Producing the milk where the people are?

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content

- Trends in the future development of world dairy sector.
- The Israeli dairy sector and it’s “production concept”.
- How Israeli “production concept” fits with future world demand for milk?
- Israeli experience, know how and technologies which can serve for the development of new dairy sectors in proximity to big cities in the developing countries.
Trends in world cow milk production 1987 - 2009 (million tons)
What will influence future world milk production and consumption?

- World economical situation.
- Prices of oil and grains.
- Stocks of dairy commodities in the exporting countries.
- States policies towards import/export of dairy products.
- Continuation/expansion of school milk programs.
- Animal welfare regulations.
- Environment regulation.
- Population “Immigration” from rural to urban areas.
- “Climatic accidents” (droughts and floods due to G.W).
Trends in global population growth by region

Graph showing population growth over time for different regions, including World, Industrialized, BRIC, LDC, and Oth Dev.
Trends in expected milk production by regions

(Million tonnes)
The decline in EU share in world trade in milk
9 out of 20 largest milk importers comes from Asia

Source: DA, ZMP, USDA
Trends in world milk price 1983 - 2009

Source: USDA
Consumption of animal products in China
2005 - 2030

Million tons

Year

Beef
Poultry
Pork
Eggs
Milk
Most of world population (>70%), will live in next decades in urban areas of the developing countries
The greatest development in per capita milk consumption in China will be in urban areas

<table>
<thead>
<tr>
<th>Year</th>
<th>Urban population</th>
<th>Rural population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>5,2</td>
<td>0,6</td>
</tr>
<tr>
<td>1997</td>
<td>5,9</td>
<td>0,9</td>
</tr>
<tr>
<td>1999</td>
<td>9,2</td>
<td>1,0</td>
</tr>
<tr>
<td>2003</td>
<td>13,0</td>
<td>1,1</td>
</tr>
<tr>
<td>2005</td>
<td>21,7</td>
<td>1,1</td>
</tr>
<tr>
<td>% Change 2005 – 1995</td>
<td>420%</td>
<td>85%</td>
</tr>
</tbody>
</table>

Babcock Inst. Paper No. 4, Univ. of Wisconsin, 2006
How will future world demand for milk be supplied?

- World cows population – 250 million.
- World cow milk production – 580 billion/year.
- Per “average cow” milk production – 2500 lit.
- Expected annual growth in world demand: 2-3 %.
- World annual demand for additional milk: 11 – 17 billion lit/year.
- This is the annual production in Australia or New Zealand!!!
Two main alternatives to supply world milk demand

• **Alternative 1** – increase world “average cow” production by 150 - 200 lit/cow/year
  R&D, genetic and management improvements

• **Alternative 2** – Increase world cows number by 5 – 7.5 million cows each year.
  Manipulations by using sexed semen and embryo transfer (E.T) techniques
The disappointing point is that, milk yields are not expected to increase significantly in developing countries in the next decade!!!
So, how will world supply it’s increasing demand for milk? (1)

• Factors influencing growth in milk demand still exist and will probably become even stronger in the future (due to increase demand in urban population of developing countries).
• Fluctuations and periodical restriction in world milk supply are expected to continue (due to “climatic accidents” like droughts and floods).
• International milk price will continue being relatively high (due to input costs and expected discrepancy between offer and demand).
• Supply of additional world demand for milk will require increase world cows inventory and increase per cow yield.
• Increase cow’s yield is the most efficient way to supply the increase in world’s milk demand, both from economical and environmental point of view.
So, how will world supply it’s increasing demand for milk?

Most of the future increase in milk consumption will be by the increasing urban populations in developing countries. Most of them are located in tropical and sub-tropical regions. These populations will request high quality products and will be able to pay for it relatively high prices. Great part of the increasing demand for milk will be for liquid and soft products (milk beverages and yoghurts). There is an advantage for manufacturing these products by using fresh milk. Cost of transportation will play an important roll in defining the location of supplying farms, giving advantage to farms in proximity to consumption centers. Producing close to large urban centers, have other advantages, such as the potential use of “agro-industrial” by products for feeding cows and the use of sewage water for irrigating forage crops.
All these characteristics exist in the Israeli dairy sector, which can serve as a “model” for future development of intensive producing dairy farms in similar conditions.
### Some data about the Israeli dairy sector in 2009
(source – Israel Cattle Breeders Association annual report)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herds</td>
<td>1000</td>
</tr>
<tr>
<td>Cows</td>
<td>120,000</td>
</tr>
<tr>
<td>Milk, kg/cow/year</td>
<td>11,650</td>
</tr>
<tr>
<td>% fat</td>
<td>3.60</td>
</tr>
<tr>
<td>% protein</td>
<td>3.20</td>
</tr>
<tr>
<td>SCC (x1000)</td>
<td>240</td>
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</table>
Advantages of Israeli dairy sector

- High professional level of the Israeli farmer.
- Well organized dairy sector through farmers association – ICBA (Israel Cattle Breeders Association).
- Well protected sector (production quota, secure “target price”, controlled price of basic products, restrictions to importation).
- Well supported sector – government subsidies for research, extension and disease control, farmers owned cooperatives for AI and clinical veterinary services.
Activity
+ID
Milk

Feed - Rumination

Weight

Conductivity
Temperature

Israel Computerized Management system

Veterinarian

Cow data

Monthly milking data

Farmer
Limitations of Israeli dairy sector

- Shortage in water and land for pasture and forage growing.
- Hot and dry summer, lasting between 4 to 6 months per year.
- Regional exotic diseases due to climatic conditions and deficiency in veterinary control in the neighbouring countries.
- High input cost (grains, fuel, machinery and labour).
- Limited markets.
The Israeli “dairy model”

• The unique and non conventional production concept in Israel is based on the belief that under Israel’s conditions, maximizing per cow milk production tends to give the highest profitability.

