Strengthening potato value chains

TECHNICAL AND POLICY OPTIONS FOR DEVELOPING COUNTRIES

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Acknowledgements

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The workshop was designed to review the current state of potato value chains in developing countries and identify the key constraints to a better functioning value chain, especially the role of the seed sector in providing the chain with a consistent quality product. It also provided a forum for discussing opportunities to re-engineer value chains to enhance food security and rural development, to counter cereal price inflation and to identify how development agencies, national authorities and the private sector can support value chain activities. The valuable contributions made at this forum by many individual participants are very much acknowledged. Their inputs and discussions were fundamental in developing a series of technical and policy options that will now help lay the foundation for sustainable potato-based systems and value chains.

We warmly recognize the contribution of those present at the workshop, including: Alpha Diallo, (EUCORD, Guinea), Berga Lemaga (CIP, Uganda), Jon Tong Gon and Kim Myong Dok (Academy of Agricultural Sciences, DPR Korea), Peter Joyce (United States Potato Board), Karma Nidup (Department of Agriculture, Bhutan), Brian Moir (FAO/ESTM), Prem Gaur (Retired Agricultural scientist, India), Fengyi Wang (CIP, China), Kurt Manrique (CIP, Peru), Peter Gildemacher (Royal Tropical Institute, Netherlands), Mieke Ameriana (Indonesian Vegetables Research Institute), Ganesh Ghettri (Department of Agriculture, Bhutan), Hans Peeten (NIVAP, the Netherlands) and Henk Knipscheer (Winrock, Brussels).

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Abbreviations and acronyms

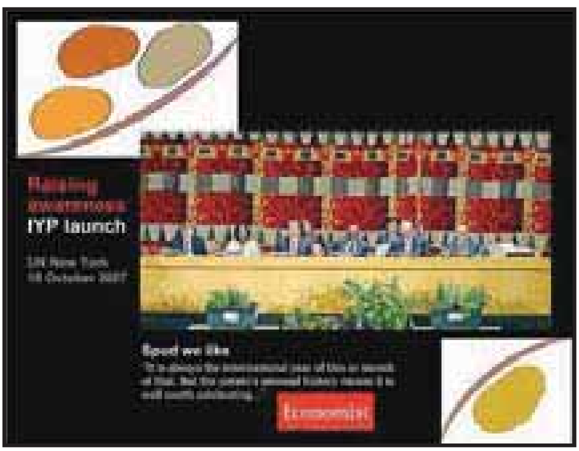
ACIAR	Australian Centre for International Agricultural Research
AGP	Plant Production and Protection Division (FAO)
APHIS	Animal Plant and Health Inspection Service (USA)
ARM	*L'Agence de Régulation des Marchés* (Senegal)
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
AUMN	*L'Association des Unions Maraîchères des Niayes* (Senegal)
CAPAC	*Cadenas Productivas Agrícolas de Calidad en el Perú*
CET	Common external tariff
CFC	Common Fund for Commodities
CIP	International Potato Center
CIPC	chlorpropham
CNY	Chinese yuan
COMESA	Common Market for Eastern and Southern Africa
CPRI	Central Potato Research Institute (India)
CSO	Civil society organization
EIAR	Ethiopian Institute of Agricultural Research
EU	European Union
EUCORD	European Cooperative for Rural Development
FAO	Food and Agriculture Organization of the UN
FAPA	District agropastoral farms (Guinea)
FFS	Farmer Field School
FIGG	FAO Intergovernmental Group on Grains
FPFD	Farmer Federation of Fouta-Djallon (Guinea)
FYM	Farmyard manure
GTZ	German Technical Cooperation
ICB	International commodity body
IGG	Intergovernmental Group (FAO)
INCOPA	Innovation and Competitiveness of Peru's Potato Sector Project
IPM	Integrated pest management
IRR	Internal rate of return
IS	Innovation system
IYP	International Year of the Potato
KARI	Kenya Agricultural Resource Institute
KR2	Kennedy Round II
LC	Life cycle
LDC	Least-developed country

LIBOR	London Interbank Offered Rate
MASL	Metres above sea level
MoA	Ministry of Agriculture
NARO	National Agricultural Research Organisation of Uganda
NGO	Non-governmental organization
NPV	Net present value
PMCA	Participatory market chain approach
RGoB	Royal Government of Bhutan
R&D	Research and development
RMB	Renminbi (Chinese yuan)
SDC	Swiss Agency for Development Cooperation
SME	Small- and medium-sized enterprises
SNPV	National Service for Vegetable Protection (Guinea)
SPOMAC	Sweet Potato Market Chains Club (Uganda)
SSA	Sub-Saharan Africa
SWOT	Strengths, weaknesses, opportunities and threats analysis
TCP	Technical Cooperation Programme (FAO)
UNCTAD	UN Conference on Trade and Development
UNDP	UN Development Programme
UNCDF	UN Capital Development Fund
UNIDO	UN Industrial Development Organization
UPOV	International Union for the Protection of New Varieties of Plants
USDA	US Department of Agriculture
USPB	United States Potato Board
WFP	World Food Programme
WTO	World Trade Organization

