Developing the typical dairy products of Alexandria and Beheira

Diagnosis and local strategy

March 2014
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LACTIMED aims to foster the production and distribution of typical and innovative dairy products in the Mediterranean by organising local value chains, supporting producers in their development projects and creating new markets for their products. The project is implemented under the ENPI CBC MED Programme, and is financed, for an amount of EUR 4.35 million, by the European Union through the European Neighbourhood and Partnership Instrument.

The European Union is made up of 27 Member States who have decided to gradually link together their know-how, resources and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development whilst maintaining cultural diversity, tolerance and individual freedoms. The European Union is committed to sharing its achievements and its values with countries and peoples beyond its borders.

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INTRODUCTION & OVERVIEW .................................................................................. 6

1. THE DAIRY INDUSTRY IN EGYPT .................................................................. 8
   1.1. DAIRY FARMING AND MILK PRODUCTION ................................................. 8
   1.2. ANIMAL FEED .......................................................................................... 9
   1.3. THE EGYPTIAN DAIRY MARKET ............................................................... 10
       1.3.1. General overview ............................................................................. 10
       1.3.2. Drinking milk .................................................................................. 12
       1.3.3. Cheese ............................................................................................. 13
       1.3.4. Yoghurt ............................................................................................ 14
       1.3.5. Desserts ......................................................................................... 15
   1.4. EGYPTIAN TRADITIONAL DAIRY PRODUCTS ........................................... 16

2. THE DAIRY CHAIN IN ALEXANDRIA AND BEHEIRA GOVERNORATES 18
   2.1. METHODOLOGY OF THE FIELD SURVEY ............................................... 18
       2.1.1. General approach ........................................................................... 18
       2.1.2. Objectives of the survey ................................................................. 19
       2.1.3. Roadmap for the methodology and research design ....................... 19
   2.2. QUANTITATIVE ANALYSIS OF THE SURVEY RESULTS .......................... 21
       2.2.1. Dairy farmers ................................................................................. 22
       2.2.2. Milk processors ............................................................................. 27
   2.3. QUALITATIVE ANALYSIS, COMMON PROBLEMS AND PRIORITIES FOR THE CLUSTER ................................................................. 33
       2.3.1. Dairy farmers’ problems ................................................................. 33
       2.3.2. Dairy processors’ problems ............................................................. 33
       2.3.3. Summary of different players’ crucial comments ............................. 33
       2.3.4. Players’ vision on the dairy cluster .................................................. 34
   2.4. SWOT ANALYSIS ..................................................................................... 35
   2.5. RECOMMENDATIONS ............................................................................. 36
       2.5.1. Dairy farmers’ recommendations .................................................... 36
       2.5.2. Dairy processors’ recommendations ............................................... 36
       2.5.3. Recommendation for forming a successful dairy cluster .................. 36
       2.5.4. Beneficial outcomes of a local dairy cluster .................................... 37

CONCLUSION .................................................................................................. 38
REFERENCES ......................................................................................... 39

APPENDIXES ....................................................................................... 40

APPENDIX 1: DIVISION OF LABOUR BETWEEN GAFI AND CITL-AAST FOR THE DIAGNOSIS .....40

APPENDIX 2: PUBLIC INSTITUTIONS AND SUPPORT ORGANISATIONS INVOLVED IN THE DAIRY CHAIN IN ALEXANDRIA AND BEHEIRA .........................................................................................41

Public institutions .........................................................................................41
Support organisations .....................................................................................43

APPENDIX 3: THE TYPICAL DAIRY PRODUCTS OF EGYPT ...............................................44

APPENDIX 4: PRODUCTION SPECIFICATIONS FOR TRADITIONAL EGYPTIAN CHEESES ..........49

Specification 1 - Domiat cheese (soft cheese) .............................................................................49
Specification 2 - Ras cheese (hard cheese) ...................................................................................52

APPENDIX 5: THE INDIAN CLUSTERING EXPERIENCE ..............................................................54
### ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CITL-AAST</td>
<td>College of International Transport and Logistics, Arab Academy for Science Technology and Maritime Transport</td>
</tr>
<tr>
<td>AOP</td>
<td>Aspect-oriented Programming</td>
</tr>
<tr>
<td>APRI</td>
<td>Animal Production Research Institute</td>
</tr>
<tr>
<td>B2B</td>
<td>Business to business</td>
</tr>
<tr>
<td>BMI</td>
<td>Business Monitor International</td>
</tr>
<tr>
<td>CAGR</td>
<td>Compound Annual Growth Rate</td>
</tr>
<tr>
<td>CAPMAS</td>
<td>Central Agency for Public Mobilization and Statistics</td>
</tr>
<tr>
<td>EGP</td>
<td>Egyptian pound</td>
</tr>
<tr>
<td>EU</td>
<td>European Commission</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
<tr>
<td>FTC</td>
<td>Food Technology Center</td>
</tr>
<tr>
<td>GAFI</td>
<td>General Authority for Investment</td>
</tr>
<tr>
<td>HACCP</td>
<td>Hazard Analysis and Critical Control Points</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>SCM</td>
<td>Supply Chain Management</td>
</tr>
<tr>
<td>SNF</td>
<td>Solids not Fat</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for the Social Sciences</td>
</tr>
<tr>
<td>SWOT</td>
<td>Strengths, Weaknesses, Opportunities, and Threats</td>
</tr>
<tr>
<td>UAE</td>
<td>United Arab Emirates</td>
</tr>
<tr>
<td>UNIDO</td>
<td>United Nations Industrial Development Organization</td>
</tr>
</tbody>
</table>
Introduction & Overview

The dairy industry, which is a key component of world food systems, especially in developing countries like Egypt, is currently undergoing major changes. This process is being driven by a wide range of forces, including shifts in the regulatory environment for dairy production and trade, technological development in the production of milk and dairy products, rapid changes in consumption patterns, and the restructuring of transnational corporate strategies for this sector. Technological and market changes result in rapid developments in products and processes, the use of new packaging technologies, and the replacement of full cream milk with specialist milk types. In addition, dairy farming is also being restructured via breeding programmes and improved feeding regimes that are producing higher yields per cow.

Besides, the dairy industry has to face significant constraints as far as hygiene, storage, transport and trade are concerned. This is particularly true for liquid milk. Hence, although some areas are suited well to dairy production and traditionally have developed know-how in milk and dairy processing, the industry as a whole has remained relatively geographically dispersed.

Dairy is a major industry in Egypt and occupies a significant place in food supply. It is characterized by the multitude of products and therefore production lines. Plants can have as few as one or two production lines or all of them. The dairy industry involves the production of raw milk and its processing into products such as drinking milk, butter, cheese, yogurt, condensed milk, dried milk and ice cream (Euromonitor, 2011).

The purpose of the overall study is to analyse the dairy chain in Alexandria and Beheira (West Nile Delta region) and assess the impact of clustering for local stakeholders. The first section provides a general overview of the dairy industry in Egypt, with particular attention to farming and milk production, animal feed, trends in the domestic dairy market, and traditional dairy products. The second section focuses on the dairy chain in Alexandria and Beheira governorates. After a brief description of relevant public institutions and support organisations, it presents the methodology of the field survey and analyses the results of interviews with dairy farmers and processors. With a view to highlight the potential benefits of a dairy cluster, the study concludes with strategy recommendations to maximize the dairy chain’s strengths and opportunities and; at the same time, minimize weaknesses and threats.
1. The dairy industry in Egypt

1.1. Dairy farming and milk production

Graph 1 shows the changes in the estimated numbers of different livestock species from 2000 to 2009, while graph 2 shows the local production of raw milk. An estimate of the production per head has been calculated using these two figures and is presented in graph 3.

Graph 1: Changes in the estimated numbers of different livestock species in Egypt from 2000 to 2009

<table>
<thead>
<tr>
<th>Livestock species</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows</td>
<td>4 525</td>
<td>5 023</td>
<td>4 933</td>
<td>4 610</td>
<td>4 485</td>
<td>4 369</td>
<td>4 227</td>
<td>4 081</td>
<td>3 801</td>
<td>3 530</td>
</tr>
<tr>
<td>Buffaloes</td>
<td>3 839</td>
<td>4 053</td>
<td>4 105</td>
<td>3 937</td>
<td>3 885</td>
<td>3 845</td>
<td>3 777</td>
<td>3 717</td>
<td>3 533</td>
<td>3 379</td>
</tr>
<tr>
<td>Sheep</td>
<td>5 592</td>
<td>5 498</td>
<td>5 467</td>
<td>5 385</td>
<td>5 232</td>
<td>5 043</td>
<td>4 939</td>
<td>5 105</td>
<td>4 671</td>
<td>4 469</td>
</tr>
<tr>
<td>Goats</td>
<td>4 139</td>
<td>4 473</td>
<td>4 211</td>
<td>3 877</td>
<td>3 877</td>
<td>3 803</td>
<td>3 811</td>
<td>3 582</td>
<td>3 497</td>
<td>3 425</td>
</tr>
<tr>
<td>Camels</td>
<td>137</td>
<td>107</td>
<td>84</td>
<td>148</td>
<td>142</td>
<td>129</td>
<td>136</td>
<td>127</td>
<td>134</td>
<td>141</td>
</tr>
</tbody>
</table>

Source: Ministry of Agriculture and Land Reclamation

Graph 2: Changes in raw milk production in Egypt from 2005 to 2009

<table>
<thead>
<tr>
<th>Livestock species</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows</td>
<td>3 824</td>
<td>3 954</td>
<td>4 210</td>
<td>5 280</td>
<td>5 624</td>
</tr>
<tr>
<td>Buffaloes</td>
<td>5 551</td>
<td>5 787</td>
<td>5 925</td>
<td>5 980</td>
<td>5 624</td>
</tr>
</tbody>
</table>

Source: CAPMAS, 2010
Graph 3: Changes in raw milk production per head in Egypt from 2000 to 2009

Egypt's average milk production per cow in 2009 was about 0.619 ton per year (graph 3) while in 23 major American States in January 2011 it was about 0.844 ton per month, i.e. about 10 tons per year. The ratio between the American States average and the Egyptian average is almost 16 to 1 respectively. This ratio puts the Egyptian dairy industry out of the competition and calls for action towards the development of the dairy industry, like improving the animal feed and increasing the use of the automated milking. These measures are discussed in details in later sections.

One of the principal problems that hinders the productivity in dairy sector is the animal feed sector, as it is discussed below.

1.2. Animal feed

Animal feed is one of the main inputs affecting the size of livestock production and occupies the first place among production factors in terms of cost; its value reached about 23 billion EGP, representing about 58.3% of the total value of agricultural production requirements in 2008. The demand for feed derived from the demand for animal products such as red and white meat, fish and dairy products. Feed crops have an important place among agricultural crops. In 2008, they covered about 2,458 acres of land, representing 30.4% of winter crop areas, 4.5% of summer crop areas, 9% of Nile crop areas and 16% of the total crop areas (Moussa et al., 2011).

Animal feed can be divided into 3 types: green feed, coarse feed, and concentrated feed. Table 1 below shows the deficit between animal feed production and consumption.

<table>
<thead>
<tr>
<th>Items</th>
<th>Available for consumption</th>
<th>Requirements</th>
<th>Deficit or Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green feed</td>
<td>64 773</td>
<td>39 824</td>
<td>24 949</td>
</tr>
<tr>
<td>Straw</td>
<td>9 216.6</td>
<td>9 566</td>
<td>(349.4)*</td>
</tr>
<tr>
<td>Concentrated feed</td>
<td>5 049.8</td>
<td>15 906</td>
<td>(10 856.2)*</td>
</tr>
<tr>
<td>Starch equivalent</td>
<td>11 630.8</td>
<td>18 405</td>
<td>(677.2)*</td>
</tr>
</tbody>
</table>

The feed gap in Egypt means that local production does not cover livestock feeding needs. This gap is covered by importing fodder from abroad. Egypt's main feed imports are maize, soybean and bran.

Therefore, animal feeding should be one of the key topics addressed by agricultural extension programmes for livestock breeders. It would help to increase animal productivity and reduce unit production costs.

Unbalanced feeding leads to excessive intake of some nutrients whilst others remain deficient. This not only reduces milk production and increases production costs, but also affects various physiological functions including long term animal health, fertility and productivity. To ensure improved productivity, it is necessary to augment and secure feed resources through short and long term planning. It is also essential that milk
Developing the typical dairy products of Alexandria and Beheira
Diagnosis and local strategy

producers feed their animals with nutrients in amounts that match their physiological needs, as well as the objective of maintaining both animal health and milk productivity.

A balanced ration is needed. It should provide protein, energy, minerals and vitamins from dry fodders, green fodders, concentrates, mineral supplements etc., in appropriate quantities to enable the animal to perform optimally and remain healthy. Unbalanced feeding results in (Soryal et al., 2004):

- Low milk production, poor growth and reproduction;
- Lower milk production compared with the genetic potential of these animals;
- Shorter lactation length and longer calving intervals;
- Animals more prone to metabolic disorders such as milk fever and ketosis;
- Slow growth in young animals and delayed age at first calving;
- Shorter productive life;
- Excessive amounts of pollutants released into the environment;
- Lower profit to farmers.

The small farmers in developing countries have limited resources available for feeding their ruminant livestock. They do not have the luxury of being able to select the basal diet but use whatever is available at no or low cost. The available resources are essentially low digestibility forages such as tropical pastures (both green and mature), straws and other crop residues and agricultural by-products, which are generally low in protein.

1.3. The Egyptian dairy market

1.3.1. General overview

As it can be observed in Graph 4, Egypt accounts for 16.3% of the Africa & Middle East dairy market value, while Saudi Arabia accounts for a further 23.9%. The market share of South Africa in value is 16.8%, while the share of UAE is 3.6%. Other African and Middle Eastern countries represent 39.5% of the region’s dairy market value.