• The “Israeli production model” is characterized by:
  - Large dairy farms in proximity to big cities.
  - Cows in full confinement all year around.
  - Zero grazing and 100% TMR.
  - Intensive feeding and management practices.
  - “Israeli Holstein” breed of high genetic potential.
  - Good housing systems with high roofs and large space per cow under shade.
  - Intensive use of “cow cooling systems” in summer.
Under Israeli conditions
Increased production = increased efficiency

<table>
<thead>
<tr>
<th>Milk yield (kg/d)</th>
<th>Cost of 1 kg DM TMR (Cents)</th>
<th>Intake (kg/d)</th>
<th>Cost of feeding ($/d)</th>
<th>Cost of feeding (cents/liter)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>13.5</td>
<td>14.2</td>
<td>1.9</td>
<td>12.6</td>
<td>100</td>
</tr>
<tr>
<td>25</td>
<td>15.7</td>
<td>18.0</td>
<td>2.8</td>
<td>11.2</td>
<td>88</td>
</tr>
<tr>
<td>35</td>
<td>16.7</td>
<td>20.8</td>
<td>3.5</td>
<td>10.0</td>
<td>79</td>
</tr>
<tr>
<td>45</td>
<td>17.7</td>
<td>23.4</td>
<td>4.1</td>
<td>9.2</td>
<td>73</td>
</tr>
</tbody>
</table>
The “Israeli feeding concept”

- TMR as predominant feeding system.
- TMR is prepared mostly in large “Regional feeding centres”, transported and distributed to the cows in the farm.
- “Feeding centres”, allows the efficient use for feeding of forages and agro-industrial by-products.
- TMR is provided to cows, heifers and fattening bulls, in large and small dairy farms.
- Most of the forages used in the feeding centres are grown when irrigated by sewage water, collected from the neighbour city.
Sewage treatment facility for forage crops irrigation
“Regional feeding centers” in Israel
Typical feed center, flat storage of concentrates
Grains storage in regional feeding center
In 2007 - 630,000 tons of fresh agro-industrial materials were used for feeding the Israeli dairy sector.

Total feeding value - 25 million US$.

Additional 15 million US$, gained by preventing the expenses required to dispose these materials.

Overall value of using these materials - 40 million US$/year (360 US$/cow/year or 3.3 cents/litre of milk),

Save above 10% of total per cow annual feeding expenses.
Obtaining high productivity and production efficiency is not easy the hot Israeli summers.
Heat stress causes today the largest losses to world dairy sector (more than mastitis and low fertility)

How Israelis deal with this problem?

- Israeli summer cause large economical losses to farmers and industry (due to seasonality in supply and increased cost of production).
- Summer effect was aggravated in the last decades, due to global warming and increase in cow’s productivity.
- In last 3 decades, cow cooling methods, were developed and implemented in most of the dairy farms in Israel.
- Studies conducted in Israel indicate that intensive cooling of high yielding cows in summer have the potential to:
  - Eliminate almost all losses due to decline in milk production.
  - Eliminate the 10% decline in feeding efficiency.
  - Reduces to an half the decline in conception rate of cows inseminated in summer.
Large fans in the holding pen
Large fans Ventilation in loose house resting area
Cooling cows in the “feeding line”
Special “cooling yard”
Special cooling yard
The benefits obtained in Israel by implementing “cow cooling systems”

- Significant reduction in seasonality of milk supply to the market (“smooth the curve”).
- Reduce cost of production of milk produced in summer.
- Improve fat and protein content in summer milk.
- Improve the quality and taste of summer milk.
- Reduce contribution to global warming.
What are the “cooling needs” in different “climatic zones”?

**Tropics** – need for cooling all year around (S.E. Asia, Caribbean Islands, Central America, Central Africa, South Japan, South China).

**Sub-tropics** – need for cooling part of the year, 3-8 month (Israel, South USA, South America, Australia).

**Temperate** – need for cooling only during “heat waves” (Europe, North USA, North Japan).
In which areas can Israeli experience contribute to the development of future world dairy sector?

- Growing forage on residual waste water.
- Use of agro-industrial by-products for feeding.
- Feeding and management practices to obtain high productivity.
- Overcoming summer heat stress negative effect.
- Use of sophisticated tools and technologies for efficient managing of dairy farms.
- Establishment of “supporting institutions” and organization of the dairy sector.
Thank you