

# GHANA

## RECENT DEVELOPMENTS IN AGRICULTURAL RESEARCH

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Country Note • June 2010

### LONG-TERM INVESTMENT AND CAPACITY PATTERNS IN AGRICULTURAL R&D

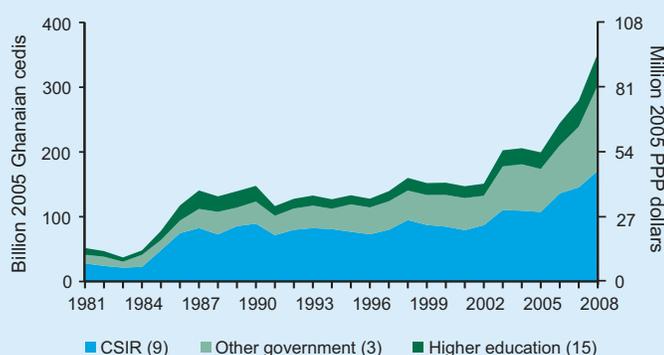
After a period of relative stagnation in the 1990s, agricultural research and development (R&D) spending in Ghana increased dramatically after 2002. In 2008, Ghana spent 352 billion cedis or 95 million PPP dollars on agricultural R&D (both in 2005 constant prices) compared with 151 billion cedis or 41 million dollars in 2002 (Figure 1; Table 1).<sup>1</sup> Unless otherwise stated, all investment data in this note are expressed in purchasing power parity (PPP) prices.<sup>2</sup> PPPs reflect the purchasing power of currencies more effectively than do standard exchange rates because they compare the prices of a broader range of local—as opposed to internationally traded—goods and services. Agricultural R&D capacity has also increased since 2002, leading to a total of 537 full-time equivalent (FTE) research staff employed in 2008 (Figure 2). However, not all of the 27 agricultural R&D agencies identified in Ghana increased consistently in size; variation existed among the agencies. Some agencies had uneven growth while others saw declines in total number of researchers from 2001–08.

The large increase in agricultural R&D expenditures reflects a policy environment in which the government of Ghana has recognized the importance of the agricultural sector, and R&D

### Key Trends Since 2000

- Agricultural research and development (R&D) spending in Ghana more than doubled during 2000–08, largely as a result of rising salary costs at the agencies under the Council for Scientific and Industrial Research (CSIR) and increased funding for the Cocoa Research Institute of Ghana (CRIG) following the country's boost in cocoa production.
- Agricultural research staff also showed steady growth throughout this period, albeit at a much slower rate than expenditures.
- The higher education sector is playing an increasingly important role in Ghana's agricultural R&D.
- Nonprofit and for profit private companies, although involved in some collaboration with CSIR and the higher education agencies, continue to have minimal involvement in agricultural R&D in Ghana.
- During 2000–08, Ghana's agricultural research was primarily funded through the government and a number of donor and loan-funded projects. Although the government legislated more than a decade ago that the CSIR agencies should derive 30 percent of their budget from private sources, only the Oil Palm Research Institute (OPRI) has come close to reaching this commercialization target.

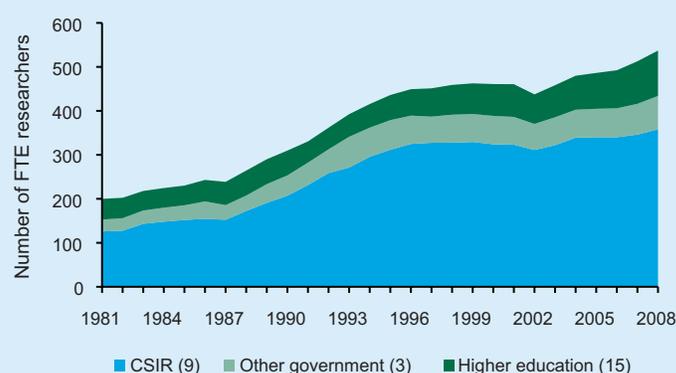
**Figure 1—Agricultural R&D spending adjusted for inflation, 1981–2008**



Sources: Calculated by authors from ASTI-STEPRI 2009 and Stads and Gogo 2004.

Notes: Figures in parentheses indicate the number of agencies in each category. Financial data are presented in "old" Ghanaian cedis. The "new" cedis was introduced on July 1, 2007, and equals 10,000 "old" cedis. For more information on coverage and estimation procedures, see the Ghana country page on ASTI's website at <http://www.asti.cgiar.org/ghana>.

**Figure 2—Agricultural research staff in full-time equivalents, 1981–2008**



Sources: Calculated by authors from ASTI-STEPRI 2009; Stads and Gogo 2004; BNARI 2007; KNUST 2010; and University of Ghana, various years.