![Graph 4: Geographical segmentation of the Africa & Middle East dairy market in 2010](image)

Source: Marketline, 2010

Although Egypt is considered one of the largest milk producers in Africa and the Middle East region, there is a negative balance between supply and demand. Moreover, according to BMI 2010 forecasts, consumption is expected to remain higher than local production over the 2008-2017 period (Graph 5).
Milk production and consumption almost increased at a parallel rate and the milk deficit remained stable. However, the deficit in production represents a small ratio, which could be realised with the development of a dairy cluster, as illustrated by the Indian dairy clustering experience presented in appendix 5 of this report.

According to CAPMAS (2010), the estimated dairy production in value was 18,681,834,000 EGP during 2008-2009. Table 2 below shows the changes in the value of different agricultural and animal productions from 2003 to 2009, including dairy milk.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plant production</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Field crops</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter crops</td>
<td>37205422</td>
<td>42041015</td>
<td>25065362</td>
<td>24526710</td>
<td>22842281</td>
<td>20568121</td>
</tr>
<tr>
<td>Summer crops</td>
<td>30839834</td>
<td>29671394</td>
<td>30064798</td>
<td>23308328</td>
<td>22635632</td>
<td>20840436</td>
</tr>
<tr>
<td>Nile crops</td>
<td>1781981</td>
<td>1854299</td>
<td>1634031</td>
<td>1071544</td>
<td>1076892</td>
<td>1132938</td>
</tr>
<tr>
<td><strong>Total field crops</strong></td>
<td>69827237</td>
<td>73566708</td>
<td>56764191</td>
<td>48906582</td>
<td>46554805</td>
<td>42541495</td>
</tr>
<tr>
<td>Vegetable crops</td>
<td>19349753</td>
<td>18866907</td>
<td>14644509</td>
<td>13211110</td>
<td>11535570</td>
<td>10407173</td>
</tr>
<tr>
<td>Fruit crops</td>
<td>19417144</td>
<td>17323609</td>
<td>18403151</td>
<td>16285967</td>
<td>13801379</td>
<td>12135566</td>
</tr>
<tr>
<td>Fruit seedlings and timber trees</td>
<td>63370</td>
<td>35171</td>
<td>46038</td>
<td>20903</td>
<td>19151</td>
<td>14297</td>
</tr>
<tr>
<td><strong>Total value of plant production</strong></td>
<td>108657504</td>
<td>109792395</td>
<td>89857889</td>
<td>78424562</td>
<td>71910905</td>
<td>65098531</td>
</tr>
<tr>
<td><strong>Animal production</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cattle meat &amp; slaughtered animals</td>
<td>27857791</td>
<td>24202331</td>
<td>21532733</td>
<td>20128460</td>
<td>18816466</td>
<td>15501509</td>
</tr>
<tr>
<td><strong>Dairy milk</strong></td>
<td>18681834</td>
<td>17811258</td>
<td>15671469</td>
<td>13423325</td>
<td>12591777</td>
<td>9851248</td>
</tr>
<tr>
<td>Wool, hair and lint</td>
<td>185113</td>
<td>164501</td>
<td>157967</td>
<td>139161</td>
<td>137051</td>
<td>134828</td>
</tr>
<tr>
<td>Farm land manure</td>
<td>7201828</td>
<td>7972258</td>
<td>6283307</td>
<td>5912140</td>
<td>5794822</td>
<td>3981390</td>
</tr>
<tr>
<td>Poultry</td>
<td>11105909</td>
<td>10371090</td>
<td>8404242</td>
<td>7182149</td>
<td>7747819</td>
<td>7587628</td>
</tr>
<tr>
<td>Chicken eggs</td>
<td>3954849</td>
<td>4418998</td>
<td>3089017</td>
<td>2785379</td>
<td>2041590</td>
<td>2142518</td>
</tr>
<tr>
<td><strong>Total value of animal production</strong></td>
<td>68987324</td>
<td>64940436</td>
<td>55138735</td>
<td>49570614</td>
<td>47129525</td>
<td>39199121</td>
</tr>
</tbody>
</table>

Source: CAPMAS, 2010

Graph 6 below shows the segmentation of the Egyptian dairy market over the 2006-2010 period: the largest dairy product segment is cheese, accounting for 38.8% of the market total value, while the milk segment accounts for 28.4% of the market. Fresh milk in Egypt is mainly used in manufacturing traditional products like cheese (White, Ras & Mozzarella), yoghurt, Rayeb, Labnah, cream, butter and ice-cream.
Barriers to entry to the Egyptian dairy market are low for small enterprises. However, only large companies have the capacity to supply products for mass consumption. As shown in graph 7 below, independent retailers form the leading distribution channel in the Egyptian dairy market, accounting for 55.1% of the total market value. Convenience stores accounts for a further 23.9% of the market (Marketline, 2010).

Graph 7: Share of the different retailer categories in the Egyptian dairy market in 2010 (% in value)

Source: Marketline, 2010

1.3.2. Drinking milk

Despite a 30% decline in raw milk domestic supply in 2012 because of the foot and mouth disease, drinking milk remained the highest growth segment in 2012, both in terms of value and volume, with respective growth rates of 26% and 18%. The value of sales increased significantly due to an 11% increase in the price of raw milk in 2012, thus raising the prices of drinking milk products by between 4% and 8%. Juhayna Food Industries, the leading company in this segment, increased its market share in drinking milk products by 2 percentage points to reach 47% in 2012 (Euromonitor, 2012).
It is noteworthy to mention that the political upheaval in 2011 caused disturbances in manufacturing and distribution sectors and yielded to a reduction in sales value growth from 24% in 2010 to 21% in 2011, while the onset of foot and mouth disease during the autumn and winter of 2011 had an ensuing impact on the supply and price of raw milk in 2012.

According to Euromonitor 2012 report, loose milk (unprocessed and unpacked) represents 72% of the Egyptian milk market. Numerous studies have revealed that it is not safe. A research carried out at the end of 2011 by the Faculty of Agriculture at Alexandria University showed that loose milk contains a high proportion of neutralizers such as formalin (which was found in 24% of the samples). Bacteria were found to be drastically higher in loose milk compared with international standards. Common for all these bacteria is that they thrive in food that is poorly stored, not chilled and in unhygienic environments.

Therefore, the industry is investing in order to convert low-income consumers from loose milk to packaged milk. Thus, it is targeted to increase the market share of packaged milk from its current level of 28% (against a 72% market share of loose milk) up to 80% of the total drinking milk market by 2020. (Tetra Tino Aseptic, 2009; Marketline, 2010; Euromonitor, 2012).

This situation brought packaging innovations such as the introduction of Tetra Fino Aseptic packaging, which allows easy storage and transportation of packaged milk to dispersed and distant rural retailers.

Companies such as Danone and Juhayna Food Industries are investing in upstream activities by expanding their dairy farms so as to increase the supply of raw milk. On the other hand, they place their production volumes towards the production of packaged milk. Drinking milk distribution channels are expected to shift back to independent small grocers, as various dairy manufacturers invest in distribution channel expansion to semi-rural and rural retailers. This will further be supported by the initiative to convert consumers from unpackaged milk to packaged milk.

### Table 3: Sales of drinking milk products by category from 2007 to 2012 (in thousand tons)

<table>
<thead>
<tr>
<th>Type of milk</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid milk</td>
<td>111.2</td>
<td>130.8</td>
<td>157.4</td>
<td>197.7</td>
<td>231.9</td>
<td>272.7</td>
</tr>
<tr>
<td>Cow’s milk</td>
<td>111.2</td>
<td>130.8</td>
<td>157.4</td>
<td>197.7</td>
<td>231.9</td>
<td>272.7</td>
</tr>
<tr>
<td>Goat’s milk</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Powder milk</td>
<td>9.1</td>
<td>9.9</td>
<td>10.5</td>
<td>11.3</td>
<td>12.1</td>
<td>13.0</td>
</tr>
<tr>
<td>Drinking milk products</td>
<td>145.8</td>
<td>169.8</td>
<td>201.7</td>
<td>247.1</td>
<td>285.3</td>
<td>330.6</td>
</tr>
</tbody>
</table>

Source: authors (based on Euromonitor International from official statistics, trade associations, trade press, company research, store checks, trade interviews, trade sources, 2012)

### 1.3.3. Cheese

Cheese is the largest segment of the dairy market in Egypt, accounting for 38.8% of the total market value, while drinking milk only accounts for 28.4%. Changes in the production of cheese and some other related products from 2000 to 2009 are presented in table 4 below.

### Table 4: Changes in the production of various food products from 2000 to 2009 (in thousand tons)

<table>
<thead>
<tr>
<th>Products</th>
<th>09/08</th>
<th>08/07</th>
<th>07/06</th>
<th>06/05</th>
<th>05/04</th>
<th>04/03</th>
<th>03/02</th>
<th>02/01</th>
<th>01/00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose</td>
<td>94</td>
<td>110</td>
<td>47</td>
<td>52</td>
<td>63</td>
<td>38</td>
<td>69</td>
<td>42</td>
<td>75</td>
</tr>
<tr>
<td>Chocolate</td>
<td>38</td>
<td>21</td>
<td>11</td>
<td>24</td>
<td>28</td>
<td>20</td>
<td>20</td>
<td>19</td>
<td>40</td>
</tr>
<tr>
<td>Cocoa</td>
<td>11</td>
<td>19</td>
<td>1</td>
<td>0.7</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>0.3</td>
</tr>
<tr>
<td>Preserved vegetables</td>
<td>57</td>
<td>94</td>
<td>22</td>
<td>13</td>
<td>17</td>
<td>50</td>
<td>332</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td>Tomato sauce</td>
<td>55</td>
<td>40</td>
<td>4</td>
<td>12</td>
<td>27</td>
<td>30</td>
<td>21</td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td>Yeast</td>
<td>26</td>
<td>23</td>
<td>15</td>
<td>19</td>
<td>17</td>
<td>22</td>
<td>23</td>
<td>23</td>
<td>19</td>
</tr>
<tr>
<td>Starch</td>
<td>15</td>
<td>44</td>
<td>33</td>
<td>72</td>
<td>79</td>
<td>53</td>
<td>13</td>
<td>29</td>
<td>24</td>
</tr>
<tr>
<td>Cheese &amp; some related products</td>
<td>39</td>
<td>52</td>
<td>63</td>
<td>75</td>
<td>51</td>
<td>48</td>
<td>33</td>
<td>54</td>
<td>15</td>
</tr>
<tr>
<td>Pasteurised milk</td>
<td>112</td>
<td>22</td>
<td>142</td>
<td>101</td>
<td>89</td>
<td>36</td>
<td>16</td>
<td>25</td>
<td>4</td>
</tr>
<tr>
<td>Hydrogenated oil</td>
<td>450</td>
<td>21</td>
<td>339</td>
<td>311</td>
<td>434</td>
<td>599</td>
<td>75</td>
<td>142</td>
<td>138</td>
</tr>
<tr>
<td>Molasses</td>
<td>542</td>
<td>634</td>
<td>670</td>
<td>553</td>
<td>687</td>
<td>636</td>
<td>461</td>
<td>1 407</td>
<td>1 584</td>
</tr>
<tr>
<td>Refined beet sugar</td>
<td>297</td>
<td>292</td>
<td>368</td>
<td>282</td>
<td>477</td>
<td>-</td>
<td>-</td>
<td>250</td>
<td>-</td>
</tr>
<tr>
<td>Refined sugar cane</td>
<td>1 308</td>
<td>1 231</td>
<td>1 268</td>
<td>1 329</td>
<td>1 603</td>
<td>1 435</td>
<td>577</td>
<td>219</td>
<td>313</td>
</tr>
<tr>
<td>Soya oil (refined or half refined)</td>
<td>11 572</td>
<td>15 655</td>
<td>17 137</td>
<td>17 466</td>
<td>18 000</td>
<td>23 110</td>
<td>-</td>
<td>5 041</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: CAPMAS, 2010
The value and volume of cheese sales increased by 15% and 9% respectively in 2012, just below historic growth rates. Unprocessed cheese continues to be the largest cheese segment, accounting for 73% of the total value of cheese sales in 2012. Soft cheese showed the fastest growth in 2012, at a rate of 26% in terms of current value and 15% in terms of volume. Unit prices increased by 6% in 2012, due to a 10% rise in the price of raw milk caused by supply pressures.

Despite the economic downturn in Egypt, inflationary price rises maintained the value growth rate close to historic levels. Cheese increased by 8% in volume terms in 2011, which was slower than the previous year’s forecast of 17% due to low-income consumers’ shift to cheaper unpackaged cheese. In 2012, the sales volume was estimated to increase by 9%; slower than the review period CAGR of 11%, as low-income consumers continued to downgrade to cheaper, lower-quality alternatives. Soft cheese was estimated to see the fastest growth in current value and volume in 2012, of 26% and 15% respectively.

Spreadable processed cheese accounted for 76% of the total processed cheese value in 2012, which was estimated to grow by 2% the same year and by 11% over subsequent years. Consumers perceive processed cheese as treats for children, or to be placed in their lunch box. The sales volume of unprocessed cheese is higher because these products are part of the staple diet of the adult population, whereas processed cheese is mostly consumed by children. Unspreadable processed cheese was estimated to account for 24% of processed cheese in 2012 and to grow by 2% in volume and by 12% in value the same year.

Packaged cheese accounts for around 30% of overall sales of cheese, and the most popular category is soft cheese, which is also the fastest growth category, driven by popular varieties (traditional Egyptian cheese) such as Domiati, Istanbulli and Feta. There is a slowdown in growth rates because of the indexation of prices to the disposable income levels of low-income consumers and to their willingness to downgrade to the cheaper alternative of unpackaged cheese.

