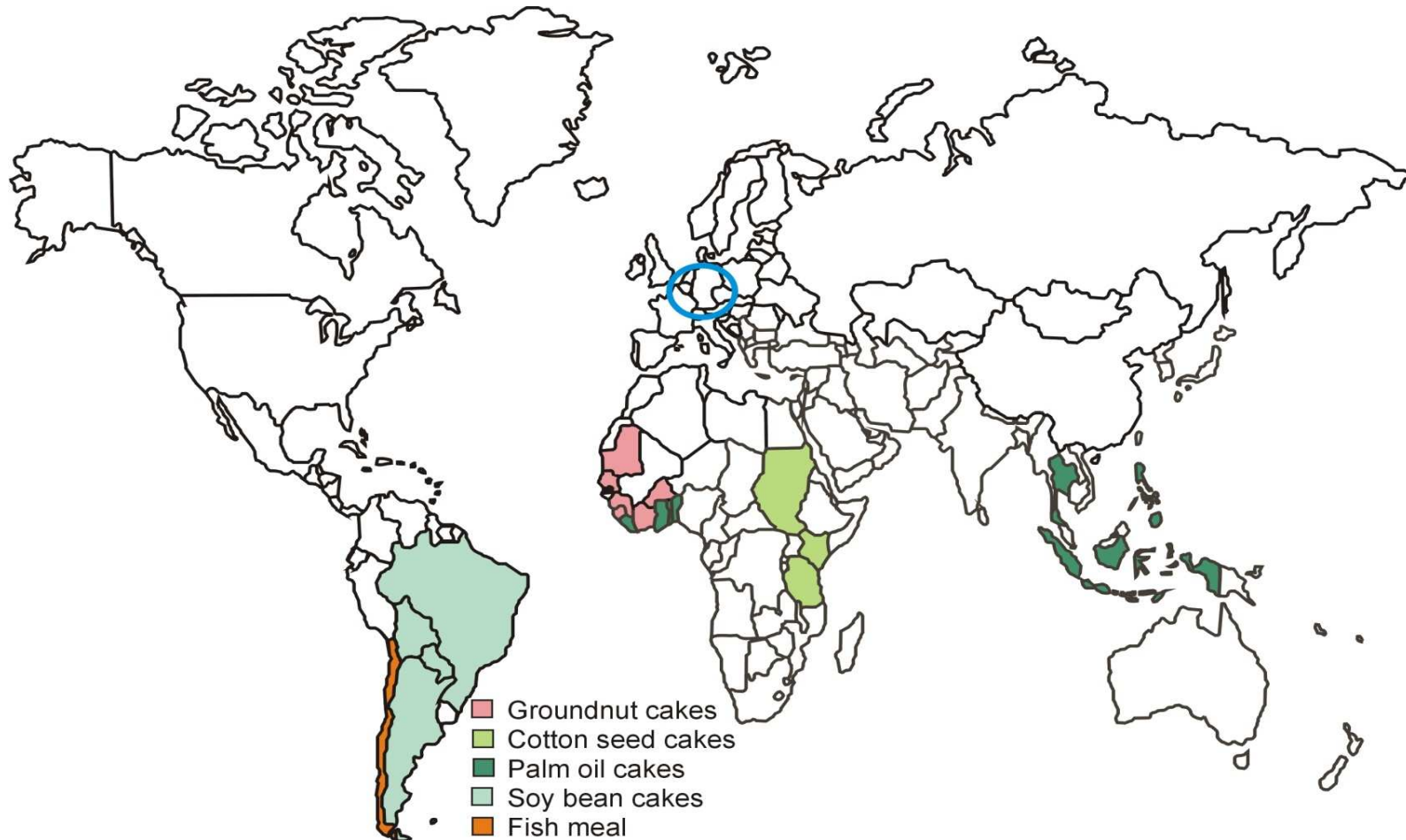
The great milk madness



Total number of dairy cows [million head] and total production and total annual milk production [million tons] by continent in 1963 and 2013



