Competitiveness of different dairy production systems

Kees de Roest  Research Centre for Animal Production, Italy

Torsten Hemme  Chairman IFCN, Kiel
Agenda points

• World milk production and world market price
• IFCN concept
• Supply and demand of dairy products
• Competitiveness of dairy systems (production costs and returns to labour)
• Special cases: Parmesan cheese, dual purpose breeds and robust/high yielding cows
### World milk production (mln t)

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2009</th>
<th>var %</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU - 27</td>
<td>153,2</td>
<td>150,9</td>
<td>-1,5</td>
</tr>
<tr>
<td>India</td>
<td>91,1</td>
<td>108,8</td>
<td>19,4</td>
</tr>
<tr>
<td>USA</td>
<td>77,5</td>
<td>85,5</td>
<td>10,3</td>
</tr>
<tr>
<td>China</td>
<td>27,0</td>
<td>44,4</td>
<td>64,4</td>
</tr>
<tr>
<td>Pakistan</td>
<td>28,6</td>
<td>37,3</td>
<td>30,4</td>
</tr>
<tr>
<td>Russia</td>
<td>32,2</td>
<td>32,8</td>
<td>1,9</td>
</tr>
<tr>
<td>Brazil</td>
<td>24,3</td>
<td>29,5</td>
<td>21,4</td>
</tr>
<tr>
<td>New Zealand</td>
<td>15,0</td>
<td>16,2</td>
<td>8,0</td>
</tr>
<tr>
<td>Ukraine</td>
<td>13,7</td>
<td>11,1</td>
<td>-19,0</td>
</tr>
<tr>
<td>Turkey</td>
<td>10,7</td>
<td>12,3</td>
<td>15,0</td>
</tr>
<tr>
<td>Argentina</td>
<td><strong>8,1</strong></td>
<td><strong>10,6</strong></td>
<td><strong>30,9</strong></td>
</tr>
<tr>
<td>Australia</td>
<td>10,1</td>
<td>9,4</td>
<td>-6,9</td>
</tr>
<tr>
<td>Mexico</td>
<td>10,0</td>
<td>11,2</td>
<td>12,0</td>
</tr>
<tr>
<td>Others</td>
<td>126,9</td>
<td>139,0</td>
<td>9,5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>628,4</td>
<td>699,0</td>
<td>11,2</td>
</tr>
</tbody>
</table>
Milk surplus and deficit areas

Self-sufficiency in %

- <= 25
- 25 <= 75
- 75 <= 98
- 98 <= 102
- 102 <= 125
- 125 <= 150
- > 150
- no data

Milk surplus in mill t milk equivalent
Milk deficit in mill t milk equivalent

Source: IFCN dairy sector model – methods + data still under refining
## Import dairy products China

<table>
<thead>
<tr>
<th></th>
<th>Share in world trade</th>
<th>var. 2009/2008</th>
<th>var. 2010 Jan-Apr</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMP</td>
<td>6,4%</td>
<td>28%</td>
<td>87%</td>
</tr>
<tr>
<td>WMP</td>
<td>8,8%</td>
<td>301%</td>
<td>64%</td>
</tr>
<tr>
<td>Butter</td>
<td>3,8%</td>
<td>109%</td>
<td>80%</td>
</tr>
<tr>
<td>Cheese</td>
<td>1,3%</td>
<td>22%</td>
<td>88%</td>
</tr>
</tbody>
</table>

Source: CLAL
World: Share Dairy Products - 2009 in ton

- OCEANIA: 47%
- EUROPA - UE 27: 27%
- AMERICA del NORD: 8%
- AMERICA - CENTRO SUD E CARAIBI: 6%
- EUROPA (Altri - EXTRA UE 27): 5%
- AFRICA: 3%
- ASIA - SUD EST: 3%
- ASIA: 1%
- ASIA MEDIO ORIENTE: 0%

47% 27% 8% 6% 5% 3% 3% 0%
What drives the world milk prices?
Crisis and shocks

- Fall of Berlin wall
- Marrakesh-agreement
- Introduction of EU Milk quota system
- "Black monday"
- Dot-com crisis
- Russia crisis
- Argentina crisis
- Melamine milk crisis
- "Lehman Brothers"
- Bankruptcy of "Lehman Brothers"
- Global financial crisis
- Global economic crisis
- Korea economic crisis

Explanations: *2008 Average from Jan08-Nov08; BSE: Bovine spongiform encephalopathy ; SARS =Severe acute respiratory syndrome

IFCN a way to understand a complex, fast changing, global dairy world
The IFCN is a global dairy research network - founded in 1997 – focus on milk production  www.ifcndairy.org

Welcome to the IFCN Dairy Network

In a rapid changing dairy world the IFCN acts as an ongoing knowledge creation system. It represents 65% of milk production volume. Via a unique combination of partnerships the IFCN represent the whole dairy chain from the farmer towards the consumers.

