DAIRY FARMING IN INDIA
A GLOBAL COMPARISON
The Indian dairy industry has grown consistently ever since the White revolution of the 1970s, making India, the world’s largest producer of milk with 17% global share. With an annual production of 146 million tonnes of milk India generates approximately USD 70 Billion of revenue. The Indian dairy market is expected to double within the next decade, primarily driven by over 15-20% growth in value added dairy segment.

To leverage this high growth potential and to meet the rising demand, a sustainable and strong dairy farming base will be critical. For achieving this, it becomes critical to address key challenges faced by the industry such as, low animal yields, ineffective breeding, improper feed and fodder management, deficient veterinary care, poor farm management and low financial inclusion among others. With dairy farming in India dominated by smallholder farmers, with an average herd size of less than 2, it becomes all the more challenging to address these issues, in the specific context of making small holder dairy farming globally competitive.

In addition to the excellent backend work being done by private sector and cooperative, appropriate farm level policies need to be developed by the Government to ensure sustainable dairy development through existing socio-economic dynamics and resource advantages.

On the occasion of the 4th IFCN Regional Workshop India 2015, we are pleased to release this joint Knowledge Report – ‘Dairy Farming in India – a Global Comparison’ by YES BANK and IFCN. The report compares cost components across dairy farming systems in major regions as well as countries like USA, Poland, New Zealand, China and Germany with key focus on India. It also assesses the sustainability of Indian dairy farming and identifies innovative dairy farming models which could be the way forward.

We are confident that this report will serve as an effective reference for stakeholders of dairy industry as well as policy makers.

Thank You.
Sincerely,

Rana Kapoor
Managing Director & CEO
Chairman
Why do we focus on milk production and dairy economics?
Today the dairy world is serving over 7 billion consumers and providing livelihoods for approximately 1 billion people which either live on dairy farms. The key challenges for the dairy stakeholders lie in its complexity and the high rate of change in a globalized world. We believe that by addressing challenges in the dairy world we can contribute to a more resilient and more sustainable future for all of us.

What is IFCN?
IFCN is a global research network to better understand the dairy world. We at IFCN started in 2000 with the basics - the cow and the dairy farmer. Step by step we deepen and widen the knowledge base every year. The IFCN is independent from third parties and is a politically-neutral knowledge provider. Our aim is to show the dairy world as it is and as accurately as we can measure it. In 2015 researcher from over 100 countries and over 100 dairy related companies are a member of the network. The results of the research are published annually in the Dairy Report. Moreover, we share our findings via three main conferences per year. In June we have an event for our researchers and in September we meet with our company partners. Since the year 2012 we have added a third event which is focusing on a specific world region. For this reason we are now in India.

What type of work has IFCN done in India?
We started our work in India in 2000, comparing typical farm types from Haryana as part of a PhD project of Dr. Amit Saha. The more intensive work with India began with involvement in the ProPoor Project Initiative of FAO to analyse farm types from Orissa, Andhra Pradesh and Punjab during 2001-2005. During 2006-12, NDDB cooperated with IFCN as research partner. Since 2008 NDRI is involved in the annual country profile analysis. In 2012 we started cooperation with Arohana dairy to analyse farming systems in Tamil Naidu. In 2013, GADVASU University from Punjab joined as regional partner from Punjab. Since the year 2014 Suruchi Consultants joined as research partner to better analyse commercial dairy farming systems in India.

What is the aim our regional workshop 2015 in India, 25 November?
The main topic of the event is: “How to sustainably grow milk production in India at a price consumers can afford?

As a neutral knowledge provider we like to share global dairy trends and relate what this can mean for India. Additionally we like to develop in open and inspirational way ideas, which can drive dairy development in India forward. The IFCN chapter in this publication shall give an illustration of the dairy world today and the position of India in it.

Torsten Hemme
Founder of IFCN and Managing Director
1 IFCN OVERVIEW ON MILK PRICES AND COSTS 12
   1.1 Dairy Farming Scenario: Global vis-à-vis India 12
   1.2 Milk and Feed Prices Development 1996 – 2015 13
   1.3 Cost of Milk Production 2014 by World Regions 16
   1.4 Analysis of Two Typical Dairy Farm Types in India 2014 17
   1.5 Cost of Milk Production in Key Countries 2000-2014 20
   1.6 Summary on the IFCN Overview on Global Milk Production 22

2 SUSTAINABLE INDIAN DAIRY FARMING 26
   2.1 Sustainability of Indian Dairy Farming Systems- What are the Key Drivers 26
   2.2 Innovative Farming Models for Enhancing Sustainability 29
   2.3 Summary on Sustainable Indian Dairy Development 31

3 ANNEX 34
   3.1 IFCN and its Research Paradigm 34
   3.2 YES BANK and Knowledge Banking Proposition 36
1

IFCN Overview On Milk Prices and Costs
1. IFCN Overview On Milk Prices and Costs

1.1 DAIRY FARMING SCENARIO: GLOBAL VIS-À-VIS INDIA

Introduction

In 2014, milk production of 778 million ton ECM (energy corrected milk with 4% fat and 3.3% proteins) was produced by around 121.5 million dairy farms (IFCN estimate) keeping 363 million milking cows and buffaloes. This means that the world’s average farmer keeps 2.9 milk animals with an average annual milk yield of approximately 2.1 ton ECM/animal/year. Of course, building averages is an oversimplification. There is a wide variation of dairy farms in the world ranging from less than 3 cows per farm in some countries to over 1,000 cows per farm in others. The simple example shows that milk production is performed distinctively in different countries and their dairy regions. The dairy farming systems differ significantly in terms of farm size, housing, milking and feeding systems.

Farm structure

The prevailing farm structure in India could be shown as the following illustration in table 1. A comparison has also been created by showcasing the farm structure at Poland and USA. India has continued to remain the world’s largest milk producer with 157.4 million ton of ECM. This accounts for about 19.5% of the milk produced in the world. However, the milk is mostly produced in dairy households with an average herd of 2 animals. India has about 76 million farms involved in milk production. Most of these farms are households with dairying as a subsidiary occupation. The average milk yield is about 1.2 ton ECM per year. Of late, medium scale family farms with 10-50 cows are making their presence felt representing about 35% of the milk production. Large scale commercial dairy farming is still at a very nascent stage with rough estimates of about 1% of dairy animals and 5% of milk production in India.