Note: Figures in parentheses indicate the number of agencies in each category.

**Table 1—Overview of agricultural R&D spending and research staff levels, 2008**

Type of agency	Total spending			Total staffing	
	Ghanaian cedis	PPP dollars	Shares	Number	Shares
	(million 2005 prices)		(%)	(FTEs)	(%)
CSIR (9)	170,708.7	45.9	49	358.0	67
Other government (3)	131,939.4	35.5	38	76.0	14
Higher education (15)	49,162.2	13.2	14	103.1	19
<b>Total (27)</b>	<b>351,810.3</b>	<b>94.6</b>	<b>100</b>	<b>537.1</b>	<b>100</b>

Sources: Compiled by authors from ASTI-STEPRI 2009, BNARI 2007; KNUST 2010; and University of Ghana 2009.  
 Notes: Figures in parentheses indicate the number of agencies in each category. Financial data are presented in “old” Ghanaian cedis. The “new” cedis was introduced on July 1, 2007 and equals 10,000 “old” cedis.

in particular, in supporting the country’s national development agenda. The increase in agricultural R&D spending can also be placed in a wider policy context of science and technology (S&T) resource allocations. Budgetary resources soared from US\$5 million in 2007 to US\$39 million in 2008 (NDPC 2009) for the main S&T agencies in the country: the Council for Scientific and Industrial Research (CSIR); the Science Division of the then Ministry of Education, Science, and Sports; and the Ghana Atomic Energy Commission. However, this unprecedented increase should be understood against the background of many years of underfunding, especially in relation to the conditions of service of the research staff.

CSIR is the main government research organization in Ghana, encompassing 13 research agencies, 9 of which conduct agriculturally related research activities: the Animal Research Institute (ARI), the Crops Research Institute (CRI), the Soil Research Institute (SRI), the Oil Palm Research Institute (OPRI), the Food Research Institute (FRI), the Forestry Research Institute of Ghana (FORIG), the Plant Genetic Resources Research Institute (PGRRI), the Savanna Agricultural Research Institute (SARI), and the Water Research Institute (WRI). CSIR accounts for about two-thirds of total researchers and one-half of total spending on agricultural R&D in Ghana. Total spending by the agricultural R&D agencies under CSIR has increased significantly since 2001, from 79 billion to 171 billion cedis in 2008 (in 2005 constant prices). In 2008, CSIR employed 358 FTE agricultural researchers, a slight increase from 323 FTE staff in 2001 (35 FTEs over the seven-year period). Of the CSIR agencies, CRI is the largest, employing 77 FTE researchers in 2008 and accounting for a quarter of total agricultural research expenditure at CSIR.

The remaining three non-CSIR government agencies in the sample are the Cocoa Research Institute of Ghana (CRIG, 46 FTEs in 2008); the Biotechnology and Nuclear Agricultural Research Institute (BNARI, 20 FTEs); and the Marine Fisheries Research Division (MFRD, 10 FTEs), which together accounted for 38 percent of agricultural R&D spending, but just 14 percent of total agricultural research capacity in the country. In 2008, agricultural research spending among these agencies was 132 billion cedis

## ASTI Website Interaction

-  More details on institutional developments in agricultural research on Ghana are available in the 2004 country brief at [asti.cgiar.org/pdf/Ghana\\_CB13.pdf](http://asti.cgiar.org/pdf/Ghana_CB13.pdf).
-  Underlying datasets can be downloaded using ASTI’s data tool at [www.asti.cgiar.org/data](http://www.asti.cgiar.org/data).
-  This brief presents aggregated data; additional graphs with more detailed data are available at [asti.cgiar.org/ghana/datatrends](http://asti.cgiar.org/ghana/datatrends).

[www.asti.cgiar.org/ghana](http://www.asti.cgiar.org/ghana)

(in constant 2005 prices), a steep increase compared with 50 billion cedis in 2001. CRIG, with its mandate for research on Ghana’s primary export crop, cocoa, is the largest of the three agencies and accounted for most of this agricultural research expenditure.

The 15 identified agricultural higher education agencies accounted for an increasing share of agricultural R&D capacity. In 2008, the higher education sector accounted for close to one-fifth of Ghana’s total agricultural researchers. The largest agricultural higher education agency in 2008 was the College of Agriculture and Consumer Sciences at the University of Ghana (UG), which employed 21 FTE researchers. The other higher education agencies that conduct agricultural research are various faculties and departments at the Kwame Nkrumah University of Science and Technology (KNUST), the University of Cape Coast (UCC), the University of Development Studies (UDS), and the University of Education, Winneba.