The IFCN Network

IFCN is offering win-win partnerships for:
- Dairy researchers
- Dairy related companies
- Dairy related institutions
- Dairy farmers
- Students

Join the Network!

Dairy Report 2009

Our annual report is used as a standard reference book to understand global dairy trends and drivers. A must have for your strategic planning.

Report Details

The latest news & dates

Dairy policy impacts on Bangladesh & EU15 dairy farmers livelihoods
11. Jan 2010
The historic low price of milk in 2009 has significantly affected millions of dairy.  Read more »

IFCN at the IDF World Dairy Summit in Berlin 2009
08. Oct 2009
At this years IDF world dairy summit the IFCN presentation was focussing on the question... Read more »

IFCN Dairy Report 2009
21. Sep 2009
This year dairy researchers from over 80 countries compiled the 10th IFCN Dairy Report, which... Read more »
Our Mission: Create a better understanding of milk production world-wide
Status of the IFCN 2010

The IFCN represents 95% of world milk production

Institutional Partners

Research Partners

In IFCN Dairy Report 2009

Process in 2010 (expected)

Working on progress
Milk supply
Milk production volume 2008 & shares of delivered and informal milk

Sources: IFCN Dairy Research Center, National statistics
Change in milk production 2005-2008
Countries and regions in US, CA, MX, BR, RU, TR, CN, IN, PK, AU

Milk production decreased (in mill tons/year)
Milk production increased (in mill tons/year)

Source: IFCN Dairy Report 2009
Winning and losing regions in Europe

2005 - 2008

Milk production decreased
Milk production increased

+ annual change
- annual change

0.4 mill tons/year
0.15 mill tons/year
0.01 mill tons/year

Source: IFCN Dairy Report 2009
Dairy demand

Sources: IFCN Dairy Research Center

International

Kenya

Africa
Per capita consumption of milk - 2008

Per capita consumption in kg

EU 12<sub>new</sub>
> 200kg

EU 15
≈ 300kg

256kg

201kg

140kg

8kg

105kg

32kg

244kg

60kg

Source: IFCN Dairy Research Center
Growth in milk supply and demand
Status what we knew in February 2010


Sources: IFCN Dairy Research Center, stock change beyond 2008 figures were very difficult to measure.
IFCN forecast done in 11/2008
IFCN conference 2008

World milk price US-$ per 100 kg

IFCN forecast done in 11/2008
Future months /years

Source: IFCN dairy sector model – 10/2009
Factors determining competitiveness

1. Production costs
   - Farm size
   - Technical efficiency

2. Farm gate price
   - Valorisation of milk in the supply chain
   - Market protection (external market barriers), milk quota

3. Returns to labour and capital invested compared to other sectors in the economy
Dairy farming systems

- Grazing systems, regular rainfall, low concentrate use (New Zealand, Ireland, Brittany)
- High tariff protected systems with or without milk quota (Canada, Norway, Switzerland and EU-27)
- Unevenly distributed rainfall, high use of concentrate, zero grazing (feedlot) (California-Idaho, Italy)
- Very small scale production primarily for informal markets (India, Pakistan, other Asian countries, Africa)
- Special cases: Protected Designation of Origins (Parmesan cheese, Comté etc. etc)
IFCN milk cost map 2008
Results for the average size farms types in 2008

Cost of milk production (2008)
US-$/100 kg milk (ECM)

- 60<
- 50<=60
- 40<=50
- 30<=40
- <30
Results of world region clusters

Cost of milk production only

Returns of the dairy enterprise

Share of farms with entrepreneurs’ profit

IFCN CRPA
Results of production system clusters

Cost of milk production only

Returns of the dairy enterprise

Share of farms with entrepreneurs’ profit

US$ / 100 kg milk (ECM)

IFCN

CRPA
Ø/++ Farms: Milk and non-milk returns
in US-$/100 kg ECM

Western Europe       CEEC       Turkey, Mid East, North&South America Asia Oceania

- Cattle returns
- Decoupled direct payments
- Milk price
- Coupled direct payments + VAT surplus
- Other returns (f.e. manure, surplus feed)
Ø/++ Farms: Costs of milk production only
in US-$/100 kg ECM

