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FOCUS 12

BUILDING ON SUCCESSSES IN AFRICAN AGRICULTURE

EDITED BY
STEVEN HAGGBLADE

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Introduction

Much of the news concerning the state of agriculture in Africa is discouraging, but there are seeds of hope. Some exciting efforts of African farmers and researchers in the past decade or so have significantly raised agricultural productivity in certain countries and for certain products. These cases may serve as models for future efforts, but only if development policymakers and practitioners understand the processes that produced them and the key ingredients in their success. To give these episodes greater attention and to help disseminate the lessons they can teach, IFPRI and several partners initiated a project to identify and understand recent successes in African agriculture.

The culmination of this project was a December 2003 conference in Pretoria, South Africa, at which Capacity Building International, Germany (InWEnt), the New Partnership for Africa's Development (NEPAD), IFPRI, and the Technical Center for Agricultural and Rural Cooperation (CTA) assembled a group of agricultural specialists from government and the private sector, as well as representatives of ministries of finance and trade, from across Africa. In all, 70 distinguished practitioners and policymakers gathered to evaluate case studies of past successes, evaluate them in light of changing global and domestic conditions, and draw out the central lessons for improving agricultural performance in the future.

This series of briefs describes some of the main cases studied and the conclusions drawn. It is our hope that the findings presented here will serve as building blocks for a vibrant agricultural sector that will raise living standards for Africa's millions of poor farmers.

We are grateful to Peter Hazell, who provided overall guidance for the project on African successes, to Steven Haggblade, who compiled this series of briefs describing the important precedents for future successes in African agriculture, and to the contributors. Their work is crucial, for Africa cannot reduce poverty and eradicate food insecurity without a strong and growing agricultural sector.

Joachim von Braun
Director General

Rajul Pandya-Lorch
Head, 2020 Vision Initiative

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BUILDING ON SUCCESSES IN AFRICAN AGRICULTURE

African Agriculture: Past Performance, Future Imperatives

STEVEN HAGGLADE, PETER HAZELL, INGRID KIRSTEN, AND RICHARD MKANDAWIRE

FOCUS 12 • BRIEF 1 OF 10 • APRIL 2004

Agricultural growth will prove essential for improving the welfare of the vast majority of Africa's poor. Roughly 80 percent of the continent's poor live in rural areas, and even those who do not will depend heavily on increasing agricultural productivity to lift them out of poverty. Seventy percent of all Africans—and nearly 90 percent of the poor—work primarily in agriculture. As consumers, all of Africa's poor—both urban and rural—count heavily on the efficiency of the continent's farmers. Farm productivity and production costs largely determine the prices of basic foodstuffs, which account for 60–70 percent of total consumption expenditures by low-income groups. Consequently, significant reductions in poverty will hinge in large part on the collective ability of African farmers, governments, and agricultural specialists to stimulate and sustain broad-based agricultural growth.

Given Africa's high population growth rate, its farmers and agricultural policymakers will face the most difficult challenge of any developing region until its demographic transition is complete. Africa has contended with population growth rates of 2.7 percent per year over the past 40 years, compared with 2 percent in developing Asia and 2.2 percent in Latin America. For this reason, in recent decades the numbers of malnourished and poor people have risen more rapidly in Africa than in any other region. In the face of current demographic trends, Africa will simply have to run faster than the rest of the developing world to keep up with its growing population.

It is difficult to imagine how significant poverty reduction in Africa can occur without a vibrant agricultural sector that provides income, employment, and affordably priced staple foods. Only rising agricultural productivity can simultaneously reduce food prices, which govern real incomes and poverty in urban areas, and increase the incomes of the 70 percent of Africans who work in agriculture. Agricultural growth provides a central thrust around which the battle against African poverty must be waged.

PAST PERFORMANCE: THE LONG VIEW

Agricultural production across the continent has changed considerably since the beginning of domesticated agriculture in Africa 7,000 years ago. Today, African farm households plant more than half of all cropped area in imported plant species, principally maize, cassava, groundnuts, bananas, cocoa, potatoes, sweet potatoes, tea, and imported varieties of cotton and rice. These imported species currently account for more than two-thirds of the value of Africa's gross agricultural output. Even more striking, the continent's 600 million head of livestock and 700 million head of poultry descend almost exclusively from imported species, with the lone exception of the guinea fowl. Despite a virtual absence of indige-

nous domesticable livestock species and a limited range of indigenous plants, African farmers have built up diverse agricultural systems based largely on imported plant and animal species. This transformation has taken place in spite of the formidable ecological constraints imposed by Africa's old and weathered soils, limited irrigation potential, and debilitating endemic diseases such as malaria, tapeworm, yellow fever, and trypanosomiasis, which has severely limited livestock rearing, animal traction, and mixed cropping in the tropical zones.

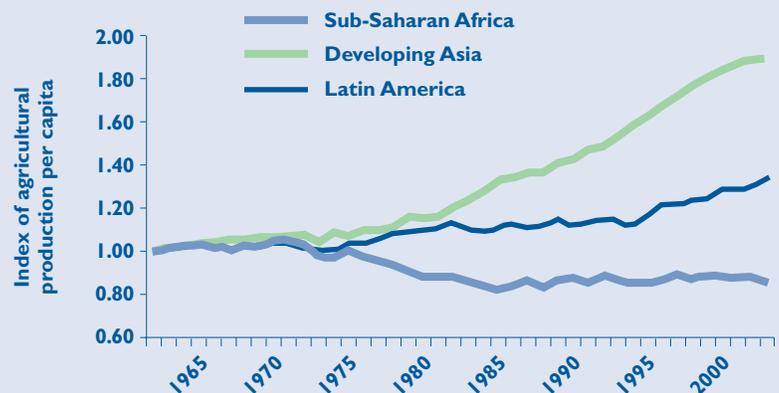
The first half of the 20th century brought with it profound changes in smallholder agriculture across Africa. Migrant farmers spread cocoa across much of West Africa, while other farmers gradually introduced cassava to replace cocoyams, with the aid of rural artisans who developed processing equipment. Maize, cassava, and sweet potatoes gradually replaced sorghum and millet, leading to productivity gains across much of Africa. Tree crops and growing population pressure led farmers to abandon shifting cultivation. Outside the endemic trypanosomiasis zones of Central Africa, ox plowing took root among many small farmers and commercial settler farmers.

THE LAST HALF CENTURY

During the second half of the century, aggregate agricultural performance has remained positive, though progress in Africa has lagged behind that achieved in other developing regions. Over the past 40 years, the value of aggregate agricultural output has increased by 2.5 percent per year in Africa compared with 2.9 percent in Latin America and 3.5 percent in developing Asia.

In spite of their considerable achievements, the efforts of African farmers and agricultural policymakers have failed to

Trends in agricultural production per capita by region, 1961–2002



SOURCE: FAOSTAT.

match the historically unprecedented demographic challenge they face. Comparisons of per capita production performance across continents over the past 40 years reveal a deterioration in agricultural performance in Africa alone (see figure).

In addition, Africa's share of world agricultural exports has fallen from 8 percent to 2 percent over the past 40 years. Over the same period, Africa has fallen from the ranks of net food exporters to become a net importer of food. Given that Africa must grow faster than the rest of the world just to keep up with its increasing population, it remains true that the many individual successes achieved over the past half century have simply not been sufficient in number or scale.

Equally worrisome are signs of decapitalization of Africa's key agricultural resources: its soils, human talent, and support institutions. Nearly half of Africa's farmland suffers from erosion and nutrient depletion. Nutrient balance studies suggest annual losses of 22 kilograms (kg) of nitrogen, 2.5 kg of phosphorus, and 15 kg of potassium per hectare over the past 30 years, a nutrient loss valued at US\$1–US\$3 billion per year. HIV/AIDS, with more than 70 percent of known cases worldwide concentrated in Africa, has likewise taken a heavy toll on Africa human strength and capital. One study has estimated that 50 percent of agricultural extension staff time in Africa is lost to HIV/AIDS.

Ministries of finance must routinely cope with enormous debt loads, narrow tax bases, and donor-imposed pressures for social spending that leave little room for maneuver or debate over the relative role of productive investments in agriculture. In this environment, public spending on agricultural research fell from 0.8 percent of agricultural gross domestic product (GDP) in 1981 to 0.3 percent in 1991. And over the past 20 years, overall public spending on agriculture has fallen from 7.5 percent to 6 percent of agricultural GDP. Eroding civil service salaries and anemic recurrent budgets have demobilized extension and research staff, demotivated them, and fueled an exodus of top scientists and staff from key ministry positions. These worrisome trends place Africa's natural, human, and institutional capital under pressure.

SCATTERED SUCCESSES

African farmers and agricultural policymakers have achieved a series of significant successes in agricultural development, although these successes are still inadequate in number and scale to counter Sub-Saharan Africa's daunting demographic challenge. Focused efforts have led to sustained gains in specific commodities and countries. Malian cotton production has

grown at 9 percent per year for the past 40 years, while small-holder dairy production in Kenya represents the fastest-growing source of farm income, benefiting more than half a million farm households, which each earn more than US\$300 annually on average from dairying. Other broad efforts have proven more generally applicable. Farmers and researchers have launched hundreds of innovative soil and water conservation initiatives in a wide variety of locations to contend with declining soil fertility and declining fertilizer subsidies. Work by cassava scientists across Africa has countered deadly disease and pest attacks and converted these threats into opportunities for significant subsequent rapid production growth, benefiting tens of millions of small farmers and making that crop one of the continent's most powerful poverty fighters to date.

LEARNING FROM PAST SUCCESSES

Though inadequate in scale and scope to outrun Africa's daunting demographics, these successes offer potentially important lessons for replicating and scaling up successful efforts more frequently in the future. Determined to learn from past successes, a group of agencies—the International Food Policy Research Institute (IFPRI), the International Water Management Institute (IWMI), the New Partnership for Africa's Development (NEPAD), and others—has commissioned investigations of successful episodes in African agriculture. These reviews aim to answer key questions about how to translate lessons from past successes into improved performance in the future.

What common ingredients and processes underlie these earlier successes? How can policymakers translate these lessons into improved performance going forward? By examining instances in which important advances have occurred in the past in African agriculture, IFPRI, NEPAD, and colleagues aim to identify promising avenues for achieving similar success in the future. The following briefs offer highlights of some of these important accomplishments and lessons learned from past successes in African agriculture. Collectively, they aim to identify key ingredients necessary for building on these individual cases and expanding them into broad-based agricultural growth. ■

For further reading see S. Haggblade, P. Hazell, I. Kirsten, and R. Mkandawire, "African Agriculture: Past Performance and Future Imperatives," Background Paper No. 2 presented at the conference "Successes in African Agriculture: Building for the Future," Pretoria, South Africa, December 1–3, 2003, and the numerous references cited therein.