Foreword by FAO
The International Year of the Potato

NeBambi Lutaladio
Senior Officer and Secretary of the International Year of the Potato
Plant Production and Protection Division, FAO

Given the upheaval in international food markets throughout much of 2008, the arrival of the year could not have been timelier. Although there had been increasing awareness of the importance of potato as a source of food, employment and income, the International Year of the Potato encouraged policy-makers, agronomists and economists to re-evaluate the potato in its role as an ideal crop to sustain food security through crisis. After all, potato prices are determined mainly by local production costs and can constitute an effective substitute for costly grain imports. All of this contributed to shifting the perception of the potato from that of an ordinary food for the poor to one that recognizes the tuber's solid nutritional benefits and its role in counteracting the effects of cereal price inflation.



This also led to growing awareness that realizing the full potential of the potato depends on a renewed commitment to potato research. In November of the International Year, the Common Fund for Commodities (CFC) and FAO co-sponsored a workshop, "Strengthening Potato Value Chains in Developing Countries", at FAO headquarters in Rome. Hailed as one of the International Year's major events, CFC and FAO used it as an opportunity to launch a new research agenda for potato in the developing world, targeted towards providing critical improvements along the potato value chain.

Workshop participants recognized that efforts to enhance the potato value chain will be successful only if there are substantial levels of public and private investment in the sector. This includes supporting breeding programmes for delivering clean and high quality potato seed tuber, good agricultural practices, infrastructural improvements and initiatives to support and coordinate activities along the chain.

The International Year of the Potato gave impetus to this effort. It raised awareness of the need for a coalition of stakeholders and for increased scientific support to work toward improving the productivity, profitability and sustainability of potato-based systems, and encouraged a renewed sense of responsibility on the part of the international community for agriculture and rural development. It also provided opportunities to report on the current status of potato value chains, on the key constraints to better functioning potato value chains, and on how value chains can be re-designed to enhance rural development, improve livelihoods and counter food price inflation in developing countries.

Above all, this global recognition of the importance of the potato presented a unique opportunity for all stakeholders along the value chain to work together toward a shared goal. By spreading awareness, the overall success of the International Year was to catalyze potato development programmes beyond 2008, to make a real and sustained contribution to the fight against hunger and poverty. A publication elaborating on best practices for sustainable potato production was released in 2009. This publication presents the work of those who participated in the workshop and contributed to raising awareness about the important role of potato.

FAO and the International Year of the Potato

As the United Nation's lead agency for agriculture and rural development and for the International Year of the Potato, FAO was a key partner in the year's activities – advising on policies and strategies to modernize the potato sector, sharing its extensive knowledge of potato-based systems, promoting appropriate technologies for sustainable intensification of production, and forging links among decision-makers, producers, processors and marketing chains. This type of support is essential, if potato sectors are to thrive in developing countries.

Foreword by CFC
Potato and Commodity Development

Guy Sneyers
CFC Chief Operations Officer

Worldwide more than 320 million tonnes of potatoes are being cultivated annually on 20 million hectares of land. This ranks the potato at number four among the worlds' most important staple food crops. However, the pace of expansion in global potato cultivation – production of which has doubled in the past 20 years – far exceeds that of higher ranked crops such as maize and wheat. At the same time potato production in the traditional potato growing regions of Europe has been steadily declining, but this decline has been more than offset by simultaneous rapid growth in Asia, Africa and Latin America. Today, more than one half of global potato production originates from Developing and Least Developed Countries, up from a share of just 11 percent in 1960.

Despite these impressive increases in total production, potato yields in non-traditional potato producing countries are still far below their agro-ecological potential. Crop husbandry is still poor, because farmers are not fully aware of good agricultural practices for this newly introduced crop. Potato yields also suffer severely due to the use of inappropriate varieties and post-harvest losses. Since potatoes are usually cultivated from earlier generation seed potatoes, crop diseases are passed on from one year to another and from one region to another. A functioning supply system for healthy seed potatoes rarely exists, as it requires a high level of organization amongst various supply chain actors.

Until recently, in many Developing and Least Developed Countries, the potato was relatively unknown and mostly regarded as a subsistence crop. However, today the market is expanding rapidly as potatoes are increasingly popular as a source of affordable food for growing urban populations. In addition, a more affluent middleclass has developed a preference for potatoes in processed forms such as fries and crisps. This growing domestic market presents a valuable opportunity for smallholder farmers. Planting potatoes is in many ways attractive to farmers with little resources and limited means to manage risk: given the right agro-ecological conditions, the plant has a short growth cycle and can be easily integrated into existing agricultural systems. Potatoes have a high per area production potential, can be stored relatively easily and, most importantly, can both be used as a staple food crop for household consumption and food security or sold as a cash crop. Thus, the twin role of potato provides a path out of subsistence farming and poverty with little risk exposure to farmers.

