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Status and development in the dairy sector in the BRIC.

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Abstract

Milk production is a very important element of the whole dairy chain. The BRIC countries are among the top 6 milk producing countries and produce nearly one third of the world's total milk volume. A large number of dairy animals and a relatively low milk output per animal show a great potential of the BRIC for a further growth of production. In the same time the BRIC countries comprise 42% of world's population. Expected population and prosperity growth will lead to a further growth in milk demand. The BRIC countries have a competitive level of milk production cost in international comparison. The success of the BRIC countries in the international milk market will depend on the contribution of all stakeholders in the dairy chain: farmers, processors, supporting industries and policy makers.

Keywords: Dairy sector, BRIC, Brazil, Russia, India, China, IFCN

1. Introduction

Milk production is a very important element of the whole dairy chain. In this part of the value chain the major share of a) the costs, b) resources used, c) emissions created and d) the political challenges come from producing the milk itself. That's why the IFCN Dairy Research Center is focusing since the last 10 years on analyzing and better understanding milk production world wide. This article summarises the findings of the IFCN work in 2010 and the IFCN Dairy Report 2010 (www.ifcndairy.org). A special focus of this article is made on BRIC countries, as important contributors to the world-wide production and consumption of milk.

2. Status and development of milk production

The IFCN Dairy Research Center estimates the amount of milk produced world wide in 2009 at 691 mill. tons¹. Brazil, Russia, India and China, together with the EU-27 and the USA are the top 6 milk producers in the world. The total production of Brazil, Russia, India and China in 2009 sums up to 212 mill. tons (see Table 1). This equals nearly one third of the global milk production and shows a high importance of the BRIC for the world milk production.

Table 1: Macro perspective: Top 20 dairy countries in 2009 - with EU-27 as aggregate

no	Production		Milk delivered		Net trade surplus		Net trade deficit		Self-sufficiency	
	in mill t ECM		in mill t ECM		in mill t ECM		in mill t ECM		in %	
1	EU-27	149.5	EU-27	135.0	New Zealand	18.4	China	-3.2	New Zealand	> 500%
2	India	123.8	USA	80.3	EU-27	13.5	Mexico	-2.4	Uruguay	245%
3	USA	80.8	China	29.3	Australia	3.6	Russia	-2.2	Belarus	183%
4	Pakistan	39.6	Brazil	19.3	Belarus	2.8	Japan	-2.1	Australia	159%
5	China	31.6	New Zealand	18.5	Argentina	2.0	Algeria	-2.0	Argentina	127%
6	Russia	28.9	India	15.0	USA	1.4	UAE	-1.5	Costa Rica	111%
7	Brazil	27.4	Russia	14.2	Uruguay	1.0	Philippines	-1.3	Switzerland	110%
8	New Zealand	18.5	Australia	9.5	Ukraine	0.8	Venezuela	-1.3	Ukraine	107%
9	Ukraine	11.5	Argentina	8.9	Switzerland	0.4	Indonesia	-1.2	Iceland	107%
10	Turkey	11.2	Canada	8.1	Nicaragua	0.2	Malaysia	-0.9	EU-27	106%
11	Mexico	10.6	Japan	7.8	Chile	0.1	Taiwan	-0.8	Tunisia	105%
12	Australia	9.8	Mexico	7.2	Costa Rica	0.1	Korea	-0.8	Chile	105%
13	Argentina	9.5	Turkey	6.7	Norway	0.1	Nigeria	-0.8	Serbia	104%
14	Iran	8.6	Iran	6.4	Serbia	0.1	Egypt	-0.7	Norway	103%
15	Canada	8.4	Colombia	5.3			Vietnam	-0.7	USA	102%
16	Egypt	7.9	Pakistan	4.7			Iran	-0.7	Kenya	101%
17	Japan	7.9	Belarus	4.7			Singapore	-0.6	Colombia	100%
18	Colombia	6.8	Ukraine	4.1			Thailand	-0.5	Bolivia	100%
19	Belarus	6.2	Switzerland	3.5			Kazakhstan	-0.5	Uganda	100%
20	Uzbekistan	5.7	South Africa	2.6			Sri Lanka	-0.5	India	100%

Notes: Data: Production and milk delivered: National statistics, AMI, FAO, estimates for some countries.