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BUILDING ON SUCCESSES IN AFRICAN AGRICULTURE

Generalizing from Past Successes

STEVEN HAGGBLADE

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FOCUS 12 • BRIEF 2 OF 10 • APRIL 2004

IDENTIFYING SUCCESSES

Past successes in African agriculture can point the way to promising avenues for achieving similar success in the future. Drawing lessons from past success requires identifying a range of successful and less successful episodes and then studying and comparing them. To identify a broad range of successful episodes in African agriculture, our analytical team launched an expert survey, polling more than 1,000 African agriculture specialists. In conducting this review, we defined “success” as: *a significant, durable change in agriculture resulting in an increase in agriculturally derived aggregate income, together with reduced poverty and/or improved environmental quality.* From the responses, we, together with our advisory group, selected a dozen successful episodes for in-depth review and dispatched case study teams to investigate them. Although these episodes differ widely in terms of instigators of change, points of intervention, levels of subsidy involved, food and export crops, regional diversity, duration, and scale achieved (see table), they suggest ways in which past successes can be replicated and scaled up.

KEY POLICY LEVERS

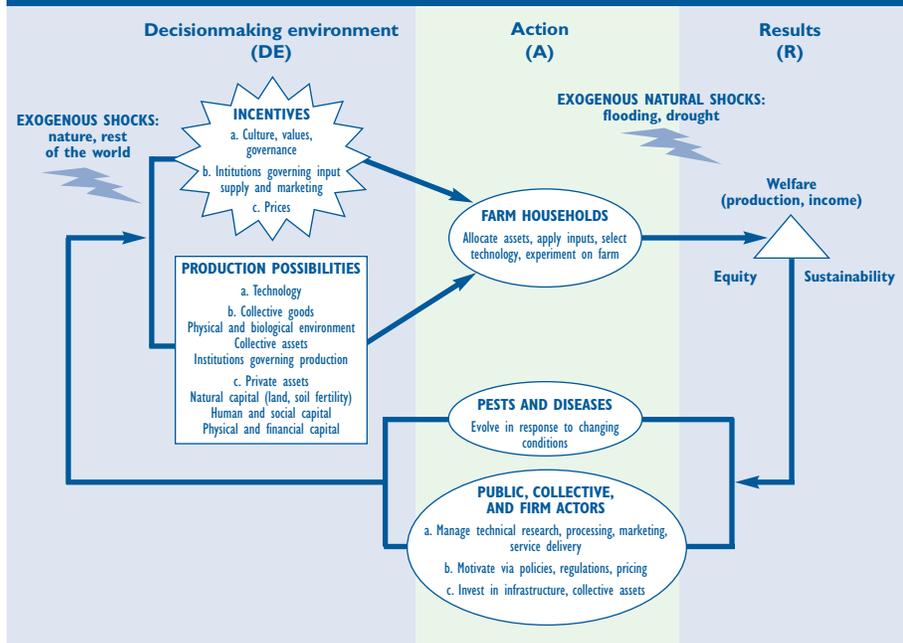
Our goal is to learn from what has gone right in the past. To do so, our case study teams adopted an analytical framework, placing farmer decisionmaking at its core (see figure next page). In this inherently dynamic system, two key structural features of the agricultural system govern farmers’ responses at any given point in time. First, production possibilities place initial bounds on the scope of action available to farmers. These possibilities depend on the stock of available biological and agronomic technology; on the state of physical infrastructure; on supporting institutions for resource management, input supply, and production; and on the available quantity, productivity, and distribution of key productive assets such as land, labor, capital, and water. Second, from within the available opportunity sets, prevailing incentive structures subsequently determine which of the many available options farmers, marketing agents, collective institutions, and public agencies will select. Market prices affect input supply as well as production, storage, processing, and marketing of outputs while incentives such as enhanced food security, social solidarity, or risk reduction influence individual and household decisionmaking.

Case Study Summaries

CHARACTERISTICS	REGION	WHO INITIATED CHANGE?		WHAT INTERVENTIONS TRIGGERED CHANGE?					WERE LARGE RECURRENT PUBLIC SUBSIDIES INVOLVED IN SUSTAINING SMALLHOLDER GROWTH?		
		KEY INVESTIGATORS	SUPPORTING ACTORS	EXPANDED PRODUCTION POSSIBILITIES		IMPROVED INCENTIVES		MARKET OUTLETS			
				Technology	Investments in asset base	Political lobbying	Market institutions				
Maize	East and Southern Africa	<ul style="list-style-type: none"> Commercial farmers Government breeders Government policy makers Parastatal marketing companies 	<ul style="list-style-type: none"> Private seed companies 	■		■	■	■	Domestic	Yes	
Cotton	West Africa	<ul style="list-style-type: none"> Donor and national governments Parastatal marketing companies 	<ul style="list-style-type: none"> Farmer organizations 	●	△	△	■	■	Export	Yes	
Cassava	West Africa	<ul style="list-style-type: none"> IITA NARS Rural artisans 	<ul style="list-style-type: none"> Private oil companies NGOs 	■				●	Domestic	No	
Cassava	Southern Africa	<ul style="list-style-type: none"> NARS IITA 	<ul style="list-style-type: none"> NGOs 	■				●	Domestic	No	
Horticulture	Kenya, Ivory Coast	<ul style="list-style-type: none"> Private traders 		△				●	■	Export	No
Dairy	Kenya	<ul style="list-style-type: none"> Commercial farmers Government policymakers Parastatals 		■	●	■	■	●	Domestic	Yes	
SUSTAINABLE NATURAL RESOURCE MANAGEMENT	Planting basins	Burkina Faso, Zambia	<ul style="list-style-type: none"> Private farmers 	<ul style="list-style-type: none"> Government extension NGOs Private cotton company 	■	■		△		Domestic	No
	Improved fallows	Kenya, Zambia	<ul style="list-style-type: none"> ICRAF 	<ul style="list-style-type: none"> Farmer researchers NGOs Government extension 	■	■		△		Domestic	No

- critical interventions
- important activities
- △ supporting activities

The dynamics of agricultural change: The DE-A-R framework



In the future, African farmers must perform better than they have in the past. Since most governments left state and collective farms behind in the 1960s, governments and their partners no longer make production decisions directly. Instead, they must influence farmer behavior. As the figure indicates, they can do so in one of two ways. First, they can expand farmers' production possibilities—through research and improved technology, provision of collective goods and institutions governing production, and assistance to farmers in improving their asset base. Second, policymakers can alter the incentives facing farmers, thus inducing them to behave differently within the production possibilities available to them. Levers available for initiating change thus fall into these two categories: those affecting production possibilities (technology, natural resources) and those influencing farmer incentives (macroeconomic and trade policy, price policy, subsidy levels).

REPLICATING AND SCALING UP

In some instances, technologies transfer directly from one location to another. SR-52, the breakthrough hybrid maize first released by the Southern Rhodesian agricultural service in 1961, spread rapidly in Zimbabwe and also to neighboring Malawi and Zambia, where it remains important today in breeding lines.

Yet in most instances technologies prove location-specific. Cassava varieties developed by the International Institute of Tropical Agriculture (IITA), for example, have not fared well when imported directly into Zambia because of different

altitude, temperature, soils, and rainfall. Many varieties of hybrid maize from temperate zones will not flower in equatorial regions because differences in daylight hours trigger tasseling. Pests, soils, and the policy environment vary across locations, making direct technology transplants uncertain. Research conducted by the World Agroforestry Centre (ICRAF) on improved fallows, which use nitrogen-fixing shrubs to rapidly rejuvenate depleted soils, clearly demonstrates the need for location-specific adaptive research.

In most cases the processes of change may prove more replicable than the individual technologies themselves. Therefore, it becomes important to pay particular attention to how the process of change unfolds in each instance. What institutions, investments, and interactions have proven key to enabling success? The remaining briefs in this series summarize the case studies, review changes in the international, national, and donor environments, and offer conclusions about how policymakers and their partners can improve agricultural performance going forward.

The challenge for the future is to build on these individual, often episodic, commodity- and activity-specific successes and translate them into sustained, systemwide improvements in agricultural performance. The partners involved in this review are committed to promoting the investments, policy environments, and partnerships necessary to replicate and scale up successful technologies and processes that can help accelerate growth in African agriculture. The stakes are high. Poverty reduction in Africa will simply not occur without a vibrant agricultural sector providing income, employment, and affordably priced staple foods. ■

For further reading see E. Gabre-Madhin and S. Haggblade, "Successes in African Agriculture: Results of an Expert Survey," Background Paper No. 1 presented at the conference "Successes in African Agriculture: Building for the Future," Pretoria, South Africa, December 1–3, 2003; International Food Policy Research Institute, "Analyzing Successes in African Agriculture: The DE-A-R Framework," Background Paper No. 18 presented at the conference "Successes in African Agriculture: Building for the Future;" S. Haggblade, "Generalizing and Building on Past Success," Background Paper No. 14 presented at the conference "Successes in African Agriculture: Building for the Future," New Partnership for Africa's Development (NEPAD), Comprehensive Africa Agriculture Development Programme

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Cassava serves as a staple food for 200 million Africans, second only to maize in its calorie contribution. In response to a series of devastating attacks by cassava diseases and pests over the past several decades, the International Institute of Tropical Agriculture (IITA) and several national agricultural research services have launched successful cassava research programs. Together, they have fended off a series of mosaic virus mutations as well as a devastating invasion of the cassava mealybug from South America, using biological control with an imported predator wasp. Since both diseases and pests spread across individual farmer fields as well as national boundaries, their prevention and cure constitute classic public goods. Close collaboration by international and national researchers has achieved impressive results in responding to these repeated threats.

Breeding programs sustained during the ensuing noncrisis periods have yielded a rich harvest of new varieties, the Tropical Manioc Selection (TMS) varieties. Bred for disease resistance, high yield, early bulking, and root shapes that will accommodate mechanical processing, the TMS varieties have routinely generated substantial yield gains. Diffusion of these varieties has spurred the private sector to develop simple mechanical processing technologies that greatly reduce processing labor. As a result of these new production and processing technologies, production has grown rapidly in many parts of Africa. In the process, Nigeria has replaced Brazil as the world's leading cassava producer.

Because cassava is vegetatively propagated, it requires no purchased inputs and thus remains accessible to even the poorest small farmer. Since it can be planted throughout the rainy season and harvested over a period of up to 18 months, it offers important flexibility in the timing of labor inputs and harvesting. This flexibility makes cassava particularly attractive to labor-deficit and HIV/AIDS households.

Sustained production gains bring with them falling consumer prices, as recent data over the past two decades from Nigeria attest. Benefiting small farmers as well as poor urban consumers, Africa's cassava transformation has arguably proven to be its most powerful poverty fighter to date.

IMPACT

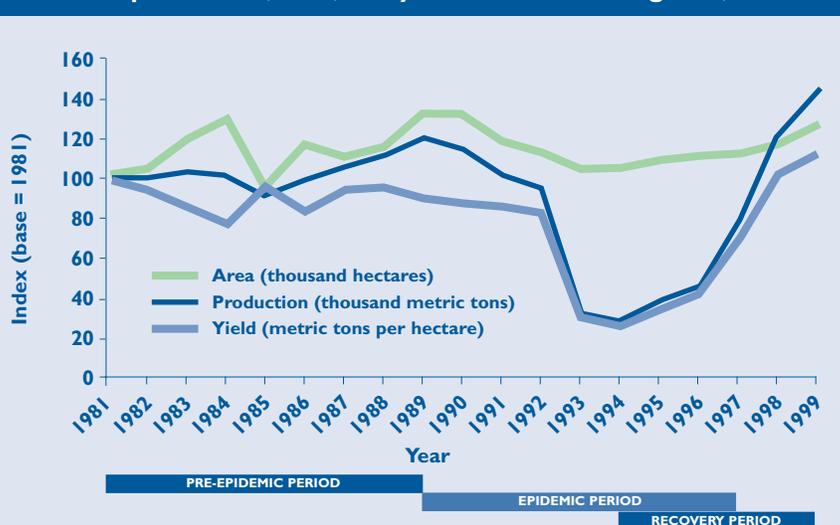
- **Production.** In a series of crisis situations, release of new cassava varieties has reversed production declines of 20 percent to 80 percent. Most recently in Uganda during the early 1990s, a virulent new mutation of the mosaic virus

disease destroyed 80 percent of Uganda's cassava crop within six years. Rapid import of resistant varieties from IITA enabled the Ugandans to restore production to trend levels within five years (see figure). In noncrisis situations, the new TMS varieties achieve on-farm yield gains of 40 percent, even without fertilizer. Together with mechanized processing technology, the new cassava technology produces returns to land 20 times greater than those achieved with local varieties and manual processing.

