



Pro-Poor Livestock Policy Initiative

Status and Prospects for  
Smallholder Milk Production  
A Global Perspective



IFCN





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Smallholder Milk Production  
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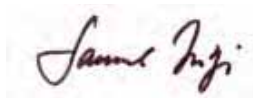
Of an estimated 2.6 billion people in the developing world surviving on less than US\$2 per day, some 1.4 billion are classified as 'extremely' poor inasmuch as they live on less than US\$1.25/day. Although the incidence of extreme poverty is highest in sub-Saharan Africa (50 percent), Asia is home to the majority of the extremely poor (933 million). Poverty is closely associated with malnutrition, particularly under-nutrition; the Food and Agriculture Organization of the United Nations (FAO) estimates that, in 2009, some 1.02 billion people, or one sixth of the world's population, were under-nourished.

More than three quarters of these 1.4 billion extremely poor live in rural areas and partly or wholly depend on agriculture for their livelihoods; almost half a billion of them also partly depend on livestock. Given that it is impossible for the expansion of agricultural land to keep pace with population growth in most developing countries, it is not easy to expand agricultural production horizontally. Rather, productivity gains that result in increased value of output per hectare of land are essential for the purpose of improving rural incomes.

Livestock have a number of characteristics that contribute to sustainable rural development: among other things, livestock provide marketable products (generally of a higher value and less vulnerable to critical harvest timing than many crops) that can be produced by small-scale, household production systems. Judicious development of the livestock sector could thus make a substantial contribution to raising nutrition levels, increasing agricultural productivity, improving the lives of rural people, contributing to growth of the world economy and achieving the Millennium Development Goal of eradicating extreme poverty and hunger.

It is estimated that almost 150 million farm households, i.e. more than 750 million people, are engaged in milk production, the majority of them in developing countries. Annual milk consumption growth rates in these countries averaged 3.5 to 4.0 percent over the decade 1995-2005, at least double the growth rates of 1.4 to 2.0 percent for major staple foods over the same period. Therefore, if properly directed, dairy sector development could serve as a powerful tool for reducing poverty.

The aim of the present publication is to provide an overview of the global dairy sector and of the forces shaping its development vis-à-vis the characteristics of 'typical' dairy farming systems. In this way, it is hoped to facilitate a better understanding of the opportunities available for improvement, as well as the constraints/threats faced by smallholder dairy producers in a rapidly changing world. It also attempts to chart an approach to dairy sector development that will allow smallholder producers to participate in the growing market for milk and milk products.



Samuel Jutzi  
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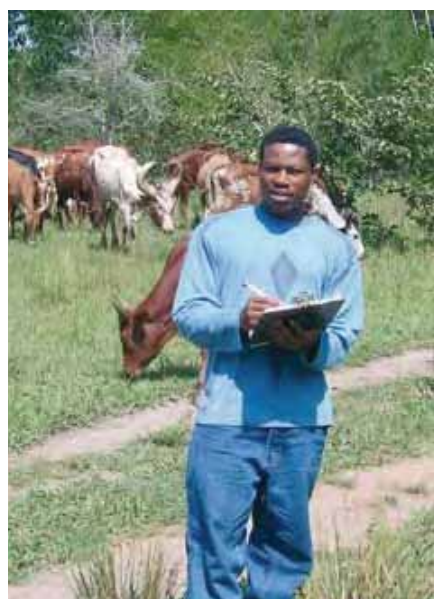
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# Abbreviations and acronyms