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USA and Poland are present among top 10 milk producing regions and represents the North American and CEEC regions respectively. USA and Poland will help to provide a comparative of large farms and mid level farms respectively with India.
Dairy Farming in India: A Global Comparison

Table 1. The dairy structure in India in comparison to Poland and USA for 2014

<table>
<thead>
<tr>
<th>Description</th>
<th>Units</th>
<th>India</th>
<th>Poland</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk production and dairy farms 2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk production</td>
<td>Mill Ton ECM*</td>
<td>157.4**</td>
<td>12.4</td>
<td>89.2</td>
</tr>
<tr>
<td>Average milk yield</td>
<td>kg/ cow/year</td>
<td>1248</td>
<td>5504</td>
<td>9633</td>
</tr>
<tr>
<td>Number of dairy farms</td>
<td>Thousands</td>
<td>76136@</td>
<td>286</td>
<td>51</td>
</tr>
<tr>
<td>Average farm size</td>
<td>cows/farm</td>
<td>2</td>
<td>8</td>
<td>182</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Annual Average Growth rate (2000–2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk production</td>
<td>%</td>
</tr>
<tr>
<td>Number of dairy farms</td>
<td>%</td>
</tr>
<tr>
<td>Milk production / farm</td>
<td>%</td>
</tr>
</tbody>
</table>

Source: IFCN data based on national statistics and estimation. IFCN is happy to collect feedback on its number to improve them steadily. In such case please contact info@ifcndairy.org

*ECM refers to Energy Corrected Milk with 4% fat and 3.3% proteins.
**Refers to cow and buffalo milk
@ refers to mostly milk producing households

If compared with other major milk producing countries, like USA and Poland, India is growing its milk production at a faster pace of 4.7% annual growth rate for the last 15 years. This growth is however mostly coming from the increasing number of farms. However, there has been a declining trend in number of farms in USA and Poland on account of consolidation.

There is a great prospect to improve dairy productivity by increasing milk yield to meet the growing milk demands. The small scale dairy farms in Asia including India have proved to be an effective tool for improving rural prosperity. India has managed to attain top position in milk production globally owing to huge bovine population. However, the full potential of Indian milch herd still remains unattained. With more than 70 million rural households engaged in milk production, the majority being small and marginal farmers, small holding dairy farms assume significance for the rural development. The sustainability of such dairy farms is highly impacted by the number of factors including subsidiary nature of dairying, low milk yields, rising input costs and a transition to non-farm activities.

1.2 MILK AND FEED PRICES DEVELOPMENT 1996 – 2015

The graphs in chart 1 below describe the development of the world market prices for milk and feed. The world milk prices are based on the weighted average of three IFCN world price indicators: skim milk powder & butter (35%); cheese & whey (45%) and whole milk powder (20%). The IFCN world feed price indicator represents the world market price level for feed. The calculated feed price indicator is based on the price for a diet comprising 70% corn (energy feed) and 30% soybean meal (protein feed). The milk: feed price ratio indicates how much compound feed a dairy farmer receiving global milk prices and paying global feed prices can buy, after selling one kg of milk. The ratio is defined as favourable, when it is >=1.5 and in general one can conclude that the higher the ratio, the more favourable intensive feeding is considered.
Besides, this commonly used milk: feed price ratio, IFCN has developed a new farm economic indicator. This is the margin over compound feed costs. This indicator assumes an average feed intensity of 300 g compound feed per 1 kg milk. This feed intensity could represent a farm with a milk yield of 8000 kg milk / cow / year using 2.4 ton of compound feed per year. The key improvement is that the milk : feed price ratio weighs milk and feed price changes one to one, whereas the margin indicator weighs the feed price based on the amount of compound feed fed per kg milk and weather related uncertainties. This enables us to give a better assessment of existing farm economics situation in real time. For farming systems which operate at a lower milk yield and lower use of compound feed per kg milk, the fluctuation of the margin over compound feed is generally only influenced by milk price developments. On the other hand, dairy farming systems with much higher milk yields and higher compound feed use are strongly driven by a combination of milk and compound feed price, especially when exposed to world market prices.

Since 2007, the milk price indicator showed a rollercoaster behaviour, swinging between less than 20 US-$ per 100 kg ECM to peaks of 56 US-. Low milk prices of less than 25 US-$/100 kg ECM throughout 2006 were followed by a steep increase to more than 50 US-$ at the end of 2007, just to be followed by a sharp decrease to 20 US-$ in early 2009. Between January 2010 and January 2013, fluctuations were less extreme. During this period, the milk price varied around 40 US-$, with a range between 48 US-$ in March 2011 and 34 US-$ in July 2012. This low point was followed by a strong increase to a level above 50 US-$ for nearly a year, peaking at 56 US-$ in February 2014. The ensuing decline was not finished in August 2015. By that time, the milk price had dropped by approximately 35 US-$ to 21.4 US-$ within 18 months.

The feed price indicator also showed fluctuations, though to a lesser extent than the milk price indicator. Besides, their behaviour was not synchronised, i.e. peaks in the milk price did not necessarily mean peaks in the feed price. Until 2010, the feed price hovered around 20 US-$ with the exemption of June 2008, where it reached 32.2 US-. Between January 2011 and June 2014, the feed price was generally higher than 20 US-$.

The highest difference between milk and feed price was noticed in August 2007 at 33.8 US-. This led to a milk : feed price ratio of 2.9. The very low milk prices in the first half of 2009, summer 2012 and summer 2015 were accompanied by feed prices that were actually higher per 100 kg, causing a milk : feed price ratio below one during these three time periods.

Chart 1 - Global prices for milk and feed

Source: IFCN Dairy Database on monthly real time data on production, prices and farm economics, September 2015
The very high milk : feed price ratio in August 2007 followed by low milk and high feed prices quickly led from a very profitable situation in the end of 2007 to a negative margin over compound feed cost by the end of 2008. It was the beginning of the first global dairy crisis which lasted until early 2010 with the lowest milk prices on the level of 20 US$/100kg ECM. The next phase was a period of relative stability of the milk price on average of 40 US$/100kg ECM. Later in 2011, milk price began to decrease while feed price continued to rise pushing dairy farmers to produce milk with a milk : feed ratio below the long-term average. In this period margin over compound feed cost was lowering since March 2011, dipping below the long term average of 32.4 US$/100kg at the end of the year. That was the beginning of the second global dairy crisis which has it epicentre in middle 2012 when milk prices dropped and feed prices rose towards new highs until the middle of the year.