Considered as one of the largest Middle Eastern companies specialising in processed cheese (Teama Cheese), Best Cheese Co for Dairy Products is leading the cheese segment, with 14% of sales value (according to 2012 figures), even though it lost some value share in 2012 due to increased marketing investment by its competitors. The strongest increase in sales value in 2011 was seen by Middle East Dairy & Foodstuff, with 33% growth. The company invested in Tetra Fino Aseptic packaging for its Greenland brand, which allowed it to capture share from unpackaged cheese. The strongest decrease in sales value the same year was seen by Bongrain, with a 20% decline, and in 2012 it was estimated to see the lowest sales growth, with just 1%

The company Misr October Co for Food Industries (Elmisriene) has been remarketing its El Misrien soft cheese line to mirror a contemporary image. The main strategy that key players such as Middle East Dairy & Foodstuff, Arabian Food Industry (Domty) and Misr Octobre are applying is to invest in expanding their product distribution networks in semi-rural and rural retail channels in order to attract consumers away from unpackaged cheese.

In Egypt, traditional lunches are comprised of a block of white cheese and a loaf of bread. Typically bought at a small grocery store, the cheese is sold unpackaged. Tetra Pak and Middle East Dairy & Foodstuff developed the Tasbeera, which is a sterile snack-sized package for its Greenland soft cheese brand, to appeal to customers who might want a more hygienic, easy-to-carry alternative to unpackaged cheese. The pre-packaged cheese is the same size as the traditional alternative, and costs the same.

The cheese segment is dominated by standard brands such as Greenland, Teama and Domty. However, Middle East Dairy & Foodstuff is expanding its Greenland range towards economy brands. This is part of its strategy to capture sales from unpackaged cheese by distributing these lower-priced products amongst low-income consumers living in rural and semi-rural areas (Euromonitor, 2012).

1.3.4. Yoghurt

Yoghurt is considered to be the most dynamic segment in the dairy market, as its share increased by 6 percentage points over the 2010s to reach 20% of the total market value by 2012. Unpackaged yoghurt (traditional Egyptian yoghurt) is relatively inexpensive and fresh, and remains popular, putting up strong competition against packaged yoghurt (Euromonitor, 2012).

The value of yoghurt sales grew by 23% in 2012, brought about by the inflated price of raw milk and skimmed milk powder in 2011. Unit prices of yoghurt increased by 8-9% in 2012. Total sales grew by 15%, a slower rate than the forecasts due to economic uncertainties and dwindling foreign reserves caused by the political transition. The fall in income growth and a declining consumer confidence made the growth rates thriftier. Middle- to low-income consumers will continue to opt for cheaper unpackaged alternatives unless they begin to see real income growth.
Drinking yoghurt saw the highest growth in current value and volume terms in 2012 but spoonable yoghurt remained the largest segment. Danone Egypt is the leading player in yoghurt, accounting for 33% of the total value of sales (according to 2012 figures).

1.3.5. Desserts

Egyptian traditional dairy desserts are locally produced by traditional retail shops and the production takes place manually in-store. Desserts are also being served in-store. The most popular Egyptian traditional dairy desserts are Roz bel laban, Ashoura and Mehalabeya.

According to Euromonitor 2012 report, other dairy products sales grew by 15% in current value and 7% in volume. Chilled dairy-based desserts remained the largest category, with a 52% value share in 2012. Nestlé Egypt continued to lead the other dairy products segment, with a 16% value share, and Danette (Group Danone) maintained its position as brand leader with an 11% value share in 2012.

The consumption of artisanal dairy products, such as the rice pudding Mehalabeya, is growing as Egyptian consumers are stressed out over the social and political uncertainties that their post revolution country is facing. In 2012, the value of sales was estimated to grow by 15%, compared to 12% the previous year. This significant increase is due to unit price increases brought about by the rise in raw milk prices. Chilled dairy-based desserts sales were estimated to see the fastest growth in 2012, both in terms of value and volume, due to the growing presence of brands of packaged chilled desserts, such as Danette (Euromonitor, 2012).
1.4. Egyptian traditional dairy products

Source: Authors’ elaboration

1 For a deeper insight on traditional dairy products, see Appendix 5.
2. The dairy chain in Alexandria and Beheira governorates

2.1. Methodology of the field survey

2.1.1. General approach

This research used in-depth qualitative and quantitative methods to investigate the key aspects of the research topic. First, the research questions were formulated and literature was reviewed to obtain a better understanding on how to proceed with the study. Then, the research elements were determined. Furthermore, primary data was gathered through semi-structured interviews with industry experts (Table 5) and structured interviews with a representative sample of dairy processing SMEs and farms in the territory (Table 6). It is worth mentioning that the raw data collected through the structured interviews (survey) were revalidated through telephone interviews by the CITL-AAST team to collect missing data, verify invalid answers and extract extra information. Finally, data was interpreted and analysed quantitatively and qualitatively to reach a synthesis.

The complexity of the dairy sector, characterised by various milk types (cow, buffalo, etc.), production systems and a wide range of dairy products, requires a significant level of data and methods. Unfortunately, the databases available do not match the needs of the research. This phenomenon arises especially as the data offered by the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS) are outdated and not in compliance with other international statistical reports like the Marketline reports and the Euromonitor reports.

Moreover, several milk equivalent methodologies exist to link the milk production volumes and the processed dairy products. Furthermore, a large number of the dairy chain small and medium players are neither registered with the Ministry of Investment, the Chamber of Commerce, nor the Ministry of Agriculture (especially farmers). Thus, it was very difficult to access them and count them as part of the sample population, which resulted in a relatively small sample of farmers and processors being interviewed (structured or semi-structured approaches). This study is mainly summarizing the existing rough data and introducing empirical insights from different dairy chain players in the studied territory. Multiple data gathering techniques were used to formulate the research outcomes. Results are analysed and presented in SWOT analysis format along with arising recommendations.

Table 5: List of semi-structured interviews

<table>
<thead>
<tr>
<th>Position</th>
<th>Entity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director</td>
<td>Animal Production Research Institute (APRI)</td>
</tr>
<tr>
<td>General Manager + Associate Manager</td>
<td>Food Technology Center (affiliated to the Ministry of Industry &amp; Foreign Trade)</td>
</tr>
<tr>
<td>General Manager + Associate Manager</td>
<td>UNIDO</td>
</tr>
<tr>
<td>General Manager</td>
<td>Chamber of Food Industries</td>
</tr>
<tr>
<td>Sector Head</td>
<td>Milk &amp; Dairy Products Sector, Chamber of Food Industries</td>
</tr>
<tr>
<td>Owner and Manager</td>
<td>Al-Fath Al-Eslamy (Producer of Dairy products)</td>
</tr>
<tr>
<td>Manager</td>
<td>International Farm (Farmer)</td>
</tr>
<tr>
<td>Department Head</td>
<td>Grants and Innovation Center, Alexandria University</td>
</tr>
<tr>
<td>Associate Owner and Manager</td>
<td>El-Asdekaa (Retailer)</td>
</tr>
<tr>
<td>Manager</td>
<td>Saber (Producer of Dairy products &amp; retailer)</td>
</tr>
<tr>
<td>Owners</td>
<td>El-Asdekaa (Producer of Dairy products)</td>
</tr>
<tr>
<td>Vice Governor</td>
<td>Alexandria Governorate</td>
</tr>
<tr>
<td>Former Dean</td>
<td>Faculty of Agriculture Alexandria University</td>
</tr>
<tr>
<td>General Manager</td>
<td>Seklam (Producer of Dairy products)</td>
</tr>
<tr>
<td>Owner</td>
<td>Abu-Dawood (Producer of Dairy products)</td>
</tr>
<tr>
<td>Owners</td>
<td>El - Magd (Producer of Dairy products)</td>
</tr>
<tr>
<td>Manager</td>
<td>El - Malki (Producer of Dairy products &amp; retailer)</td>
</tr>
<tr>
<td>Owner and Manager</td>
<td>Mashrek (Producer of Dairy products)</td>
</tr>
</tbody>
</table>

Source: General Authority for Investment
Developing the typical dairy products of Alexandria and Beheira
Diagnosis and local strategy

Table 6: Statistics of structured interviews (survey)

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk processors</td>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alexandria</td>
<td>2</td>
<td>28.6%</td>
<td>28.6%</td>
<td>28.6%</td>
</tr>
<tr>
<td>Beheira</td>
<td>5</td>
<td>71.4%</td>
<td>71.4%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>Dairy farms</td>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alexandria</td>
<td>3</td>
<td>23.1%</td>
<td>23.1%</td>
<td>23.1%</td>
</tr>
<tr>
<td>Beheira</td>
<td>10</td>
<td>76.9%</td>
<td>76.9%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

Depending on the focus of the research questions, the research is descriptive in nature. Descriptive studies are those undertaken to describe the characteristics of variables in a situation. In this case, the some important questions arise.

2.1.2. Objectives of the survey
The study aims at answering the following questions:
- How developed is the Egyptian dairy chain?
- What type of problems do Egyptian dairy SMEs face and prevent them from developing and improving their production, distribution and visibility?
- What are the different traditional Egyptian dairy products that can be developed through clusters?
- Is there a real opportunity for establishing clusters within the studied territory?

2.1.3. Roadmap for the methodology and research design
The following diagram illustrates the methodological approaches undertaken to conduct this research:
Diagram 2: Roadmap for research methodology

- **Literature review analysis:** Previous studies, reports by research institutions and Egyptian statistical agencies.
- **Qualitative approaches:**
  - Semi-structured interviews were conducted with some industry experts including SME owners, farmers, government bodies, and chain leaders. Also, some parts of the structured interviews were aiming at gathering qualitative data (January till April 2013).
- **Quantitative approaches:**
  - Structured interviews with a sample of small and medium dairy farms and processing units in the assigned territory (February till April 2013).
  - Interpretation through descriptive statistical tools (SPSS).
- Inputs were analyzed and interpreted qualitatively to form insights for the final analysis.
- A synthesis showed the outcomes of methodological approaches in the form of a compiled SWOT analysis for the dairy chain with a focus on traditional products.

**ELEMENTS OF RESEARCH**

- **Type of investigation:** geographical case study (Alexandria and El Beheira territory). The case study is one of the most common forms of research in management and supply chain. This case study was developed for the purpose of conducting empirical research to inquire into a social problem. It began with a research question and involved the collection of data to analyze and answer that research question (Yin, 2003). It was aimed to enhance understanding through the in-depth investigation of the different aspects and players of the territory;
- **Extent of researcher’s interference:** minimal;
- **Study setting:** field study;
- **Unit of analysis:** organization (small and medium-sized dairy farms and processing units);
- **Sampling approach:** purposive sampling. Due to the research focus, purposive sampling was the most relevant sampling approach to target only small and medium-sized dairy farms and processing units with the studied territory;
- **Sample (survey):** 13 dairy farms among the total small and medium farms registered in the territory of Alexandria and El Beheira, plus 7 dairy processing units among the total dairy SMEs registered in the territory of Alexandria and El Beheira;
- **Time horizon:** cross sectional.
DATA COLLECTION METHOD AND RESOURCES

Secondary data, on dairy production volumes and values, different dairy products, territory traits, animal feed, obstacles facing dairy chain players, was collected from national and international statistical reports, online references, international periodicals and journals and similar researches related to the topic. Primary data was collected from a sample of dairy chain stakeholders: farmers, small and medium-sized processors, wholesalers, retailers and governmental bodies. The empirical study was conducted in 2 phases: semi-structured interviews with industry experts such as representatives of governmental bodies and local agroindustrial groups; structured interviews with a sample of small and medium-sized dairy farms and processing units.

Interviews can yield both qualitative and quantitative data. Questionnaires were not conducted as they are instruments completed by the respondents themselves (Bryman, 2004). They are often referred to as self-administered questionnaire. All structured and semi-structured interviews were conducted by the researchers face to face or via telephone with the interviewees.

As highlighted before, the area of integration, is understudied, especially at the territorial level. The data collected as part of the research was descriptive in nature and required mainly qualitative methods to identify the relevant constructs and develop an understanding of the situation. As supply chain management (SCM) research has often been criticized of following the positivist approaches, while qualitative and interpretative research is rather scarce (Kotzab, 2000), the initial findings of this research were mainly based on qualitative interpretations. Furthermore, the research based on the initial findings followed a more structured approach to generate more quantitative results. As a result, a balanced approach of triangulation has been achieved.

Given the nature of the research, the interviews of the first phase were of the semi-structured format. According to Lee (1999), semi-structured interviews are more flexible than structured interviews, but have more focus than unstructured interviews. The intention was to explore and gain more insights into the territorial dairy process. This semi-structured protocol was not rigid i.e. questions have changed over time as interviewees offered more insight and enabled the researchers to elaborate more with the succeeding participants. Throughout the interviews, more elements, problems and opportunities were uncovered. The overall aim of interviews is to elicit the interviewee’s information (e.g., their thoughts and feelings) about the topic, rather than the interviewer influencing them. Interviews are well suited when the researcher wants to see the topic from the perspective of the interviewee and understand how and why he or she comes to have this particular perspective (King, 1994).

Phase 2 followed a more structured format that was completely composed of pre-set standardised questions, in this case mostly closed-ended. Many field surveys are administered through structured interviews (Seidman, 2006). In structured interviews, questions are read aloud to the interviewee and the interviewer records the responses. It is essential for the interviewer to ensure that the interviewee understands the questions and that the responses are reliably given. The respondents’ answers are written down, and everyone is asked the same questions in the same manner. Telephone interviews were also conducted by CITL-AAST team to revalidate the raw data of the surveys in order to collect missing data, verify invalid answers and extract extra information.