## Countries

AL	Albania	JO	Jordan
AM	Armenia	JP	Japan
AR	Argentina	KR	Korea, Republic of
AT	Austria	KZ	Kazakhstan
AU	Australia	LK	Sri Lanka
AZ	Azerbaijan	LT	Lithuania
BA	Bosnia and Herzegovina	LU	Luxembourg
BD	Bangladesh	LV	Latvia
BE	Belgium	MA	Morocco
BG	Bulgaria	MD	Moldova
BR	Brazil	MK	Macedonia
BY	Belarus	MM	Myanmar
CA	Canada	MN	Mongolia
CH	Switzerland	MX	Mexico
CL	Chile	NG	Nigeria
CM	Cameroon	NL	The Netherlands
CN	China	NO	Norway
CY	Cyprus	NZ	New Zealand
CZ	Czech Republic	PE	Peru
DE	Germany	PH	Philippines
DK	Denmark	PK	Pakistan
EC	Ecuador	PL	Poland
EE	Estonia	PT	Portugal
EG	Egypt	RO	Romania
ES	Spain	RU	Russian Federation
ET	Ethiopia	SA	Saudi Arabia
FI	Finland	SD	Sudan
FR	France	SE	Sweden
GB	United Kingdom	SI	Slovenia
GR	Greece	SK	Slovakia
GT	Guatemala	SY	Syria
HR	Croatia	TH	Thailand
HU	Hungary	TR	Turkey
ID	Indonesia	TW	Taiwan
IE	Ireland	UA	Ukraine
IL	Israel	UG	Uganda
IN	India	US	USA
IR	Iran	UY	Uruguay
IS	Iceland	UZ	Uzbekistan
IT	Italy	VN	Viet Nam
		ZA	South Africa

## Currencies

ALL	Albanian Lek	LVL	Latvian Lats
ARS	Argentine Peso	MAD	Moroccan Dirham
AUD	Australian Dollar	MMK	Myanmar Kyat
BDT	Bangladeshi Taka	MNT	Mongolian Tugrik
BGL	Bulgarian Lev	MXN	Mexican Peso
BRL	Brazilian Real	NGN	Nigerian Naira
BYR	Belarus Rouble	NOK	Norwegian Kroner
CAD	Canadian Dollar	NZD	New Zealand Dollar
CHF	Swiss Franc	PEN	Peruvian Nuevo Sol
CLP	Chilean Peso	PHP	Philippine Peso
CNY	Chinese Renminbi Yuan	PKR	Pakistan Rupee
CSK	Czech Koruna	PLN	Polish Zloty
DKK	Danish Krone	RON	Romanian New Lei
ECS	Ecuador Sucre	RUB	Russian Rouble
EEK	Estonian Kroon	SAR	Saudi Riyal
EGP	Egyptian Pound	SDD	Sudanese Dinar
ETB	Ethiopian Birr	SEK	Swedish Krona
EUR	European Euro	SIT	Slovenian Tolar
GBP	British Pound	SKK	Slovak Koruna
GTQ	Guatemalan Quetzal	SYP	Syrian Pound
HUF	Hungarian Forint	THB	Thai Baht
IDR	Indonesian Rupiah	TRL	Turkish Lira
ILS	Israeli New Shekel	TWD	Taiwan Dollar
INR	Indian Rupee	UAH	Ukraine Hryvnia
IRR	Iranian Rial	UGX	Uganda Shilling
JOD	Jordanian Dinar	USD	US Dollar
JPY	Japanese Yen	UYP	Uruguayan Peso
KRW	South Korean Won	UZS	Uzbekistani Soum
KZT	Kazakhstan Tenge	VND	Viet Nameese Dong
LKR	Sri Lankan Rupee	XAF	Communaute Financiere Africaine Franc
LTL	Lithuanian Litas	ZAR	South African Rand

## Units

ct	cent
Cwt	hundredweight = 100 lb (45.36 kg)
ECM	Energy corrected milk 4% fat, 3.3% protein
g	gram
h	hour
ha	hectare
lb	Pound (453.59 g)
kg	kilogram
l	litre
MCAL	Mega calorie
ml	millilitre
NE	Net energy
ppl	pence per litre
Snf	Solids non-fat
t	metric tons
yr	year