The year 2015 shows the milk prices dipping to the lowest levels since 2009 in July touching the 23.2 US-$ mark – the climax point of third global dairy crisis. Observing the world milk price development and the drop of 59% vs February 2014, IFCN assumes that the world milk price is currently in the middle phase of the roller-coaster price scenario – similar to the one from the first world crises in 2009. August world milk price shows an increase of 4%.

Though world milk prices have shown high variability during 2006-2015, average Milk prices in India have shown more or less a stable growth in milk prices since 2006, as seen in chart 2.

There have been very less price transmission between world and Indian milk price especially during peaks. India has more or less a protected market not affected much by the volatility in world markets.

Average distance between World and Indian milk price during 2006-2009 was 6.4 US-$ below world prices but during 2010-15, this difference has narrowed down to 4.9 US-$ per 100 kg ECM.

As India gets more and more integrated to the world markets, there will be a tendency to align with world prices, when volatility plays a big role in maintaining sustainability and managing risks.
1.3 COST OF MILK PRODUCTION 2014 BY WORLD REGIONS

The annual IFCN work of comparing typical farms around the world has been an on-going process since the year 2000. Since then, the number of countries participating has increased from 8 to 55. Moreover, the number of dairy farm types analysed has increased from 21 to around 170.

The IFCN methodology applied for data collection, economic analysis and results validation uses the three elements:

- a network approach of research continuously co-operating,
- the concept of typical farms described below and
- a standard model TIPI-CAL (Technology Impact Policy Impact Calculation model) to ensure technical comparability of indicators.

A typical farm represents the most common production system which produces a significant proportion of milk in a country or a region. Usually, two farm types are used per dairy region – the first represents an average farm and the second a larger farm type. The typical farms were built and validated by a combination of accounting statistics and a panel of dairy experts. The data collection and validation were done by researchers in the represented countries, researchers in the IFCN Dairy Research Network and also during the IFCN Dairy Conference held in Germany in June 2015.

**ECM correction:** As the dairy farms operate with milk of very different fat/protein content, the IFCN uses the energy correct milk (ECM) approach to standardise milk volumes to 4% fat and 3.3% protein. The following formula was used: ECM milk = (milk production * (0.383 * % fat + 0.242 * % protein + 0.7832) / 3.1138).

**Cost indicator:** The IFCN uses the indicator cost of milk production only which can be directly related to a milk price. This cost includes all costs from the profit & loss account of the farm. From this cost level, the non-milk returns from sales of cull cows, heifers, calves, manure, etc. and also returns from coupled direct payments have been deducted. Furthermore, the opportunity costs for own labour, land and capital are also included. For creation of the world map, the average size farm from each country was used.

**Cost range:** Cost of milk production ranges from 4.5 US-$ per 100 kg milk in extensive farming systems in Cameroon (where beef is the major output and milk is a side product) to 118 US-$ for an average sized farm in Switzerland. The average cost over all countries analysed was 46 US-$/100 kg milk.

**Low cost regions:** Based on the average sized farms, three low cost regions have been identified: a) Argentina, Peru, Chile and Uruguay b) Central and Eastern Africa c) Some farms in the Central and Eastern European Countries. Some selected countries in Asia (except Japan and large farms from China) also have low costs.

**Western Europe:** The leading farms in Western Europe had costs ranging from 45 – 55 US-$.

**The US:** The smaller farm types in the Eastern Region of USA i.e. Wisconsin and New York had a cost of 46 and 59 US-$, respectively. In the western region, the large farm in Idaho had the lowest cost of about 35 US-$.
In chart 3 below, a simplified global overview on costs of milk production is shown. The illustration is based on the results of the typical average sized farm analysed per country in 2014. The results can be summarised as follows:

**Chart 3 - Cost of milk production on average sized farms 2014**

-Oceania: The cost level in Oceania was about 36.6 US$. Cost of milk production in Australia is in the range of 30-35 US$ while in New Zealand it is about 41-42 US$ per 100 kg ECM. The difference is mainly on account of higher feed prices, land costs and exchange rates to US$. It is important to note that New Zealand cost estimates refer to the seasonal year i.e. July 2013–June 2014.

-South and South East Asia: Farms in this region are able to produce milk in the range of 20-44 US$ per 100 kg ECM with average costs of 33 US$, which is below the milk production costs in New Zealand. This signifies great potential for dairy development in South and South East Asia to exploit its strengths on international competitiveness. The average cost of milk production worldwide was 46.2 US$ per 100 kg ECM in 2014. Generally, on an average, the milk prices for the year 2014 were at similar levels as in 2013. This along with good feed prices made farm economics a very profitable year for many dairy farmers in the world.
1.4 ANALYSIS OF TWO TYPICAL DAIRY FARM TYPES IN INDIA 2014

India has typical dairy farming systems ranging from household farms with 1-10 cows to family farms with 10-50 cows and commercial farms ranging from 50-1000 animals.

As seen in chart 4 below, the typical dairy farming systems from Punjab region is shown. The farming system is represented in terms of average milk yield, farm size, and type of returns from the farming system. The farm types are as follows:

**IN-4N**: This is an average size typical farm from Punjab region in North India, household type with 2 jersey crossbred cows and 2 Murrah buffaloes that produce on an average 4.4 ton of milk (ECM) per year. The feeding system is based on green forages, home grown on a quarter of the land owned, straw, crop residues and compound feed. The family operates on about 3 hectare of land and a part of the income is coming from crop enterprises.

**IN-20N**: A larger family farm in North Punjab with 20 Holstein crossbred cows and 3 hectare of land. Most of the land is used to grow green fodder throughout the year. The average yield is about 4.3 ton of milk (ECM). The family used hired labour to carry out 70 percent of the dairy operations. The feeding system is quite similar to the average farm type above.

Chart 4 – Representation of typical dairy farming systems in India

The chart 5 below shows the cost competitiveness of milk production in the typical dairy farming systems in Punjab. It can be seen that the cost of milk production in 2014-15 was about 39 USD per 100kg ECM on the average farm and 32 USD on the larger farm. The cost reduction by about 20 percent is mostly owing to the labour economies of scale as shown in the graph depicting the return to labour. With herd size increasing from 4 to 20 animals, the return to labour increases by about 5 times making dairying a better employment alternative at the present wage levels.
Chart 5 – Economics of typical dairy farming systems in India

In order to understand the specific cost component which gives cost competitive edge to the dairy farming systems, cost analysis is done for the six farm types for the year 2014 as shown in the chart 6 below:

Chart 6 – Cost components of dairy enterprise across typical dairy farming systems in major milk producing countries in the world in 2014

*Other costs refers to dairy management costs like veterinary, breeding, record keeping, haulage, taxes, etc.