Origin of some feed ingredients connected to dairy production in Western Europe



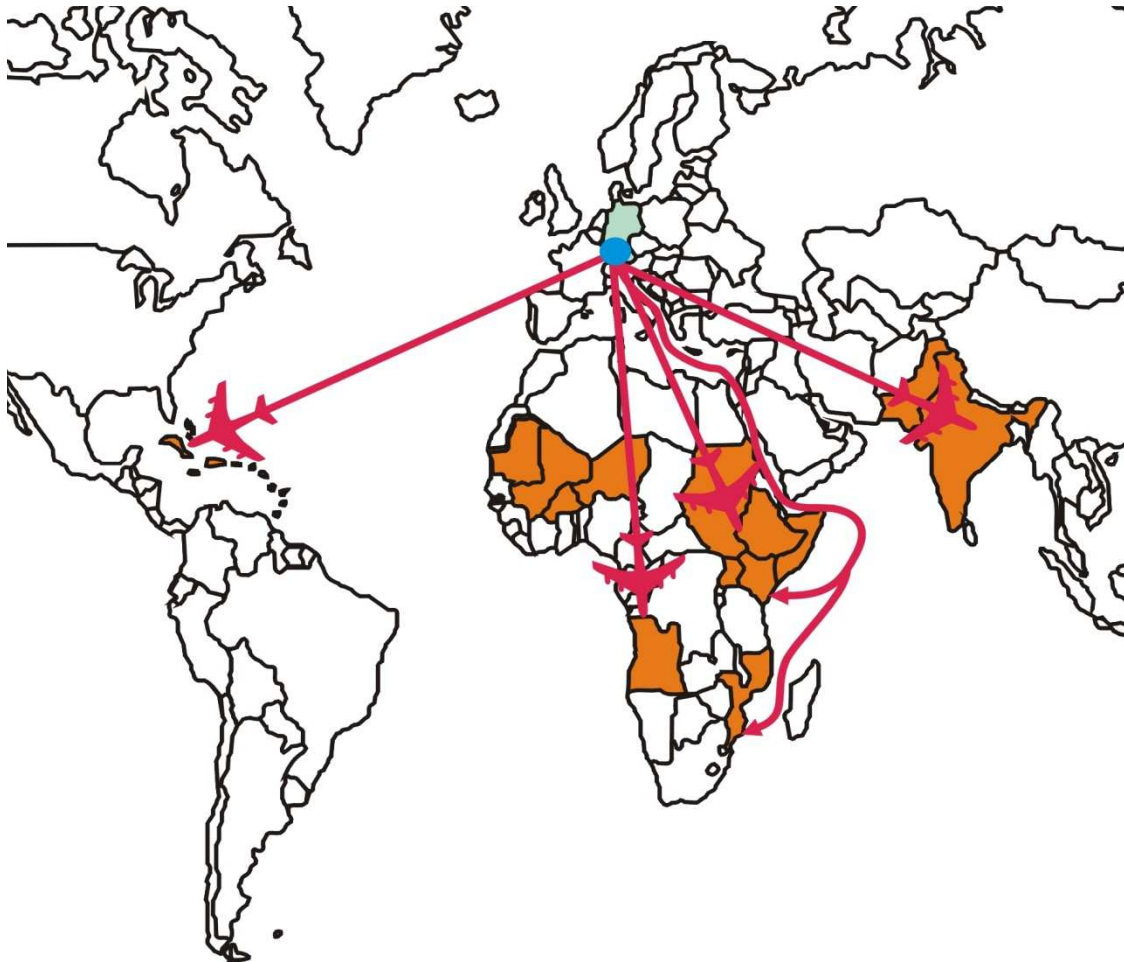
The long way of milk (1)



- 1) Soy bean production in Paraguay
- 2) Transported by lorry to Brazilian harbour, transferred to ship
- 3) Initial processing in Netherlands transferred to smaller ship
- 4) Shipped through Baltic sea, processed to concentrate in Russia
- 5) Transported to Southern Russia, fed to cows, milk production
- 6) Milk transported by road to Southern Germany for final processing