Exports and imports: Trade data from FAO and national statistics, other sources or estimates in some cases for the years 2008/2009. UAE = United Arab Emirates. **Method:** Production: cows and buffalos milk in mill t ECM. Delivered: Cow and buffalo milk in mill t ECM. Net trade: Exports minus imports in mill t ECM ME. No data <0.1 mill t ECM shown. EU-27 as aggregate. The intra-trade of the EU-27 countries might be not fully documented. Trade data for butter, dry products, cheese and curd, condensed and evaporated products and fresh products calculated in ECM ME. Self-sufficiency: Country milk production in mill t ECM divided by country consumption in mill t ECM ME; in %. Self-sufficiency EU-27 106% as arithmetic mean of all member states.

Source: Hemme (2010)

About 58% of the total milk produced in the world reached a milk processing plant in 2009². The rest of milk was consumed on farms or sold through informal channels. The share of milk

¹ Cows and buffalos milk in mill. t ECM. ECM stays for energy corrected milk, milk with 4% fat and 3.3% protein.

² The world-wide share of milk delivery might be underestimated, since only the milk from cows and buffalos is included and precise data is not available for all countries. In developing countries in particular, the share of milk

delivered in 2009 was 99% in the USA and on average 90% in the EU-27 member states and only 37% in the BRIC. Within the BRIC, China had the highest share of milk delivered (93%) while India had the lowest share with 12% of total milk produced only. When considering only the volume of milk delivered, the BRIC only contributes 18% of the world's milk. A relatively low share of the milk delivery in the moment shows a significant potential of the BRIC countries to increase their participation in the global formal dairy sector even without increasing milk production itself.

The actual important position in the world's milk production was reached by the BRIC countries among other things due to high growth rates of milk production in the last decades. It becomes visible by comparing different parts of the world. From 1996 to 2009 the total world's milk production increased by 29%. In the same period, milk production in the BRIC grew double as fast (60%). Meanwhile, within the same period, milk production in the USA increased by 23% and remained stable in the EU-27 countries.

Table 2: Micro perspective: Top 20 dairy countries in 2009 - with EU-27 as aggregate

No.	Cows and buffalos in 1,000 head	2009	Ø milk yield ECM t/animal/y	2009	Dairy farm number in 1,000	2009	Milk per farm ECM t/farm	2009
1	India	124,218	Israel	9.7	India	75,000	New Zealand	1,596
2	Pakistan	29,704	USA	8.8	Pakistan	12,180	Australia	1,245
3	EU-27	23,947	Canada	8.6	Ethiopia	5,265	USA	1,242
4	Brazil	21,833	Japan	8.0	Russia	3,162	Israel	1,215
5	Sudan	13,754	Switzerland	7.5	China	2,802	Argentina	914
6	Ethiopia	9,919	Norway	7.2	Ukraine	2,002	South Africa	838
7	USA	9,201	EU-27	6.3	Kenya	1,850	Canada	633
8	Mongolia	9,151	Australia	6.1	Uganda	1,647	Japan	341
9	Russia	9,023	Taiwan	6.0	Uzbekistan	1,573	Korea	307
10	Kenya	6,840	Jordan	5.5	Bangladesh	1,414	Jordan	286
11	China	6,583	Iceland	5.3	Brazil	1,209	Uruguay	279
12	Tanzania	4,900	Argentina	5.2	EU-27	1,092	Iceland	197
13	Uganda	4,609	Chile	4.9	Turkey	1,089	Switzerland	161
14	Colombia	4,338	China	4.8	Iran	1,056	Norway	147
15	New Zealand	4,253	Korea	4.7	Egypt	935	EU-27	137
16	Bangladesh	4,241	Mexico	4.5	Kazakhstan	878	Chile	124
17	Turkey	4,165	New Zealand	4.4	Mongolia	610	Belarus	118
18	Afghanistan	4,068	Belarus	4.2	Ecuador	299	Malaysia	86
19	Egypt	3,799	Ukraine	4.2	Serbia	265	Nigeria	82
20	Iran	3,730	Russia	3.2	Albania	231	Paraguay	67

Notes: Data: Data for 2009. Farm number: If not available for 2009, 2008 data was taken. Source of data: Number of cows and buffalos: National statistics, AMI, FAO and estimates. Dairy farm number: National statistics and estimates. Milk price: National statistics, FAO and estimates. **Method:** Average milk yield: Milk production of cows and buffalos divided by number of cows and buffalos in t ECM per animal and year. Milk per farm: Milk production of cows and buffalos divided by number dairy farms in t ECM per farm and year.