- **Equity.** In countries such as Malawi and Zambia, where cassava remains primarily a food security crop for human food consumption, smallholders and poor people depend more on cassava than do large farmers. In places like Nigeria, where cassava has become primarily a commercial crop, small farmers continue to grow cassava, although large farmers produce the bulk of the commercial crop. In these settings, poor urban consumers become the principal beneficiaries of the cassava booms and the resulting declines in the relative price of cassava.

- **Sustainability.** Cassava proves financially profitable for smallholders in a wide variety of settings. It requires no purchased inputs. Its flexible planting and harvesting calendar enables households to fit in labor requirements around other obligations, making cassava one of the easiest crops for labor-constrained HIV/AIDS households to grow. Initial evidence from Zambia suggests that HIV/AIDS prevalence makes a small but statistically significant contribution to area expansion of cassava among affected households. Long-term trials suggest that cassava can maintain steady yields over 30 years on the same plot without fertilizer.

Trends in production, area, and yield of cassava in Uganda, 1981–99



SOURCE: University of Greenwich, "An Application Nominating the National Agricultural Research Organization of Uganda (NARO) for the King Baudouin International Development Prize." January 19, 2000.

DRIVERS OF CHANGE

• **Improved varieties.** A stream of new TMS varieties has powered cassava production growth over the past 25 years. With yields 40–100 percent higher than local varieties, earlier bulking, disease resistance, and roots shaped to facilitate mechanical processing, the TMS varieties have dramatically improved the profitability of cassava production in Africa. Initial research at the IITA in Nigeria has provided new genetic material to national research programs across Africa and stimulated production surges across a broad swath of the continent

• **Biological control of mealybug.** In the early 1970s the accidental introduction of the cassava mealybug from South America resulted in crop losses of up to 80 percent, as the mealybug literally ate its way across Africa. After identifying a predator wasp, also from South America, international research centers, African research services, and donors launched a mass rearing and distribution program that led to the biological control of the mealybug threat by 1988. These efforts saved cassava production worth more than US\$2.2 billion at a program cost of US\$15 million, resulting in an eye-popping benefit-cost ratio of 149.

• **Development of mechanical processing technologies.** As TMS varieties increase on-farm yields, they likewise increase labor requirements for harvesting and processing. In response to growing labor shortages in Nigeria, local artisans have developed a wide array of simple mechanical processing technologies that reduce labor requirements and facilitate the commercial production of cassava and prepared cassava-based convenience foods, such as gari, a fermented, precooked cassava flour used widely to prepare porridge.

• **Policy reforms.** Macroeconomic and sectoral policy reforms triggered substantial increases in cassava production. In Nigeria an overvalued exchange rate, coupled with food subsidies for imported rice, stymied the expansion of TMS cassava varieties during the early years of their release in the late 1970s. A decade later, after petroleum revenues dried up and government was forced to devalue the naira and suspend its subsidies on imported foods, adoption of TMS cassava varieties surged. Similarly, policy reform proved instrumental to cassava expansion in Malawi and Zambia. In these two countries, heavy maize subsidies through the 1980s artificially inflated profitability and area planted to maize. When governments withdrew these unsustainable subsidies in the early 1990s, cassava production surged in both countries as farmers substituted cassava for maize. In both cases, the emergence of a level playing field has favored rapid expansion of cassava production and area.

• **Drought.** In Southern Africa recurrent droughts during the 1990s favored policymakers' and farmers' interest in cassava,

just as the new TMS varieties were coming onstream. The epidemic outbreak of HIV/AIDS in the region may have contributed as well, as a diminished rural labor supply induces a move to flexible, labor-saving, low-input crops like cassava.

KEY LESSONS FOR BUILDING FUTURE SUCCESSES

• **Long-term sustained research.** The cassava mosaic virus continues to mutate, and new pests will undoubtedly emerge as they have in the past. Africa's cassava research establishment cannot rest on its laurels. Sustained scientific capacity will remain instrumental for ensuring effective crisis response as well as ongoing productivity gains.

• **Multiplication and distribution of improved cuttings.** Multiplication and distribution of improved cuttings requires coordinated public support in the early years of any new variety release. Because cassava farmers clone new crops with cuttings from their prior season's crop, private seed companies have no financial incentive to distribute cassava cuttings.

• **Mechanical processing and production.** Cassava marketing and processing will need to improve dramatically if the highly perishable fresh cassava crop is to continue to grow rapidly. Hence drying and processing become central to any strategy for expanded marketing of cassava. Southern, Central, and East Africans can learn from the cassava mechanization and processing technology that has been developed over many decades in West Africa.

• **Regional cooperation.** Africa's experiences with cassava illustrate the considerable benefits accruing to regional research collaboration. Over the past three decades, the sharing of genetic material—primarily from IITA to national programs, but also between countries—has proven critical in responding to crises and sustaining ongoing yield gains. For contiguous small countries sharing common agroecological zones, the benefits of collaboration have been evident in the numerous successful cassava varietal exchanges over the past decades. The repeated rapid spread of disease and pests across national boundaries has instilled a recognition of the value and even the necessity of continued regional collaboration. ■

For further reading see F. I. Nweke, D. S. C. Spencer, and J. K. Lynam, *The Cassava Transformation: Africa's Best-Kept Secret* (East Lansing, MI: Michigan State University Press, 2002); S. Haggblade and B. Zulu, "The Cassava Surge in Zambia and Malawi," Background Paper No. 9 for the conference "Successes in African Agriculture: Building for the Future," Pretoria, South Africa, December 1–3, 2003; F. Nweke, "New Challenges in the Cassava Transformation in Nigeria and Ghana," Environment and Production Technology Division Discussion Paper No. 118 (Washington, DC: International Food Policy Research Institute, 2003).

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BUILDING ON SUCCESSES IN AFRICAN AGRICULTURE

Maize Breeding in East and Southern Africa, 1900–2000

MELINDA SMALE AND T. S. JAYNE

FOCUS 12 • BRIEF 4 OF 10 • APRIL 2004

During the first half of the 20th century, African farmers transformed maize from a minor imported foodcrop into the continent's principal staple food. In the second half of the century, newly independent governments launched support programs that greatly expanded smallholder production, leading to substantial production surges of 10 to 20 years in duration. Today, after widespread adoption by both commercial farmers and smallholders, farmers now plant 58 percent of all maize area in East and Southern Africa to new high-yielding varieties, which on average outyield traditional varieties by 40–50 percent even without fertilizer.

The sustained domestic breeding programs that underpin this transformation represent impressive technical and political commitments. In 1960 Zimbabwe (then Southern Rhodesia) released its famous SR-52, the first commercially grown single-cross maize hybrid in the world.

Though these maize-breeding efforts were an undeniable technical success, broader efforts to support national production growth proved fiscally unsustainable, and once heavy subsidies were withdrawn, production fell (see table). This qualified success story reveals important lessons about both the strengths and pitfalls of past agricultural development efforts in Africa.

DRIVERS OF CHANGE

- **Commercial farmer lobby.** During the 1920s and 1930s settler commercial farmers in Kenya, Zimbabwe, and Zambia successfully lobbied colonial legislatures for government assistance and protection from both world markets and smallholder competitors. Catalyzed by slumping world agricultural markets during the worldwide depression of the 1930s, the colonial governments created parastatal crop-buying stations in European farming areas, offering prices that were typically far above export parity prices. These crop-buying stations and associated price supports were not scaled up to serve smallholder farmers until the post-independence years. In addition, at the urging of the commercial maize farmers, governments established publicly funded maize research programs in 1932 in Zimbabwe and in 1955 in Kenya.

- **Breeding breakthroughs by national research programs.** Investments by colonial governments in maize research radically transformed opportunities for maize farmers in Kenya and Zimbabwe. Zimbabwe's maize breeding program, initiated in 1932, was the first outside of the United States to produce double-cross hybrids for commercial use, releasing Southern Rhodesia-I (SR-I) in 1949. During the 1960s both the Kenyan and Zimbabwean breeding programs launched a stream of highly productive conventional and nonconventional hybrids that fueled steady yield and output gains. From the mid-1970s the Zambian program released an array of hybrids and improved

open-pollinated varieties. Some of these, along with the leading hybrids released in Malawi in the early 1990s, were relatively well suited to production by smallholders who process and consume their grain on farm and replant saved seeds.

- **Collateral support for smallholders.** At independence, governments in the region expanded the input and marketing support institutions to serve smallholders as well. The expansion of state marketing infrastructure in smallholder areas allowed state agencies to disburse subsidized inputs on credit to smallholders and to recoup loans through farmer sales to the marketing boards. In addition to these direct subsidies, an expanded network of cooperative marketing depots reduced the transport costs that farmers incurred in selling maize in remote areas. Pan-territorial pricing brought smallholders in remote areas into production for the state and shifted production patterns toward maize self-sufficiency at the expense of other crops. At the same time most governments subsidized the retail price of industrial maize meal to consumers, thereby raising the demand for domestic production under a policy of maize self-sufficiency. These systems were not effective, however, in recouping credit. By 1990, for instance, 80 percent of Zimbabwe's smallholder farmers receiving maize inputs on loan were in arrears. Inability to recoup loan losses contributed to the financial drain on the state marketing systems that later exposed them to pressure for reform.

WHY DID THE PRODUCTION SURGES STALL?

- **Unsustainable financial subsidies withdrawn.** State subsidies on inputs, producer prices, and consumer prices, combined with limited recovery of input loans, exacerbated fiscal crises in Kenya, Malawi, Zambia, and Zimbabwe. Because governments could not afford to sustain these operations indefinitely, they were forced to scale down their public support and subsidy levels during the 1990s. As input costs rose and state buying stations were withdrawn, farmer incentives collapsed and production fell, particularly in the more remote areas.

- **National research systems atrophy.** Public funding for maize research fell in the 1980s and 1990s. The scientific and institutional cooperation that created the maize success story of earlier decades collapsed as governments prioritized other expenditures. The number of new variety releases stalled, as funding dried up and key personnel vacated the research systems.

- **Drought, poverty, and erratic crisis management policies.** Spotty rainfall in the 1990s contributed to erratic, crisis-motivated food and agricultural management policies, including greater reliance on food aid and a patchwork of often poorly coordinated operations by nongovernmental organizations (NGOs) and donors.