The chart 6 above clearly shows the comparative advantage in typical dairy farming systems from India coming from lower proportion of labour and other costs. The feed costs share is relatively higher than the typical dairy farming systems in other major milk producing countries.
OUTLOOK OF MILK PRODUCTION COSTS IN 2015

The devaluation of the Euro against the US-$ has been about 20% in 2015. In Oceania, the New Zealand dollar has also depreciated by about 11%. In Brazil, the currency devaluated by 28% while in Poland by 17%. This will probably make the costs competitive in this part of the world.

Milk prices began to decline from the all-time peaks in February 2014 to its lowest levels since 2008 in July 2015 at 23.2 US-$. By July 2015, milk prices had dropped by 30-40%. The ensuing crisis has led farmers to respond in a way to reduce their intensity of dairy farm operations in many countries in EU and Oceania. Though costs in USA have remained more or less stable, costs in EU are expected to decline by currency devaluation and farmers reactions. It is expected that the average costs of milk production will reduce in EU by a range of 8-9 US-$ per 100 kg ECM primarily driven by Euro devaluation against US-$ while in Oceania by 5-6 US-$ due to farmers response and NZ-$ devaluation.2

1.5 COST OF MILK PRODUCTION IN KEY COUNTRIES 2000-2014

It is very important to understand the average cost trends of typical farms over a period of time to understand the factors behind the competitiveness of milk production. It also enables us to take a view on the levels of milk production costs to sustain milk supply levels or the milk prices level in the short and medium term. Hence, in this part of the analysis, we tend to compare the cost trends of average typical farm types from the six major milk producing nations representing the major regions of the world with special reference to India.

Chart 7 – Cost of milk production 2000 – 2014 of typical dairy farms in 7 countries

The graphs in chart 7 above illustrate the costs of milk production of selected typical farms the IFCN had been analysing over a certain period of time.

2Details to be delivered during IFCN analysis and Dairy Conference in 2016

Germany (DE-126N): This farm type stands for an average farm in Northern Germany representing an estimated 13% of the farms and 46% of cows in the country. The farm has grown from 68 cows in 2000 to 126 cows in 2014 at an average annual growth rate of 4.5%. In the year 2000, the costs were 28 US-$/100 kg milk and increased towards 42 US$ per 100 kg milk in 2006. The key driver was the appreciation of the Euro (+36%) and moderate increase of costs in Euro terms. From 2008 – 2012, the costs showed a declining trend towards 42 US-$ per 100 kg milk. The key drivers were a devaluation of the Euro by 14%. Costs have increased again to 50 US-$ since then. This is mainly due to higher feed and energy prices and labour costs in Euro terms.

USA (US-500WI): This farm type is a larger family farm in the range of 200-1000 cows and represents 10% of the farms and about 18% of the cows in the USA. This farm has been in our data base since 2000. In the US, costs were relatively stable from 2000 to 2006 as inflation driven change of input prices could be compensated by increasing milk yields. Once feed prices started rising, this had a direct impact on these farms and costs, which increased by 50% to a level of 38.5 US$ per 100 kg milk. The sharp drop in costs in 2009 can be interpreted as a result of very bad milk prices, when farmers tried to cut costs wherever possible. Until the year 2012, cost had increased – mainly driven by feed prices – towards 44 US-$ per 100 kg milk. US dairy farms had a significant cost advantage over larger family farms in Germany for over 10 years. In the year 2012, the costs were on a similar level. They have stayed between 40 and 45 US-$ per 100 kg milk for the last four years.

Poland (PL-65): This farm type represents a larger family farm type in Poland in the range of 20-100 cows. It represents about 10% of the farms and 41% of the cows in the country. This farm has been monitored since 2003 when it had 60 cows. This Polish farm had very low costs in 2003 and 2004 and was almost as cost competitive as dairy farms in New Zealand. After joining the EU, costs increased from 17 US-$ to 53 US-$ per 100 kg milk in 2008. This was driven by an increase of wages, land prices and an appreciated currency against the Euro. This increase could not be compensated by an increasing farm productivity. After 2008, the farm type followed a similar cost trend as the German dairy farm. The 20% reduction in costs in 2012 was a result of the devaluation of the Zloty (-7%) and improvements in farm efficiency. Costs stayed under the 40 US-$ mark for the last three years.

New Zealand (NZ-390): The typical farm representing an average sized farm covers about 60% of the farms and milk production in New Zealand. This dairy farming system was a world leader in cost competitive milk production in the year 2000. IFCN identified costs of 12 US-$ per 100 kg milk, which was the lowest cost level in those days. Driven by an increase in input prices and an appreciating currency, costs increased to a level of 40 US-$ per 100 kg milk in 2014. Like in Argentina, weather conditions and pasture growth had an impact on milk yield and thus production costs per 100 kg ECM. Based on the typical farms chosen for this analysis, the costs in New Zealand were approximately 25% higher than in Argentina and about 25% below the costs level in Germany in 2014.

China (CN 340BE): This typical farm represents 30 to 40% of the farms and is a larger farm type in China in the range of 200-500 cows. It has been monitored since 2006 with 300 cows. It enables us to understand the dynamics of cost trends in China. Since 2006, a strong increase in cost due to the appreciation of the Yuan could be seen. In 2012, the Yuan had gained value by +25% to the US-$ compared to 2000. The costs on Chinese farms did not drop sharply in 2009 as was observed in most other countries, because the drop in prices in national currency was almost fully compensated by the appreciation of the Yuan. From 2010 until 2014, the rising feed prices were a strong driver for increasing cost of production.
India (IN-20N): The typical farm representing larger family farm in North India. These farms are mostly having crossbred or pure Holstein Friesen cows with average yield of 4300 kg ECM in 2014. Monitored since 2006, the farm has maintained an average herd size of 20 cows varying from 18 to 26 cows. The family farm in 2006 was very competitive in 2006 producing milk at 18 US$ per 100 kg ECM but increased significantly since then till 2011 to reach costs upto 39 US-$ driven by an increase in wage rates, feed prices and an appreciating currency. However, since 2012, a control in feed prices and a depreciating currency has seen costs go down and reach very competitive levels of 32 US-$ in 2014.