Source: Hemme (2010)

The importance of BRIC in the world comparison is also obvious by looking at the number of dairy animals and number of dairy farms (see table 2). The highest number of dairy animals and dairy farms in the world was found in India (124 and 75 mill. respectively). Also, Brazil, Russia and China are among the top 11 countries in the world with respect to these indicators. Meanwhile by looking at the average milk yield per animal per year only China and Russia appear in the top 20 list with 4.8 and 3.2 tons per animal per year respectively, and the average milk yield per animal per year in Brazil and India is even lower. The relatively low milk yield per animal per year in the BRIC is one of the reasons why none of these countries

delivered was low, partly due to less mechanisation in the chain and also to milk production from other dairy species.

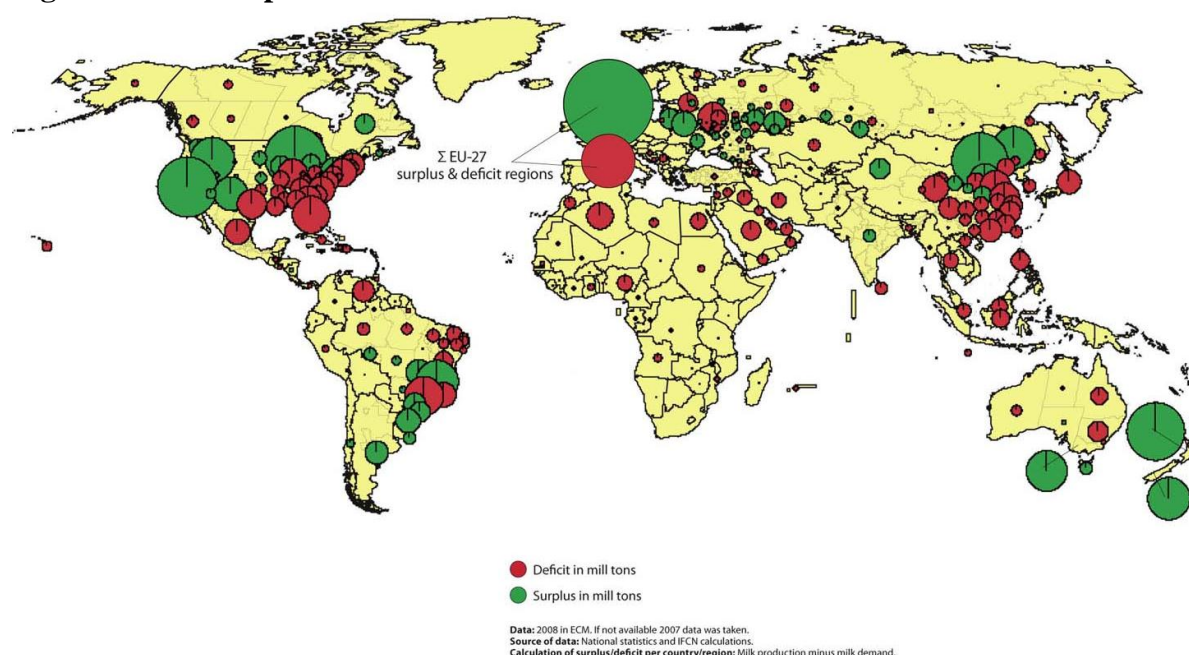
appears in the top 20 list of the next indicator, milk production per farm. Another reason for this is of course a relatively low average farm size, which becomes visible by dividing the number of dairy animals by the number of dairy farms. A currently relatively low milk output per animal and farm in the BRIC means a significant potential for an intensification and consolidation of milk production, what in turn could lead to a further growth of milk volume produced.

2. Status and development of milk demand, surplus and deficit

Milk demand is influenced by the number of people and the amount of milk that each person is willing to drink and can afford. In 2009 the world population was 6.8 billion people; meanwhile, the average per capita milk consumption for the year 2009 was 105 kg ME³. However, the per capita consumption varies between countries and also changes depending on consumption patterns in different countries which are mainly affected by changes in per capita income and urbanisation.

From the world's population 42% of people, or 2.9 billion potential consumers for milk and dairy products, live in the BRIC. With respect to the population, the BRIC is also a very dynamic part of the world. On average, the world population increases by 78 million people per year during the past 15 years, and about one third is living in the BRIC⁴. Together with an increasing prosperity of people, population growth leads to an additional demand for milk and dairy products in the BRIC. The relation between milk production and milk demand as well as their development through over time in a country is crucial in determining if country will be self-sufficient in milk or not. In the first case a country is able to cover the demand from own milk production and can export a surplus of milk. In the second case a country is dependent on dairy imports and has to source dairy products from international market.