## Others

AI	Artificial insemination
CAP	Common Agricultural Policy (in EU)
CIF	Cost, insurance, freight
CIS	Commonwealth of Independent States (Countries of the former Soviet Union)
CPI	Consumer Price Index
FAO	Food and Agricultural Organisation
FOB	Free on board
GDP	Gross Domestic Product
HH	household
IDF	International Dairy Federation
IFCN	International Farm Comparison Network
IMF	International Monetary Fund
ME	Milk Equivalent
OECD	Organisation for Economic Co-operation and Development
P&L	Profit and loss account
PAM	Policy analysis matrix
PPLPI	Pro Poor Livestock Policy Initiative
sbm	soya bean meal
SMP	Skim milk powder
TIPI-CAL	Technology Impact and Policy Impact Calculation Model
UHT	Ultra High Temperature (milk)
VAT	Value added tax
WTO	World Trade Organization
ZMP	Zentrale Markt- und Preisberichtsstelle (Germany)



### Why dairy?

Since 2003, the Pro Poor Livestock Policy Initiative of the Food and Agriculture Organization of the United Nations and the IFCN (International Farm Comparison Network) have been cooperating on the compilation and analysis of information on dairy sector development and on the household economics of dairy farming over a wide range of countries across the globe. The aim of this book is to bring these studies together and to provide a holistic picture on the trends and drivers in the dairy sector as well as the implications these may have for the future of dairy farming, in particular among the smaller-scale producers. We consider the following to be the salient findings of the studies:

#### **The dairy sector provides income and employment to many, often poor, people:**

It is estimated that some 12 to 14 percent of the world population, or 750 to 900 million people, live on dairy farms or within dairy farming households. The mean dairy herd size is around two cows that give an average milk yield of 11 litres per farm per day. Production of 1 million litres of milk per year on small-scale dairy farms creates approximately 200 on-farm jobs: in developed countries and in intensive dairy operations, such a volume of milk creates less than five on-farm jobs.

#### **There is a great opportunity for dairy sector development to contribute to poverty reduction:**

Throughout the world, there are more than 6 billion consumers of milk and milk products, the majority of them in developing countries. As such, if it is to keep pace with the growth in demand, milk production will need to grow by close to 2 percent per year. If small-scale milk producers in developing countries continue being in a position to compete on a level 'playing field' with large-scale, capital-intensive dairy farming systems in developed (and developing) countries, dairy-sector development will be a powerful tool for reducing poverty and creating wealth in the developing world.

#### **A word of thanks:**

We would both like to express our sincere thanks to all dairy farmers, researchers and institutions that have contributed, directly and indirectly, to this book. It is thanks to the passion for dairy-sector development and the continuous input from researchers from more than 60 countries cooperating under the umbrella of the IFCN, that it has been possible to produce this book. Among the researchers, special mention is due to the contributions of Otto Garcia, Asaah Ndambi, Amit Saha, Khalid Mahmood, Juliane Stoll, Carlos Gomez, Henning Bendfeld and Martin Hagemann.

In addition to the dairy researchers who provided the contents of the book, none of this would have been possible without the help of those who worked behind the scenes on the 'organizational' and 'editorial' aspects involved. In this respect, we also wish to express our special gratitude to Eva Asmussen, Katja Seifert and Brenda Thomas for their contributions and dedication.



Joachim Otte,  
Coordinator of the PPLPI



Torsten Hemme,  
Chairman of the IFCN

It is estimated that, throughout the world, almost 150 million farm households are engaged in milk production, the majority of them in developing countries where annual growth rates in milk consumption averaged 3.5 to 4.0 percent in the decade 1995-2005. This is at least double the growth rates of 1.4 to 2.0 percent for major staple foods over the same period. Therefore, if properly directed, dairy sector development could serve as a powerful tool for reducing poverty.

With this in mind, the aim of the present publication is to provide an overview of the global dairy sector and the forces shaping its development with a focus on the characteristics of, and implications for, 'typical', mostly smallholder, dairy farming systems in developing countries.