Nonprofit and for profit private companies, although involved in some collaboration with CSIR and the higher education agencies, were found to have minimal involvement in agricultural R&D in Ghana. Therefore, analyses in this country note exclude the nonprofit and private sectors.

Female researchers constituted 17 percent of total agricultural research staff in Ghana in 2008 (ASTI-STEPRI 2009). The share of female staff varied significantly across CSIR agencies and has changed very little compared with data from 2001 (ASTI-STEPRI 2009; Stads and Gogo 2004).

The support-staff-per-researcher ratio, on average, slightly decreased since 2001, from 7.5 to 6.9 in 2008 (ASTI-STEPRI 2009). The slight decrease in the ratio is attributable to a virtual ban on employment over the past four years at CSIR. The government agencies have in general had much higher ratios of support staff compared to the universities. Lower support-staff ratios at higher education agencies are common across countries given that research is not their primary mandate.

To compare agricultural R&D spending across countries, one indicator often used is that of total spending on agricultural R&D as a percentage of agricultural output (AgGDP), known as

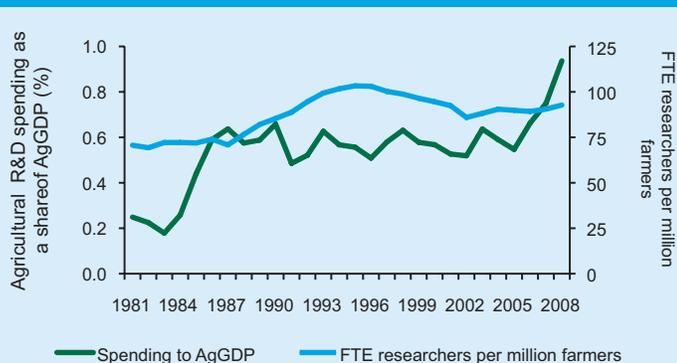
the research intensity ratio. In Ghana, the ratio experienced a sharp rise starting in 1983, then fluctuated year-to-year. Starting in 2005–06, the ratio began to increase again and reached its highest point in 2008 (Figure 3). In that year, for every \$100 of agricultural output, \$0.94 was invested in agricultural R&D, one of the highest levels in West Africa. In comparison, the amount in 2001 was \$0.53 for every \$100 due to a higher increase in agricultural R&D spending compared to AgGDP. Another ratio, the number of FTE agricultural researchers per million of farmers, has been more static, with an average of 90 researchers per million over the 2001–08 period.

## INSTITUTIONAL STRUCTURE AND POLICY ENVIRONMENT

The overall institutional structure of Ghana's agricultural R&D system has remained the same since the 1990s. The agencies of CSIR serve as the main providers of agricultural research, with CRIG, MFRD, and BNARI supporting the cocoa, fisheries, and biotechnology subsectors, respectively. The implementation of agricultural policies is the primary responsibility of MOFA. Unlike many other ministries, which have undergone changes depending on the government in power, MOFA has remained one of the more stable ministries in Ghana. There are connections between it and Ministry of Environment, Science, and Technology (MEST), which is responsible for CSIR and BNARI. Most of the CSIR centers have management boards, on which a MOFA representative might serve, to advise on operations. MEST has undergone frequent restructuring, however. Before 2009, it was the Ministry of Education, Science, and Sports. The Ministry of Education is now a separate ministry.

In order to ensure sustained funding of research, partnerships between private sector firms (including farmer groups) and NGOs have been encouraged. The concept of research-extension-farmer linkages (RELCs) was introduced to increase participation of end users in technology development. The R&D agencies have made some efforts at demand-driven research, but the impact has been limited. In 1996, the government of Ghana legislated changes to CSIR's mandate and operations with a view to addressing private sector issues and introducing market principles. One of the newly introduced

**Figure 3—Intensity of agricultural research spending and capacity, 1981–2008**



Sources: Calculated by authors from ASTI-STEPRI 2009; Stads and Gogo 2004; World Bank 2009; and FAO 2009.

## ASTI Website Interaction

-  A list of the nine CSIR, 3 other government, and 15 higher education agencies included in this note is available at [asti.cgiar.org/ghana/agencies](http://asti.cgiar.org/ghana/agencies).
-  Detailed definitions of PPPs, FTEs, and other methodologies employed by ASTI are available at [asti.cgiar.org/methodology](http://asti.cgiar.org/methodology).
-  The data in this brief are predominantly derived from surveys. Some data are from secondary sources or were estimated. More information on data coverage is available at [asti.cgiar.org/ghana/datacoverage](http://asti.cgiar.org/ghana/datacoverage).
-  More relevant resources on agricultural R&D in Ghana are available at [asti.cgiar.org/ghana](http://asti.cgiar.org/ghana).