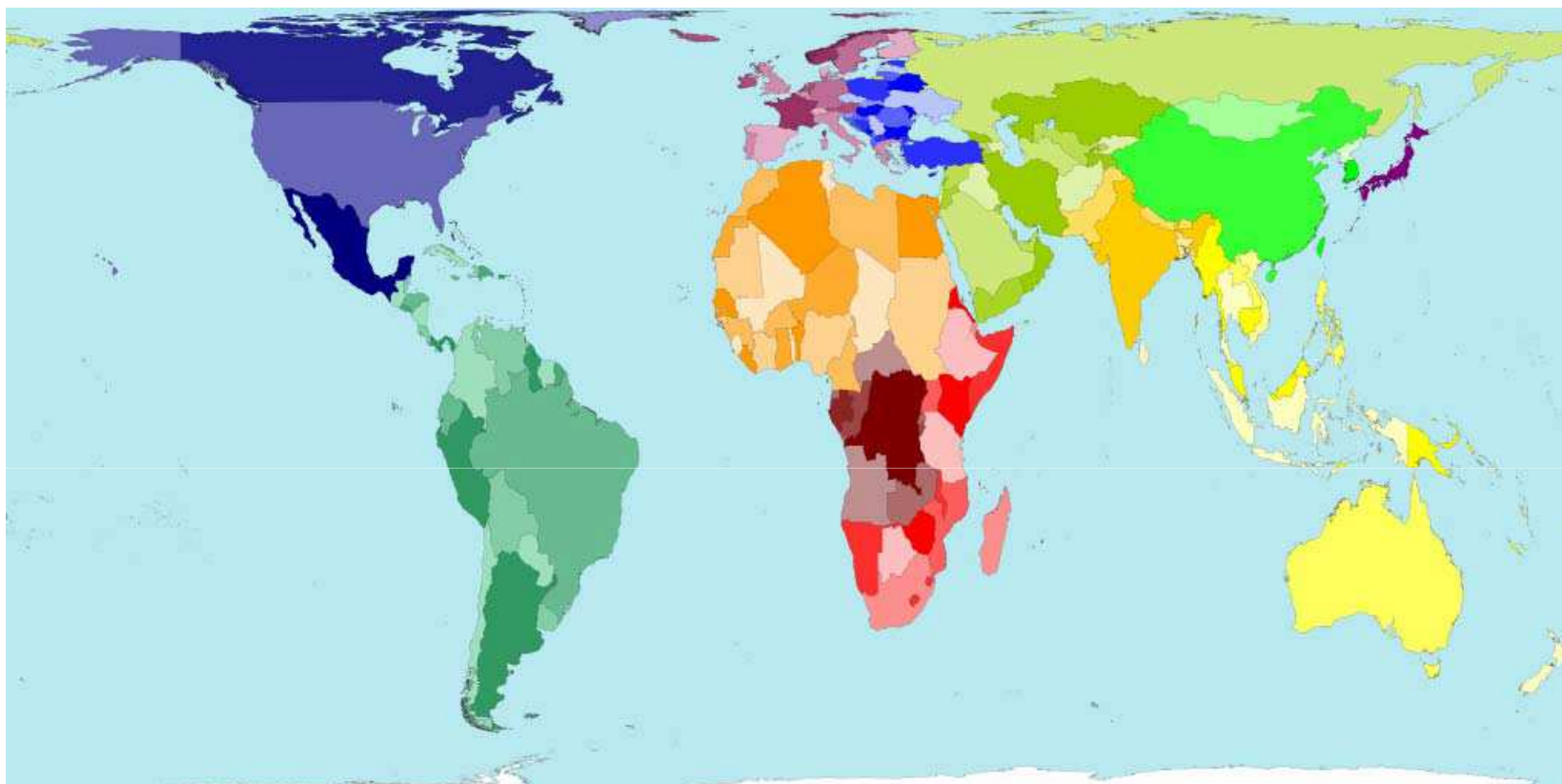
The long way of milk (2)



Disposal of dairy products (dry milk powder and butter fat) as famine relief food to developing countries in Africa, Asia and the Caribbean.