### ■ Status and trends in the global dairy sector

Based on milk equivalents (ME), average per capita global milk consumption amounts to about 100 kg of milk per year, with very significant differences between countries/regions. Per capita consumption in Western Europe is in excess of 300 kg of milk per year compared with less than 30 kg (and even sometimes as little as 10 kg) in some African and Asian countries. In the past, increases in global milk demand have been mainly driven by population growth, whereas nowadays they are increasingly also fuelled by rising per capita milk consumption in some highly populated developing countries. Increasing income levels are expected to raise the demand for milk and dairy products by more than 1.8 percent per annum. Should increases in milk production not follow suit, dairy prices will rise significantly over past levels.

South Asia and EU-25 are the most important dairy regions, accounting for 44 percent of global milk production. In the period 2002 to 2007, world milk production grew by 13 percent, or by an average of 15 million tons of energy-corrected milk (ECM) per year – mainly through production increases in China, India and Pakistan. Overall, therefore, developing countries, which rely predominantly on smallholder dairy production systems, have increased their share in world milk production.

Milk is likely to become one of the most volatile agricultural commodities owing to: (a) the strong influence that small changes in the quantities available internationally have on world market prices; (b) the length of time required for milk production to increase in response to rising prices; and (c) the delayed reaction of consumer demand to changing dairy commodity prices.

A key determinant of milk prices is the cost of feed, which directly affects milk production through increased production costs and, indirectly, higher land values. Demand for grain, an ingredient of dairy rations, is driven by the need for food, feed and fuel of a growing world population. Higher incomes in

developing countries raise the demand for food derived from livestock, leading to more demand for animal feed. Higher energy prices and policies that promote bio-fuels lead to an increased use of crops for energy production and, thereby, push up the prices of feed and land. The Organisation for Economic Co-operation and Development (OECD) and the Food and Agricultural Policy Research Institute (FAPRI) forecast that, in the long term, feed price levels will increase to about 50 percent above those of 2002-2006.

The milk:feed price ratio is one of the main factors determining the choice of dairy production system. The highest milk:feed price ratio (more than 2.5) is seen in North America, where, as a likely consequence, the most intensive milk production systems are found. Farming systems with lower milk yields, making little use of compound feed, are generally observed in countries with a milk:feed price ratio of less than 1.5.

Very few countries are self-sufficient with regard to milk. The main milk-surplus countries are Argentina, Australia, New Zealand, USA, Uruguay and countries of the European Union (EU) and Eastern Europe. The main milk-deficit countries are Algeria, China, Japan, Mexico, the Philippines and Russia. Over the period 1990-2004, global milk exports increased from 4.4 to 7.1 percent of production, while the share delivered to formal milk processors increased from 14 to 24 percent.

### ■ International competitiveness of 'typical' dairy farms

Farms representative of various dairy farming systems in Bangladesh, Cameroon, China, India, Morocco, Pakistan, Peru, Thailand, Uganda and Viet Nam were subjected to detailed technical and economic analyses. For industrialized countries, similar analyses were conducted for farms in Germany, New Zealand and the USA.

Milk returns account for 55 to 95 percent of the returns of all farm types analysed and range from US\$12 to US\$36/100 kg of ECM. Non-milk returns range from US\$2 to 38/100 kg ECM. Non-milk returns were very low for the farms in India whereas they were very high in Germany and Morocco.

Average milk production costs in the three industrialized countries covered by the study stand at US\$31.4/100 kg, or 56 percent above the average production cost of US\$20.2/100 kg calculated for the ten developing countries while the average price of milk in the three industrialized countries (US\$31.2/100 kg) is only 30 percent higher than that in the developing countries (US\$24.0/100 kg). Thus, the overall profitability of milk production appears to be higher in developing than in industrialized countries, which may be one of the reasons why developing countries are increasing their shares in global dairy production.

Given the major differences in agricultural wage rates between industrialized and developing countries, it could be assumed that in the latter farms have a labour cost advantage. However, this was found not to be the case when comparing labour costs per litre of milk, mainly because countries with higher salaries also tend to have a significantly higher level of labour productivity. Per litre of milk, the labour costs of a nine-cow dairy farm in Punjab, India, are similar to those of a 350-cow farm in the USA. The main cost advantage of smallholder dairy farming lies in the use of low(er)-cost feed and the overall 'low-tech' approach to milk production. Cows fed on crop residues, such as straw, are significantly lower-cost producers of milk than high-yielding, grain-fed dairy cows.