DATA ANALYSIS AND INTERPRETATION

After data were obtained from both primary and secondary sources, they were classified, analysed using descriptive statistical methods (SPSS) and then displayed into tables and figures with a view to interpreting their significance. As regard to the primary qualitative data from the semi-structured interviews with industry's experts and major players, data were comprehended and analysed to extract specific territorial problems, opportunities and recommendations to improve the dairy chain.

2.2. Quantitative analysis of the survey results

The following analysis is divided into 2 parts, namely quantitative and qualitative. The semi-structured interviews yield purely qualitative data while the surveys (structured interviews) yield both quantitative and qualitative results. Thus, the statistical quantitative results are presented based on the survey outcomes along with some quantitative information that was merely described but not statistically presented. The reason behind this is the minimal rate of responses to the corresponding specific questions.

The qualitative outcomes of both data collection methods are presented in the second part in the form of problems and recommendations. Moreover, quantitative and qualitative outcomes were used to build a synthesis presented in the form of a SWOT table.
2.2.1. Dairy farmers

EMPLOYMENT
- The number of workers of the surveyed sample range from 1 to 30 workers;
- The ages of workers vary from 20 to 40 years old;
- The majority of workers are family members with a very low rate of literacy.

CROP PRODUCTION
- Open-field irrigated crops and irrigated fodder are the most common crop productions;
- Surfaces vary from 20 to 35 fedans and they produce around 20 to 50 tons per harvest.

HUSBANDRY
- Number of cattle ranges from 30 to 80 cows and buffalos;
- Number of calved cows ranges from 20 to 50;
- Milk production per day varies from 20 to 25 litres according to feeding schedule and type, and weather conditions;
- Number of new born cattle ranges from 15 to 45;
- Number of cows bought ranges between 20 and 60 per year.

TENURE SYSTEMS/ OWNERSHIP
- 8 out of the 13 interviewed farmers own their farm;
- 3 farmers own a part of the land and rent the rest;
- 1 farmer graduated from agricultural secondary school, raises cattle and processes dairy products on his farm.

INVESTMENT IN FARM INFRASTRUCTURE
10 out of 13 of the sample participants invested in the farm infrastructure including constructing stables and warehouses.

Graph 8: Investment in farm infrastructure (stables, warehouses, etc.)

The most common materials used are concrete, white stone and iron.
INVESTMENT IN AGRICULTURAL EQUIPMENT

8 out of 13 purchased agricultural equipment and machines like automated milking systems, agricultural tractors, trefoil and fodder mixing equipment.

Graph 9: Investment in new agricultural machines or equipment

![Pie chart showing investment in agricultural equipment](image)

The equipment were purchased between 2001 and 2008.

FEED SUPPLIERS

The interviewed dairy farmers buy their animal feed either from merchants (10 out of 13 interviewees) or directly from producers (3 out of 13). There is no other supply channel.

Graph 10: Feed suppliers of interviewed dairy farmers

![Bar chart showing feed suppliers](image)

TYPE OF FEED

7 out of the 13 interviewed farmers claimed that they use concentrated feed and 9 expressed that they use roughage. Thus, we can conclude that the majority use a mixture of both. This mixture includes trefoil, corn, maize, soya beans and dry fodder.

Some farmers grow fodder crops on their farm, such as soya beans, trefoil and corn.

All of the interviewed dairy farmers declared that they pay cash to their animal feed supplier.

Graph 11: Types of feed used by the interviewed dairy farmers for their animals

![Bar chart showing types of feed](image)
MARKETING CHANNELS

None of the interviewed dairy farmers sell their milk to cooperatives. Only one of them delivers directly to cheese makers, while 3 dairy farmers sell their milk to retailers and 3 others use other channels. 4 farmers claimed that they sell their milk directly on their farm (Graph 12).

Graph 12: Farmers’ marketing channels for their raw milk

BUYERS’ MILK COLLECTING OPTIONS

The absence of milk collecting centres was mentioned by the dairy farmers interviewed. All the participants denied the use or the existence of a milk collecting centre in the area.

11 out of the 13 interviewees declared that the buyers send their own trucks or that they use an intermediary for the milk delivery. Only 3 dairy farmers deliver their milk by their own means (Graph 13).

Graph 13: Farmers’ milk delivery options to the client
Deliveries concern short distances as the distance from the farm to the client’s place (retailer, wholesaler, cheese maker) ranges from 20 to 35 km. There are some rare exceptions where the clients are located in other parts of the country.

Products are usually picked up twice a day.

The majority of farmers do not receive any extra advantage from their clients except a few services such as technical advice and refrigerated milk tanks to transport their products.

The interviewed dairy farmers declared that they choose their clients according to the following criteria:

- Price offered by the client;
- Client’s consistency in purchasing;
- Availability of transportation means to pick up the products;
- Trust.

**FINANCIAL RESOURCES**

Only 4 participants declared that they borrow money from the Principal Bank for Development and Agricultural Credit (PBDAC), while another one indicated that he received a public grant.

**EXTERNAL NETWORKS AND ACCESS TO INFORMATION**

Few farmers have associative activities. Only 3 out of the 13 interviewed claimed that they participate in dairy farmers’ unions. 3 farmers also declared that they are members of an informal agricultural cooperative, basically for collective sourcing of animal feed and for selling their milk (Graph 15).

Nevertheless, the interviewed farmers see agricultural cooperatives as beneficial in terms of stabilizing prices and accessing sources of raw materials.

Their access to information on milk, meat or animal feed prices is mainly through other farms, the market and traders and not through any public authority.
DAIRY CLUSTERS

8 out of the 13 interviewed farmers expressed their willingness to join a dairy cluster (Graph 16).

Graph 16: Willingness to join a dairy cluster

Some of them would like to:

- share responsibilities in the administration of the cluster;
- participate with a share in the capital required;
- become a major partner advising and guiding the activities of the cluster.

The majority are interested in taking part in B2B meetings in order to meet potential partners, mainly regional and national suppliers, exporters or other dairy producers to buy/sell raw materials and share experiences.

They are also interested in meeting fodder suppliers and dairy equipment suppliers (packing machines, processing materials, etc.).

They believe that milk producers are the dairy chain stakeholders that deserve private and public support and protection the most.

Table 7: Summary of statistical responses of farmers

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you invest in constructing stables, warehouses etc.?</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Did you buy any new agricultural machines or equipment?</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Who is your feed supplier?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Producer</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Merchant</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>What types of feed do you buy from this supplier?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentrated feed</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Roughage</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>What are the channels that you use to market your product?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheese dairies</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Cooperative</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td>Retailer</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Market place</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td>Direct sales</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Sales through informal channels</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Do you deliver your milk to your client by your own means?</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>By which means does your client collect your milk?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>By his own means</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Via milk collecting centres</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td>Do you borrow money?</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Do you receive any grants or other public aid?</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Do you participate in any dairy farmers’ union (formal or informal)?</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Are you member of an informal agricultural co-operative?</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Are you ready to participate in the functioning of the dairy cluster?</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>
2.2.2. Milk processors

OWNERSHIP

4 out of the 7 interviewed processors own their company. 2 interviewed farmers-processors graduated from agricultural secondary schools, raise their own cattle and process their milk on their own farm.

MACHINERY AND EQUIPMENT OF THE COMPANY

Interviewed companies have an average of 2 milk tanks with a surface of 1.5x2 and 1.5x3 m². The average number of refrigerators varies from 1 to 2 refrigerators with a surface of 1.5x2 and 1.5 x 3 m².

Pasteurisation capacity at the interviewed SMEs ranges from 200 to 500 kg. They also have their own trucks (average capacity of 2.5 tons) and reefer trucks with similar capacities.

FINANCING OPTIONS

None of the participants borrow money to finance their operations.

EMPLOYMENT

The number of workers of the surveyed sample ranges from 1 to 25 permanent workers and 6 to 15 seasonal workers. The workers education level varies from illiterate to bachelor degree graduates. The majority have professional secondary school education and labour-intensive jobs while the employees with higher education work in administrative jobs.

RAW MATERIAL PROCUREMENT

Among the studied sample, the daily procurement of raw milk is composed of cow’s and buffalo’s milk with a quantity of half a ton up to 2 tons. The price of cow’s milk is 2.65 to 2.75 EGP per kilo and those of buffalo’s milk is 3.75 to 5.5 EGP per kilo.

The period of milk collection does not exceed a week. Advanced payments are relatively scarce; it depends on the strength of the buyer-supplier relationship.

The distance between the supplying farms and the interviewed processors does not exceed 2.3 km in most cases with some exception where the distance might reach 25 to 30 km. Suppliers of cow’s and buffalo’s milk vary from 1 to 3 small and micro farms from the area.

Services offered to milk suppliers are mainly technical and veterinary advice on how to deal with the infected animals. Usually, farmers and processors also discuss the suitable animal feed to increase milk productivity.

BACKWARD INTEGRATION

Graph 17: Backward integration of the dairy processors interviewed (activity in farming)

2 out of the 7 interviewed processors have activities in dairy farming (Graph 17). They produce mainly cow’s milk with an average quantity ranging from 40 to 100 litres per day. The backward integrated processors are self-sufficient in raw milk procurement.

The cost of one kg of cow’s milk is 2.65 EGP.
OTHER CHARGES OF THE COMPANY

Graph 18: Charges concerning certification of the sanitary and/or distinctive quality of the milk and processed dairy products

2 processors out of the 7 interviewed have extra charges on microbiological analysis, while only 1 has extra charges concerning ISO and HACCP certification.

None of the interviewees has either organic agriculture certification or AOP certification.

DELIVERY OF PRODUCTS

Graph 19: Delivery patterns of dairy products

6 out of the 7 participants deliver their products themselves using their own trucks. Only 1 processor relies on his clients to pick up his products or uses an intermediary.
Backward collaboration with raw material suppliers does not exist in a long term contract format. 4 out of the 7 interviewees have backward collaboration through oral conventions while only 1 of them establishes yearly contracts with its raw milk suppliers. 2 of the interviewed dairy processors declared that they have other types of backward linkages without any precision.

Prices are generally fixed yearly on the basis of free market mechanisms. In rare occasions, it is determined at the time the milk is produced.

**PROBLEMS REGARDING MILK PROCUREMENT**

6 processors out of 7 highlighted a serious deficit concerning the milk procurement in the production pool.

From the processors’ perspective, the crucial problems in the dairy chain with regard to raw materials are the following:

- Insufficient milk production to fulfil dairy production requirements and needs;
- High cost of packing materials;
- Electricity shortage, which causes large production loses;
- Animals feeding problems;
- Lack of veterinary medicines;
- Fluctuations in raw materials prices (fodders and fertilizers), which cause problems in supply contracts;
- Fluctuation of prices.

**PACKAGING**

4 out of the 7 interviewees have packing units installed in-house. The packaging concerns their best-selling products including yoghurt, feta cheese and other traditional cheeses made from cow’s and buffalo’s milk.

Packaging materials vary from plastic to metal. The average capacity of packaging units ranges from 300 to 800 units.
The processors interviewed share the view that improvement in packaging methods and materials is needed:
- to protect dairy products from damages;
- to keep the products in good conditions;
- to serve marketing and promotional purposes.

MARKETING CHANNELS
Two main reasons determine processors to prefer one particular marketing channel to another:
- Price offered and regular payment;
- Proximity.

Dairy processors would consider changing their marketing channels if another buyer offered them higher prices for their products.

The majority sell to supermarkets, grocery stores and dairy retailers.
Forward collaboration with clients does not exist in a long term contract format but mainly through short term-yearly contracts, usually signed with local clients.

PROBLEMS REGARDING MARKETING
The main problem that the interviewed dairy processors expressed concerns the long distance between production and consumption places. The distance is an important constraint for the distribution of their finished products. This obstacle could be overcome by using well-equipped refrigerated trucks that could deliver easily dairy products to distant locations.

From the processors’ perspective, the crucial problems concerning the distribution of dairy products in the domestic market are the following:
- Lack of distribution centres;
- Lack of professional distribution services offering refrigerated trucks;
- Lack of resources and know-how to improve marketing channels.

MARKETING DEPARTMENT AND PROMOTIONAL ACTIVITIES
Graph 22: Presence of in-house marketing department and promotional activities

4 dairy processors out of 7 have a marketing department within their company. But only 2 have promotional programmes, mainly to enhance their sales. Nevertheless, they participate from time to time in fairs (national and international) as part of their promotional campaigns.

EXPORTS AND MARKET DEVELOPMENT
A very small share of the participants export their products. They don’t export to EU countries as there is a ban for dairy products exports to EU countries.

Few interviewees sell their products on international markets or build relationships through contacts, fairs and exhibitions.

However, all respondents see great future perspectives for local traditional dairy products like cheeses and chilled desserts. According to them, the conditions for improving their positioning in the market are to train farmers and processors, to adopt innovations and to improve distribution channels and equipment.
INNOVATIONS LEVEL AND BENEFITS

Most innovations concern shifting the production line from the manual system to modern automated system regarding the pasteurization process; the main benefits being the improvement of hygiene conditions and sanitary quality of processed products as well as lower labour intensity.

Other important innovations concern modern automated systems for milk collection in order to:
- increase production quantities;
- improve products' hygiene;
- lower labour intensity.

EXTERNAL NETWORKS AND ACCESS TO INFORMATION

Only 1 of the interviewees is member of a professional body.

Only 1 of the respondents stated that he benefited from training actions (Graph 23).

Graph 23: Dairy processors benefiting from training facilities

2 out of the 7 respondents consulted an agency or a private laboratory for a quality test and they thought results of these quality analyses were satisfactory. The main question then is to develop and extend this kind of services to a larger number of SMEs.