As a reflection of the increasing popularity of the potato in Developing and Least Developed

Countries, the Common Fund for Commodities has registered steadfast growth in its potato project portfolio. The overarching objective of all CFC interventions is to address the formidable challenge of establishing a functioning and efficient potato value chain, which requires the collaborative interaction of all stakeholders - from tissue culture laboratories, to seed multipliers, to producers, to processors and finally to the end users. CFC projects share a common design element in piloting initiatives to demonstrate that integrated potato sector development can have a significant poverty impact.

The workshop presentations summarized in this publication are mostly based on experiences made in CFC potato sector development projects. In line with our policy to disseminate the information generated by CFC financed projects as widely as possible, it is our expectation that this publication will be instrumental to make impressive results and experiences of CFC pilot projects in the potato sector available to a wider audience. We hope that extension workers, researchers, policy makers and others involved in the development of the potato sector will find this document most useful and relevant.

Introduction
The role of potato in developing country food systems

Adam Prakash
Economist
Trade and Markets Division, FAO

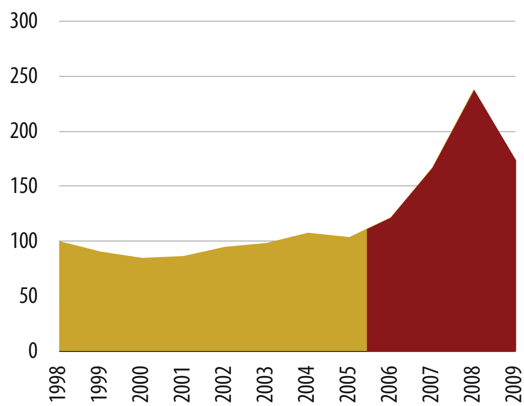
Potato and food price inflation

Commodity prices soared to all time highs between 2007 and 2008, brought about by intense competition for reduced international supplies of cereals and other agricultural commodities. However, by mid-2008, those same prices had fallen back sharply.

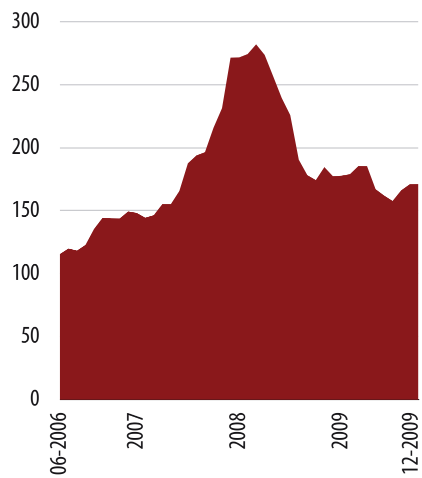
This type of volatility in commodity pricing brings with it food security risks and social unrest, particularly in low-income countries. Overcoming such risks requires adopting both short- and long-term strategies. For example, diversifying the crop base to focus on nutritious and versatile staple foods which are less susceptible to the temperament of international markets is a long-term strategy that could ease the strain of food price inflation and import dependence. The potato is one such staple food.

At the height of the price spikes, FAO surveyed the depth and breadth of food

FAO cereal price index 1998-2009



Monthly FAO cereal price index (Sept. 06-Oct. 09)



price inflation in more than 70 of the most vulnerable countries in the world. It found price inflation was higher and more widespread for cereals than for potato and other root crops. This is because the potato is insulated from international shocks.

Unlike major cereal commodities, potato is thinly traded in global markets. Only a fraction of its total production enters foreign trade. Potato prices are determined by local demand and supply conditions, not the vagaries of international markets. In addition, since potato is absent in major international commodity exchanges, it is not at risk of the ill-effects of speculative activity. Consequently, potato is a highly dependable food security crop that can help ease future turmoil in world food supply and demand.