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policies made commercialization a key function of CSIR. It was proposed that CSIR should internally generate up to 30 percent of each agency's budget (Stads and Gogo 2004). The target remains in force, although no institute has achieved it. There are many dimensions to the challenge of commercialization of R&D in Ghana. One relates to the extent to which partnerships or even very basic collaboration are forged with the private sector. For example, a number of private agribusiness enterprises have been collaborating with scientific institutions such as KNUST's Animal Science Department and ARI of CSIR to improve feed for poultry and production of breeding stocks for the poultry industry, respectively (Essegbey 2009). Such collaboration is limited, however, and needs to be strengthened to foster greater innovation and commercialization of R&D outputs.

Among the universities, the longer established colleges and faculties of agriculture, biological sciences, and natural resources at UG, KNUST, and UCC are still the main providers of agricultural research. However, UDS' Faculty of Agriculture, established in 1993, has caught up with the older universities and now ranks second to UG's Faculty of Agriculture in number of FTE researchers. No new faculties or departments of agriculture were identified as having been established since 2001 in Ghana. Generally, the role of the higher education sector in Ghanaian agricultural R&D has become more prominent in recent years. University budgets have increased with the introduction of student tuitions. A number of agricultural scientists have left CSIR to take up opportunities in some of Ghana's universities, where salaries and conditions are reportedly better.

## RESEARCH STAFF QUALIFICATIONS AND TRAINING

The average qualifications of agricultural research staff in Ghana have changed very little since the 1990s. A majority of the agricultural research staff were trained at the postgraduate level, with 35 percent holding PhDs and 46 percent holding MSc degrees in 2008, compared with 35 and 50 percent, respectively, in 2001 (Figure 4). The number of female researchers with PhDs did increase, however, doubling from 8 FTEs in 2001 to 16 in 2008, a share of 10 percent of total FTE researchers with PhDs (ASTI-STEPRI 2009; Stads and Gogo 2004).

At the nine CSIR agencies, 29 percent of researchers held PhD degrees in 2008, while 48 percent were trained to the MSc level. There was, however, variation among the agencies, ranging from a 19 percent PhD share at agencies such as PGRRI and SARI to a 40 percent share at WRI. In comparison, two of the non-CSIR agencies, BNARI and CRIG, had higher shares of PhDs, 44 percent and 46 percent, respectively. Universities worldwide generally have a higher share of agricultural R&D staff with PhDs, and this is true in Ghana as well, where 52 percent of FTE researchers at universities held PhDs in 2008, while 37 percent had MScs. These shares showed almost no change since 2001.

The World Bank-funded Agricultural Services Subsector Investment Project (AgSSIP), which ran from 2000 to 2007, included a significant training component. Through the program, 17 CSIR scientists received PhDs and 15 received either MSc or MPhil degrees in various fields, most of them agriculturally related. The majority of researchers were trained locally at UG, UCC, and KNUST, while some pursued PhD training abroad in the United Kingdom and Sweden. The Dutch government has also financed various training initiatives for CSIR scientists over the past decade. Over the 2001–08 period, nine researchers from CSIR received various degrees under the sponsorship of the Dutch government in universities in the Netherlands. CSIR also has its own training initiatives for staff in various disciplines and degree levels at universities in Belgium, Canada, Cyprus, Denmark, Germany Ghana, the Netherlands, Singapore, South

Africa, the United Kingdom, and the United States. From 2005 to 2008, 30 staff members undertook training initiated by CSIR under various sponsorships.

One major area of concern for CSIR is the rapidly aging research pool. The average age of CSIR researchers is around 50, meaning that a very large number of senior scientists are quickly approaching retirement age. In 2007, 27 percent of CSIR's researchers were 51 years or older, while one half were between 41 and 50 years (ASTI-AWARD 2008). Retiring staff members are not being replaced, as the national government has instituted a ban on recruitment in the government sector that is strictly enforced. Consultants, however, can still be hired within project frameworks, as they do not show up on the government payroll. CSIR's principal challenge currently is to find a way to retain existing staff and to attract young staff at the same time.