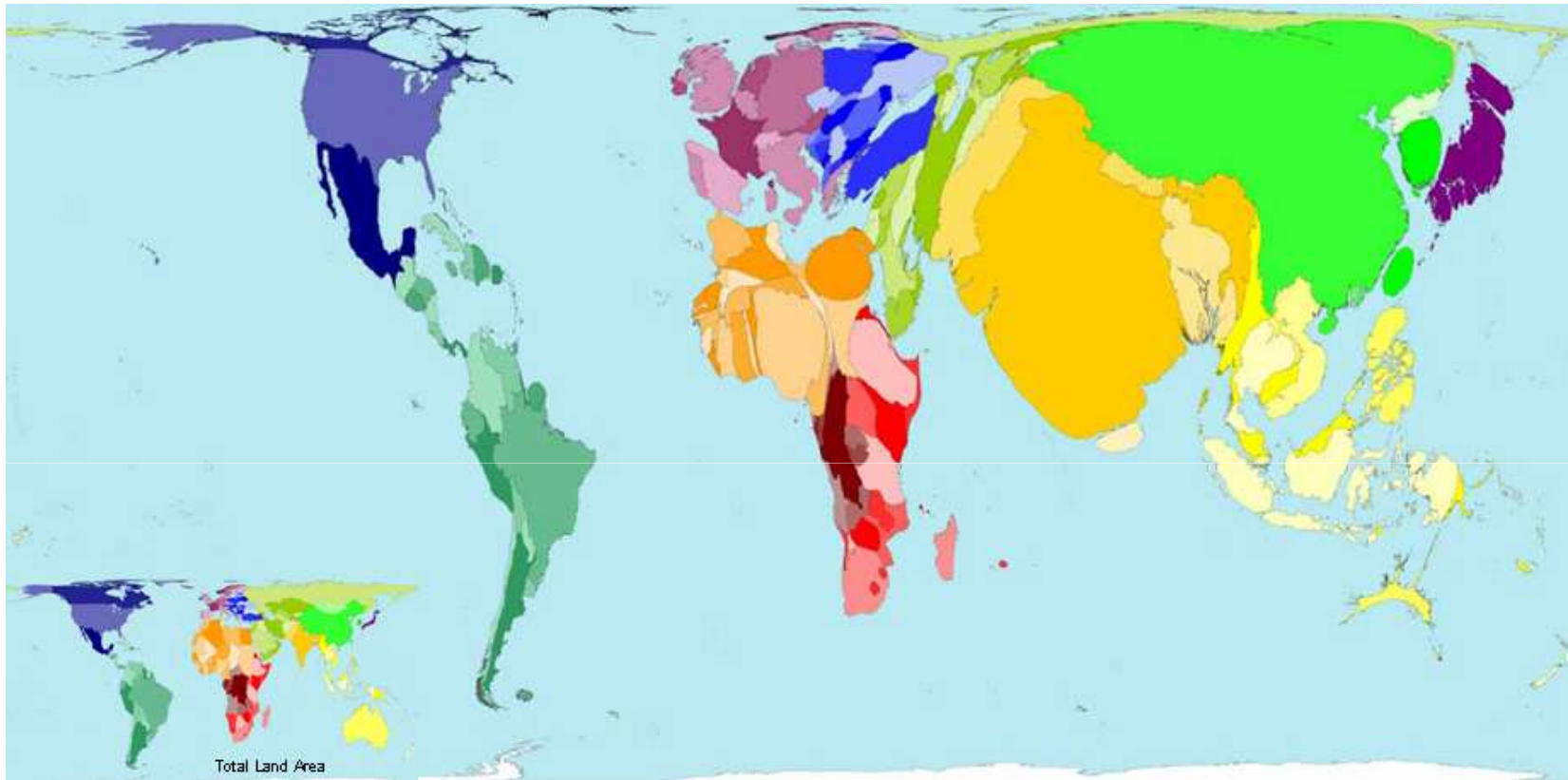
World map representing true land area by country



Source: <http://www.worldmapper.org/> (Map 1)