Global potato economy

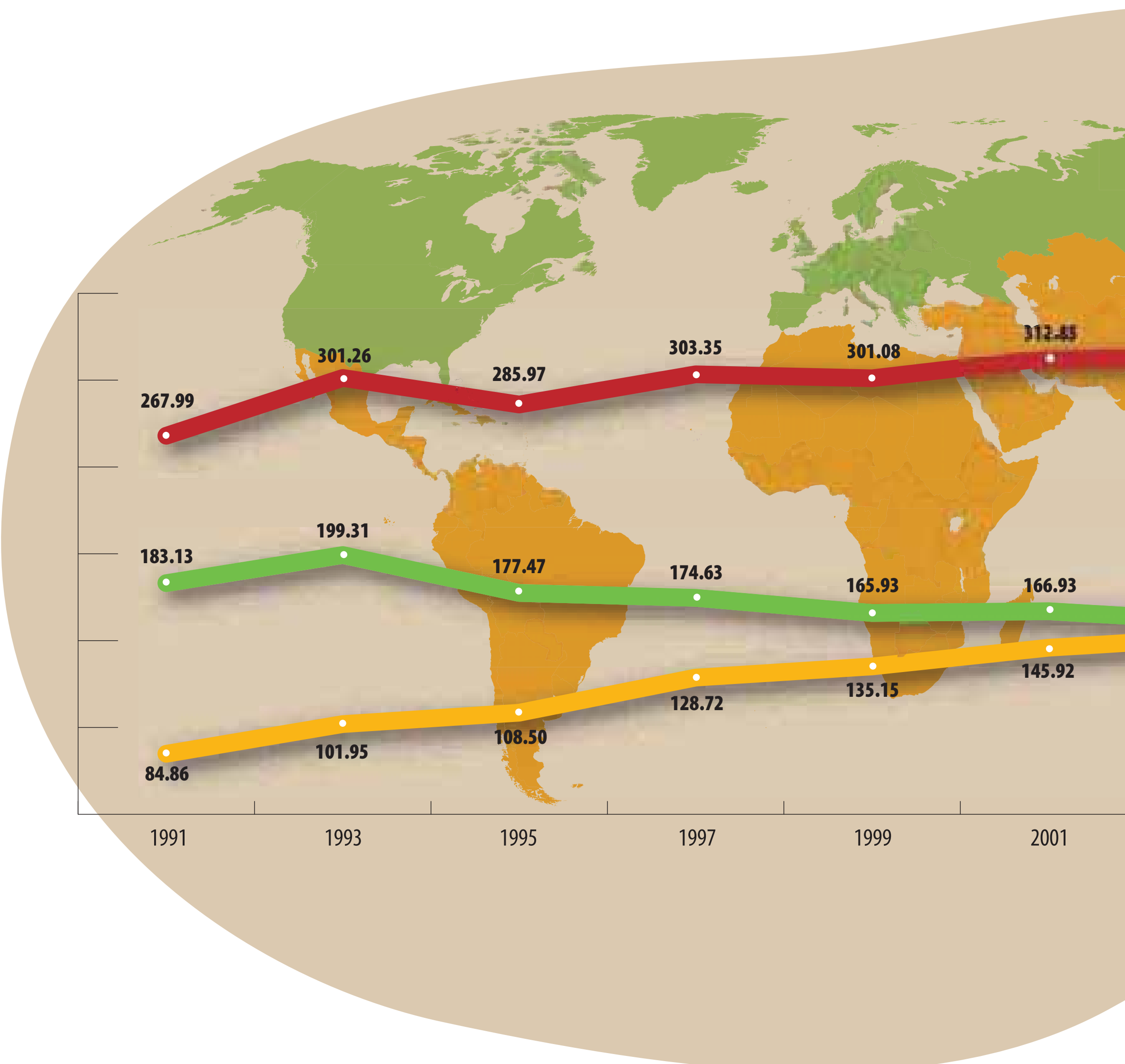
Production

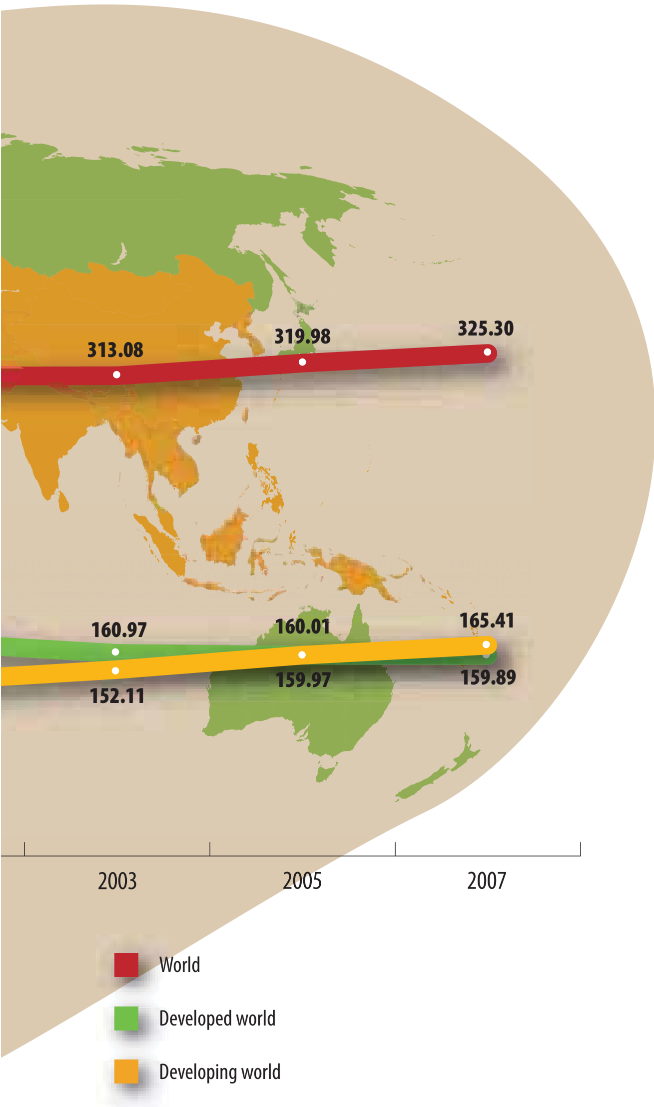
Potato is the world's number one non-grain food commodity. It is cultivated on almost 20 million ha, producing 320 million tonnes in 2007. However, the world potato sector is undergoing major changes.