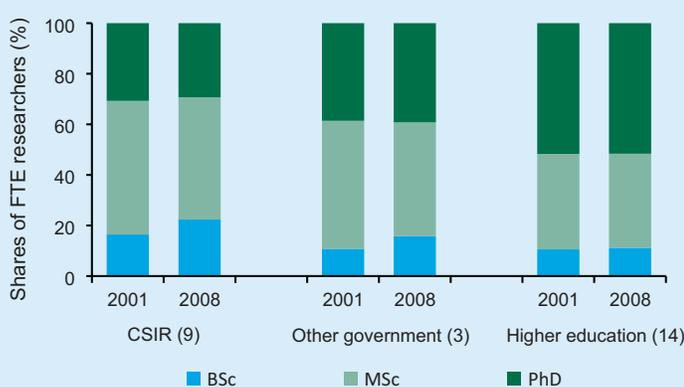
In many R&D agencies in Ghana, there is a general trend of researchers making efforts to improve their educational status with their own resources, since their institutions are not able to offer study leave or other necessary support given their budgetary constraints. This trend is also driven by the enhanced opportunities for education from private tertiary educational institutions, more flexibility in access to education, and the increasing competitive pressure in the job market.

## INVESTMENT TRENDS

### Expenditures

The allocation of research budgets across salaries, operating costs, and capital costs affects the efficiency of agricultural R&D, and therefore detailed data on cost categories of government agencies were collected as part of this study. Since 2001, three-fourths of agricultural R&D expenditures at the agricultural agencies of CSIR have been spent on salaries. In 2008, salaries accounted for 83 percent of total spending, while operating costs were 14 percent and capital costs were 3 percent (Figure 5). This distribution represents a significant increase in spending on salaries and a concurrent, relative decline in spending on operational

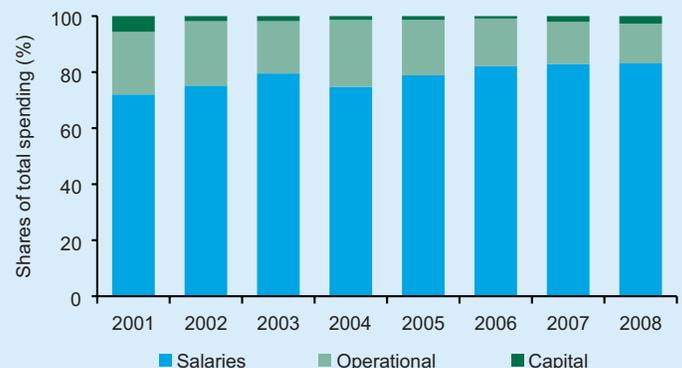
Figure 4—Qualifications of researchers by institutional category, 2001 and 2008



Sources: Calculated by authors from ASTI-STEPRI 2009; Stads and Gogo 2004; BNARI 2007; KNUST 2010; and University of Ghana various years.

Notes: Figures in parentheses indicate the number of agencies in each category. Data are for researchers only and therefore exclude 3 FTE technicians holding MSc degrees and 42 FTE technicians holding BSc degrees employed at the government and higher education agencies.

Figure 5—Cost category shares of CSIR, 2001–08



Source: Calculated by authors from ASTI-STEPRI 2009.

Note: Figure includes all nine CSIR institutes involved in agricultural research activities.

costs, a trend beginning in the 1990s. Operating costs actually increased in absolute terms but did not outpace the higher growth in salary costs. The year-to-year differences in total spending at CSIR were mainly due to salary increases.

The increase in salary expenditures reflects the growing number of researchers at CSIR (averaging 5 FTEs per year during 2001–08) but also represents an increase in expenditure costs per researcher. CSIR staff receive a yearly increase in salaries and benefits, as do other public servants. The especially high expenditure on salaries in 2008 was due to an accumulated salary increase that was paid out that year. Capital and operating costs are always included in the budget presented to government. However, as the government is more concerned about the salaries of staff (probably to prevent labor unrest for nonpayment of salaries), capital and operating costs are the budget portions most often slashed when the government is hard pressed for resources. This prioritization of salaries is the main reason for the continuous proportional decline in capital and operating costs since 2000. The trend of increasing salary costs may change soon, however. In October 2009, the national government requested CSIR to cut the share of salary costs in its total budget to 40 percent. This directive has not yet been implemented, but a strict accounting policy is being enforced to ensure prudent spending by CSIR.

During the budget allocation process by the government, each institution prepares its budget taking into consideration a general rate of increase proposed by the Ministry of Finance and Economic Planning (MOFEP). The budget is then presented and defended at the sector ministerial level, before being sent to the appropriate Parliamentary Select Committee for review, defense, and approval. Parliament then forwards approval to MOFEP to allocate funds to the respective agency for its operation.