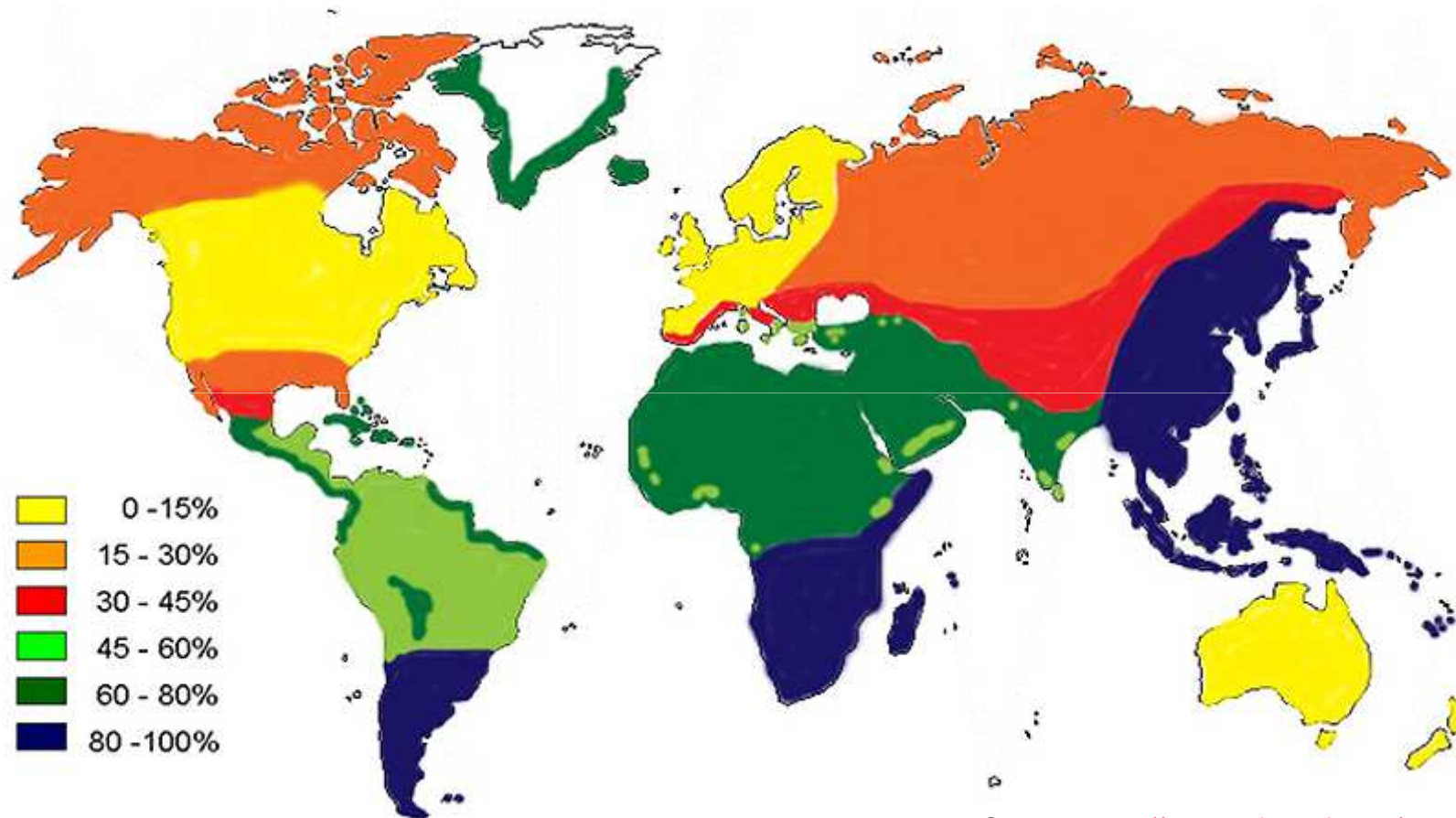
World map representing human population by country



Source: <http://www.worldmapper.org/> (Map 2)