Graph 24: Appeal to consulting agencies or private laboratories for quality tests and level of satisfaction

DAIRY CLUSTERS

Graph 25: Willingness to join the dairy cluster

5 out of 7 of the sample participants are willing to join a dairy cluster.

They would like to cooperate with the Faculty of Agriculture for guidance; and with the Chamber of Commerce, other processors and nearby dairy farmers for expertise and information sharing. They even insisted that clustering with competitors, for example with other milk or cheese producers who have the same scale of production, would be beneficial to share the working experience and solve common problems. Moreover, they consider veterinarians as major partners in the foreseen cluster.
The interviewees think that the dairy cluster should take the form of a producers’ union for example.

PARTICIPATION IN BUSINESS MEETINGS

Graph 26: Interest to participate in business meetings gathering local dairy chain stakeholders

4 interviewees out of 7 are interested in participating in business meetings gathering the various stakeholders of the local dairy chain.

They are also interested in participating in the workshop for the preparation of these meetings in order to be familiar with the requirements and critical issues regarding the dairy cluster.

FREE COMMENTS ON THE SURVEY

The participants expressed their hopes that this initiative is real and will result in actions and not just theoretical research. Moreover, they stressed that the dairy cluster should start by helping farmers improve their awareness of health issues, feeding systems, milking and pasteurisation techniques, etc.

Table 8: Summary of statistical responses of processors

<table>
<thead>
<tr>
<th>Questions</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you borrow any money?</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Do you have any activity in dairy farming?</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Other charges of the company:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microbiological analysis</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>ISO certification</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>HACCP</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Organic agriculture</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>AOP certification</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Other costs</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Do you deliver your end products yourself?</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>By your own trucks</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>By your client’s trucks</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>By a third party transportation</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Collaboration patterns with raw milk suppliers:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yearly contracts</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Long-term agreement</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Oral convention</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Is there any deficit concerning the milk procurement in the production pool?</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Do you have a packaging unit installed in your company?</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Do you have a marketing department within your company?</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Have you any promotion activity?</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Are you member of any professional body?</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Did you benefited from any training activity?</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Did you appeal for a consulting agency or a private laboratory for quality tests?</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Was the quality of the analysis satisfactory?</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Are you willing and ready to join to the dairy cluster?</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Would you be interested to participate in business meetings gathering the stakeholders of the local dairy chain?</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>
2.3. Qualitative analysis, common problems and priorities for the cluster

2.3.1. Dairy farmers’ problems

The interviewed farmers highlighted some problems and constraints that hinder farming and animal production quality:

- Reduced quality of animal feed due to different reasons including:
  - lack of irrigation water that results in lower availability and higher prices;
  - fraud on the quality of feed;
  - lack of monitoring and control that facilitates price manipulation.
- Animal diseases that affect both milk quantity and quality (e.g. foot and mouth disease);
- Insufficient quantity and quality of fertilizers;
- Lack of professional medical services and appropriate treatment for sick animals;
- Insufficient supply of several feedstuffs (e.g. soybean and maize) and higher costs related to their import.

2.3.2. Dairy processors’ problems

The interviewed dairy processors were concerned about different problems:

- Frequent power outages that reduce the volume of production as not all of them can afford buying electricity generators;
- Non conformity of loose milk transportation with any standards;
- Unavailability of distributor centres and refrigerated tankers (especially with the short shelf life of some dairy products like yogurt -3 days- or cheese -15 days);
- Mixing of cow’s milk with buffalo’s milk to counter the low quality of liquid milk that in turn reduces the milk quality even more;
- Unavailability of good breeds that negatively affects the quantity and quality produced;
- Complexity of paperwork to export dairy products;
- High production costs, exceeding the common Egyptian market prices;
- High prices of packaging (plastic bottles and packs) and lack of packaging providers in the Egyptian market.

2.3.3. Summary of different players’ crucial comments

Most of the interviewees’ comments were about the shortages, prices and types of animal feed that noticeably affect milk production quantity and quality. They mentioned that, due to the gap between production and consumption, 90% of animal feed requirements are imported although they could easily be produced in Egypt. As for the prices, they indicated that animal feed prices per ton doubled compared to the previous year, which obliged farmers to reduce the amount fed to the cattle and resulted in reduced milk production. The interviewees emphasized that the weakness of animal feed production in Egypt and the lack of animal feeding systems (e.g. specific feeding time) also negatively affect milk production.

Some other weaknesses raised by the interviewees were the absence of governmental support, veterinary services and the inefficiency of available vaccines. Because of this, Egyptian dairy products are banned from entering the EU zone. The interviewees added that, before the Egyptian revolution, the codex specifications were abolished to adopt the EU standards but the project stopped, leaving dairy products with no specifications or international standards.

The consumption of loose milk is higher than those of packed milk. Thus, the lack of distribution centres for loose milk in the studied territory and in Egypt as a whole increases the costs and reduces the hygiene measures and control.

However, the interviewees see opportunities to improve the dairy chain through the clustering project and promising perspectives in the Arab and African markets, especially for the Ras/Romy cheese and chilled traditional desserts.
2.3.4. Players’ vision on the dairy cluster

Farmers expect the dairy cluster to provide professional training, information and business intelligence, R&D and innovation, and other services. These services should help workers involved in animal production to adopt innovative ways to feed animals, increase their productivity and guarantee their health. They also believe that the key factors which would motivate the producers of any territory to gather within a cluster are: stabilisation of fodder prices, insurance for animals, subsidies on fodders, good management of the cluster.

As for the processors, their expectations focus on personal training, information and business intelligence, R&D, innovation and other services. These services will allow them to share information and experience on their main concerns. Processors also stated that reaching common goals and increasing productivity could trigger the development of the dairy cluster.

They also encouraged collaboration of the dairy cluster with other organisations such as the Faculty of Agriculture, local Chambers of Commerce and farmers in the neighbourhood.

According to the interviewees, the producers’ union should have an essential role in the physical and managerial structure of the dairy cluster.

Some respondents also stated that punctual payment would be the best financing pattern for any external service needed for the cluster functioning. Others believe that the services and intervention should be financed by membership fees.

Table 9 represents a comparison between the essential missions and priorities of the dairy cluster from the dairy farmers’ and processors’ perspectives:

**Table 9: A comparison between the essential missions and priorities of the dairy cluster from the dairy farmers’ and processors’ perspectives**

<table>
<thead>
<tr>
<th></th>
<th>Dairy farmers’ perspective</th>
<th>Dairy processors’ perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st PRIORITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establishment of fodder production plants inside the area</td>
<td>Milk packaging</td>
<td></td>
</tr>
<tr>
<td>Reduction of production costs</td>
<td>Distribution centres</td>
<td></td>
</tr>
<tr>
<td>Infrastructural improvement for farms</td>
<td>Better transportation means (refrigerated trucks)</td>
<td></td>
</tr>
<tr>
<td>Supporting tools for peasants</td>
<td>Introduction and control of hygiene standards</td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2nd PRIORITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stabilization of prices</td>
<td>Qualification and training of workers</td>
<td></td>
</tr>
<tr>
<td>Marketing facilities</td>
<td>Governmental support</td>
<td></td>
</tr>
<tr>
<td>Provision of the necessary technology</td>
<td>Improvement of Egyptian traditional dairy products</td>
<td></td>
</tr>
<tr>
<td>Subsidies for fodder crops</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3rd PRIORITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supporting tools for production</td>
<td>Export facilities for Egyptian traditional dairy products</td>
<td></td>
</tr>
<tr>
<td>Insurance services</td>
<td>Governmental subsidies and facilitation</td>
<td></td>
</tr>
<tr>
<td>Advertising facilities for producers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In addition, they expect upward and backward collaborations between farmers, dairy processors and animal feed producers within the dairy cluster to contribute to the achievement of this set of targets.
### 2.4. SWOT Analysis

#### Table 10: SWOT analysis of the dairy chain in Alexandria and Beheira

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Availability of a cheap workforce</td>
<td>• Lack of cooperative activities</td>
</tr>
<tr>
<td>• Traditional know-how in dairy production</td>
<td>• Absence of public support services</td>
</tr>
<tr>
<td>• Raising cattle is considered as a basic activity in the Egyptian culture in urban areas</td>
<td>• Quantity, quality and price of animal feed</td>
</tr>
<tr>
<td>• Availability of cow’s and buffalo’s milk</td>
<td>• Lack of automation in the milking process</td>
</tr>
<tr>
<td></td>
<td>• Lack of improved breeds of livestock</td>
</tr>
<tr>
<td></td>
<td>• Low animal productivity</td>
</tr>
<tr>
<td></td>
<td>• Poor sanitary and hygiene conditions</td>
</tr>
<tr>
<td></td>
<td>• Insufficient supply and high prices of packaging</td>
</tr>
<tr>
<td></td>
<td>• Absence of standardised specifications for traditional dairy products</td>
</tr>
<tr>
<td></td>
<td>• Lack of collection and distribution centres</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Import of 90% of animal feed requirements whereas it could easily be produced in Egypt</td>
<td>• Unstable political situation</td>
</tr>
<tr>
<td>• Domestic demand for milk not fully satisfied by the national production</td>
<td>• Lack of appropriate regulation and effective enforcement (especially for company registration)</td>
</tr>
<tr>
<td>• Lack of milk collection centres = opportunity for the private sector to invest in the dairy chain</td>
<td>• Rapid changes in the dairy technology</td>
</tr>
<tr>
<td>• Promising prospects for traditional Egyptian dairy products (Ras/Romi cheese and chilled desserts especially) in Arab and African markets</td>
<td>• High costs of dairy equipment (especially for transportation) and absence of subsidies</td>
</tr>
<tr>
<td>• Increased awareness among dairy farmers and processors of the benefits of cooperation</td>
<td>• Lack of guaranteed reliable time table to import animal feed (soya bean and maize)</td>
</tr>
<tr>
<td></td>
<td>• Complexity of export procedures (paperwork and EU export ban)</td>
</tr>
</tbody>
</table>

The SWOT analysis presented above represents the strengths, weaknesses, opportunities and threats of the dairy chain in Alexandria and Beheira, resulting from the quantitative and qualitative analysis of the outcomes of interviews with different players of the chain.

Although the strengths listed are not numerous, it should be taken into consideration that there are a good number of opportunities to take advantage of and turn into strengths. The formation of the dairy cluster could help in this process. The threats are similar to those faced by other countries which succeeded in taking advantage of dairy clusters.

Most interviewees declared that traditional dairy products could easily be enhanced and become popular if there were activities for strengthening professional qualifications, solving feeding issues, improving hygiene standards, establishing distribution centres. All these activities could be implemented within the dairy cluster.
2.5. Recommendations

The following recommendations were formulated by the different players in the dairy chain, with the goal of overcoming the above-stated problems, weaknesses and threats. They are based on the field survey findings.

2.5.1. Dairy farmers’ recommendations

What the farmers want the most is to activate the role of agricultural associations and farmers’ unions in guiding, monitoring and supporting activities related to awareness raising, training and skills development in the dairy chain. They also recommend involving competent bodies in the follow-up and monitoring of the dairy chain to prevent abuses and ensure access to support services by targeted beneficiaries. Farmers mainly suffer from selling their loose milk at a fixed price, which is profitable for processors regardless of their own high costs.

Another recommendation is to build animal feed production plants close to dairy farms to save transportation costs. Farmers also suggest the development of new and innovative ways for promoting, distributing and marketing dairy products to improve sanitary conditions and increase prices. According to them, additional facilitation measures to encourage investment and export are required. The coordination and cooperation between the relevant stakeholders within a dairy cluster would encourage the realisation of these recommendations.

2.5.2. Dairy processors’ recommendations

Dairy processors’ recommendations of the dairy processors concern a higher level: government support and facilitation, especially for small projects. Suitable equipment, appropriate training programmes, improved breeds of livestock and subsidies or facilitated access to debt financing are some areas where government support could help increase milk and dairy production. According to them, the government could also support the dairy chain by reducing taxes on imported dairy equipment. For example, processors require equipped vehicles to safely transport their products for long distances and guarantee their quality. Training and skills development of farmers and production line workers are also needed to raise their awareness on animal health and nutrition techniques.

Processors were very much concerned about traditional Egyptian dairy products, especially Ras cheese (Romi), chilled dairy desserts and spreadable cheeses, since they are the most promising products for the cluster. Indeed, the latter could help develop their presence in the market through improvements in packaging and branding.

2.5.3. Recommendation for forming a successful dairy cluster

The issues mentioned by dairy farmers and processors present great opportunities for the dairy cluster, but also major challenges. Therefore, a suitable framework and effective support schemes are required for the successful development of the dairy cluster. It is important to mention that the government’s role in supporting the dairy industry is essential. The Indian clustering experience (presented in Appendix 5) could serve as a model for the Egyptian dairy cluster.

**DESIGNING AND IMPLEMENTATING AN INTENSIVE DAIRY DEVELOPMENT PROGRAMME**

- Technical services to increase milk production;
- Training in procurement, processing and marketing techniques to reinforce the milk supply chain in a cost-effective manner;
- Skills development to ensure good prices for both dairy farmers and processors;
- Support for improving the economic, social and nutritional conditions of residents of disadvantaged areas.

**IMPROVING THE QUALITY OF MILK PRODUCTION**

- Modernisation of production systems to ensure milk quality from producer to consumer;
- Automation and on-the-job training to improve farmers’ milking practices;
- Awareness raising on hygiene and quality standards to facilitate exports.
ENCOURAGING COOPERATION BETWEEN THE VARIOUS STAKEHOLDERS

- Cooperation at all levels, from the district level to the State level;
- Cooperation between the different stakeholders in the dairy chain.