## Funding Sources

Agricultural R&D in Ghana is funded primarily by the government, with some contributions from donors and from agencies' own sales of goods and services. The government ensures that salaries are paid regularly and also funds administrative expenditures and the costs involved in keeping the research agencies operational. Based on these expenditures, the government appears to be investing heavily in R&D, as funding to CSIR increased during 2001–08. However, the government funding includes funding through loans from the World Bank, such as those provided for AgSSIP. In addition, operating and capital costs of research activities are still largely funded by foreign donors or through development bank loans. Donors to agricultural research agencies in Ghana include the World Bank, International Fund for Agricultural Development (IFAD), Japan International Cooperation Agency (JICA), European Union (EU), United States Agency for International Development (USAID), Food and Agriculture Organization of the United Nations (FAO), United Nations Development Program (UNDP), Department for International Development (DFID), Alliance for a Green Revolution in Africa (AGRA), Denmark, the Netherlands, International Maize and Wheat Improvement Center (CIMMYT), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Institute of Tropical Agriculture (IITA), International Fertilizer Development Center (IFDC), and Bioversity International. Overall, donor funding to the CSIR centers has increased over the past decade.

As mentioned earlier, in 1996 CSIR introduced a private sector funding target of 30 percent for each agency's budget. However, in reality only OPRI came close to reaching that goal. In 2008, 22 percent of OPRI's R&D funding was generated through the sale of goods and services (ASTI-STEPRI 2009). The average share for CSIR—excluding CRI and the four non-agriculturally related institutes—was 6 percent in 2008. CRIG, as a division of the Ghana Cocoa Board (COCOBOD), benefited greatly from the rise of cocoa prices and Ghana's increase in cocoa production that began in 2003–04. CRIG is partially funded through a levy on cocoa.

The World Bank has been a major source of funding to agricultural research in Ghana since the 1990s, providing loans through projects that were co-financed by the government. The first project, the National Agricultural Research Project, covered the period 1991–99 and provided US\$26 million in funding for infrastructure, training, and improved institutional management and collaboration (World Bank 2000). AgSSIP followed in 2000 and contained four components: a) reforming and strengthening agricultural technology generation and diffusion; b) institutional reform and strengthening of MOFA; c) development of farmer-based organizations; and d) strengthening agricultural education and training (World Bank 2007a). The project got off to a slow start and required restructuring in 2004 to improve implementation of activities and disbursement. A number of new initiatives were added at this point to align with Ghana's Poverty Reduction Strategy (GPRS I), which included funding for horticulture and the oil palm industry, OPRI in particular. By the project's closing in 2007, a total of US\$74 million had been disbursed, with US\$23 million distributed to MOFA and US\$20 million to CSIR for the component relating to agricultural technology generation and diffusion. Under this component, a competitive agricultural research grant scheme (CARGS) was developed and a group of regional RELCs were created as mechanisms for farmers to help set priorities for research. CARGS successfully funded 193 research projects—80 percent of which were found to be satisfactory—and 67 new technologies (World Bank 2007a). The project appraisal notes, however, that the influence of the RELCS has been fairly limited. Other project weaknesses were procurement complications slowing the renovation of labs and a lack of private sector partnerships and investment.

After AgSSIP, another tranche of funding for US\$25 million was approved for 2008–10 under the name AgSSIP II in support of Ghana's revised Food and Agriculture Sector Development Program, which emphasizes a more sector-wide approach to funding the agricultural sector in line with the Ghana Joint Assistance Strategy (G-JAS) (World Bank 2008). G-JAS provided a framework for donors to harmonize funding in support of Ghana's second Poverty Reduction Strategy (GPRS II). Approximately US\$200 million per year for 2007–10 was expected to be disbursed by donors to support the modernization of agriculture as outlined in GPRS II. One of the strategic priorities of this component was strengthening the provision and targeting of agricultural research and extension services. But it is unclear how much funding is expected to be allocated to this priority.

The West Africa Agricultural Productivity Program (WAAPP)—financed by the World Bank and coordinated by the West and Central African Council for Agricultural Research (CORAF/WE-CARD)—supports crop and livestock research in West Africa. WAAPP was initiated in 2007 and the first phase covered Senegal and Mali in addition to Ghana. Ghana was allocated US\$15 million

of World Bank credit to develop improved technologies for roots and tubers in close collaboration with the Root and Tuber Improvement and Marketing Program (RTIMP) (World Bank 2007b). In 2009, the agricultural R&D grant scheme component of WAAPP approved eight proposals for Ghana.

IFAD has also been a source of funding for R&D at several CSIR agencies, such as SRI and PGRRI through the Root and Tuber Improvement Program (RTIP), which ran from 1999 to 2005 and provided US\$10 million—mostly for cassava improvement (IFAD 2009). RTIMP expanded on this program to include additional types of roots and tubers and a marketing component at a cost of US\$28 million for 2006–14.