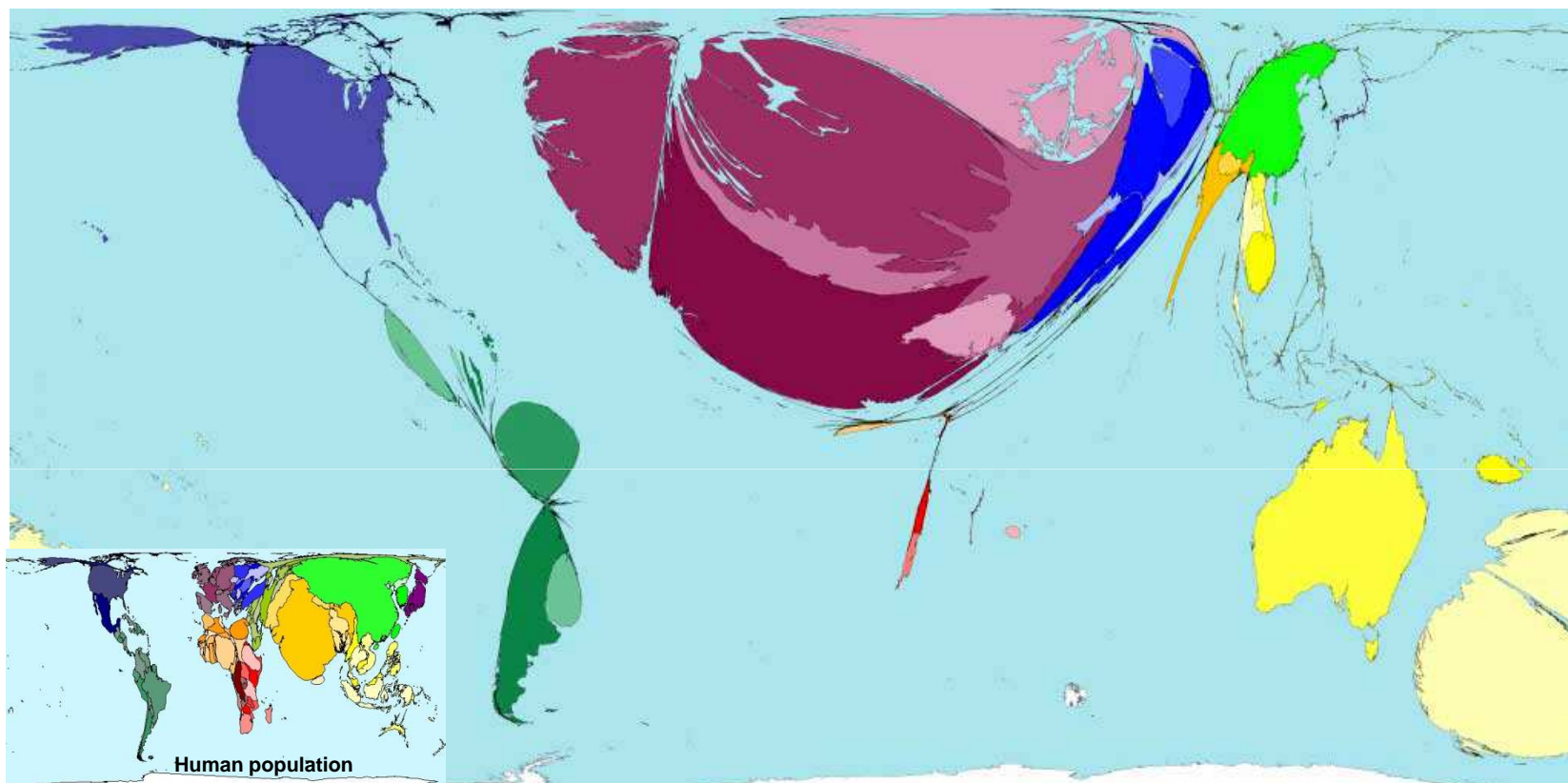
Proportion of lactose intolerant individuals in the world human Population 2009