1.6 SUMMARY ON THE IFCN OVERVIEW ON GLOBAL MILK PRODUCTION

121.5 million dairy farms on this planet keeping on average 2.9 cows per farm

Based on IFCN data collection and estimations, in 2014 there were 121.5 million dairy farms and farming households on this planet producing 778 million ton of ECM milk (cows and buffaloes with 4% fat and 3.3% proteins). The average dairy farm size has 2.9 milk animals with an average milk yield of 2145 kg ECM milk/animal/year.

2014 Costs to produce milk ranges from 4 to 128 US-$ per 100 kg milk

Based on the IFCN cost comparison, 170 typical farms in 55 countries were analysed. Cost of milk production ranged from 4.5 US-$ per 100 kg milk in extensive farming systems in Cameroon to 118 US-$ for an average sized farm type in Switzerland. The simple average cost over all countries analysed was 46 US-$/100 kg milk.

From 2000 – 2014, cost of milk production increased in all countries analysed

As the IFCN has analysed typical dairy farms since the year 2000, a time series analysis was possible. The results show that costs in a specific country can increase significantly within 3-6 years. This is especially the case for countries like Poland, China, and New Zealand where the value of the currency has significantly strengthened against the US-$ and farm input price like land, feed, and labour costs have increased significantly. Costs in EU and US reach a level of 40 – 50 $

Cost of milk production in China still significantly higher than EU and Germany

An extreme case was observed in China where dairy farming highly depends on purchased feed. In addition, China had the strongest increase in salaries and an appreciation of the currency of 24%. The combined effect of these factors drove the costs in China from a level of 40 US-$ / 100 kg milk in 2008 to a level of 60 US-$/100 kg in 2014.

Very volatile milk and feed prices –we are now in the 3rd dairy crisis since 2008

Via standardised world milk and feed prices, IFCN tracks the overall farm economic situation for dairy farming. The IFCN developed an indicator “margin over compound feed costs” which is a significant improvement compared to the often used milk:feed price ratio. By using this margin, it becomes visible how much of a threat dairy farmers face in a situation when milk prices fall and feed prices increase to such an extent that 100 kg feed are more expensive than 100 kg ECM. This situation occurred three times within the last eight years, in 2009, in 2012 and most recently in the beginning of 2015.
2015 perspectives of production costs to decrease in US-$ terms

✓ The cost analysis results shown are based on 2014 data– but changes to be expected for 2015 will be mainly driven by 2 factors:
  a) Changes in exchange rate
  b) Lower milk price which drives changes in dairy farming systems.
✓ First estimation by IFCN for costs in 2015 show stable costs for USA and significant costs reduction of 5-9 US-$ in the EU, NZ, BR, PL.

Perspective on competitiveness of Indian milk production

✓ Costs of milk production in 2014 in the typical farms analysed is in the range of 30-40 US-$ per 100 kg ECM and is in the competitive range of milk production.
✓ World dairy competitiveness is getting more and more consolidated as the major countries are able to produce milk in the competitive range of 40-45 US-$/ 100 kg ECM. This implies that the ability to maintain stability in volatile markets or adoption of innovative solutions to sustainable dairying is the key.
✓ There is very less price transmission between the global milk market and the Indian milk prices. This is mainly because of the protection of its market policy and the insulation from extreme volatility.
2

SUSTAINABLE INDIAN DAIRY FARMING
2. SUSTAINABLE INDIAN DAIRY FARMING

2.1 SUSTAINABILITY OF INDIAN DAIRY FARMING SYSTEMS- WHAT ARE THE KEY DRIVERS

Dairy sector continues to be one of the major livelihood sources for rural India and a significant contributor to the country’s agricultural economy. Livestock sector, which comprises of majorly milk and milk products, contributes a large share to the agricultural gross domestic product (GDP). It contributed over 4.1% to the overall GDP during 2012-13.

Dairying has become an important secondary source of income for millions of rural families and has assumed the most important role in providing employment and income generating opportunities particularly for women and marginal farmers. About 15.46 million farmers have been brought under the ambit of 1,62,600 village level dairy corporative societies up to March, 2014. The dairy industry is still predominantly unorganized with only 20-25% of milk production being routed through the organized channel. Private players account for approximately 55% of milk routed through the organized channel and rest 45% is procured by the cooperatives. Growing private sector investment in dairy farming, supply chain, processing facilities and backward integration is providing further impetus to India’s dairy industry.

Key Drivers of Sustainability of Indian Dairy Farming System

Sustainable dairy farm management practices are critical to ensure the profitability of dairy farms thereby ensuring lower cost of milk production and quality and clean milk to the end consumers. Key drivers impacting the sustainability of dairy farms and essential for making it globally competitive are presented below.

Feed and Fodder Management: Feed is one of the critical components in ensuring good milk yield and also constitutes approximately 60% to 70% of the operating expenses. With rapidly shrinking land and natural resources, availability of good quality feed and fodder is increasingly becoming a challenge. The current deficit level of green fodder and concentrates is up to the tune of 34%. Further, there is a supply demand gap for quality forage seeds as well. Maximization of the usage of crop residues and leguminous forages, promotion of balanced feed rations, integrated watershed development approaches for encouraging fodder production systems and
training farmers in silage preparation are some of the measures to optimize feed and fodder production in farming systems in India.

**Hybrid Corn Seeds Developed by DuPont Pioneer**

DuPont Pioneer has developed hybrid seeds of corn for livestock feeding. These yield very good tonnage with higher digestibility and ensure uniform supply of quality nutrients. The company offers solutions that enable farmers to make silage using corn hybrid crop and inoculants. A corn silage based diet is more nutritious and also improves farm productivity by reducing production costs substantially. The innovative inoculants used to prepare silage improve fermentation, retain valuable nutrients, reduce dry matter losses, increase milk and meat production of animals, and improve the quality of milk by increasing fat percentage and protein in milk.

*Source: Company Publication*

**Breeding and Health Care Management:** Lack of awareness amongst the dairy farmers in India on technical skills regarding breeding practices including record keeping and progeny testing is the key deterrent for improving herd quality. It can be addressed through expansion of artificial insemination (AI) network and extension services provided by research institutions and private sector participation. Breeding services using superior quality, disease free germplasm needs to be given priority for addressing these issues. Timely identification of diseases and knowledge about preventive measures will add to better livestock health which will further improve productivity and quality of milk.