PROMOTING ENTREPRENEURSHIP IN THE DAIRY CHAIN

- Establishment of advanced and modern dairy farms producing quality milk;
- Support to structural change in the unorganized sector to promote initial milk processing at the village level;
- Dissemination of automated machinery and modern technology to handle milk on a commercial scale.

2.5.4. Beneficial outcomes of a local dairy cluster

The dairy farmers and processors interviewed expressed their willingness to join the dairy cluster and cooperate with the Faculty of Agriculture, the Chamber of Commerce, professional distributors, packaging companies, marketing experts, other processors and farmers. They even insisted that clustering with competitors, for example with other milk or cheese producers who have the same scale of production, would be beneficial to share the working experience and solve common problems. Moreover, they consider veterinarians as major partners in the foreseen cluster.

The majority of interviewees are also interested to cooperate with suppliers of animal feed and dairy equipment, as well as with exporters. They believe that traditional cheeses and chilled desserts have the highest potential to benefit from clustering.

The results of the study show developing local clusters bringing together the different stakeholders in the dairy chain would bring the following benefits:

- Improved production quality;
- Reduced costs of packaging materials;
- Reduced costs and improved quality of animal feed;
- Improved veterinary services;
- Stabilized prices for agricultural inputs (fodder and fertilizers);
Conclusion

If the dairy chain wants to control its own development, it will have to: turn rivalries into cooperation; increase its efficiency without compromising the quality of its products; diversify and add more value to its products. Pursuing these objectives will require improved innovation capacity and a higher level of expertise.

By 1) improving the supply of milk in both quantity and quality through encouraging the establishment of farmers’ groups, 2) clustering small dairy processors (traditional cheeses and chilled desserts) to collectively buy raw materials, use packaging facilities and access new markets (through contracting with retailers and exporters), and 3) developing a marketing strategy aimed at developing Egypt’s share in the Arab and African dairy market and entering the European and North American markets, the dairy cluster will help the Egyptian dairy industry reach another stage of development.

If Egypt is to emerge as a leading dairy producer, some major problems and barriers to the sustainable development of the dairy chain (fodder shortage, high prices of agricultural inputs, shortage and low quality of raw milk, low-skilled workers, etc.) will have to be abolished. Moreover, to become a major exporter, it is imperative that proper production, processing and marketing infrastructure be developed to meet international quality requirements. Finally, a comprehensive strategy for producing quality and safe dairy products should be formulated and implemented, with strong public backing.

Focus should be on specialty dairy products. The availability of both cow’s and buffalo’s milk is another strength to build on. Thus, Egypt should concentrate on developing its production of specialty dairy products, like Ras cheese, Domiat cheese and chilled dairy desserts (Mehalabeya, Om Ali, Ashoura, Roz bel laban) and tailor it to the needs of the target consumers.
References

- Industrial Modernization Centre - Egypt. (2005) Egyptian Processed Food Sector Review. Rotterdam, April 2005
Appendixes

Appendix 1: division of labour between GAFI and CITL-AAST for the diagnosis

**GAFI**

I. Inventory of the dairy chain and positioning of the studied territory within the national value chain (10-20 pages)

II. Dairy chain structure (breakdown of dairy farms and processing units by size, etc.)

III. Marketing systems (distribution channels, milk collectors, transportation means and logistics services), pricing systems and development policies applied within the dairy sector at national and territorial levels

IV. Positioning of the studied territory in national dairy value chain: special assets of the territory concerning the production of milk, dairy products and forage

**CITL-AAST**

I. General evolution of the national dairy chain (supply, demand, national and international trade for drinking milk, cheese, fresh dairy products, butter, ice cream and other dairy desserts, animal feed)

II. Survey results (25-35 pages)

II.1. Methodology: sample's representativeness (share in the total number of farms and production plants of the territory), number of interviews and identity of the persons interviewed, dates and duration of the survey, description of data processing methods (SPSS, discourse analysis software, etc.) (maximum 5 pages)

II.2. Current situation of the dairy chain and strategic priorities for its sustainable development: synthesis of the survey results; challenges and constraints of the dairy chain; supporting activities by the public sector; priorities declared by the stakeholders (dairy farmers, processors, distributors and institutional players) (10-15 pages)

II.3. Dairy cluster: opportunities for the creation of a cluster (declaration of interviewed stakeholders and results of the field survey), main objectives and means, identification of key players, governance patterns (10-15 pages)
Appendix 2: Public institutions and support organisations involved in the dairy chain in Alexandria and Beheira

Public institutions

FOOD TECHNOLOGY CENTER (FTC)
FTC was established in 2001 by the Ministry of Industry and Foreign Trade to provide technical assistance to the food processing sector in Egypt. Its main mission is to upgrade, modernize and develop Egyptian food industries by promoting innovation and technological development, transferring technology and providing sustainable and integrated solutions to meet technological needs, enhance productivity, improve quality, increase efficiency, build capacity, add value, facilitate access to markets, boost exports and improve competitiveness. Its areas of activity include: technical support, entrepreneurship & incubators, product development testing, funding, networking. FTC works on national and international projects for the development of food industries in Egypt, with special focus on the dairy industry. It is headquartered in Giza (Cairo) and has 2 branches in Belbis and Menia.
Website: www.ftc.gov.eg

INDUSTRIAL DEVELOPMENT AUTHORITY (IDA)
Established in 2005 by the Ministry of Industry and Foreign Trade, IDA is responsible for executing industrial policies, promoting new industrial investment (both foreign and domestic), devising and implementing land development policies and providing investors with industrial land and operating licenses. It also participates in drafting relevant new laws and regulations and in determining the price of industrial land.
Website: www.ida.gov.eg

INDUSTRIAL MODERNIZATION CENTER (IMC)
IMC was established in 2000 as an independent body to give an impetus to the modernization of the Egyptian industry. It was jointly funded by the European Union, the Egyptian government and the Egyptian private sector. Today IMC is part of the everlasting process of continuously bringing Egyptian industry to international competitiveness with serious commitment from the Government of Egypt to continue financial support for years to come. Its main mission is to support all industrial enterprises, individually or sectorally, according to their development needs, through comprehensive and customized business development competitiveness programmes. It focuses on companies employing more than 10 workers or industrial clusters. IMC is headquartered in Cairo and has several other branches throughout the country, including Alexandria, Borg El Arab and Damanhour.
Website: www.imc-egypt.org

FOOD TECHNOLOGY RESEARCH INSTITUTE (FTRI)
FTRI was established in 1991 by the Ministry of Agriculture and Land reclamation in order to integrate the research work between all food processing sectors. It brings together 8 different research departments working in various food processing sectors (bread and dough, special food and nutrition, field crops, horticultural, oils and fats, meat and fish, dairy technology, food processing and packaging), 2 thematic research units (food processing economics, training and development), a Food Safety Information Center and several pilot plants (including a dairy products unit). FTRI conducts applied researches in food processing and preserving to improve the quality of food products, provides quality control, food safety and technology transfer services to food processing factories and trains agriculture institutes graduates.
Website: www.arc.sci.eg/InstsLabs/Default.aspx?OrgID=16

AGRICULTURE RESEARCH CENTER
ARC was created by the Ministry of Agriculture in the early 1970s. Its main missions are to: conduct applied and basic research to generate a continuous flow of technologies that help increase productivity and reduce production cost; transfer new technologies to the farming community through extension service; monitor their adoption by end users; develop human capital as a continual process.
Website: www.arc.sci.eg

ANIMAL PRODUCTION RESEARCH INSTITUTE (APRI)
APRI dates back to 1908 when an independent Animal Breeding Section was formed. Its responsibilities were limited to applied research and activities related to buffalo, cattle and equine breeding. Since 1921, it has been
Developing the typical dairy products of Alexandria and Beheira
Diagnosis and local strategy

March 2014

affiliated with the Ministry of Agriculture as a Branch for Animal Breeding. In 1939, the branch was transformed into the Department of Animal and Poultry Breeding, and then into the Department of Animal Production in 1944. In 1952, it was converted into the General Department of Animal Production, and in 1971, when the General Authority for Agricultural Research (which became the ARC in 1983) was formed, APRI became one of its research institutes.

Website: www.arc.sci.eg/instslabs/Default.aspx?OrgID=7&lang=en

GENERAL ORGANIZATION FOR VETERINARY SERVICES (GOVS)

Established in 1984, GOVS aims to protect livestock and their products from communicable and infectious diseases and to treat all cases of diseases leading to the deterioration of productivity.

Website: www.govs.gov.eg

FACULTY OF AGRICULTURE – ALEXANDRIA UNIVERSITY

The Faculty of Agriculture was established in 1942 in Damanhour, then moved to Alexandria in 1947. It grants bachelor's degrees in agricultural science in 8 programs and 15 subsidiary divisions, as well as master's and doctoral degrees in these different disciplines. It includes Dairy Science and Technology and a dairy processing pilot plant.


FACULTY OF VETERINARY MEDICINE – ALEXANDRIA UNIVERSITY

Founded in Edfina (Beheira province) in 1974, the Faculty of Veterinary Medicine aims to produce a comprehensively prepared and innovative graduate being able to interact with the challenges created by global economy in different veterinary fields. It offers postgraduate programs that help participants to acquire updated knowledge and provide research and consultancy to serve the society requirements and promote community development. It also provides veterinary medical services, as well as poultry and animal treatment services to individuals and institutes.

Website: http://vetmed.alexu.edu.eg

GRANTS, INNOVATION & TECHNOLOGY TRANSFER CENTER (GITTC) – ALEXANDRIA UNIVERSITY

Founded in Alexandria in 2009, GITTC is organized into 3 business units: Technology Transfer and Industry Collaborative Office (TTICO), Intellectual Property Rights Office (IPRO), Grants and Outreach Office (GOO). Its missions are to: support staff members, researchers, undergraduate students and industry to obtain grants and funding to sponsor their research and mobility; develop a sustainable system of technology transfer, innovation and entrepreneurship; protect, manage and license the Intellectual Property Rights.

Website: www.gittc-alexu.org

PRINCIPAL BANK FOR DEVELOPMENT AND AGRICULTURAL CREDIT (PBDAC)

PBDAC was founded in 1931 by several private parties with a common interest in the development of Egypt's agricultural sector. The bank grew rapidly to become the largest financial institution in the Arab world serving the specific interests of the farming community. It was nationalized in 1961 to root out unscrupulous practices by traders and other middlemen that prevented small farmers to obtain a fair price for their produce. Over time the bank expanded its range of activities by attracting savings deposits, by offering treasury and foreign exchange services, and by starting to lend to non-farm related business enterprises, including the financing of major infrastructural projects. Today the bank's operations are carried out through a network that encompasses an administrative head office in Cairo, 2 independent regional banks (Lower and Upper Egypt), 18 governorate banks (known as BDACs), 169 district branches, some 1,012 village banks and 312 banking units. The bank currently serves over 3.5 to 4m farmers and other rural dwellers. PBDAC is wholly-owned by the Egyptian government and its Board of Directors is directly answerable to the Minister of Agriculture and Land Reclamation.

Website: www.pbdac.com.eg
SOCIAL FUND FOR DEVELOPMENT

Established in 1991, SFD is entrusted with supporting SMEs, providing an integrated package of financial and non-financial services for start-ups and coordinating efforts with all SME development institutions and stakeholders in view of adopting policies and legislation required for their promotion. It operates through a network of 31 regional offices covering all the governorates of Egypt with one-stop-shop (OSS) service complexes annexed to each to guarantee an efficient lending process and streamlined administrative procedures (licensing, commercial registry, tax cards, etc.).

Website: www.sfdegypt.org/web/sfd/home

ALEXANDRIA AND BEHEIRA GOVERNORATES

Egypt is divided for administrative purposes into 27 governorates (muḥafazah) which are the top tier of the country's five-tier jurisdiction hierarchy. A governorate is administered by a governor, who is appointed by the President of Egypt and serves at the president's discretion. Governorates are either fully "urban" or else an admixture of "urban" and "rural". Moreover, they may comprise just one city, as in the case of Alexandria. Non-urban governorates in the Nile Delta like Beheira tend to have names different from their capital (Damanhour).

Support organisations

CHAMBER OF FOOD INDUSTRY (CFI) – MILK & DAIRY PRODUCTS SECTOR

CFI is a non-profit organisation established in 1958 under the umbrella of the Federation of Egyptian Industries (FEI). It is the official representative of the Egyptian food industry, with a member base of more than 2,500 companies with a processing and/or packing activity related to the food & beverage industry. The pool of members is clustered according to their products into 9 divisions. The milk & dairy products division comprises 294 members, including raw milk producers, collectors and dairy processors.

Website: www.egycfi.org.eg/en/Milk_Dairy_Products

ALEXANDRIA AND BEHEIRA CHAMBERS OF COMMERCE

Chambers of Commerce are local business organisations working to promote and further the interests of their members in Egypt. Their main activities are, among others, safeguarding business interests and sharing business experiences and interests, interacting with governments, civil society and the media, as well as organizing trade shows and events. Both Alexandria and Beheira governorates have their own Chamber of Commerce.

OTHER BUSINESS ORGANISATION INVOLVED IN AGRI-FOOD

Borg El Arab Investors Association
Beheira Investors Association
Saudi Egyptian Businessmen Association

DEVELOPMENT PARTNERS INVOLVED IN AGRI-FOOD

European Investment Bank (EIB): www.eib.org/confcentre/contact/offices/egypt.htm?lang=en
USAID: www.usaid.gov/egypt
Appendix 3: The typical dairy products of Egypt


LABAN RAYEB

Laban rayeb, also known as Laban Matrad, is a type of curdled skimmed milk made in Lower Egypt. It may be drunk fresh or used to make Karish cheese, which in turn is used to make Mish, a staple peasant food. There is evidence that it was made by the ancient Egyptians.