IMPACT

• **Production.** Today, farmers in East and Southern Africa plant 58 percent of maize area in improved varieties. A large part of the 40 percent yield gain currently experienced over local varieties can be attributed to improved hybrid cultivars, although extension messages, improved management practices, and the input and marketing subsidies fueling intensification of fertilizer use are also responsible for the yield gains.

• **Equity.** During the post-independence period of rapid smallholder production growth, nearly all small farmers in Zimbabwe used improved varieties, while 87 percent did so in Kenya, 65 percent in Zambia, and 43 percent in Malawi.

• **Sustainability.** The highly subsidized input supply and marketing systems proved financially unsustainable, accounting for as much as 5 percent of gross domestic product (GDP) in Kenya and Zambia. Following withdrawal of these subsidies, the artificially inflated production booms of the prior period led to output contractions of 10–20 percent in the cases of Kenya, Zambia, and Zimbabwe (see table). Ecologically, poor soil fertility management under continuous fertilized maize production has led to soil acidification, fertility loss, and plow and hoe pan buildup in some locations.

KEY LESSONS FOR BUILDING FUTURE SUCCESSES

• **Sustained investments in agricultural research.** Seed genetic change is a necessary but not a sufficient condition for improving the welfare of African smallholders. Maize successes in the future will continue to depend not only on strategic breeding improvements to relieve specific environmental and disease problems and enhance the stability of net returns to farmers, but also on enabling these advances to release land for alternative uses and diversify the income sources for farmers, regions, and nations. Continued development of improved seeds and seed markets and a realistic understanding of farmers' needs remain critical. Patience and the commitment to steady funding are crucial. Lead times for plant breeding average roughly a decade, while new livestock technologies may demand 15 to 20 years. Long-term commitment to agricultural research remains essential.

• **Financially viable input and credit delivery systems for smallholders.** In the past decade necessary investments in germplasm research have declined and investments in institutions that can translate germplasm advances into improved income, including seed and grain markets, have faltered. The public investments in state-controlled, coordinated input and output markets were not fiscally sustainable. In many instances, the cost of generating additional maize in remote areas exceeded the value of the output. The policy focus on maize also directed public resources to maize production in areas where farmers may have been better off with a different set of crop

production and marketing investments. The current environment, however, is characterized by great policy instability. On the one hand there is ostensible commitment to a more market-oriented input and commodity pricing and distribution system. In Kenya, Malawi, Zambia, and Zimbabwe, however, the state retains a major presence in maize marketing and stockholding. Government programs distributing subsidized inputs in Malawi, Zambia, and Zimbabwe continue to cause uncertainty in input markets and limit the incentives for private actors to invest more aggressively. As a result, rural input and credit markets remain highly fragmented. In the future, governments and their partners must ensure policy stability and find financially sustainable models for delivering inputs and credit to smallholders.

• **Political pressure and responsiveness.** Can a local constituency be formed to successfully stake a claim on public resources over the long run to support agricultural research, marketing institutions, and other kinds of growth-promoting public goods? The experiences with maize in the four case study countries underscore the strong connection between agricultural development and governance. The early success of the maize industry in Kenya and Zimbabwe can be attributed largely to the strength of the institutions built by settler farmers, which provided a constituency to encourage sustained public and private support for the sector. Today farm lobbies are uniformly weaker and smallholder farmers continue to be poorly represented in the political process. A crucial issue is how the key growth- and equity-promoting investments in agricultural research, infrastructure, and market institutions can be financed. Perhaps most important, from where will the domestic political pressure for these public investments come? ■

Maize production growth (compound annual growth rates)

COUNTRY	BOOM PERIOD		PERIOD OF UNCERTAINTY	
	Years	Growth (%)	Years	Growth (%)
Kenya	1965–80	3.3	1990–2000	-1.5
Malawi	1983–93	3.1	1994–2000	4.4
Zambia	1970–89	1.9	1990–2000	-2.4
Zimbabwe	1980–89	1.8	1990–2000	-0.2

For further reading see M. Smale and T. S. Jayne, “Maize in Eastern and Southern Africa: Seeds of Success in Retrospect,” Environment and Production Technology Division Discussion Paper No. 97 (Washington, DC: International Food Policy Research Institute, 2002); C. Eicher, “Zimbabwe’s Maize-Based Green Revolution: Preconditions for Replication,” *World Development* 23, no. 5 (1995): 805–818.

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BUILDING ON SUCCESSES IN AFRICAN AGRICULTURE

Mali's White Revolution: Smallholder Cotton from 1960 to 2003

JAMES TEFFT

FOCUS 12 • BRIEF 5 OF 10 • APRIL 2004

One of the pillars of rural development in francophone Africa, the cotton sector serves as a principal motor of economic development, generating benefits to farmers, rural communities, private traders, cotton companies, and national governments. Grown in rotation with coarse grains under rainfed conditions, the cotton sector in Mali has historically been managed by vertically integrated, state-supported cotton companies. With a guaranteed price and market for seed cotton, access to inputs and equipment on credit, and improved varieties developed by the cotton-supported regional research system, cotton households have traditionally been the most prosperous in rural Mali. Currently 30 percent of Malian households cultivate cotton. Their cotton profits have enabled them to build up their agricultural assets, particularly oxen and plows, making them likewise the nation's most productive cereal producers. Cotton is Mali's number two export and foreign exchange earner (after gold), and it contributes 15 percent of total government revenues and 8 percent of gross domestic product (GDP). Government and farmers alike consider cotton a strategic industry.

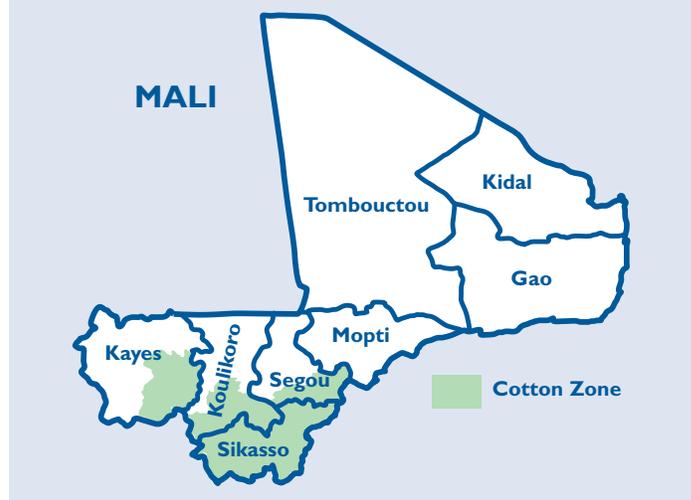
IMPACT

- **Production.** Cotton production has grown at a compound annual growth rate of more than 9 percent for the past 40 years (Figure 1). Currently, 30 percent of Mali's households grow cotton.

- **Equity.** Most smallholders in Mali's cotton zones (Figure 2) grow cotton. They earn higher incomes and invest more in agriculture than smallholders in other zones. These additional resources enable cotton farmers to produce up to 70 percent more cereals per capita than non-cotton farmers.

- **Sustainability.** The vertically integrated, state-owned

Figure 2—Cotton-producing zones of Mali

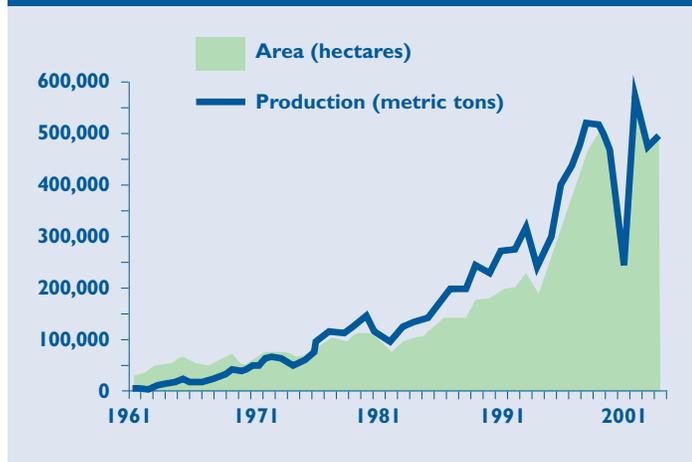


CMDT (Compagnie Malienne pour le Développement des Fibres Textiles) that supports Malian cotton farmers has attempted to stabilize farmer prices and, to some extent, insulate them from world price fluctuations. In recent years the CMDT has provided a recurrent subsidy of about US\$0.025 per pound (6 percent of world price), far lower than the US\$0.235 per pound subsidy received by U.S. cotton farmers. Difficulties encountered in maintaining corporate governance and controlling cost inflation over the past five years have contributed to an erosion of farmers' confidence in the CMDT as well as the overall competitiveness of cotton production in Mali. These problems have contributed to debate over the most effective type of institutional structures needed to achieve sector objectives. Environmentally, questions also have arisen about soil fertility management and possible soil mining in some locations. The growing resistance to pesticides and need for more concentrated, costlier formulations to reverse declining yield trends will need to be balanced with the growing concerns over their negative effects on human health.

DRIVERS OF CHANGE

- **Vertically integrated support for smallholders.** The CMDT supplies inputs, extension support, and a guaranteed market for smallholder cotton production in Mali. The integrated approach used across the CFA franc zone begins with a regional varietal breeding and agronomic research program that links Mali's Rural Economy Institute in a network of CFA franc zone countries harmonized by France's Centre de coopération internationale en recherche agronomique pour le développement (CIRAD). In addition to supplying inputs (seeds, fertilizer,

Figure 1—Cotton area and production: 1960–2003



and pesticides) on credit and facilitating the acquisition of animal traction equipment, the CMDT uses an extensive network of field agents to closely monitor all phases of production. A monopolist, the CMDT guarantees the purchase of farmers' seed cotton at panterritorial prices (announced before planting) and assures credit reimbursement. It controls collection, ginning, baling, and export.

• **Devaluation.** During the early 1990s, throughout West Africa's CFA franc zone, the guaranteed exchange rate pegged to the French franc led to steady overvaluation of the CFA franc and consequent erosion of farmgate cotton prices. The devaluation of 1994 led to a 40 percent increase in real farmgate prices, a doubling of area planted, and a subsequent twofold rise in seed cotton production over the next five years, returning production to its historic upward trend (Figure 1).

KEY LESSONS FOR BUILDING FUTURE SUCCESSES

• **Vertical models of smallholder support.** The Malian cotton model exemplifies the common vertical support system for smallholder agriculture, in which a single entity supplies inputs (usually on credit) in return for guaranteed marketing of the output, from which input costs can be deducted. Though historically a public sector model in Mali, private companies elsewhere have adopted the same outgrower systems for cotton and other export crops. Questions about the inefficiency and high cost of Mali's public sector model have led to recent, highly contentious debates about possible privatization of the system in Mali and elsewhere in francophone Africa. The vertical model offers one of the very few available for providing sustainable input credits to smallholders. It addresses the issues of aggregation and organization, thereby helping smallholders gain access to international markets. Yet the model fails in the case of domestic foodcrops, and it depends critically on some form of farmer organization, competition among buyers, or countervailing political power to ensure that farmers get fair treatment from large exporters.