**Livestock Development Initiative by BAIF**

BAIF’s under its livestock development initiative is exploring the modern technologies in animal breeding, reproductive management and healthcare. Some of these include Marker Assisted Selection (MAS) for breeding bulls, molecular studies on prevalence of Beta-casein and Kappa casein allelic variants in breeding stock, designing metagenomic studies to deduce mastitis pathogens, deducing an adopted genotype to specific environments and possibilities of production and use of sexed semen in small holders’ dairy production system. BAIF has also been instrumental in indigenous breed improvement initiatives for Gir and Sahiwal breeds.

*Source: BAIF’s Annual Report, 2013-14*

**Impact of Climate Change on Sustainability:** The estimated annual milk loss due to heat stress in cattle and buffalo in India is about 1.8–2.0 million tonnes. Investment in R&D initiatives for reduction in greenhouse gases (GHG) emissions through cost effective and scalable interventions in the areas of animal selection and breeding, cattle nutrition, manure and effluent handling can go a long way in addressing this challenge. There is an urgent need to curtail the effects of global warming through development of focused policy and research and development initiatives.

Effective management of nitrogen in dairy farms need to be emphasized upon to reduce its loss. Precise feeding as per the nutrient requirements of animal will maximize production and minimize greenhouse gas (GHG) emissions per unit of product. Feeding a nutritionally balanced ration with the available feed resources could be a practical approach for mitigating GHG emissions from large ruminants in India in the longer term.
National Dairy Development Board (NDDB) Ration Balancing Programme

NDDB had launched a ration balancing programme to feed least cost balanced ration to milch animals of smallholder dairy farmers, in different agro-climatic regions of the country. Reduction in enteric methane emission per kg of milk yield in lactating cows and buffaloes has been reported earlier, through improved efficiency of utilization of available feed resources. Inefficiencies in the conversion of feed protein into edible animal protein present a major challenge to livestock nutritionists, as excretion of excess nitrogen (N) by the animal is not only an economic loss of a valuable feed component but it also acts as a source of nitrous oxide (N2O), a potent greenhouse gas. About 10-40% of the consumed feed nitrogen is retained in the form of animal products like milk and meat and the remainder is excreted into the environment through urine and faeces.

Source: NDDB

Extension Services and Skill Development: With the paradigm shift of dairying from being a subsidiary occupation to mainstream activity, availability of skilled manpower will be of utmost importance. Augmenting knowledge and skill levels of the workforce is essential to enhance resource productivity, boost innovation, manage finance, mitigate risks and improve decision making ability which will enable sustainable dairy farming.

Private sector participation in extension services needs to be aligned with the public schemes and market led practices are to be encouraged to increase resilience in the smallholder dairy farming ecosystem.

Village Women Dairy Development Programme by Nestle

Nestle India recognized that village women are the primary caretakers of cattle and play a significant role in dairy farming. As a result, the Village Woman Dairy Development (VWDD) Programme - an initiative focusing on empowering village women engaged in dairy farming was formally launched in 2006. The objective of the programme is to empower women dairy farmers to improve quality and productivity of milk. The village women are educated through women training team on

- Good dairy practices including good feeding and breeding practices
- Animal care and treatment
- Sustainable agricultural practices
- Personal health, hygiene, water conservation and economic independence.

Over 58,600 village women across Punjab, Haryana and Rajasthan have benefitted from the Village Women Dairy Development Programme by the end of December, 2013.

Source: Company Website

Access to Finance: Given the importance of dairy sector in rural employment and revenue generation, easy access to credit and instant payments for sale of milk and milk products are critical for making production system remunerative and sustainable. Animal husbandry and dairying is a state subject, and bulk of the investment for their development comes from the state governments. The central government contributes about 10% to the total investment through central and centrally-sponsored schemes as to supplement state governments’ resources. In absolute terms, total outlay for animal husbandry and dairying has increased over the plan periods. About 80% of the credit to animal husbandry and dairying is provided by the commercial banks. In 2009, dairy processing was included in the list of priority sector lending activities but presently there is no specific target with the banks for animal husbandry loans.
Financial institutions need to design innovative and tailor made suite of financial products including systems to immediately credit milk payment in farmers’ accounts. This would pave the way for financial literacy of the farmers and reduce their dependence on moneylenders for credit requirements. Rural financial institutions need to focus on widening their reach to small farmers who are conventionally under-banked or unbanked, offering structured financial products and services to them.

YES BANK’s Kisan Dairy Plus and Pilot Project with Paayas Producer Company (PPC)

YES Kisan Dairy Plus was implemented as a pilot project in collaboration with one of the largest dairies in South India, based in the Villupuram district of TamilNadu. YES Kisan Dairy plus product proposition comprised of a) Instant milk payment (as applicable, in association with respective dairy) b) Basic Saving Account (BSA) with 6% interest and ATM-cum-debit card c) Free unlimited withdrawals on any bank’s ATM d) Lean season Over-draft facility e) Unlimited deposit/withdrawals through YES Bank’s specially deployed YES SAHAJ handheld device f) Domestic inward/outward remittance service g) Annual Group Life Insurance for member and spouse h) Flexible Recurring Deposit facility linked to BSA.

YES Bank started a pilot project with PPC, promoted by National Dairy Development Board (NDDB), to provide payments to farmers along two milk procurement routes in Renwal and Sri Madhopur Milk Chilling Center in Rajasthan. Farmers were happy to receive direct credit in their accounts and were comfortable with money withdrawal from other bank ATMs during their routine visits to cities/bigger villages. Farmers also used the YES SAHAJ Micro ATM Business Correspondent facility that YES BANK provided, which helped manage their cash flows as per convenience. This model represented an immense opportunity for scale-up given that 60% of farmers supplying to PPC prefer the use of regular ATM network.

Source: YES BANK Annual Report 2013-14

Role of Information Technology: Information technology is an important tool which can be harnessed for efficient management of small scale dairy farms in India. It is important to invest in the information systems to make strategic decisions on optimization of dairy supply chain and costs involved. It can also be used for real time monitoring of transactions for efficiently managing the payment cycle of farmers.

Small holder farmers do not have direct access to basic financial services including insurance. IT can play pivotal role in bringing a large chunk of small holder farmers under the ambit of financial services. Each of the farmers may be assigned a single account where all the transactions pertaining to payments, financial services, insurance etc. can be monitored through a single platform. This will also enable the government to keep a track of the small scale farmers in order to pass on the benefits of several important schemes run by it.