The traditional way to make Laban rayeb starts with milking cows directly into partially sterilized shallow or deep earthenware pots. The inside of a newly-made pot (Matared or Shalia) is soaked in oil or a mixture of egg white and oil and then baked in a kiln to close the pores. After each use the pot is washed and dried in a hot oven for two hours. The milk is left for 1 to 4 days, depending on the temperature, while the fat rises to the top and the milk below curdles. The milk is kept at 20-25°C while the curd forms. The milk is not disturbed while its natural microflora ferment it. The fat is scooped out and used to make butter. The remaining curd is the Laban rayeb. It smells similar to buttermilk, and has a slightly acid taste.

LABAN KHAD

Laban khad is a variant that is poured into skin bags (Kerbah) and left to ferment for periods determined by experience. Air is blown into the Kerbah before closing it tightly and shaking until milk coagulates. After the removal of fat, the remainder is called Laban Khad, or sour butter milk.

LABAN ZEER

Laban zeer, also known as earthenware stored Laban Khad or concentrated butter milk, is another variant made in earthenware pots. During hot weather in Upper Egypt, the milk coagulates before the fat is removed. It is then stored in earthenware containers (Zeers). The walls of Zeer are porous and thus the whey differs and the Laban Zeer thickens. Fresh sour milk and a suitable quantity of salt are added, and the contents of the Zeer are mixed. The Laban Zeer is usually made from May onwards to be used in the making of Kishk, after harvest of wheat.

KISHK

Kishk is also known as wheat fermented milk. In Upper Egypt, Kishk is considered as a typical native food made of Laban Zeer and boiled, dried and crushed wheat grains. Kishk has good keeping quality and is consumed throughout the year. The wheat grains are boiled in the water, the cooked grains are named “Belila”, then the grains are dried in a sunny place for nearly a week. The dried product is crushed, sieved and the smooth particles are disposed of. The crushed wheat is put in an earthenware jar and gradually moistened, first with salted water and then with Laban Zeer. The ingredients are thoroughly mixed; the resultant paste is covered with a thick cloth in a warm place to keep the temperature constant for 24 hours. As a result of fermentation, the paste swells and is then divided into small round pieces, spread over straw mats and left to dry in the sun place for few days and dried in a warm oven. The final product is not hygroscopic and can be stored in open jars for 2 or 3 years without deterioration.

LABAN ZABADY

Zahads, Zabadi or Laban Zabady is the traditional type of yoghurt manufactured in Egypt. The best Zabady is made from buffalo’s milk, though it can be made from cow’s milk or from a mixture of the two milks. It is believed that Zabady is derived from the ancient Egyptian fermented milk Laban Rayeb.

The milk is filtered through a cloth, boiled for a few minutes and then left to cool to 37°C to 45°C. The starter culture is mixed and then added to the cooled milk. Inoculated milk is transferred to pots or plastic lines or carton containers and incubated. The most popular incubators are wooden boxes, heated by charcoal. During the incubation period, the temperature is controlled manually. When the milk begins to coagulate, the source of heat is removed, and the pots are left until the milk sets. They are then removed to a cool place such as ice chest or a refrigerator, to stop the development of acidity. Excess acid gives the product an objectionable sour taste and may cause separation of whey.

The final type of Zabady is smooth (porcelain like surface), bright white when made from buffalo’s milk, and yellowish white when made from cow’s milk. It has characteristic taste and aroma, full, pleasant and mildly sour, and a firm consistency without whey separation, custard like, nearly sliceable.
LABNEH

The Egyptian Labneh is concentrated Zabady, super Zabady or Zabady cheese. It is obtained from Zabady after removing part of its aqueous phase. In Egypt, the conventional method for producing Labneh is to make Zabady and store it overnight under refrigeration to the next day. Salt is then added and thoroughly mixed. The mixture is put into cloth bags and hung on racks to drain for about 12-24 hours, packed and stored under refrigeration. The final product should be soft, smooth and spreadable, its consistency resemble cultured cream. It has an acidic clean flavour and a milky white colour.

KARISH CHEESE

Karish, Kartesh or Kareish cheese is one of the most popular fresh cheeses made from skimmed milk. It contains most of the skimmed milk constituents including protein, small amount of sugar, some of water, soluble vitamin and most of the calcium and phosphorous.

It is made from defatted buffalo’s or cow's milk or a mixture of both. The defatted milk may be in the form of Laban Rayeb, Laban Khad, Laban Zeer or mechanically skimmed milk (Laban Farz). Although details of Karish cheese making differ depending upon the type of defatted milk, the principle of its preparation is roughly the same (Fahmi, 1950). Milk is poured directly into special earthenware pots (Shallia or Zeer) with a capacity of about 4-7 kg. The pots of milk are kept in a suitable place so that the fat may rise and form a surface layer and the milk underneath may sour and clot. After removing the cream layer, which is formed within 24 to 36 hours during summer and from 2 to 3 days during winter, the curd is poured onto a mat, which is usually made of a type of Juncus to drain. After a few hours, the end of the mat are tied together to permit a portion of the whey to drain. This process of spreading the curd, then squeezing it in the mat is repeated once or twice. Finally, the mat is hung from the joined ends in order to complete the drainage of whey. Draining of the whey takes 2 or 3 days, or until the desired texture of cheese is obtained. Finally, cheese is cut into suitable pieces, then dry salted to taste. The salted cheese is left for a few more hours in the mat until no more whey drains out and is then ready to be consumed as fresh cheese.

The quality and composition of Karish cheese may vary considerably due to such factors as the quality and composition of the clotted skimmed milk, the method of manufacture, the time required to complete the drainage of whey, the quality of salt added and the method of handling the finished cheese.

MISH CHEESE

Mish cheese is made by fermenting cheese in brine for several months or years. It may be similar to cheese that has been found in the tomb of the First Dynasty Pharaoh Hor-Aha at Saqqara, from 3200 BC. It is generally prepared at home, although some is sold in local markets. Peasants use it as a staple food. When ripe it is a yellowish brown colour, and tastes sharp, salty and pungent. Products similar to Mish are made commercially from different types of Egyptian cheese such as Domiati or Ras, with different ages.

Although details of traditional Mish cheese making differ from one area to another, and even from home to home in the same part of the country, the basic steps of the preparation are essentially the same. The first step in Mish cheese making is the preparation of Karish cheese. Then, cubes of Karish cheese (8 cm²) are incubated under microaerophilic conditions in a large clean earthenware pot (Ballas or Zallaa). The space between the pieces of cheese is filled with whole milk, skimmed milk or buttermilk, known as “Laban Khad” (see description above), and about 10% edible salt is added. Nutritive substances are added such as “Kosba”(the cake obtained after extracting the oil from sesame seeds), “Morta” (the precipitate found after the boiling of butter for the manufacture of butter oil), together with one or more of the following oriental spices and medicinal plants: fenugreek (Trigonella feanum graecum), red pepper (Capsicum frutescens var. faseiculatum), hot pepper (Capsicum frutescens var. chili), paprika (Capsicum frutescens var. tetragonium), black pepper (Piper nigrum), grains and flowers of anise (Pimpinella anisurn), cumin (Cumin cyminum), fennel (Foeniculum officinalis), Khella (Ammi visnaga), clove (Syxgium aromaticus), nutmeg (Areca catchus), thyme (Thymus vulgaris) and nigella (Nigella sativa). The fruits of sweet green peppers (Capsicurn frutescens var. grosum) and some old Mish (as a natural starter from 2-7% of the whole mixture to be pickled) must be added. Borax, i.e. sodium borate, which is known locally as “Tinkar”, is usually added in a small cloth bag and placed on the surface of the milk to kill Pyophilla casei larvae, which may contaminate the cheese during preparation. No figures could be obtained as to the exact amount of borax added. The spiced milk covering the curd should reach the neck of the Ballas, and the opening is then covered by means of a palm leaf sheath (fibres and fibre vascular bundles) and a piece of cloth. After that, the Ballas is tightly sealed by means of a mud paste mixed with chaff. The hard paste keeps the contents under partially anaerobic conditions during ripening, which requires one year of storage in a warm place, or transfer from time to time to a sunny place.
DOMIATI CHEESE

Domiati cheese (Gebnah Domiati) is the most popular Egyptian soft white cheese in brine, and is named after the Northern city and governorate of Damietta. It is also known as white cheese (Gebnah baida) and as soft cheese (Gebnah tariyah). Domiati cheese is made and consumed not only in Damietta but also in all of the 25 Egyptian governorates. It is well known and consumed in the Arab world in general, and variants are made in Europe and in many other countries. It closely resembles Greek Feta cheese, and it is believed that Domiati cheese originated in Egypt after 332 B.C. Domiati cheese differs chiefly from other cheeses in brine in that it is salted at the first step of production: the salt is added directly to the milk. The shape of finished Domiati cheese varies widely with the curd forms used for whey drainage. It may be cubic or cylindrical.

A cubic shape is more common. The cheese is packed into rectangular tins in layers, of about nine pieces per layer, each piece measuring about 8 cm² by 3.5 cm in thickness. Cylindrical shape of cheese may be produced in different dimensions, e.g. 12 cm in diameter and 3.5 cm thick or 6 cm in diameter and 4 cm thick. Domiati cheese has a distinctive flavour. It is mild and rather salty when fresh. As the cheese ages, it develops considerable acidity. At 12 month or older, a pungent flavour similar to that of Mish cheese develops, and is accompanied by a change in colour from white to light brown. Fresh Domiati cheese has a soft body. As it ripens in brine, the body usually becomes firmer up to the third month of age after which it mellows, mainly as a result of protein breakdown. It possesses a close texture with no holes, as ripening proceeds it becomes slightly flaky and is brittle rather than elastic when broken.

In Egypt, the manufacturing process for Domiati cheese differs only in the size of the batches of milk. In private dairies in Damietta and other governorates, milk batches of about 500 kg are used. The manufacturing process can be summarized as follows: approximately one-third of the standardized milk (8, 4 and 2% fat for full cream, half cream and quarter cream cheese, respectively) is heated to 80°C, and the salt (5-14%) is added to the remainder. The percentage of salt differs according to the season of production and the ripening temperature of the cheese. For refrigerator-stored cheese, known locally as "Tallaga cheese", salt is added to the milk at a level of 5-6% in winter, 6-7% in spring and autumn and 7-8% in summer. For ambient-temperature-stored cheese, known locally as "Khazin cheese", salt is added at a level of 8-10% in winter, 10-12% in spring and autumn, and 12-14% in summer. The two portions of milk are mixed and renneted. The best temperature for coagulation is about 39°C. Coagulation takes place after 2-3 hours and the coagulum is poured into wood or steel moulds lined with coarse cloth or netting. Moulds vary greatly in size, with very large ones being used for industrial scale manufacture. Small moulds are turned frequently whereas, for large ones, the curd is put under pressure and is then cut into blocks of convenient size. The drainage time varies from 12 hours to 24 hours.

Moulds are removed prior to marketing the cheese. In the case of wooden moulds, the cheese is cut into pieces of 8 cm². It is then wrapped in waxed paper. The cheese may be consumed fresh. If the cheese is in brine, it is preserved in salty whey for 4-8 months. Cheese pieces are arranged in layers in suitable tins and completely covered with brine. The tins are soldered and then stored at refrigerator or ambient temperature.

TALLAGA CHEESE

Tallağa cheese is a white soft cheese. It is made of pasteurized milk, salt starter culture and cow rennet. The full production process is described above (see "Domiati cheese"). It contains 40% fat in dry matter.

ISTANBULI CHEESE

Istanbuli cheese has a crumbly white texture, with a great chilly taste. The original unique taste of tender, mature Istanbuli white cheese with Jalapeno pepper thrown in for a spicy flavour gives this cheese its distinctly chilly taste. It is quite salty so keeps well in the refrigerator. It softens and sags but does not run or get stringy and exudes almost no oil. Its strong green pepper flavour makes it unsuitable for most cheese recipes. The test example was made in Egypt from buffalo milk.

Istanbuli cheese is made from fresh pasteurized milk, salt starter culture, microbial rennet Contains. It contains 40% fat in dry matter. It has to be kept refrigerated at temperatures between 0 and 5°C, with food preservatives.

RAS CHEESE

Ras cheese is the main Egyptian hard cheese and is rather similar to the Greek Kefalotyri. The names from both countries mean "head". Perhaps because the cheese resembles a bold head. It must be noted that the term "Ras cheese" is only used in the scientific literature, while the local commercial name is Romi cheese (Gebnah Romi), except in Alexandria markets where it is known as Torky cheese (Gebnah Torky). It is probable that the basic Ras cheese originated in the Balkans, and appeared in Egypt during the early stage of the industrial renaissance after 1818. Ras cheese is now the best-known hard cheese in Egypt, and throughout the Arab world. The best quality cheese is reported to be made by private cheese companies in the Damietta governorate.
Developing the typical dairy products of Alexandria and Beheira
Diagnosis and local strategy
March 2014

Standardized milk (3% fat) is heated to 32°C and sufficient rennet is added to complete coagulation in 35 minutes. The coagulum is cut into small pieces, about the size of wheat grains, and then vigorously stirred. The temperature of the vat is then raised to 45°C over a period of around 40 minutes, and gentle stirring is maintained throughout. After the curd has settled and the whey drained out, salt is sprinkled over the curd at a rate of 1% (w/w), and the curd is manually pushed to the sides of the vat. Moulds, lined with cheese cloth, are filled with sufficient curd to produce one finished cheese, and manual pressure is applied to expel some of the adhering whey. Light mechanical pressure follows over the next 4 hours, at which point the cheese is reversed in the press and left under pressure for 24 hours. The wheels of cheese are then removed from the moulds and cloths and placed in brine (20% salt solution) for 24 hours. After draining for a further day at ambient temperature, the surface of each cheese is covered with a small amount of dry salt. By the next day, most of the salt will be absorbed into the cheese, so that the wheels are turned and the dry salting process repeated once again. This dry salting procedure is continued for a period of around 2 months, either daily or every other day. If a cheese becomes hard wet, salt may be used instead but this problem is usually avoided by washing the cheese in brine at least twice a week.