In 2008, the Science and Technology Endowment Fund was established with 500,000 cedis in seed funding and the expectation that it would generate additional financing through various sources, such as the private sector (MOFEP 2007). The intention of the fund is to provide supplementary support to S&T. In contrast with CARGS, agriculture is just one of several priority areas. The fund is managed by CSIR and overseen by a board with members from various government agencies and associations.

The higher education sector has also experienced increasing budgets for R&D. University education was once free, but student tuitions were introduced in the 1996/97 academic year after the tertiary education project financed by the World Bank to rehabilitate university facilities. Academic faculty user fees were the first to be introduced, followed by residential facility user fees, adding to the overall budgets of universities (Adu and Orivel 2006; Arthur, Asante, and Oteng 2006; NCTE 2007). The public tertiary institutions in Ghana are financed from four main sources: public grants given directly to the institutions from the government; student fees; the Ghana Educational Trust Fund (GETFund)—established in 1999 and recipient of a fraction of VAT receipts—; and internally generated funds, raised through the provision of various services to the public (Arthur, Asante, and Oteng 2006). The amount of funds allocated to agricultural R&D from these sources is not clearly spelled out, although 50 percent of the funds from GETFund is allocated solely for research purposes. In general terms, funding for research activities at the tertiary education institutions comes mainly from the Teaching and Learning Innovation Fund from the World Bank, which is

still in operation, and the Faculty Development and Research Fund (FARF) funded by GETFund (NCTE 2007). FARF is aimed at supporting faculty members who undertake research and participate in conferences and seminars. In 2009, 26 million cedis were allocated to the tertiary institutions for this purpose based on a criterion developed by the National Commission on Tertiary Education (NCTE 2010). FARF continues to be the main sustainable source for supporting research activities and replacing the old faculty facilities in the tertiary institutions. Additionally, lecturers and researchers at the public universities are given an annual book and research allowance of US\$2,000 each for research activities in their area of expertise.

## ALLOCATION OF RESEARCH ACROSS COMMODITIES

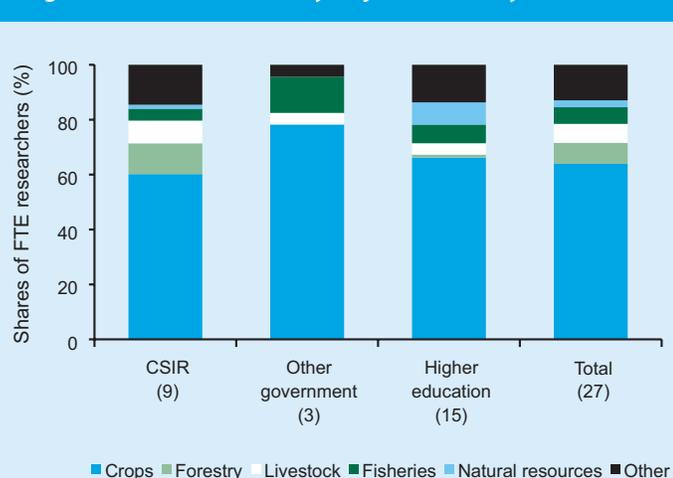
Given that the allocation of resources across various lines of research is a significant policy decision, detailed information was collected on the number of researchers working in specific commodity and thematic areas (in FTEs).

The focus of agricultural research in Ghana was predominantly on crops. In 2008, 64 percent of researchers were involved in crop research, while 8 percent focused on forestry, 7 percent on livestock, 6 percent on fisheries, and 3 percent on natural resources (Figure 6).

### Commodity Focus

Taking a closer look at crop and livestock research, commodities such as cassava, cocoa, maize, and rice were the most heavily researched, with shares of 8–10 percent of total FTE crop and livestock researchers across agencies (Table 2). At CSIR, rice

Figure 6—Research focus by major commodity area, 2008



Source: Calculated by authors from ASTI-STEPRI 2009.

Note: Figures in parentheses indicate the number of agencies in each category.

Table 2—Crop and livestock research focus by major item, 2008

	CSIR (6)	Other government (2)	Higher education (14)	Total (22)
<b>Crop items</b>				
Shares of FTE researchers (%)				
Cassava	9.2	7.7	13.8	9.8
Cocoa	0.7	51.4	2.3	9.3
Maize	10.5	2.6	9.3	9.0
Rice	11.1	—	4.3	7.9
Vegetables	6.9	1.3	7.6	6.1
Potatoes	2.6	2.6	18.3	5.6
Oil palm	6.5	—	2.7	4.7
Yam	5.8	1.3	2.9	4.5
Other crops	34.7	28.2	33.1	33.3
<b>Livestock items</b>				
Swine	2.3	2.6	0.6	2.0
Sheep and goats	1.8	2.6	1.5	1.9
Poultry	2.3	—	1.5	1.8
Other livestock	5.7	—	2.2	4.1
<b>Total crop and livestock</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: Calculated by authors from ASTI-STEPRI 2009.