2.2 INNOVATIVE FARMING MODELS FOR Enhancing Sustainability

In the past decade, there have been initiatives in the direction of establishing large scale dairy farms (with more than 1000 animals) by private players to achieve better product quality, traceability and increase productivity with lower cost of production. However, most of the players have been able to achieve limited success due to high operating costs, low productivity, large investment and lack of adequate knowledge to manage large scale farms. Due to the current diversity in nature of farming systems, prevailing infrastructure, farmer capacities,
socio-cultural realities and climatic patterns, a mix of various models may evolve and determine the landscape of commercial dairy farming in India in coming years. Some of the key innovative models emerging in dairy farming are listed below.

**Large scale single location integrated dairy farms** - Large scale integrated dairy farms possess high yielding cross bred cows, milk processing and storage facilities along with feed production systems. In these farms, ownership and responsibility for the operation and maintenance lies with a private player. Players may also enter into contract farming model with the farmers for supply of green fodder, a key input for enhancing milk yield of cattle. The milk is either sold to other dairies or used for processing into value added milk products at its own plant. The significant benefit of this model is efficiency in scale of operations, end to end product traceability and high level of product and process control.

**Progressive dairy farming model** - Mid size dairy farms with 300-500 cattle may evolve in near future as they have comparative advantage of size economics in the business through efficient management of labour, veterinary services, feed etc. This is an entrepreneurship model wherein the anchor without incurring substantial capital expenditure benefits from an assured supply of milk of traceable, consistent and good quality. The anchor provides technical support (veterinary care, feed management, training) and financial support (directly or through financial institutions) to the farms. Government also provides support to small farmers for purchase of cattle and also by way of administration of breeding programmes. This model is constrained by way of limited capital investment capability of the progressive farmers and is also challenging in terms of the anchor’s ability to have a fool proof mechanism to ensure checks and controls on the farm operations. However if replicated, this can be an excellent partnership between farmers and processors and can be a win-win model for all stakeholders in the long run.

**Community dairy farms** - The Chinese dairy model of setting up of community dairy farms or hostels for milch animals owned by people in neighbourhood is also gaining acceptance in India. This model envisages investment in farm infrastructure by a private player with ownership of the stall lying with the individual milk producers, who are responsible for housing of cows and managing them under guidance of the private player. The milk is purchased under the buy-back arrangement by the private player. This model enables the smallest of the dairy farmers to avail the benefits of technology, scale and systems.

**Hub and spoke model** - Hub and spoke model of dairy farming includes the main farm (hub) having all the integrated facilities including processing and other connected farms (spokes) having basic infrastructure for milking and feeding. The connected/satellite farms (spokes), with 50 to 200 cattle each, have basic infrastructure for milking and cattle management and are owned by progressive dairy farmers/rural entrepreneurs in close proximity to the main farm (less than 100 km distance). The main farm provides technical support (veterinary care, feed management, training) to the satellite farms. This model offers the benefits of end-to-end product traceability and reasonable level of product and process control, although with significantly lesser capital expenditure by the Anchor. Critical to this model are the control systems that need to be put in place to ensure that farm management administration is of desired level and that milk output quality adheres to the set standards. Further, in comparison to Single Location Large Scale model, the land requirement is distributed over multiple locations. The model is also more socially inclusive and lends itself to faster scale up.

**Industry supported farming model** – Various players in the industry provide financial support through tie-ups and technical assistance to farmers for scaling up of their herd size along with extension activities related to farm management, modern breeding techniques and feed management.
2.3 SUMMARY ON SUSTAINABLE INDIAN DAIRY DEVELOPMENT

Key messages for sustainable Indian dairy development

- Suitable farm level policies need to be developed by the government to ensure sustainable dairy development keeping in view the ensuring socio-economic dynamics and the existing competitive resource advantages.
- Concerted efforts in linking the milk producers to the organized supply chain needs further strengthening to ensure stable milk prices that consumers can afford.
- The key strengths of Indian dairying lies in maintaining its milk production growth at an even rate to meet its domestic needs but with demand rising at a faster pace as economic development takes place it will have to look into better ways to meet its domestic needs.
- The road ahead for the small holder dairy farmers is quite challenging and considerable gains in productivity can be reaped through improved management by linking production system to consumer demand. Concerted efforts in the areas of feed and nutrition management, improved breeding and health care systems, financial inclusion, dedicated extension services and procurement infrastructure development with ICT support are required. Capacity building of small livestock owners, particularly women, and promotion of collective farming is essential for development efficient value chains.
- One of the major constraint has been the feed prices which are quite high relative to the milk prices. There is great opportunity to exploit the world markets provided India is able to take care of its constraints and strengthen its value chain to deliver quality milk.
ANNEX
3. ANNEX

3.1 IFCN AND ITS RESEARCH PARADIGM

About IFCN

IFCN is the global dairy research network. By addressing challenges in the dairy world, IFCN can contribute to a more resilient and more sustainable future for all of us.

What does IFCN do?

IFCN provides globally comparable dairy data, outstanding knowledge and inspiration to widen your imagination. IFCN creates a better understanding of the global dairy world. The IFCN started in 2000 with the basics - the cow and the dairy farmer. Step by step we deepen and widen the knowledge base every year. The knowledge creation is done via a network of dairy researchers from over 90 countries contributing to our annual processes, managed by the IFCN Dairy Research Center with currently 15 dairy researchers. The IFCN economic models and standards ensure comparability between countries and provide a global picture. More than 100 dairy related companies and organisations support the IFCN and use the knowledge to better solve challenges in the dairy world.

IFCN has innovative ways to share the knowledge with its members and with the dairy world as a whole. The IFCN events are a key element in developing the network spirit.

Analysing the Dairy World Using the Typical Farm Approach

In the IFCN, a typical farm represents a certain production system, farm size, production technology used and the related milk volume in a country/dairy region (HEMME 2000). The goal is to have at least two (and up to six) typical farms for each region. The first farm is an average sized farm with an average management performance. The second farm is larger than the first one but also having an average management performance, to show economies of scale. The key issue in creating high quality farm comparison results is to apply a uniform method to all farms. For further details please contact us at info@ifcndairy.org or visit us at www.ifcndairy.org
World Dairy Map 2015

The World Dairy Map 2015 shows us the dairy economic results of the Dairy Report 2014 representing 98% of the world milk production volume. The map gives us an overview of the major economic parameters like milk price, feed price, margin over compound feed costs and cost of milk production at monthly and yearly intervals since 2006. The information on the top 20 milk processors, milk production and milk delivered gives an overview of the dairy supply chain in the world.