Figure 1: Milk surplus and deficit worldwide in 2008



Source: Hemme (2009)

The 2009 status of milk surplus or demand for the top 20 countries was already presented in Table 1. Figure 1 shows the milk supply and demand situation for the whole world in 2008. In the world-wide comparison for 2009, the countries with the highest milk surplus were New Zealand (18.4 mill. tons) and the EU-27 (13.5 mill. tons). From the BRIC, China and Russia

³ ME stays for milk equivalent.

⁴ Increasing population in Brazil, India and China; decreasing population in Russia

featured among the top 3 milk deficit countries in the world (with 3.2 and 2.2 mill. tons of milk deficit respectively). The other two BRIC countries, Brazil and India, were able to cover the internal milk demand from own milk production (self-sufficiency level around 100%).

An analysis of regional data for selected countries shows⁵, that milk is not only moving between exporting and importing countries, but also that regions of a country can differ in a level of self-sufficiency in milk. We see on Figure 1 that milk is usually moving, for example in the US, milk is moving from the west to the east, while in China, it moves from north to south. In Brazil milk is moving from south to north and to highly populated states: São Paulo and Rio de Janeiro. A similar trend can be seen in Russia too, where southern regions have in many cases a surplus of milk and areas in north, east and around Moscow and Sankt-Petersburg have a deficit of milk. From the surplus regions especially Tatarstan and Bashkortostan are notable on the map with a milk surplus of 0.9 and 1.4 mill. tons respectively⁶. Differences in regional trends within one country emphasize the importance of going deeper in country analyses. By just looking at whole country data, important regional trends can be overlooked, and this is especially valid for big and dynamic countries like the BRIC.

3. Cost of milk production 2009

Cost of milk production is one of the key drivers for the development of milk production and a success of a country on international milk market. For analysing the cost of milk production the IFCN has started annual work of comparing typical farms around the world and this is an ongoing process since the year 2000. Since then the number of countries has increased from 8 to 44. Moreover, the number of dairy farm types analysed has increased from 21 to 143.

The cost indicator used in this article is representing the concept of full economic costs. Technically it is defined as follows: Costs from the profit loss account of the dairy farm + opportunity costs for own production factors (family labour, own land, own capital) – the non milk returns (returns from cull cows, calves or heifers, returns from manure and coupled direct payments).

Figure 3 shows a simplified global overview on milk production costs⁷:

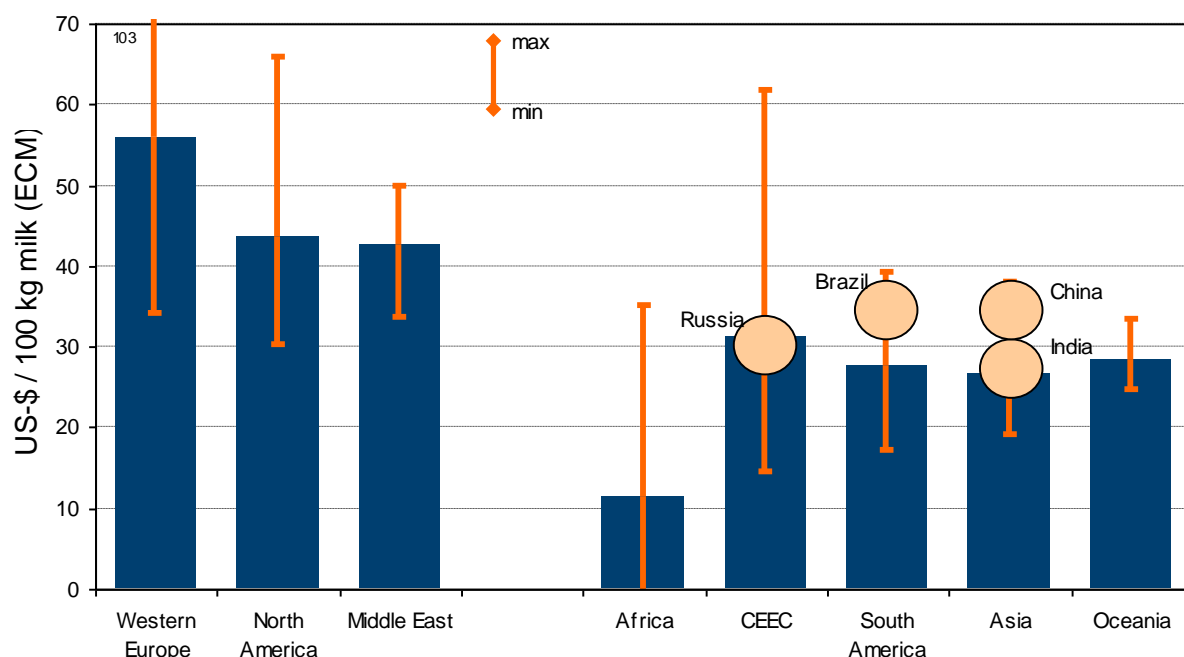
On average Africa had the lowest milk production costs and is the only region where milk was produced at costs below 26 US-\$. Western Europe, North America and the Middle East had the highest cost; Cost in Eastern Europe, South America, Asia and Oceania were on a similar level of 28 to 31 US-\$ per 100 kg milk.