Western Europe  CEEC  Turkey, Mid East, North&South America  Asia  Oceania

- Quota costs
- Opportunity costs
- Cost P&L - non milk returns
- Milk price
IFCN comparison of "larger" farm types

Cost of milk production only in 2008

- Quota costs
- Opportunity costs
- Cost P&L - non milk returns

Price level 2007
World market price 2008
Price level 2006

US$ / 100 kg milk (ECM)
"IFCN world milk supply curve 2008"
Estimate based on the larger / better farm types

- Estimated 'potential' cost of milk production only
  (excl. costs for quota) per country

- Price level 2007
- World market price 2008

Milk production per country (sorted and accumulated)
Special cases:

1. Parmesan cheese production
2. Dual purpose vs High yield cows
3. Robust cows vs High yield cows
PDO's shares on the whole cheese production in Italy

<table>
<thead>
<tr>
<th>Cheese Type</th>
<th>Production (tonnes)</th>
<th>% production</th>
<th>% milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grana Padano</td>
<td>159,621</td>
<td>14.1</td>
<td>22.9</td>
</tr>
<tr>
<td>Parmigiano-Reggiano</td>
<td>118,979</td>
<td>10.5</td>
<td>16.9</td>
</tr>
<tr>
<td>Gorgonzola</td>
<td>48,481</td>
<td>4.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Mozzarella Campana</td>
<td>29,590</td>
<td>2.6</td>
<td>1.3</td>
</tr>
<tr>
<td>Pecorino Romano</td>
<td>23,855</td>
<td>2.1</td>
<td>1.4</td>
</tr>
<tr>
<td>Asiago</td>
<td>23,616</td>
<td>2.1</td>
<td>2.0</td>
</tr>
<tr>
<td>Provolone Valpadano</td>
<td>12,745</td>
<td>1.1</td>
<td>1.2</td>
</tr>
<tr>
<td>Taleggio</td>
<td>9,196</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
<td>Other PDO cheese</td>
<td>27,505</td>
<td>2.4</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>TOTAL PDO</strong></td>
<td><strong>453,588</strong></td>
<td><strong>40.0</strong></td>
<td><strong>52.6</strong></td>
</tr>
<tr>
<td>Other cheese</td>
<td>680,600</td>
<td>60.0</td>
<td>47.4</td>
</tr>
</tbody>
</table>

Fonte: Osservatorio Latte - ISMEA
Product specification of Parmigiano-Reggiano cheese

- Milk only from a delimited area
- Feed regime of cattle does not allow use of silage
- At least 70% of roughage should come from delimited area
- Limited list of concentrates can be used
- Milk cannot be cooled below 18° C
- Only raw milk can be used for processing to cheese
- Milk is collected twice a day
- Cheese is being produced 365 days a year
Parmigiano-Reggiano supply chain

114.000 tonns
produced by:
- 290 cooperatives dairies
- 60 private dairies
- 73 farm dairies

102.000 tonns (89%)
ripened and traded
by 200 ripeners/wholesalers
(top 4 companies account for 25-30%)

12.000 tonns (11%)
ripened and traded
by cheese dairies
(wholesale market and direct sales to consumers)

12 months cheese

Food industry 3%
Ho.Re.Ca. 6%
Export 22%
Multiple retail chains 50%
Direct sales to consumers 6%
Small retailers 13%

Source: CRPA-Reggio Emilia
Price development of PR cheese

Source: CRPA-Reggio Emilia
Milk price for milk destined to PR cheese

<table>
<thead>
<tr>
<th></th>
<th>€/kg</th>
<th>contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price PR</td>
<td>8,83</td>
<td>225</td>
</tr>
<tr>
<td>Prezzo butter</td>
<td>1,15</td>
<td></td>
</tr>
</tbody>
</table>

**Milk price calculation**

<table>
<thead>
<tr>
<th></th>
<th>kg/100 kg</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheese yield</td>
<td>7,0</td>
<td>61,81</td>
<td></td>
</tr>
<tr>
<td>Butter</td>
<td>1,5</td>
<td>1,73</td>
<td></td>
</tr>
<tr>
<td>Totale</td>
<td></td>
<td>63,53</td>
<td></td>
</tr>
<tr>
<td>Proc. Costs</td>
<td>€/100 kg</td>
<td>15,36</td>
<td></td>
</tr>
<tr>
<td>Milk price</td>
<td>€/100 kg</td>
<td>48,17</td>
<td></td>
</tr>
</tbody>
</table>

**Milk reference price 2009**  

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk price</td>
<td>48,17</td>
<td>59,24</td>
</tr>
</tbody>
</table>