• **Farmer organization.** The rise of the cotton producers' union (Syndicat des Producteurs de Coton et Vivriers, SYCOV) has helped to broker fairer negotiations between farmers and the CMDT, providing small farmers with a collective means of expressing their views. In 1974 the CMDT established Associations Villageoises (AV)—village-based farmer organizations—to deal with farmer complaints of unfair cotton grading and weighing practices. Growing farmer involvement in managing village-level cotton activities (inputs, seed cotton assembly) laid the groundwork for greater farmer participation in the operational management of the sector (such as farmer representatives being signatory to performance contracts with the government and CMDT). These experiences, combined with the opportunities created by the grassroots democracy wave in the early 1990s, contributed to the creation of the farmer's union (SYCOV) in 1991.

• **Farm subsidies in countries of the Organization for Economic Cooperation and Development (OECD).** Heavy

subsidies to cotton farmers in the United States currently depress world prices by about US\$0.11 per pound. If these subsidies were removed and the price increase transmitted to Malian farmers, the typical farm would increase earnings by 30 percent. In this case, trade reform by the OECD would prove more powerful than aid in improving African farmer welfare. But without the additional investment and institutional evolution that lead to improvement in productivity at all stages of the supply chain, Malian cotton will continue to be vulnerable to competitive pressures and world market price fluctuations.

• **Soil fertility management.** Over the past 40 years, two-thirds of Mali's cotton production growth has come from area expansion and the remaining one-third from increasing yield. The past pattern of extensification, in which farmers reduce fallow periods and apply insufficient quantities of organic fertilizers, has contributed to declining soil fertility. As area expansion becomes increasingly infeasible, in Mali as elsewhere in Africa, increasing attention will need to be devoted to maintaining soil fertility.

• **Benefits of regional collaboration.** In both research and marketing, Mali has benefited from collaboration with regional cotton networks that have achieved important scale economies for many small countries in the region. In cotton breeding, Mali's national agricultural research program at the Institut d'Economie Rurale (IER) is linked to a regional network of other West and Central African breeding programs managed by CIRAD that facilitates cross-country exchange of new varieties. In fact, only one of the six major cotton varieties grown in Mali during the past 40 years was originally developed by Mali's national research system. In marketing as well, the CMDT benefits from regional cooperation through its continued close association with Dagrís, formerly known as the Compagnie Française de Développement des Textiles (CFDT), which managed Mali's cotton sector until 1974 and still retains 40 percent ownership in the CMDT. Dagrís not only provides technical expertise for the Malian ginning operations, but also markets the bulk of Mali's cotton through its marketing arm, COPACO. CMDT can thus develop a market identity for Malian cotton while at the same time benefiting from economies of scale that would not otherwise be possible for a single small country. Given obvious spillovers of agroclimatic zones across contiguous African countries, this model of regional collaboration in research and marketing illustrates key benefits that could be applied to many other agricultural commodities—bananas, cassava, maize, beans, and livestock, for example. ■

For further reading see J. Bingen, "Prospects for Development and Democracy in West Africa: Agrarian Politics in Mali," in *Democracy and Development in Mali*, edited by J. Bingen, D. Robinson, and J. M. Staatz (East Lansing, MI, USA: Michigan State University Press, 2000); J. Tefft, "Mali's White Revolution: Smallholder Cotton from 1960 to 2003," Background Paper No. 4 for the conference "Successes in African Agriculture: Building for the Future," Pretoria, South Africa, December 1–3, 2003.

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Dairy production in Kenya has grown at 2.8 percent per year over the past two decades, resulting in per capita production levels double those found anywhere else on the continent. Kenya's commercial farmers laid the foundation for this growth. They introduced improved dairy breeds in the early 1900s, and by the 1930s they had successfully lobbied for a range of government financial and policy support, including quarantine laws, veterinary laboratories, artificial insemination services, and marketing and price controls managed through the Kenya Cooperative Creameries.

Subsequent smallholder growth began slowly in the 1950s and 1960s, spurred by rapidly growing cash incomes in rural areas, which stimulated steadily rising demand for milk.

Following the adoption of the Swynnerton Plan for encouraging smallholder production in agriculture, the Kenyan government and donors financed a series of promotional projects supplying veterinary and artificial insemination services, extension support for an intensive zero-grazing production package, and support for cooperative development. Decontrol of milk pricing in 1992 led to a restructuring of production and retailing, resulting in a growing share of raw milk in total sales and greatly improved milk availability in retail outlets.

Smallholders have captured a steadily rising share of that market. Recent panel data show that by the year 2000 nearly 70 percent of Kenyan smallholders produced milk and that it had become their fastest-growing income source.

IMPACT

- **Production.** More than 600,000 small farmers raise dairy cows in Kenya, generating per capita milk production double that found in the rest of Africa (see table). Among the small farmers who produce milk, annual net earnings from milk average US\$370 per year.

- **Equity.** Smallholders operating between one and three dairy cows produce 80 percent of Kenya's milk. The poorest quintile of small farmers earns 48 percent of its income from milk sales, whereas the richest quintile earns 28 percent from milk. In spite of decades of formal sector marketing support, informally marketed raw milk accounts for more than 75 percent of marketed sales.

- **Sustainability.** Dairy production remains highly profitable for smallholders. Although recent liberalization has reduced recurrent input subsidies for artificial insemination and veterinary services, market liberalization has simultaneously raised the output prices smallholders receive. The net effect has been to increase smallholder profitability by more than 100 percent. Ecologically, smallholders operate a range of intensification technologies, from purely range-fed systems to zero-grazing, stall-fed regimes. In the intensive systems, they recycle manure and fodder between crop and livestock enterprises.

DRIVERS OF CHANGE

- **Improved breeds.** Widespread introduction of highly productive breeds of dairy cows, or grade cattle, has been the major source of increased productivity in Kenyan dairying. Provision of efficient and affordable reproductive services has therefore remained a central pillar of the country's dairy development strategy. In the early decades following independence, from 1964 to 1987, government heavily subsidized artificial insemination services. Though expensive, this strategy did result in widespread adoption of improved breeds. Today in

Contrasting dairy sectors in Kenya, Ethiopia, and Uganda

INDICATOR	KENYA		ETHIOPIA		UGANDA	
	1985	1998	1985	1998	1985	1998
Total milk availability per capita (kg/yr)	83.3	85.1	25.6	20.1	25.6	24.2
Total milk availability (thousands of metric tons)	1,656	2,421	1,125	1,170	377	485
% of imports in total milk availability	2.8	0.1	19.7	0.9	6	2
Per capita net imports (kg)	2.4	0.1	5	0.2	1.5	0.5
Total cattle (thousands)	12,727	13,418	28,000	34,514	5,064	5,438
Milking cows (thousands)	3,209	4,494	3,567	4,507	1,013	1,358
% of milking cows	25	33	13	13	20	25
Total cow's milk produced (thousands of metric tons)	1,484	2,277	683	941	355	475
Yield (kg/cow)	462	507	192	209	350	350

Kenya improved dairy cattle account for 23 percent of the total cattle population and 75 percent of all specialized dairy cattle in Eastern and Southern Africa. In contrast, improved breeds account for only 3 percent of dairy cattle in Uganda and less than 1 percent of total cattle in Ethiopia.

• **Heavily subsidized public support services.** In addition to 80 percent subsidy rates on artificial insemination services, the Kenyan government supplied veterinary services and medicines at nominal charges at more than 280 clinical centers across the country. From 1988 on, government gradually withdrew these subsidies to encourage privatization of veterinary services.

• **Tight market control followed by market liberalization.** From its creation in 1931 until 1992, the Kenya Cooperative Creameries (KCC) tightly controlled milk marketing through a tiered system of quotas and statutorily controlled prices. All other licensed milk processors were denied the right to procure raw milk supplies directly from farmers. Instead, they were required to place an application with the KCC. The government formally declared raw milk sales illegal in urban areas until their decriminalization in 1992. Since liberalization, raw milk sales have flourished, and they continue to dominate milk markets in Kenya. For smallholders, the most important practical effect of liberalization was to introduce competition in milk procurement. Producer prices received by farmers for their milk have nearly doubled since liberalization.

KEY LESSONS FOR BUILDING FUTURE SUCCESSES

• **Time and experience are key.** Kenya has enjoyed 100 years of experience with exotic breeds of dairy cattle, while surrounding countries such as Ethiopia and Uganda have not. The resulting accessibility of improved cross-breeds, well-established artificial insemination and veterinary services, and marketing infrastructure offer an important springboard on which smallholder farmers have been able to build. Other countries without this historic endowment of dairying expertise and facilities will likely face longer lead times in expanding smallholder dairy production.

• **Input services are crucial but expensive.** Artificial insemination, veterinary, and disease control services have been crucial ingredients in raising productivity of the Kenyan dairy herd. For two and a half decades, from independence through the late 1980s, smallholders received a subsidy of up to 80 percent on artificial insemination and veterinary services. The gradual withdrawal of these unsustainable subsidies from 1988 onward has led to a shrinking of public services and rapid but

geographically uneven growth of private services. In areas that are considered easy to serve, privatization has tended to flourish. Because of this market “skimming,” while smallholders in high-density dairy zones have access to the more expensive private services, smallholders elsewhere do not. Since veterinary services, particularly those related to disease control, constitute public goods, even cash-strapped governments will need to identify ways of maintaining effective disease control while keeping down costs.

• **Raw milk markets merit greater attention.** Most promotional resources, in Kenya and elsewhere, have been channeled into promotion of formal milk markets. Yet in Kenya, as elsewhere, raw milk dominates the market, accounting for more than 75 percent of total sales. Given the prevalence of raw milk in total marketed supplies, attempts to facilitate development of this market will merit increasing public attention on efficiency, equity, and public health grounds.

• **The short-term priority is market access for smallholders.** The immediate focus of a strategy to promote market-oriented dairying must be to improve market access for smallholders. One way to do this is to reduce smallholders’ travel time to a milk sale point. This step releases time, allowing the household to give more time to other farming activities.

• **The long-term priority is improving herd productivity.** In the longer term, the challenge is to enhance the productivity of smallholders’ dairy herds. Meeting this goal entails a three-part strategy: (1) enhancing the dairy herd’s milk production traits; (2) enhancing the smallholder’s ability to realize the breed’s potential through advice and training on better herd management practices; and (3) optimizing the herd’s potential by providing adequate feed in terms of both quality and quantity. ■

For further reading see M. A. M. Ahmed, S. Ehui, and Y. Asefa, “Dairy Development in Ethiopia,” Environment and Production Technology Division Working Paper No. 119 (Washington, DC: International Food Policy Research Institute, 2003); M. Ngigi, “Successes in African Agriculture: The Case of Smallholder Dairying in Eastern Africa,” Environment and Production Technology Division Working Paper No. 118 (Washington, DC: International Food Policy Research Institute, 2003); S. J. Staal, G. A. Waithaka, G. A. Owour, and M. Herrero, “Demand and Supply Changes in the Livestock Sector and Their Impact on Smallholders: The Case of Dairy in Kenya” (Nairobi: International Livestock Research Institute, 2002).

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BUILDING ON SUCCESSES IN AFRICAN AGRICULTURE

Are Kenya's Horticultural Exports a Replicable Success Story?