⁵ Countries in regional analysis are: the USA, New Zealand, Australia, Brazil, Russia and China. For the EU-27 countries, from place reasons, the sums of milk surplus and the sum of milk deficit in single countries are presented on the map. Regional consumption is calculated based on country average consumption and regional population, except in China, where region specific consumption level was used.

⁶ Status 2008

⁷ A simple average for all farms in a cluster. **Farms:** All farms analysed in Chapter 1.6 of the IFCN Dairy Report 2010 are included. Classification of the typical farms is documented in Annex 4 of the IFCN Dairy Report 2010. **Analysed year:** 2009; Paraguay, Uruguay, New Zealand, Australia = season 2008/2009, India = financial year 2009/2010. **Regions:** Western Europe (36 farms): All of the EU-15 countries analysed, Norway and Switzerland. North America (6 farms): Canada and the USA. Middle East (4 farms): Israel and Jordan. Africa (10 farms): Egypt, Uganda, Nigeria, Cameroon and South Africa. CEEC (16 farms): Poland, the Czech Republic, Serbia, Ukraine, Belarus and Russia. South America (16 farms): Mexico, Argentina, Uruguay, Paraguay, Chile, Brazil and Peru. Asia (12 farms): India, Pakistan, Bangladesh, Indonesia and China. Oceania (6 farms): Australia and New Zealand.

Figure 2: Cost of milk production by world region in 2009



Source: Hemme (2010)

Analysing the cost of milk production in the BRIC we put it in the relation to the cost in their geographical regions, but also to other parts of the world. If we compare the costs of milk production the BRIC countries with the cost of their geographical region, the picture is the following. The milk production costs of analysed farms in Russia were around an average level in a region (region CEEC). The same we can say about the cost in India (region Asia). The milk production cost in Brazil (region South America) and China (region Asia) were more on the upper range for their regions. In international comparison an average cost level in the BRIC countries is below an average cost level of high cost regions like Western Europe, North America and Middle East. This can be seen as a competitive advantage for dairy industries and a supporting factor for a success in the international market. But in the same time also in the other regions there were farms able to produce milk at similar or even lower cost like the farms in the BRIC.

4. Conclusions

The results in the IFCN Dairy Report 2010 delivered a good overview of the world's dairy sector and dairy sector in the BRIC in terms of milk production, consumption and cost of milk production.

With 212 mill. tons of milk produced in 2009 the BRIC contributes nearly one third of the world's milk production. The milk production in the BRIC has increased by 60% since 1996. A large number of dairy animals and relatively low milk output per animal show a great potential of the BRIC for a further growth of production. Also by increasing a share of milk delivered to processing plants the BRIC could easily increase their participation in the formal milk sector with significant amounts of milk.

Milk demand is driven by population growth, income developments, and shifts in consumer preferences. Just the expected growth in population⁸ leads to an increasing demand of 8 mill t milk per year which is almost the annual milk production volume of Australia. Growing population together with the growing per capita income and urbanisation will lead to a growing demand for milk in the future. A significant fraction of the demand growth will come

⁸ Based on a strong population growth in the past, a stable population growth in the future can be assumed. The IMF (2010) predicts a population growth in the world by another 0.5 bill. people until 2015, of which one third in the BRIC.

from the BRIC countries. The question here is if the consumption growth will be covered from own production or additional milk volumes will be demanded on the world market.

There are significant cost differences between world regions, which has a strong impact on international competitiveness of milk production. The BRIC countries have a competitive level of milk production cost in international comparison. Nevertheless also farms in other countries are able to produce milk on similar or lower cost. The success of the BRIC countries in the international milk market will depend on the contribution of all stakeholders in the dairy chain: farmers, processors, supporting industries and policy makers.

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