Source: CRPA-Reggio Emilia
Milk price for industrial and PR milk

Source: CRPA-Reggio Emilia
## Two different dairy systems in one region (Friuli)

<table>
<thead>
<tr>
<th>Milking cows Breed</th>
<th>110 Holstein Friesian</th>
<th>70 Simmenthal</th>
<th>63%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk production per cow (kg/cow)</td>
<td>8.827</td>
<td>7.137</td>
<td>81%</td>
</tr>
<tr>
<td>Total milk production in kg</td>
<td>991.092</td>
<td>500.646</td>
<td>51%</td>
</tr>
<tr>
<td>Land area (ha)</td>
<td>62</td>
<td>48</td>
<td>77%</td>
</tr>
<tr>
<td>Fat content in %</td>
<td>3.86</td>
<td>3.92</td>
<td>101%</td>
</tr>
<tr>
<td>Protein content %</td>
<td>3.43</td>
<td>3.46</td>
<td>101%</td>
</tr>
<tr>
<td>Labour productivity (kg milk/h)</td>
<td>117</td>
<td>73</td>
<td>63%</td>
</tr>
</tbody>
</table>

Source: CRPA-Reggio Emilia
Profit/loss account of two dairy systems

<table>
<thead>
<tr>
<th></th>
<th>FRIULI V.G.</th>
<th>FRIULI V.G.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>110 Holstein Friesian</td>
<td>70 Simmenthal</td>
</tr>
<tr>
<td>Total returns</td>
<td>€/100 kg</td>
<td>€/100 kg</td>
</tr>
<tr>
<td>Gross production costs</td>
<td>50,55</td>
<td>494,769</td>
</tr>
<tr>
<td>Net production costs</td>
<td>54,38</td>
<td>514,768</td>
</tr>
<tr>
<td>Profit/Loss</td>
<td>-3,83</td>
<td>-19,999</td>
</tr>
<tr>
<td>Direct costs</td>
<td>35,87</td>
<td>364,868</td>
</tr>
<tr>
<td>Margin (Returns - Direct costs)</td>
<td>14,69</td>
<td>129,901</td>
</tr>
<tr>
<td>Returns to labour (Euro/h)</td>
<td>8,19</td>
<td></td>
</tr>
</tbody>
</table>

Source: CRPA-Reggio Emilia
Comparison between dual purpose and high milk yield cow (1)

<table>
<thead>
<tr>
<th></th>
<th>ROBUST DUAL PURPOSE COW</th>
<th>HIGH OUTPUT COW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Milk income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lactation income</td>
<td>6.800</td>
<td>8.765</td>
</tr>
<tr>
<td>Annual income</td>
<td>6.284</td>
<td>431</td>
</tr>
<tr>
<td><strong>Feed costs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DMI 19 kg</td>
<td>t DM/cow</td>
<td>t DM/cow</td>
</tr>
<tr>
<td>Concentrates</td>
<td>2.000</td>
<td>2.500</td>
</tr>
<tr>
<td>Forage (DM)</td>
<td>4.935</td>
<td>4.935</td>
</tr>
<tr>
<td>Margin over feed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Neil Darwent, European Farmers Network
Comparison between dual purpose and high milk yield cow (2)

<table>
<thead>
<tr>
<th></th>
<th>ROBUST DUAL PURPOSE COW</th>
<th>HIGH OUTPUT COW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calf sales</td>
<td>Calves sold</td>
<td>Value per head £/cow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>96,80</td>
</tr>
<tr>
<td>Calf sales</td>
<td></td>
<td>66</td>
</tr>
<tr>
<td>Culling rate</td>
<td>Heifer costs</td>
<td>20%</td>
</tr>
<tr>
<td>Cull value</td>
<td>Net cost</td>
<td>600</td>
</tr>
<tr>
<td>Replacement costs</td>
<td></td>
<td>Heifer costs</td>
</tr>
<tr>
<td>Net margin per cow</td>
<td></td>
<td>Heifer costs</td>
</tr>
<tr>
<td>100 Cow herd</td>
<td></td>
<td>Cull value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Net cost</td>
</tr>
<tr>
<td>Net margin per cow 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cow herd</td>
<td></td>
<td>715,92</td>
</tr>
<tr>
<td></td>
<td></td>
<td>71,591,83</td>
</tr>
</tbody>
</table>

Source: Neil Darwent, European Farmers Network
Europe – Question is in what region you are in?

* In Ireland, NL and DK the milk consumption per capita is linked to neighbour countries to get a realistic self-sufficiency and surplus/deficit: IE→UK, NL→BE, DK→SE

Source: IFCN Dairy Report 2009
Thank you for your attention