Until the early 1990s, most potatoes were grown and consumed in Europe, North America and countries of the former Soviet Union. Since then, there has been a dramatic increase in potato production and demand in Asia, Africa and Latin America where their combined output rose from less than 30 million tonnes in the early 1960s to more than 165 million tonnes in 2007. This rapid growth in potato production was in sharp contrast to slowing rates of expansion of other major food crops, such as maize and wheat.

According to FAO, the developing world's potato production exceeded that of the developed world for the first time in 2005. Emerging countries have recently realized potato's potential in food security. In fact, almost a third of all the world's potatoes are harvested in China and India. In China, the world's biggest potato producer, authorities are reviewing proposals for potato to become the country's major food crop to alleviate poverty. In India, authorities are considering plans to double potato output by 2015. Worldwide potato production is projected to expand 2–3 percent annually during the next decade, with developing countries, especially those situated in sub-Saharan Africa, as the main engines of growth.

Top potato producers, 2007



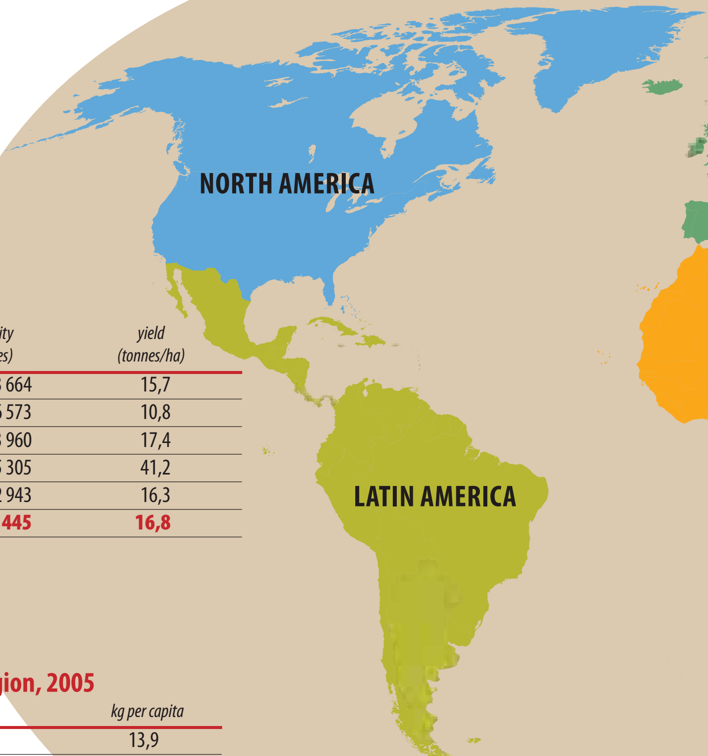


Top potato producers, 2007

		tonnes
1	China	72 040 000
2	Russian Federation	36 784 200
3	India	26 280 000
4	United States of America	20 373 267
5	Ukraine	19 102 000
6	Poland	11 791 072
7	Germany	11 643 769
8	Belarus	8 743 976
9	Netherlands	7 200 000
10	France	6 271 000

Source: FAOSTAT

Potato production and consumption, by region



Potato production, by region, 2007

	harvested area (hectares)	*quantity (tonnes)*	*yield (tonnes/ha)*
Africa	8 732 961	137 343 664	15,7
Asia/Oceania	1 541 498	16 706 573	10,8
Europe	7 473 628	130 223 960	17,4
Latin America	615 878	25 345 305	41,2
North America	963 766	15 682 943	16,3
World	**19 327 731**	**325 302 445**	**16,8**

Source: FAOSTAT

Potato consumption, by region, 2005

	total food (tonnes)	*kg per capita*
Africa	12 571 000	13,9
Asia/Oceania	94 038 000	23,9
Europe	64 902 000	87,8
Latin America	11 639 000	20,7
North America	19 824 000	60,0
World	**202 974 000**	**31,3**