NICHOLAS MINOT AND MARGARET NGIGI

FOCUS 12 • BRIEF 7 OF 10 • APRIL 2004

Kenyan horticultural exports have grown at over 6 percent per year for the past 30 years. Since 1974 the value of Kenya's horticultural exports has increased fourfold in constant dollar terms, reaching US\$167 million in 2000 (see figure). As a result, horticulture has become the third largest source of foreign exchange after tourism and tea. More than 25,000 small farmers participate in the sector, accounting for over half of Kenyan horticultural exports.

Driven largely by private traders responding to international market opportunities, the growth of the Kenyan fruit and vegetable sector has not been a smooth, continuous process. Rather, the sector has expanded in fits and starts, with numerous changes in the commodity mix and types of marketing institutions. Over time, fruit and vegetable exports have become steadily more diversified. The importance of canned pineapple fell dramatically during the 1990s, owing in part to pressure from Thailand and other exporters and in part to the expansion in fresh fruit and vegetable exports over this period. Although French beans, Asian vegetables, canned pineapple, and avocados dominate Kenya's exports, Kenyan traders now exports 30 different fruits and 27 vegetables. In spite of increased competition from Cameroon, Côte d'Ivoire, Morocco, South Africa, and Zimbabwe, Kenya continues to be the most important supplier of vegetables to the European Union. The flexibility and responsiveness of Kenya's private traders have sustained this steady upward momentum.

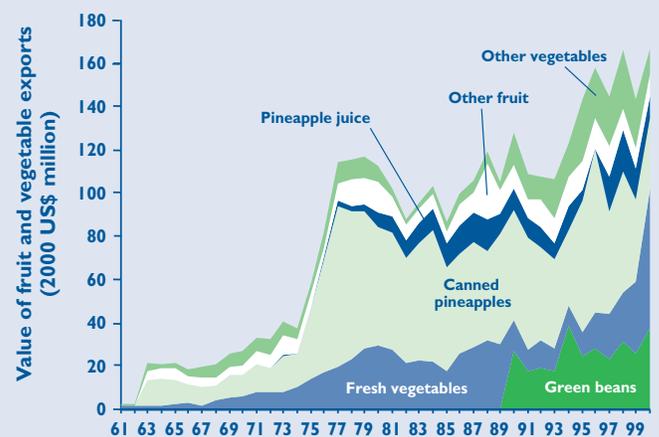
IMPACT

• **Production and incomes.** The real value of fruit and vegetable exports has quadrupled over the past 30 years. Given the high value of these crops, returns per hectare exceed those from maize by a factor of 6 to 20. Though riskier than staple food crops and available only to farmers within close proximity to major transportation arteries, fruit and vegetable production for export remains a highly lucrative farming enterprise.

• **Equity.** To ensure consistent quality and timely supply, many exporters have developed contract-farming arrangements with smallholders, who supply about half of all fruit and vegetables for export.

• **Sustainability.** The financial viability of export horticulture remains well established. No recurrent subsidies have underpinned this rapid growth. In the future, increasingly concentrated buying power from large European supermarket chains, along with their increasing concern over convenience and food safety, will pose challenges that African exporters must meet. As in the past, continued attention to market dynamics will be crucial in sustaining growth in this sector.

Composition of Kenyan horticultural exports, 1961–2000



SOURCE: FAOSTAT.

DRIVERS OF CHANGE

• **Nimble private traders exploit growing external markets.** Export demand for vegetables grew significantly in the 1970s as an indirect effect of the expulsion of the South Asian community from Uganda under the regime of Idi Amin. Many of these refugees resettled in the United Kingdom, contributing to the growing demand for Asian vegetables. Kenya offered several advantages as a source to meet this growing demand. It could supply Asian vegetables throughout the year instead of on a seasonal basis. Kenyan smallholders already had experience growing Asian vegetables for the local Asian community. And finally, the presence of an Asian community in Kenya meant that there were family and social ties between Asian traders in London and those in Nairobi, reducing the risk and transaction costs in expanding this trade.

• **Tourist industry spinoffs.** Two important spinoffs from Kenya's tourist industry have spurred the growth of export horticulture. First, tourism has dramatically increased access and reduced the cost of airfreight to Europe. By 1980 Kenya was receiving 372,000 international tourists per year, more than any other African country after South Africa. Although canned goods can be transported by ship from Africa to Europe, fresh produce generally must generally be airfreighted. When export volumes were too small to justify a charter cargo jet, the cargo capacity of passenger jets provided a means of airfreighting Kenyan produce to Europe. Later, as volume increased, cargo jets were used more widely. Second, the tourism industry increased local

demand for high-quality fruits and vegetables by hotels and restaurants, giving Kenyan farmers more experience in horticultural production and an outlet for produce not meeting export standards.

• **Stable, supportive policy environment.** Kenya has maintained a stable, liberal macroeconomic policy environment. Government policy has favored foreign investment and international trade. Kenya's Horticultural Crop Development Agency (HCDA) has played a facilitative role, attempting to coordinate various participants in the industry rather than directly intervening as a buyer in the market.

KEY LESSONS FOR BUILDING FUTURE SUCCESSES

• **Stable policy environment.** Political and economic stability matter. Stability provides investors with the confidence that they will be able to reap the benefits of long-term investments. Exchange rate policy is particularly important for horticultural exports. A market exchange rate provides greater incentives to produce exports and facilitates the purchase of imported equipment and inputs for production.

• **Nonintervention.** The tendency of the Kenyan government not to intervene directly in horticultural production and marketing is clearly an approach that can be, and is, emulated by other countries. The fresh fruit and vegetable sector is simply too diverse, too risky, and too fast-changing for state enterprises or marketing boards to play a constructive role. Kenya's earlier experience in promoting joint ventures between foreign companies and state enterprises was almost uniformly unsuccessful and serves as a counterexample. The most successful processed horticulture operation in Kenya has been Del Monte, which did not involve a partnership with a state enterprise.

• **Promoting institutional innovation.** The Kenyan experience demonstrates the importance of allowing a variety of private institutions and marketing arrangements to develop. The early experience of Del Monte in Kenya shows that it takes more than experience and technical skills to survive in horticulture—it takes continual experimentation, innovation, and adaptation to changing environments. The horticultural sector in Kenya is characterized by a wide array of institutional arrangements, including smallholders selling in spot markets, personalized relationships with traders, implicit contracts, explicit contracts, farmer organizations, medium- and large-scale farming, and vertically integrated producer-exporters. The government can play a role in facilitating institutional innovation by providing market information, extension services, mediation of disputes, and the establishment of standards.

• **Linking smallholders to high-value urban and export markets.** Linking small farmers to high-value urban and export markets is an important strategy for raising rural incomes and reducing poverty. Such a strategy may also be critical for maintaining export competitiveness, at least for some labor-intensive crops that require careful husbandry. Government should avoid counterproductive attempts to impose cooperative production, contract farming, nucleus estate production, or any other specific marketing system. Efficient market institutions should evolve out of experiments with different forms. The government can facilitate linkages between farmers and exporters or other buyers by helping to organize farmer groups, establishing ground rules for farmer-buyer contracts, disseminating lessons learned from successful contract schemes, establishing small-claims courts to address contract disputes, gathering and disseminating information about the past performance of buyers and farmers, and providing certification services to reduce the transaction costs faced by buyers trying to purchase from many small farmers.

• **Contract enforcement.** Although disputes in contract farming arrangements will never be avoided completely, the experience of Kenya indicates that the government may have a role in enforcing contracts between buyers and growers, or at least in mediating the disputes between them. Developing new institutional arrangements that would facilitate the enforcement of contracts would contribute significantly to more widespread use of contract farming and would expand the participation of small farmers in high-value horticultural production and export.

• **Investment in irrigation.** In the past 10 years, most of the investment and increases in capacity in Kenyan irrigation have been carried out in the private sector, by large-scale commercial farms and by groups of smallholders. Given the spillover effects associated with irrigation, the government has a role to play in facilitating the formation of water-user groups to regulate water use, organize maintenance, and resolve disputes. In addition, the government can fund research and dissemination activities to stimulate innovation, particularly in micro-irrigation technology. ■

For further reading see S. Jaffee and P. Gordon, *Exporting High-Value Food Commodities: Success Stories from Developing Countries*, World Bank Discussion Paper 198 (Washington, DC: World Bank, 1993); N. Minot and M. Ngigi, "Are Horticultural Exports a Replicable Success Story? Evidence from Kenya and Côte d'Ivoire," Background Paper No. 3 for the conference "Successes in African Agriculture: Building for the Future," Pretoria, South Africa, December 1–3, 2003.

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BUILDING ON SUCCESSES IN AFRICAN AGRICULTURE

Strategies for Sustainable Natural Resource Management

STEVEN FRANZEL, FRANK PLACE, CHRIS REIJ, AND GELSON TEMBO

FOCUS 12 • BRIEF 8 OF 10 • APRIL 2004

Sub-Saharan Africa, with the highest fertility rate in the world, faces increasing demographic pressure on its natural resource base. As a result of rapid population growth and growing land constraints, cultivated land per capita has fallen by 40 percent since 1965, from 0.5 to about 0.3 hectare per person. At the same time, land quality has fallen. Data on nutrient balances over the past 30 years suggest that African soils have sustained annual net losses of nitrogen, phosphorus, and potassium on the order of 22, 2.5, and 15 kilograms (kg) per hectare respectively. This soil mining may contribute from one-third to as much as 80 percent of farm output in some locations. Failure to replenish soil fertility—from organic or inorganic sources—leads to unsustainable output and incomes in agriculture.

Old strategies for coping with these new pressures on the natural resource base are becoming increasingly infeasible. Classic methods of replenishing soil fertility via shifting cultivation and long-term fallows break down as population pressure reduces the interval between fallows as well as their duration. The withdrawal of fertilizer subsidies across much of Africa during the structural adjustment liberalizations of the 1990s and the collapse of rural credit systems have rendered reliance on chemical fertilizers increasingly less profitable and infeasible for farmers.

Consequently, Africa's farmers require new solutions to address the increasing pressure on the continent's soil and water resources. Among hundreds of innovative efforts across the continent, two promising sets of responses have emerged in different locations.

First is the use of planting basins, an approach that has emerged in recent decades in both the Sahel and Zambia. Known as *zai* in the Sahel and as "conservation farming" in Zambia, the systems involve a series of common practices: dry-season land preparation to avoid peak-season labor bottlenecks and ensure timely planting with the first rains; minimum tillage of only 15 percent of surface area using grids of 10,000 to 15,000 small planting basins per hectare, which harvest water and focus nutrients in a small area nearest the plants; breaking of hard crusts and plow pans in soils to enable water and root penetration; and application of organic material and sometimes also small doses of chemical nutrients in the basins immediately adjacent to the plants.

The second strategy involves the use of improved fallows, introduced over the past decade in eastern Zambia and western Kenya. In this strategy farmers introduce rotations of leguminous trees planted for one to three seasons on a given

plot, then cut them down and plant crops on the same plots for two to three seasons. These managed, or "improved," fallows build up soil fertility through crop rotations with nitrogen-fixing trees and retention of organic material from plant leaves and branches. The use of trees rather than smaller leguminous plants helps to penetrate the soil with root channels, which serve as biological plows, facilitating water and root infiltration by subsequent crops.

Both technologies are of recent vintage. Although *zai* have become popular in the Sahel since early 1980s, use of these two approaches elsewhere only emerged a decade or more later. They have attracted widespread interest because of their environmental sustainability, reduced use of purchased inputs, and ability to increase farmer yields and to recapitalize soil fertility.