Notes: Figures in parentheses indicate the number of agencies in each category. Five agencies of the total sample of 27 did not conduct crops or livestock research.

**Table 3—Research focus by major theme, 2008**

	CSIR (9)	Other government (2)	Higher education (8)	Total (19)
Shares of FTE researchers (%)				
Crop genetic improvement	12.7	23.0	21.2	15.2
Crop pest and disease control	7.7	21.8	11.5	10.1
Other crop	16.1	39.1	12.1	18.7
Livestock genetic improvement	4.9	—	—	3.6
Livestock pest and disease control	2.1	2.4	1.7	2.1
Other livestock	3.6	3.0	3.9	3.6
Water	11.4	0.6	4.4	9.1
Soil	4.6	0.9	1.1	3.6
Other natural resources	4.7	—	—	3.4
Postharvest	3.0	—	2.0	2.5
Other	29.2	9.1	42.0	28.1
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: Calculated by authors from ASTI-STEPRI 2009.

Notes: Figures in parentheses indicate the number of agencies in each category. This figure excludes 2 government agencies and 7 higher education agencies for which data on thematic focus were unavailable.

and maize were the predominant research areas, followed by cassava, vegetables, and oil palm. Cassava and potato research took precedence at higher education agencies. Seventy percent of research at CRIG was focused on cocoa, but other crops researched there include coffee, shea nut, cashew, and cola nut. Within livestock research, a much smaller area of research in Ghana, swine was the most researched type, followed by sheep and goats, and poultry. Other livestock include beef, dairy, guinea fowl, and grasscutter.

### Thematic Focus

In 2008, crop genetic improvement accounted for 15 percent of total FTE researcher time, while 10 percent of researchers focused on crop pest and disease control (Table 3). Water was also a major theme, with a 9 percent share of total FTE researchers. The research focus for the remaining researchers

included food safety, socioeconomics, capacity training, livestock genetic improvement, livestock pest and disease control, and postharvest.

## CONCLUSION

After a decade of marginal growth in the 1990s, agricultural R&D spending in Ghana has more than doubled since 2002. In 2008, the country spent 352 billion cedis or 95 million dollars on agricultural R&D (both in 2005 constant prices). Although these high growth rates are certainly an indication that agricultural R&D is a priority of the national government, a closer look at the cost category composition reveals that the overall increase in agricultural R&D spending is largely due to an increase in salary costs. In 2008, salaries accounted for 83 percent of CSIR's total expenditures, leaving only very limited room for actual research costs and much-needed capital investments. The Ghanaian government is fully aware of the challenges that the current CSIR cost structure poses. It has therefore issued a directive in 2009 to reduce the share of salary costs in CSIR's budget to 40 percent. Although not yet implemented, this directive could have a serious negative impact on future CSIR spending and capacity levels, forcing many CSIR agencies to either reduce the number of staff on their payroll or to generate funding from other sources. Transition to greater internal income generation continues to be a major challenge, however. Despite the fact that commercialization targets for the CSIR were set more than a decade ago, only one of the nine CSIR agencies (OPRI) comes close to reaching these targets. Donor funding continues to play an important role in financing Ghanaian agricultural R&D.

Though Ghana's overall agricultural R&D capacity levels have shown steady growth since the turn of the millennium, especially at CSIR and the higher education agencies, many agencies are faced with an aging pool of scientists and a concurrent ban on recruitment that limits new hires. These are issues that need to be urgently addressed if Ghana is to maintain its current agricultural R&D capacity levels and to prevent the numerous training efforts that have taken place over the past decade from being eroded.

## NOTES

<sup>1</sup> Financial data are presented in "old" Ghanaian cedis, the national currency in 2005, which is the base year of the inflated-adjusted time series. In July 2007 the "new" cedi was introduced at a value equal to 10,000 "old" cedis.

<sup>2</sup> Financial data are also available in current local currencies or constant 2005 US dollars in the ASTI data tool, [www.asti.cgiar.org/data](http://www.asti.cgiar.org/data).

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The authors thank the 21 agricultural research agencies that participated in the ASTI-Ghana survey; without their commitment this country note would not have been possible. The authors also thank Michael Rahija for his research assistance, and Nienke Beintema, Gert-Jan Stads, and Teunis van Rheenen who provided comments on earlier drafts of this note. ASTI gratefully acknowledges the generous support from the Bill & Melinda Gates Foundation.

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