Given the rapid increases in feed prices over the recent past, it is important to consider how this trend affects the competitiveness of small-scale dairy farmers in developing countries. As these smallholder dairy systems normally use much less compound feed per kilogram of milk than dairy farms in industrialized countries, rising feed prices increase the cost of milk production in the latter to a larger extent than in the low-yield systems predominating in developing countries. Thus, as feed prices increase, 'typical' smallholder dairy farms become more cost-competitive.

For dairy farming to remain sustainable, it must be able to compete for labour on local labour markets. If the 'return to labour' in dairy farming (i.e. the 'value-added' per hour of labour put into dairy farming) is higher than the average local wage rate, the dairy farming system can pay competitive wages and should be sustainable from the labour standpoint. The average return to labour observed in the developing countries covered by this study is US\$0.45/hour, which is 45 percent higher than the average local wage of US\$0.31/hour. In the three industrialized countries covered, the average return to labour is US\$16.30/hour, which is still 22 percent above the average estimated wage of US\$13.30/hour. These figures indicate that it would be possible for dairy farming to compete on local labour markets in both groups of countries. However, milk production quickly loses its competitive advantage when local wages rise faster than labour productivity.

### Conclusions for smallholder dairy development

The various analyses and case studies presented in this document indicate that:

- small-scale milk production not only improves the food security of milk-producing households but also helps to create numerous employment opportunities throughout the dairy chain, i.e. for small-scale rural processors and intermediaries; and
  - small-scale milk producers incur low production costs. Thus, if well organized, they should be able to compete with large-scale, capital-intensive 'high-tech' dairy farming systems in industrialized (and developing) countries.
- Dairy development may therefore serve as a powerful tool for reducing poverty. Devising a viable dairy development strategy for smallholders calls for a detailed analysis of strengths, weaknesses, opportunities and threats posed by the external environment. The strengths of smallholder dairy systems are low production costs; high profit margins; low liabilities; limited liquidity risk; and relative resilience to rising feed prices – strengths that enable smallholders to serve as a competitive source of milk supply. However, smallholder milk producers are also beset by a number of weaknesses: lack of knowledge and technical know-how; poor access to support services; low capital reserves and limited access to credit; low (labour) productivity; and poor milk quality – all of which limit their ability to take advantage of market opportunities.
- Major opportunities for smallholder producers engaged in dairy production are: (i) growing demand for dairy products in developing countries; (ii) probable milk price increases; (iii) potential to increase milk yields through relatively few additional inputs; (iv) potential to increase dairy labour productivity; and (v) employment generation in the dairy value chain (for example, absorbing family labour released by higher on-farm labour productivity). However, smallholders in developing countries also face major threats, namely (a) policy support for (and competition from) dairy farmers in OECD countries; (b) increased consumer demand for food safety; (c) environmental concerns (low-yield dairy systems are estimated to have higher carbon footprints per 100 kg of milk produced than high-yield systems); (d) increasing local wage rates; (e) intergenerational discontinuity (children of the better-performing farmers leave the system); (f) under-investment in dairy chain infrastructure; and (g) inappropriate dairy development policies and investment plans.
- Given the increasing 'interconnectedness' of global agriculture, the ability of smallholder milk producers to participate in the dairy market in a profitable manner will depend not only on their own competitiveness, mainly determined by production costs, but also, and to an increasing extent, on the efficiency of the dairy chains of which they are part. Therefore, recommendations for smallholder dairy development must include strategies to increase the competitiveness in all segments of the dairy chain, namely, input supply, milk production, processing, distribution and retailing. In other words, to be successful, any dairy development strategy must be based on the principle of 'creating value' in each and every segment of the dairy chain. This makes formulation of a dairy development strategy a complex task, involving a large number of stakeholders and requiring comprehensive analysis and continuous reassessment.





China



Morocco