IMPACT

• **Production.** Under these technologies cereal yields increase substantially—in Burkina Faso and Niger yields of 400–1,200 kg per hectare are obtained on soils that were so degraded that nothing could be produced—though outcomes vary considerably from year to year and location to location. Returns to labor and land typically rise compared with conventional tillage without fertilizer. The basins have attracted between 20,000 and 80,000 adopters in each location, while the more recently introduced improved fallows have attracted 5,000 to 20,000 adopters in each country. As these ranges indicate, adoption estimates remain subject to a wide margin of error, though most indicators suggest a steady increase in numbers over time.

• **Equity.** Both small and larger farmers adopt these technologies. Most adopters are small hand-hoe farmers. The well-off smallholders appear more likely to adopt improved fallows in Zambia, though the poor are using them as much as the wealthy in Kenya. In Burkina Faso, as well, middle-income and rich farmers are most likely *zai* adopters because they have sufficient family labor as well as the ability to hire more for this labor-demanding technology, but poor farmers also adopt the technology. Improved fallows appear to be well suited to female-headed households. In Kenya the proportion of female-headed households using improved fallows is higher than that of male-headed households. In Zambia males use them slightly more than females.

• **Sustainability.** Ecologically, these technologies aim for sustainable intensification of smallholder production. Financially, they appear attractive because of low cash input costs and generally higher returns to land and labor.

DRIVERS OF CHANGE

• **Changing incentives.** Both technologies emerged in response to rapidly changing farmer incentives. Recurrent droughts, during the 1970s in the Sahel and during the 1990s in Southern Africa, have driven interest in water harvesting in both places. Declining fertilizer subsidies and reduced fertilizer availability, which accompanied structural adjustment during the 1990s, substantially diminished farmers' access to fertilizer in Burkina Faso and Zambia and triggered a serious search for alternative methods of soil fertility management.

• **New technologies for soil fertility management.**

Farmer innovation resulted in the development of the planting basin technologies. A handful of smallholders in Burkina Faso is credited with developing and expanding use of *zai* in the Sahel. Similarly, commercial farmers from the Zambia National Farmers Union (ZNFU) launched research and extension of conservation farming technologies for all sizes of farmers. With improved fallows, formal researchers launched the initial innovation but worked closely with farmers who later made significant modifications to the technologies.

• **Extension.** In Burkina Faso individual farmer-innovators launched private extension services themselves by creating farmer groups or organizing an annual fair to exchange experiences. At the same time, soil and water conservation projects organized many study visits for farmers to the Yatenga region in Burkina Faso, where the *zai* are most widely applied. A project-supported study visit in 1989 by farmers from Niger to Burkina Faso led to widespread adoption of the technology in parts of Niger's Tahoua Department. A slightly different sequence emerged in Zambia when the ZNFU launched its Conservation Farming Unit. The unit received early extension support from a private sector cotton company, from selected NGOs, and beginning in 1998, from government extension officers. With the improved fallows, initial extension support came from a variety of NGOs and subsequently from government extension staff.

KEY LESSONS FOR BUILDING FUTURE SUCCESSES

• **New technologies are available for managing soil fertility in Africa.** A wide variety of experimentation is currently underway to develop and extend technologies appropriate for Africa's changing economic and ecological environment. Widely scattered, many of these efforts are small in scale. The four case studies summarized here are among the few that have attempted to carefully measure the increased inputs—of organic matter and labor—required to achieve increases in yield. Given peak season labor constraints in many

smallholder agricultural systems in Africa, additional assessments are required to identify the most promising of these often labor-demanding technologies.

• **Strong extension support, formal and informal, is necessary.** These technologies all involve substantial departures from conventional land management. They demand changes in the timing of key activities and in the flow of inputs and output. The practices do not diffuse from area to area on their own, as new crop varieties often do. Careful extension is therefore necessary to promote widespread adoption. Clustering seems to work well in some cases, as it did with cotton farmers in Zambia and with improved fallows in both study locations. Where extension support has been weak, as with the animal draft variant of conservation farming, adoption and on-farm effectiveness have been low. Farmer study and exchange visits have also played a key role in the rapid spread of these labor-intensive technologies.

• **Farmer involvement is necessary in technology development.** Many of the innovations underway have been developed by farmers themselves. Those developed by the formal research system repeatedly emphasize the importance of close researcher interaction with farmers in the design and testing of new land and water management practices. Because of variable soils and farmer conditions and preferences, a range of technologies and alternatives remains necessary in most locations. The widespread experimentation currently underway suggests active interest in developing such alternatives. ■

For further reading see S. Haggblade and G. Tembo, "Conservation Farming in Zambia," Environment and Production Technology Division Working Paper No. 108 (Washington, DC: International Food Policy Research Institute, 2003); D. Kaboré and C. Reij, "The Emergence and Spreading of an Improved Soil and Water Conservation Practice in Burkina Faso," Environment and Production Technology Division Working Paper No. 116 (Washington, DC: International Food Policy Research Institute, 2003); F. Kwesiga, S. Franzel, P. Mafongoya, O. Ajayi, D. Phiri, R. Katanga, E. Kuntashula, F. Place, and T. Chirwa, "Improved Fallows in Eastern Zambia: History, Farmer Practice, and Impacts," Background Paper No. 12 for the conference on "Successes in African Agriculture: Building for the Future," Pretoria, South Africa, December 1–3, 2003; F. Place, S. Franzel, Q. Noordin, and B. Jama, "Improved Fallows in Kenya: History, Farmer Practice, and Impacts," Environment and Production Technology Division Working Paper No. 115 (Washington, DC: International Food Policy Research Institute, 2003).

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BUILDING ON SUCCESSES IN AFRICAN AGRICULTURE

The Changing Policy Environment Facing African Agriculture

FRANCIS CHIGUNTA, ROSS HERBERT, MICHAEL JOHNSON, AND RICHARD MKANDAWIRE

FOCUS 12 • BRIEF 9 OF 10 • APRIL 2004

Both national and international economic environments have changed substantially in the past decade and a half. As they look to the future, African policymakers will have to apply the lessons of the past in a very different environment.

THE INTERNATIONAL ENVIRONMENT

Global consolidation in food retailing. Since 1990 the relaxation of restrictions on international trade, foreign direct investment, and foreign exchange markets have launched rapid consolidation in food retailing and marketing worldwide. The emergence of majority rule in South Africa led to a suspension of economic sanctions and unleashed a rapid expansion of South African supermarket chains throughout the continent, where they increasingly compete with homegrown and international supermarket chains. In Kenya alone, more than 200 supermarkets now account for up to 30 percent of food retailing in the country. The rapid scaling up of procurement by these large retail outlets radically changes marketing requirements. Large retailers and exporters require high volumes, consistent quality and packaging, and guarantees of food safety and timing of delivery—qualities most smallholders cannot currently meet.

Shifting composition of traded goods. A second striking change in the global environment for agricultural trade is the structural shift in its composition. World trade is no longer dominated by bulk commodities. Processed high-value products (such as meat, beverages, snacks, and bakery products) doubled as a share of world agricultural trade between 1980 and 1998, and trade in fruits and vegetables has also grown rapidly.

Processed products and fruits and vegetables face increasingly stringent scrutiny under international health and food safety regulations. African farmers have had difficulty adjusting to this new environment, and as a consequence Africa has been the only major region to lose market share in world agricultural trade over the past two decades.

Growing regional demand for staples. Often forgotten, yet critical, is the large potential demand for food staples (such as maize, rice, cassava, and legumes) within domestic and regional markets. Currently, the value of staple food consumption exceeds that of export commodities markets by roughly a factor of three. To tap the growing potential of these regional markets will require improvements in regional infrastructure as well as harmonization of trade and marketing institutions.

Advances in science and technology. Yields for Africa's major export crops, coffee and cotton, remain below half those of Asia and Latin America. Clearly the potential exists to rapidly expand yield gains. Conventional breeding will probably continue to improve crop yields, as it has in the past. Biotechnology also has the potential to enhance crop attributes such as insect resistance, herbicide tolerance, drought perseverance, higher yield levels, and improved nutritional qualities. The highly politi-

cized debate on biotechnology poses significant challenges for African policymakers. The key issue is not whether Africa should make use of biotechnology—rather, it is how Africa can take advantage of the benefits derived from biotechnology in a safe, beneficial, and sustainable manner.

Heavy farm subsidies in industrialized countries.

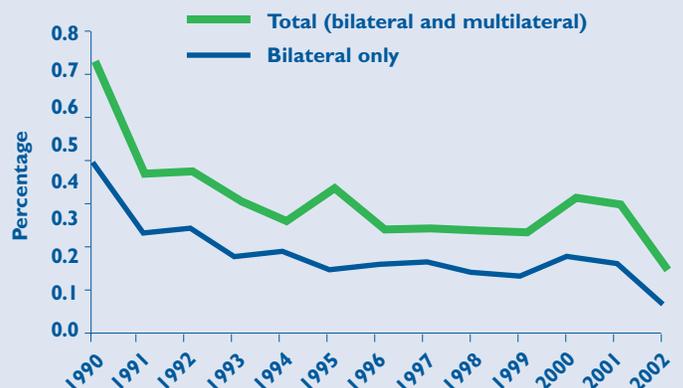
Currently, the rich countries of the Organization for Economic Cooperation and Development (OECD) spend close to US\$1 billion a day on agricultural subsidies, or about US\$300 billion a year. These substantial subsidies artificially boost production and depress world prices. Cotton subsidies, for example, depress world prices by more than 20 percent, thus lowering the income of African farmers. Simulations suggest that overall OECD farm subsidies cost farmers in Sub-Saharan Africa US\$1.8–1.9 billion per year in lost agricultural income.

Falling aid to African agriculture. Aid agencies mandated to assist African farmers deploy only about US\$1 billion per year—roughly half the amount of agricultural income lost because of subsidies. From the late 1980s to the late 1990s, aid flows for African agriculture fell by half, from US\$2 billion to US\$1 billion per year. As a share of OECD farm subsidies, they fell even faster (see figure).

NATIONAL ENVIRONMENTS

Land pressure. Growing population places increasing pressure on Africa's land resources. Across most of Sub-Saharan Africa, the scope for further expansion of cropland has dramatically narrowed. On average, per capita arable land cultivated declined

Total overseas development assistance as a share of OECD spending on agricultural subsidies, 1990-2002



SOURCE: United Nations Millennium Development Goal Database. (<http://millenniumindicators.un.org>); OECD Creditor Reporting Database (www.oecd.org). Note: The total is only for OECD countries that are also development assistance countries.

from 0.5 hectare per person in 1965 to slightly less than 0.3 hectare per person in 1990. In many parts of Sub-Saharan Africa, soil fertility is declining as soils are mined of nutrients that are not replenished. Nearly half of the farmland in Sub-Saharan Africa is affected by soil degradation, and up to 80 percent of its rangeland shows signs of degradation.