IFCN Baseline Results and Outlook 2025

The IFCN Baseline is produced every year to show the most probable scenario of the Dairy World in the next 10 years and to show perspective guide line for dairy industries and all related business. The IFCN results for 2015 predicts that the world milk production will grow on an average of 2.4% reaching 1059 mill ton ECM in 2025. The highest milk production increase is expected in South Asia. It is likely that India and Pakistan may shift from self-sufficient situation to importer under existing conditions. The world milk demand is likely to grow at an average growth rate of 2.4% per annum meaning an additional 240 million ton of milk ECM to be produced by 2025. This demand growth is likely to be met by an average increase in herd productivity of 1.3% and animal population by 1%. The average farm size will show a rising trend from present 2.9 animals to 3.8 animals indicating decrease in farm numbers.
3.2 YES BANK AND KNOWLEDGE BANKING PROPOSITION

YES BANK, India’s 5th largest private sector bank, is an outcome of the professional & entrepreneurial commitment, vision and strategy of its Promoter and Founder Rana Kapoor and his top management team, to establish a high quality, customer centric, service driven, private Indian Bank catering to the ‘Future Businesses of India’. The Bank has 630+ Branches and 1190+ ATMs across all 29 States and & Union Territories of India. YES BANK has adopted international best practices, the highest standards of service quality and operational excellence, and offers comprehensive banking and financial solutions to all its valued customers.

YES BANK is a knowledge driven organization and is structured around product and knowledge teams. Business dynamics vary from sector to sector and YES BANK believes that in-depth understanding of each sector is crucial for success and sustenance. Our knowledge banking initiatives across sectors continue to gain traction with several State Governments and Central Ministries appointing YES BANK as their strategic advisors on significant projects.

In line with YES BANK’s approach of being a knowledge driven organization, a specialized Food & Agribusiness Strategic Advisory & Research Group (FASAR) has been domiciled within the Food & Agribusiness Research Management (FARM) division of the Bank. The group houses industry specialists with immense sectoral knowledge and relevant experience and expertise in the conceptualization and implementation of food & agri initiatives.

FASAR works with corporates, small & medium enterprises, multinationals, state governments, central government (Ministry of Agriculture, Ministry of Commerce, Ministry of Food Processing Industries) & multilateral agencies in sectors like dairy farming, dairy processing, agri inputs, food processing & food services, food safety, agri SEZs, modern terminal markets, food parks, agri-infrastructure, commodities, plantations, logistics, agri supply chain, large scale farming, skill development and rural retail among others.

FASAR also conducts in-depth research on various sub-sectors of Food & Agri domain and releases knowledge reports and research papers apprising the stakeholders on the latest issues, key trends and developments in the sector. The team has published knowledge reports with various partners covering the latest industry trends and sectoral issues on Agri Infrastructure, Biotechnology, Retail, Dairy, Food Processing, Indian Sugar Industry and Skill Development among others. Additionally the division anchors knowledge pool development for publication of thought leadership articles in the print media.
YES BANK, India’s fifth largest private sector Bank with a pan India presence across all 29 states and 7 Union Territories of India, headquartered in the Lower Parel Innovation District (LPID) of Mumbai, is the outcome of the professional & entrepreneurial commitment of its Founder Rana Kapoor and its top management team, to establish a high quality, customer centric, service driven, private Indian Bank catering to the future businesses of India.

YES BANK has adopted international best practices, the highest standards of service quality and operational excellence, and offers comprehensive banking and financial solutions to all its valued customers.

YES BANK has a knowledge driven approach to banking, and offers a superior customer experience for its retail, corporate and emerging corporate banking clients. YES BANK is steadily evolving as the Professionals’ Bank of India with the long term mission of “Building the Finest Quality Large Bank of the World in India” by 2020.
For a better understanding of the dairy world

**Monthly milk price in USD / 100 kg milk 2006 – 2015**

<table>
<thead>
<tr>
<th>Region</th>
<th>Jan-06</th>
<th>Jan-07</th>
<th>Jan-08</th>
<th>Jan-09</th>
<th>Jan-10</th>
<th>Jan-11</th>
<th>Jan-12</th>
<th>Jan-13</th>
<th>Jan-14</th>
<th>Jan-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tunisia</td>
<td>2.0</td>
<td>2.2</td>
<td>2.7</td>
<td>2.9</td>
<td>3.0</td>
<td>3.1</td>
<td>3.2</td>
<td>3.3</td>
<td>3.4</td>
<td>3.5</td>
</tr>
<tr>
<td>Uganda</td>
<td>1.8</td>
<td>1.9</td>
<td>2.2</td>
<td>2.5</td>
<td>2.7</td>
<td>3.0</td>
<td>3.3</td>
<td>3.6</td>
<td>3.8</td>
<td>4.0</td>
</tr>
</tbody>
</table>

**Genetics for animal & plants**

**Agribusiness partners**

**Source of data:**

Milk production and share of milk delivered in 2013

**IFCN Top 20 milk processors 2014 by milk intake**

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Milk Intake (mill. kg ECM)</th>
<th>Milk Intake (mill. kg ECM)</th>
<th>Milk Intake (mill. kg ECM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saputo Canada/USA/others</td>
<td>6.0</td>
<td>1.1</td>
<td>0.8%</td>
</tr>
<tr>
<td>Groupe Sodiaal France</td>
<td>5.2</td>
<td>1.0</td>
<td>0.7%</td>
</tr>
<tr>
<td>Bongrain France/others</td>
<td>4.2</td>
<td>1.4</td>
<td>0.6%</td>
</tr>
<tr>
<td>Mengniu Dairy Company China</td>
<td>4.0 – 4.5*</td>
<td>1.6*</td>
<td>0.6%</td>
</tr>
<tr>
<td>Groupe Lactalis (incl. Parmalat) France/others</td>
<td>15.0</td>
<td>1.3</td>
<td>2.0%</td>
</tr>
<tr>
<td>Arla Foods Denmark/Sweden/others</td>
<td>12.7</td>
<td>1.1</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

**Comments:**

- The data presented is for the year 2014.
- The milk intake figures are in million kilograms of ECM (Equivalent Milk Content).
- The percentages are based on the total milk intake for each company.

**Explanation:**

- Cost P&L - non milk returns
- Calculation:

**Explanation of variables:**

1. Milk

**Research partners / organisations participating**

These researchers provided information in 2014 about their countries and use the global IFCN knowledge, its tools and the database for their research, teaching and farm advisory work.

**Applicability:**

These companies use the IFCN knowledge for their strategy planning.

**Institutional partners**

The IFCN

**Contact:** info@ifcndairy.org

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