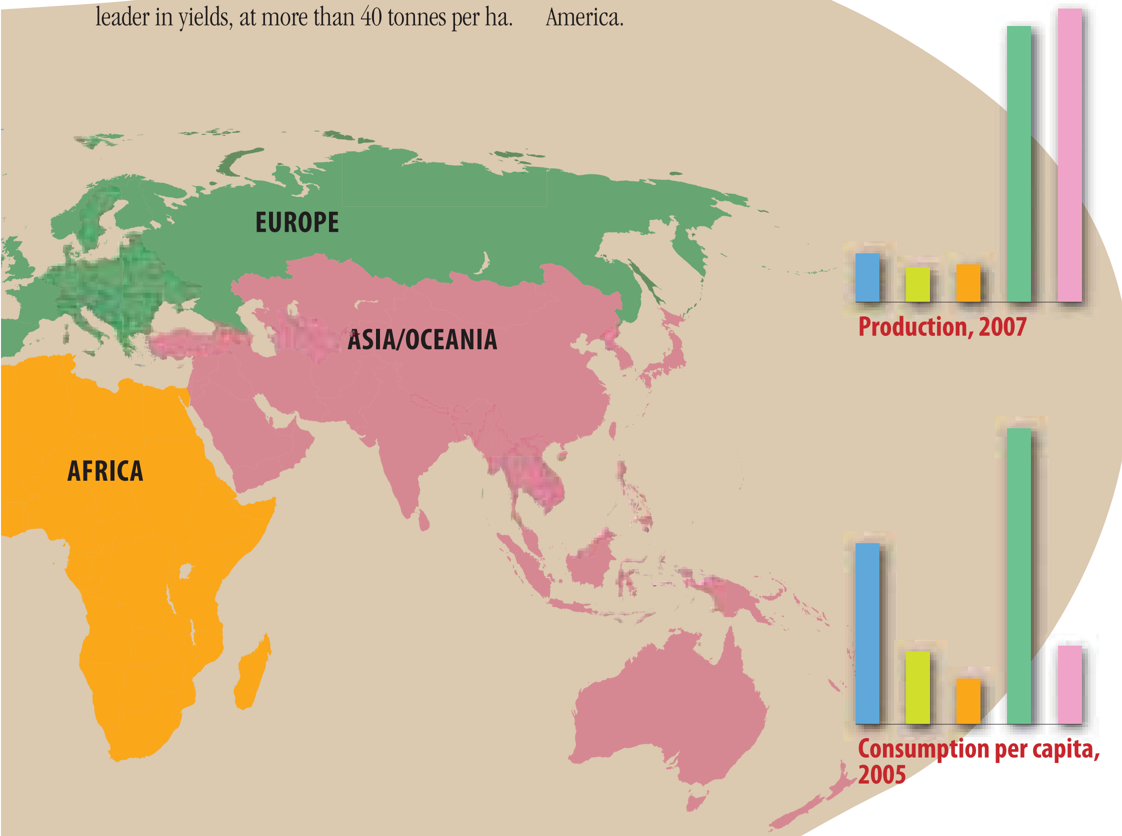
Source: FAOSTAT

Production concentration

Asia and Europe are the world's major potato producing regions, accounting for more than 80 percent of world production in 2007. While 2007 potato harvests in Africa and Latin America were far smaller, production was at or near record levels. North America was the clear leader in yields, at more than 40 tonnes per ha.

Consumption

Asia consumes almost half of the world's potato supply, but its huge population means that consumption was a modest 24 kg per person in 2005. The heartiest potato eaters are Europeans, while per capita consumption is lowest, but increasing, in Africa and Latin America.



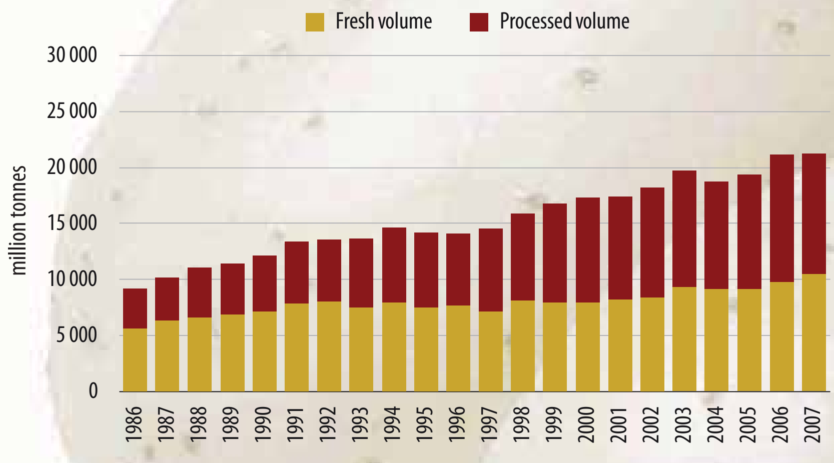
Trade

International trade in potatoes and potato products remains thin relative to production. Only 6 percent of output (21 million tonnes) is traded, although trade has more than doubled in volume since the mid-1980s. This growth has been due to unprecedented international demand for processed foods, particularly frozen and dehydrated potato products.