Labor constraints. Agricultural productivity per worker in Africa has declined by about 12 percent over the past 20 years. The HIV/AIDS pandemic and low educational levels are adversely affecting the quality of the African labor force. The Food and Agriculture Organization of the United Nations (FAO) predicts that HIV/AIDS could kill an additional 16 million people in the next two decades and reduce the agricultural labor force by as much as 26 percent in 10 of the most affected African countries by 2020. The impact on Africa will be severe, given the dominance of labor-intensive farming systems with low mechanization and low use of modern inputs. AIDS is also killing agricultural specialists and professionals, such as agricultural extension workers.

Changing market structure. Over the past two decades, agricultural markets have witnessed significant transformations throughout most of Sub-Saharan Africa. Governments have withdrawn support for parastatal marketing companies, dramatically reduced input and output marketing subsidies, and relaxed regulatory restrictions on private trade. Yet individual reform efforts have varied widely, with significant slippage in many cases. Though the formerly heavy role of state-subsidized marketing companies has diminished overall, uncertainties remain, making private traders nervous and compromising the development of efficient new postreform marketing systems.

Government capacity and commitment to agriculture. Africa's ministries of finance must routinely cope with enormous debt loads, narrow tax bases, and donor-imposed pressures for social spending—conditions that leave little room for maneuver or debate over the relative role of productive investments in agriculture. As a result, overall funding for agriculture has fallen from 7.5 to 6 percent of agricultural gross domestic product (GDP) over the past 20 years.

Why is it that French, American, and Japanese politicians bend over backward to cater to the needs of their farmers, yet in Africa, where rural votes represent more than two-thirds of the total, governments routinely neglect agriculture? In part, donor dependency in much of Africa has broken the link of responsibility between government and citizen, making it too easy simply to excuse government nonperformance by blaming the weather or lack of donor support. Moreover, African political systems have come to be dominated over time by the concerns of urban dwellers and elites.

Because improving agriculture depends on successful management of so many facets of the economic environment—roads, rails, ports, grain storage, response to drought, education, extension, macroeconomic stability, credit provision and collection, trade facilitation, and agricultural research and development—Africa will not turn the situation around without a major recommitment to effective overall management.

THE CHALLENGE AND THE OPPORTUNITY

Fortunately, African and donor governments have come to realize that they have marginalized agriculture for too long. Through the consultative process of the New Partnership for Africa's Development (NEPAD), the African heads of state have identified agriculture as a priority sector for stimulating economic growth and poverty reduction in Africa. At the African Union Summit in Maputo, Mozambique, in July 2003, the African heads of state and government agreed that African governments should commit themselves to allocate at least 10 percent of their national budgets to agriculture within five years. This goal represents a near doubling from the current average level of 6 percent.

Domestically, NEPAD aims to facilitate policies, strategies, and partnerships that will enhance the performance of agriculture in Africa. Internationally, it will continue to lobby for a more level playing field for African smallholders in international markets while promoting subregional cooperation and market development. Only sustained high-level political support will result in the policy incentives and long-term financial support to agricultural institutions that will, together, prove necessary for accelerating Africa's agricultural growth. ■

For further reading see F. Chigunta, R. Herbert, and R. Mkandawire, "National Environments for Agricultural Policy," Background Paper No. 15 presented at the conference "Successes in African Agriculture: Building for the Future," Pretoria, South Africa, December 1–3, 2003; C. Eicher, "Flashback: Fifty Years of Donor Aid to African Agriculture," Background Paper No. 16 presented at the conference "Successes in African Agriculture: Building for the Future"; P. Hazell, M. Johnson, and A. Temu, "Global Environment for African Agriculture," Background Paper No. 17 presented at the conference "Successes in African Agriculture: Building for the Future."

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BUILDING ON SUCCESSES IN AFRICAN AGRICULTURE

The Pretoria Statement on the Future of African Agriculture

FOCUS 12 • BRIEF 10 OF 10 • APRIL 2004

On December 1–3, 2003, the New Partnership for Africa's Development (NEPAD), Capacity Building International, Germany (InWent), the Technical Center for Agricultural and Rural Cooperation (CTA), and the International Food Policy Research Institute (IFPRI) assembled a group of experienced agricultural, trade, and finance specialists from government and the private sector and from across Africa to help review, summarize, and distill conclusions from the case studies of African successes. Together, these 70 specialists produced a shared statement of findings identifying priorities for future policy action necessary to trigger sustained agricultural growth in Africa. That shared statement, the Pretoria Statement, provides the best available summary of key lessons learned on how to scale up agricultural successes for the future.

PREAMBLE

Significant poverty reduction will not be possible in Africa without rapid agricultural growth. Only improved agricultural productivity can simultaneously improve welfare among the two-thirds of all Africans who work primarily in agriculture as well as the urban poor, who spend over 60 percent of their budget on food staples.

Regrettably, past performance has proven inadequate. Africa remains the only region of the developing world where per capita agricultural production has fallen over the past 40 years. To stem deepening poverty, social inequity, and political instability, African farmers, governments, international partners, and the private sector must all do better in the future. Recognizing this imperative, African Heads of State and Government agreed, at the African Union Summit in July 2003, to make agriculture a top priority and to raise budget allocations for agriculture to a minimum of 10 percent of total public spending within five years.

Africa's sluggish aggregate performance, however, masks a rich historical record of substantial agricultural successes. Though these episodic and scattered booms have proven insufficient to sustain aggregate per capita growth in agriculture, they do prove informative in pointing to promising areas for effective intervention in the future. In a rapidly changing global environment—with increasingly concentrated market power and rapidly

changing biological, information, and communication technologies—and given increased pressures on the natural resource base, public budgets, and the growing threat of HIV/AIDS, governments and their private sector partners must learn to apply the lessons from these past successes.

Evidence from a series of successful episodes in African agriculture suggests two fundamental prerequisites for sustained agricultural growth as well as a number of promising specific opportunities:

FUNDAMENTAL PREREQUISITES

- **Good governance.** High-level political commitment has consistently proven essential to improving the welfare of farm households. It translates directly into favorable policy environments and budget allocations to agricultural support institutions and related infrastructure. Effective farmer organizations remain central to improving the communication and articulation of farm sector needs to government. Both farmers' organizations and governments must take responsibility for initiating overtures and organizational forms to make this possible. We call upon governments to work closely with the private sector, civil society, and farmers' organizations in the allocation of increased public funding to agriculture. In consultation with the private sector, governments should create and facilitate an enabling environment for the private sector to perform.

- **Sustained funding for agricultural research and extension.** Raising productivity remains central to boosting farm output and lowering consumer food prices. Virtually all of the successes we have identified involve some form of improved technology: biological, agronomic, mechanical, or organizational. Therefore, governments must elevate funding for agricultural research and extension. Furthermore, it is important that farmers' innovations be mainstreamed into the research agenda. Governments, together with donors, must ensure the training of staff capable of mastering new biological research technologies. Given the growing role of private research in biotechnology and hybrid breeding, governments must develop partnerships and protocols for making new technologies developed in the private sector available to smallholder farmers.

PROMISING OPPORTUNITIES

• **Soil and water conservation.** We have been impressed with the number and range of innovative efforts by farmers and researchers to sustain soil fertility and water resources in response to increasingly degraded natural environments. Therefore, further testing of these models across national borders merits additional examination and support with the aim of refining and scaling up successes in restoring and sustaining soil fertility. This will require interaction among formal researchers, farmers, and their supporting institutions.

• **Replication of proven commodity-specific breeding and processing successes.** We are impressed with the importance of upscaling cassava breeding and processing research to meet food security, livestock feed, and industrial uses. Strong complementarities across regions suggest that regional cooperation and sharing of biological and mechanical technologies will magnify returns. Tissue-culture bananas and Nerica rice offer further examples of commodity-specific replication potential. NEPAD and leading centers of technology development should take the lead in initiating this exchange.

• **Marketing and information systems.** Mechanisms for aggregating and improving the quality of the products of smallholder farmers and providing relevant and timely market information will enhance market efficiency. This will prove necessary in enabling them to compete in increasingly concentrated domestic, regional, and global markets. A variety of models exist—contract farming among cotton and horticulture producers, dairy marketing groups, and others—for grouping small farmers into economically viable market entities.

• **Vertical supply chains.** To improve efficiency, raise value added in production and processing, and ensure improved coordination between producers and final markets will require increasing attention to supply chain management rather than an exclusively production orientation. Successes in cotton, horticulture, dairy, and maize

all reveal the importance of vertical farmer-to-market coordination.

• **Regional cooperation in trade and agricultural technology.** Regional trade offers significant potential for moderating food insecurity through cross-border exchange. Harmonization of trade regulations on a regional basis will prove necessary to facilitate these commodity flows. In research as well, countries along common agroecological zones mean that regional technology and information exchange offers significant opportunities for sharing research and development overheads, expanding benefits and reducing costs. This cross-border technology exchange has proven vitally important in the cases of cassava, maize, and natural resource management technologies. For this exchange, capacity building is necessary. NEPAD and the regional economic organizations remain uniquely suited to facilitate such exchange.

We believe that with renewed commitment to building partnerships between governments, farmers' organizations, international partners, and the private sector, significant gains are achievable in African agriculture. And achieve them we must, to ensure significant economic growth and poverty reduction in the decades ahead. We call upon the organizers of this conference and all participants to play their rightful role to ensure the realization of these recommendations. ■

Participants of the
International Conference on
Successes in African
Agriculture Building for the
Future

December 3, 2003
Pretoria, South Africa

For further reading see “**Successes in African Agriculture: Building for the Future,**” findings of an international conference, Pretoria, South Africa, December 1–3, 2003, <http://www.ifpri.org/events/conferences/2003/120103/papers/papers.htm>.



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The **Centre technique de coopération agricole et rurale** (Technical Centre for Agricultural and Rural Cooperation, CTA) was established in 1983 under the Lomé Convention between the ACP (African, Caribbean and Pacific) group of states and the European Union member states. Since 2000, CTA has operated within the framework of the ACP-EC Cotonou Agreement. CTA's tasks are to develop and provide services that improve access to information for agricultural and rural development, and to strengthen the capacity of ACP countries to produce, acquire, exchange, and utilize information in this area.

The **International Food Policy Research Institute** (IFPRI), established in 1975, is one of several international research centers supported by the Consultative Group on International Agricultural Research. Its mission is to identify and analyze policies for sustainably meeting the food needs of the developing world. **“A 2020 Vision for Food, Agriculture, and the Environment”** is an initiative of IFPRI to develop a shared vision and consensus for action on how to meet future world food needs while reducing poverty and protecting the environment.

InWEnt—**Internationale Weiterbildung und Entwicklung gemeinnützige GmbH** (Capacity Building International, Germany)—is an organization for international human resources development, advanced training, and dialogue. It was established through a merger of Carl Duisberg Gesellschaft e.V. and the German Foundation for International Development. Its practice-oriented programs, with the underlying goal of worldwide sustainable development, are directed at experts, managers, and decisionmakers from business and industry, politics, public administration, and civil society from all over the world.

The **New Partnership for Africa's Development (NEPAD)** is an initiative by African leaders to promote African renewal by entering into new partnerships with the international community. Its primary objectives are to eradicate poverty; place African countries, both individually and collectively, on a path of sustainable growth and development; halt the marginalization of Africa in the globalization process and enhance the region's full and beneficial integration into the global economy; and accelerate the empowerment of women.

BUILDING ON SUCCESSES IN AFRICAN AGRICULTURE

Edited by Steven Haggblade

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