**ROZ BI LABAN**

Roz bi Laban is a traditional Egyptian rice pudding, thickened with corn flour (corn-starch) and flavoured with raisins and cinnamon. The basic recipe consists in dissolving sugar in milk, adding rice and cooking over a low flame until the rice is tender. Roz bi Laban is usually served cold. Raisins are blended into the pudding and some powdered cinnamon is sprinkled on top before serving. Today there are dozens of dairy shops that specialize in an endless variety of Roz bi Laban toppings, from ice cream and clotted cream to fresh and compote fruits.

**MEHALABEYA**

Mehalabeya is a traditional Egyptian dairy pudding, flavoured with rose water and topped with pistachios, chocolate, mango or any other flavour. It is served cold. The basic recipe consists in heating milk, sugar and rice/wheat flour until it boils, adding orange flower while stirring quickly, pouring the mixture into round moulds, then the chosen topping, and refrigerating it until cold.

**ASHOURA**

Ashoura is a traditional Egyptian dessert, based on corn-starch, wheat and sugar. It is named after the Day of Ashoura, the 10th day of Muharram (first month of the Islamic calendar), and is traditionally prepared during this period. The basic recipe consists in placing wheat grain in an earthenware pot or ceramic container, covering with warm water at least 3 times its amount, leaving to rest in a warm place for 4-6 hours, draining and covering it with warm water, boiling over low flame until it is very soft, draining again, dissolving sugar in milk, adding cornstarch and butter, pouring over wheat, returning pot to flame, simmering for 10 minutes on very low heat, placing in serving dish to cool. In addition, raisins are lightly fried until they puff, mixed with nuts and cinnamon and sprinkled over the mixture. Ashoura is served chilled.

**GILATTI (ICE CREAM)**

Ice cream is a traditional and long-standing treat among Egyptian consumers, with artisanal products being especially popular. Egypt’s hot climate encourages consumption of ice cream, especially in the summer. Gilatti is a frozen product made from various milk products, dry or liquid forms of glucose, sucrose or corn sugar, and water. It generally contains flavouring and colouring agents, as well as egg products and stabilizers. Manufacturing ice cream involves the following processes: pasteurizing, mixing, homogenizing, cooling, aging, freezing, packaging, hardening and storing.

**SAMN BALADI**

Samn Baladi, also known as Al-Samn Al-Fallahi or Al-Samn Al-Saidi, is a clarified butter commonly used in Middle Eastern and North African cuisines. When prepared with cow’s milk, good quality Samn has a golden yellow colour, owing to the high content of β-carotene, while in case of buffalo’s milk, it has a white, slightly greenish colour. It is characterized by a pleasant flavour that arises from various compounds, which are formed during the manufacturing process, i.e. fermentation and heating.

The main object of the primitive dairy industry in the rural districts of Egypt is to separate milk fats for making butter, and to process the remainder into products to be consumed as such or after storage throughout the year. In Lower Egypt, farmers put fresh milk in shallow or deep earthenware pots (Matrad or Shalia) and leave it to stand in a warm and dark place till the cream rises and the rest of milk coagulates. The cream layer is removed and beaten into butter, which is boiled and therefore converted into Samn. The presence of earthenware pots and Barany (pot with glazed inner surface for storage of Samn in the tomb of king Horaha of the first dynasty - 3,200 B.C.) indicates that the art of Samn making was known to the ancient Egyptians.
Samn is traditionally prepared by direct heating of salted sour butter until most of the water evaporates. Care must be taken during this stage to avoid frothing by continuous stirring and slow heating rate. When foams recess, the rate of heating is increased with continuous stirring until the aggregated milk solids-not-fat (SNF) acquire a creamy colour and temperature reaches 118-120°C. Heating is then discontinued and Samn is left to cool at room temperature to allow setting of the aggregated SNF (termed Morta) and the clear fat is separated by decantation. The slow cooling of Samn allows for the formation of fat crystals that characterize Samn. The latter should have a sweet flavour and be free from rancidity. The fat content should not be less than 99.5% and the moisture content more than 0.3%. The main flavour compounds in Samn are methyl ketones, 2-enals, and 2,4 di-enals.
Appendix 4: Production specifications for traditional Egyptian cheeses

The following production specifications were prepared by the Food Technology Center.

**Specification 1 - Domiati cheese (soft cheese)**

**PRODUCTION METHOD**

- Receiving fresh raw milk (70% buffalo’s milk, 30% cow’s milk) (pH = 6.5 or less, fat = about 5%) and putting it directly in the vats without pasteurization “in most cases”;
- Adding 5-15% of salt;
- Raising temperature of milk to 40-45°C;

- Transferring heated salted milk into plastic or stainless steel barrels (200 kgm);
- Adding standard animal rennet (60-65 ml/100 kgm of milk) and covering top of barrels with cloth;

- Coagulation time takes around 2-3 hours in the normal atmosphere;
- Digging out the curd with a ladle directly from the barrels and setting the curd carefully in a wooden or stainless steel frame with a cloth inside; once the frame is filled, tying both opposite sides of the cloth together;
- After 2 hours, loosening the tied cloth and moving carefully the curd from side to side with a ladle to remove extra whey;
- Action 7 and 8 may be repeated;
- Pressing the curd overnight with weights (about 50% of the weight of the cheese);
- Cutting the cheese into cubes (0.3-0.5 kgm);
- Cleaning and preparing galvanized tin cans, and covering them with plastic nylon;
- Filling cans with cheese cubes;
- Storing cans for at least 3 month either:
  - in a normal atmosphere (in this case the salt percentage is about 15%);
  - in refrigerators (5-7°C) (in this case the salt percentage is between 6-9%).

COMMON PROBLEMS WITH DOMIATI CHEESE
- Holes, gas production and bad smell;
- Bitter taste;
- Shrinkage of cheese during storing (loss of weight);
- Low yield of cheese (quantity out of certain amount of raw milk).
Specification 2 - Ras cheese (hard cheese)

PRODUCTION METHOD

- Receiving fresh raw milk (70% cow’s milk, 30% buffalo’s milk) (pH = 6.5 or less, fat = 4-4.5%) and putting it directly in the vats without pasteurization “in most cases”;
- Raising temperature of milk to 32°C;
- Adding standard animal rennet (50 ml/100 kgm of milk) in the cheese vat;
- Coagulation time is around 45-60 min;
- Cutting the curd with a wooden stick while the temperature is raised to 45°C until the curd is cooked;
- Draining the whey;
- Filling the moulds (13 kgm);
- Pressing the moulds overnight (around 15-20 bar);
• Dry salting for 4-5 weeks;
• Repining for 3-6 months.

COMMON PROBLEMS WITH RASS CHEESE:
- Cracks in the cheese rounds during storing;
- Shrinkage of cheese during storing (loss of weight);
- Moulds growth inside rounds;
- Bitter taste of cheese.
Appendix 5: The Indian clustering experience

Clustering is the process of automatically detecting items that are similar to one another and grouping them together (Vivek, 2004). Industrial clusters are increasingly recognized as an effective mean of industrial development and promotion of small and medium-sized enterprises. Cluster is also a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities (external economies). The issue has gained immense popularity among policy-makers as a very important tool of development through intervention (Hague, 2010). Enterprises can better improve their competitiveness due to the presence of specialized suppliers of raw materials, machinery, skills and technology as well as other supporting services.

Developing clusters is not only a mean to improve the competitiveness of an industry but also an instrument for alleviating poverty, generating sustainable employment, fostering innovation, enabling better, effective and sustainable credit flow. As a result, clusters have a positive effect and improve the countries’ economic status.

Moreover, clusters can also be considered as part of a bigger value chain mechanism (raw materials, intermediates, finished products and marketing) where the value chain extends beyond geographically defined boundaries. Defined by relationships rather than a particular product or function, clusters include organisations across multiple traditional industrial classifications, which makes drawing the categorical boundaries of a cluster a challenge.

Specifically, participants in a clusters include (Wislon, 2004):

- Organisations providing similar and related goods or services;
- Specialised suppliers of goods, services and financial capital (backward integration);
- Distributors and local customers (forward integration);
- Companies with complementary products (lateral integration);
- Companies employing related skills or technologies or common inputs (lateral integration);
- Related research, education and training institutions such as universities;
- Community colleges and workforce training programmes;
- Cluster support organisations such as trade and professional associations, business councils and standards setting organisations.

Development and joint management of common facilities requires a lot of trust and cooperation among cluster participants. Companies often view others as competitors and do not want to participate in joint activities. This requires building up trust among the participants to guarantee the cluster success (Jonsson, 2012).

Thus, characteristics of the cluster policy need to be:

- Neutral across clusters;
- Enhancing productivity of multiple firms/institutions;
- Facilitating/capturing integrations and externalities;
- Facilitating the flow of information/knowledge across actors;
- Engaging the private sector, not just government;
- Preserving and enhancing market competition, not retarding it.

From the lesson learnt from the Indian clustering experience, the typical roles the government can play may therefore be:

- Develop/ strengthen local governance institutions and other bodies;
- Remove entry/ exit barriers in industries related to cluster;
- Remove avoidable regulatory burdens that prevent firms from functioning efficiently and yet ensuring uniform regulations on environment and labour across the cluster to avoid distortions;
- Develop existing institutions that address the collective R&D needs of firms in the cluster;
- Develop and/ or strengthen existing institutions that offer specialised skills for competitiveness;
- One-stop shop for dissemination of public information on products and markets;
Facilitate export promotion and attract Foreign Direct Investment (FDI);

Develop provisions for basic factors such as land, labour and capital, as well as advanced factors such as skilled labour, technology and equipment, faster/cheaper transportation, etc.;

Ensure financing of enterprises by linking up with banks and support to receive finances.

In the light of the above remarks, a dairy cluster could be a major contributor to the Egyptian economy. Much of the value chain, from dairy farm to distributors through processing, is well represented in the territory (Alexandria and Beheira governorates). The cluster would increase its competitiveness and promote dairy products by including cow farms producing milk as well as all downstream organisations processing it and distributing derivative products.

India was chosen as a success model for the dairy clustering project due to its similarities to Egypt in the dairy industry. The similarities are present in the large number of micro farms scattered all over the agricultural land, which in turn results in difficulties in the distribution channel. These difficulties might decrease the hygiene measures. Moreover, both countries are classified as developing countries, with large but low-income populations.

India had similar problems and constraints related to the dairy industry as in Egypt: absence of hygiene measures, lack of integration of key growth drivers such as finance, training, facilitation and creation of market linkages. The missing integration has prevented the informal sector to set up registered companies to access institutional support. It is often easier for producers and micro-entrepreneurs to manage what they can by negotiating with informal sources rather than through formal institutions. The lack of support policies for small entrepreneurs is particularly acute.

In India, farmer cooperatives played a very influential role in cluster development, spurring the development of private-public collaborations that created institutions to support the cluster. This is expected to create collaboration in the industry, allowing the cluster to lower labour-intensity, increase quality and move into value added production. It formed a strong network of supporting industries such as suppliers of feed, irrigation systems and machinery to process cheese and packaging. The Indian cluster also resulted in low priced dairy products and cost advantage.

The cooperatives that process the milk transform it into different dairy products and in some cases distribute it. However, most of those cooperatives do not distribute the dairy products abroad and instead sell their products to consumer packaged goods companies. The dairy industry is of crucial importance to India. The country is the world’s largest milk producer, accounting for more than 13% of the world’s total milk production. It is the world’s largest consumer of dairy products, consuming almost 100% of its own milk production. Dairy products are a major source of cheap and nutritious food to millions of people in India and the only acceptable source of animal protein for large vegetarian segment of Indian population, particularly among the landless, small and marginal farmers and women.
Developing the typical dairy products of Alexandria and Beheira

Diagnosis and local strategy

March 2014

LACTIMED aims to foster the production and distribution of typical and innovative dairy products in the Mediterranean by organising local value chains, supporting producers in their development projects and creating new markets for their products. The project is implemented under the ENPI CBC MED Programme, and is financed, for an amount of EUR 4.35 million, by the European Union through the European Neighbourhood and Partnership Instrument. From November 2012 to May 2015, ANIMA and its 11 partners will organise a hundred operations targeting the various stakeholders of the dairy value chains of Alexandria and Beheira (Egypt), the Bekaa and Baalbeck-Hermel (Lebanon), Bizerte and Beja (Tunisia).

So as to encourage integrated development of the dairy chain in Alexandria and Beheira, the project will base on a diagnosis of this value chain and study opportunities in the national and international markets, thus helping local authorities and support structures to adopt a strategy for promoting local typical dairy products.

The diagnosis conducted from January to September 2013 involved the following steps:

- Inventory of the dairy chain: literature review, identification of local stakeholders, interviews and working groups with experts and key stakeholders;
- Field survey with 13 dairy farmers, 7 processors and 18 industry experts;
- Identification of 11 local typical dairy products and description of their production specifications;
- Summary, definition of strategic priorities to ensure the development of the dairy chain and proposals for the creation of a dairy cluster.

The results of the diagnosis were presented on 9 October 2013 at a regional restitution workshop in Bizerte and discussed with all the project partners and associates as well as with a panel of Tunisian and international experts. The conclusions of these discussions have been incorporated into the present report.

More information at: www.lactimed.eu