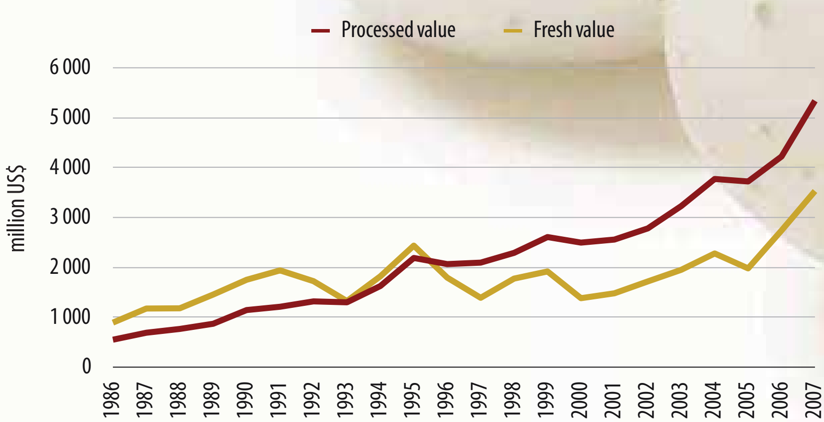
In contrast, international potato trade has almost quadrupled in value since the mid-1980s. Global transactions are worth close to US$96 billion, again dominated by processed potato products.

To date, developing countries have not been beneficiaries of this trade expansion. As a group, they have emerged as leading net importers of the commodity.

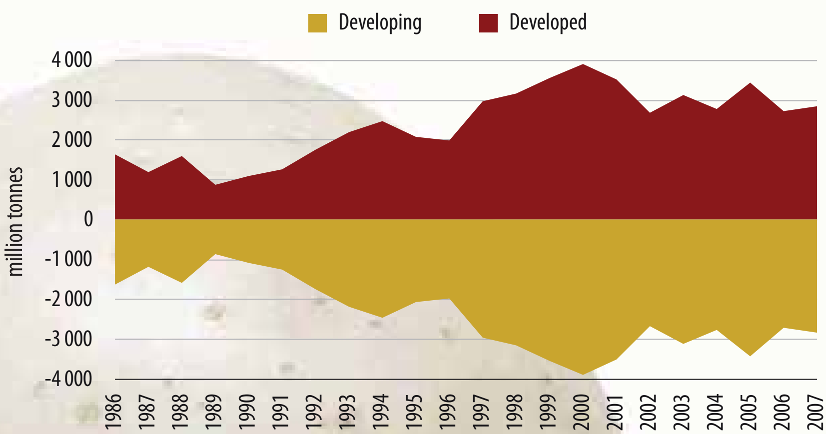
Global potato trade volume (tuber equivalent) 1986-2007



Global potato trade volume (tuber equivalent) 1986-2007



Global net trade (tuber equivalent) 1986-2007



Trade issues

Most countries use *ad valorem* import tariffs to protect domestic potato markets. They also restrict access to markets through sanitary and phytosanitary measures and technical barriers to trade.

Import tariffs on potatoes and potato products are applied by most countries. The binding rates agreed under the aegis of the World Trade Organization vary considerably. Potato provides a classic example of "tariff escalation", whereby importing countries protect processing industries by levying higher duties on processed products than on raw material. Tariff escalation prevents countries from diversifying their export base into higher-value processed products, keeping them "trapped" as providers of raw material.

Countries wishing to supply potato commodities to the international market – especially to the more lucrative developed country markets – also face considerable hurdles in the form of food health standards and technical regulations.

The Doha Development Round of World Trade Organization (WTO) negotiations recognizes the negative impacts of tariff escalation. It includes important provisions aimed at ensuring that standards and regulations do not become *de facto* barriers to trade or hidden protectionist policies, and that they put public health concerns foremost.

Unfortunately, negotiations pertaining to the Doha agenda have suffered a series of setbacks and, in 2009, almost a decade after its inception, the prospect of a binding agreement remained bleak. The most significant differences were between developed countries and developing countries but there was also contention against and between the EU and US over their use of agricultural subsidies that are perceived as trade barriers.

WTO bound tariff (%)

Product	*Trade-weighted average*	*Maximum*
Fresh potatoes (inc. seed)	29	378
Frozen potatoes	16	414
Potato flour	38	446
Potato starch	109	550

The importance of potato in developing country food systems

Potato and food security

Many of the poorest producers in developing countries and most undernourished households depend on potatoes as primary or secondary sources of food and nutrition. The crop produces large quantities of dietary energy and has relatively stable yields under conditions in which other crops may fail.