Source: <http://www.infografik.de/presse>



World map representing dairy exports* by country

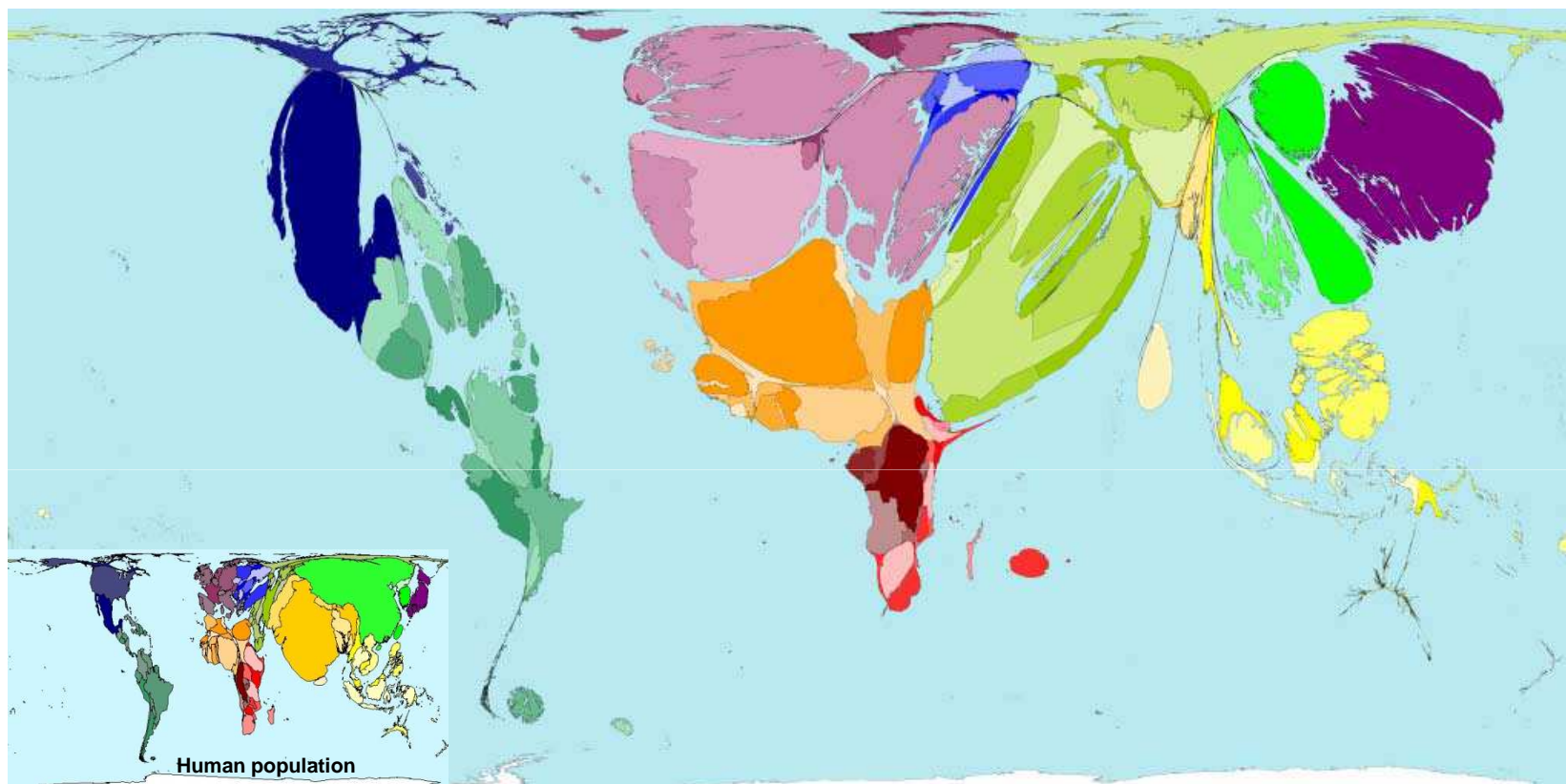


* annual US\$ worth of net dairy exports per person living in that territory

Source: <http://www.worldmapper.org/> (Map 45)



World map representing dairy imports* by country



* annual US\$ worth of net dairy imports per person living in that territory

Source: <http://www.worldmapper.org/> (Map 46)



Literature

<http://www.milk.de/pages/de/Marktinformation-1.htm> : Dairy World Information from the ZMB