Potato crops are suited to places where land is limited and labour is abundant, which characterizes many of the poorest developing countries. Potato crops are also highly adaptable to a wide variety of farming systems. Their short and highly flexible vegetative cycle, which brings yields within 100 days, fits well with double cropping and intercropping systems. In addition, potatoes are ecologically adaptable. They can be grown at almost any altitude or climate, ranging from the barren highlands of the Andes Mountains to the tropical lowlands of Africa and Asia.

Importantly, potatoes produce more nutritious food more quickly, on less land and in harsher climates than most other major crops. Up to 85 percent of the plant is edible human food, compared with around 50 percent for cereals.

Beyond food security . . .

Potato cropping is rapidly becoming a valuable source of cash income, as potatoes are increasingly used by the food processing sector to meet the increasing demand of the fast food, snack and convenience food industries. The increased demand for processed products is itself a result of growing urban populations, rising incomes, diversification of diets and the substantial time required to prepare the fresh tuber for consumption.

The structural transformation of rural-based economies into more urbanized societies has opened new market opportunities to participants in the potato value chain. Such opportunities can both increase incomes and create employment in the sector.

Overcoming value chain challenges

Key challenges

Potato's adaptability opens it to a range of specific uses. However, it also has potential to play a broad role in developing country food systems. This requires establishing an efficient value chain, but first the following key challenges must be overcome.

- **Market integration.** Owing to institutional constraints, farmers in developing countries typically are not innovative when it comes to marketing their products. In the poorest countries, potatoes are usually marketed through fragmented chains that lack coordination and information exchanges, giving rise to high supply risks and high transactions costs.
- **Production initiatives.** Average yields remain far too low for small-scale potato producers to produce marketable surpluses. Thus, sufficient quantities of quality seed are essential to meet the needs of potato growers, processors and traders. For farmers to capitalize on the potential gains from using quality seed will require improvements in technology, irrigation, fertilizer use, storage facilities, transport and infrastructure.
- **Producer groups.** With few buyers relative to sellers, the farmgate price of potato is often based on very limited negotiation. Smallholder farmers often do not have the market savvy or access to market information needed to negotiate appropriate prices with buyers. Unfair pricing as a result of uneven bargaining power can lead

to producers failing to respond to market incentives, and can stifle farmers' drives to invest in increased productivity. This makes the formation of producer groups to share expertise and to strengthen bargaining power within the chain essential.

- **Public and private support.** Agriculture policies and resources have traditionally focused on cash crops for export and on cereals, leaving potato and other root crops at the periphery. Readdressing this imbalance – with policy-makers providing more support – and seeking substantial levels of public and private investment is critical if the potato sector is to thrive. Such investment would include breeding programmes, infrastructural improvements and commercialization initiatives that are all geared towards strengthening the value chain.

Key beneficiaries

Developing efficient potato value chains and increasing potato production would have huge potential benefits for developing countries.

- **Countries with low dietary diversity and high dependency on cereal imports**
  Taking the lead from cassava, governments have recently launched initiatives to reduce costly wheat imports by encouraging the consumption of bread that is made of wheat and potato flour, such as the *papapan* that is produced in Peru.
- **Countries with low dietary diversity and high export**
  During the 2007–2008 food crisis, when commodity prices spiked, several rice-producing countries imposed export bans on rice in order to protect against food shortages and to shield their economies from domestic food price inflation. However, their actions only served to exacerbate global rice price inflation.

When consumers can rely on a broad base of staples in their national food baskets, external changes in commodity prices do not have such impact on the food security in either cereal importing or exporting countries.

Food security and profit maximization

The challenge going forward will be to provide the necessary incentives to sustain potato production in an increasingly volatile world, without thwarting drives for greater cost efficiency and productivity. A boom followed by a bust in cereal prices could easily undermine investments in potato sectors, if consumers revert back to purchasing inexpensive, subsidized imported cereals. A volatile macro-economic environment could also have negative repercussions. For instance, the retrenchment in bank lending that was witnessed in the financial crisis of 2008–2009 undermined efforts to commercialize the sector and improve the value chain.

As producers, farmers, of course, seek to maximize their profits. However, from a welfare perspective, profit maximization is not necessarily compatible with food security maximization, since profit-seeking behaviour does not guarantee food availability at an affordable price. An investment in potato cultivation can be considered insurance against international market turbulence and, more so, a food security safeguard.

The world's population is expected to grow by a third over the next 30 years. More than 95 percent of that increase will be concentrated in developing countries, where pressure on land and water is already intense. With such strain on the world's resources, it is plausible that crises and price spikes will always be around the corner. With the international community faced with ensuring food security for present and future generations, it is critical to recognize the important role that potato can play in efforts to meet those challenges.