



# ETHIOPIA

## RECENT DEVELOPMENTS IN AGRICULTURAL RESEARCH

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Country Note • November 2010

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

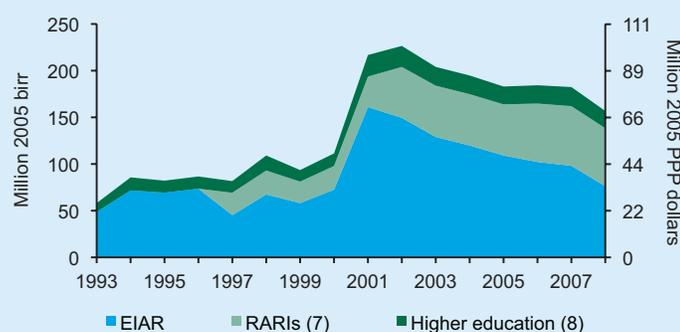
**A**gricultural research and development (R&D) spending in Ethiopia doubled between 1993 and 2000, and then again between 2000 and 2001, peaking at 227 million Ethiopian birr or 100 million PPP dollars in 2002, all in 2005 constant prices (Figure 1, Table 1). Note that, unless otherwise stated, all dollar values in this note are expressed in purchasing power parity (PPP) prices.<sup>1</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. This expenditure growth was primarily driven by greater government and donor funding to Ethiopia’s main agricultural research agency, the Ethiopian Institute of Agricultural Research (EIAR). From 2003, investment in agricultural R&D began to decline, reaching 157 million birr or 70 million PPP dollars by 2008. Although the 2008 value of spending was lower than 2001–02 levels, it was still significantly higher than the levels recorded in the 1990s, which averaged 85 million birr or 38 million PPP dollars (all in 2005 constant prices).

Total agricultural R&D capacity increased from the 1990s onward at a relatively steady rate, resulting in a total capacity of 1,318 full-time equivalent (FTE) research staff in 2008 (Figure 2).

### Key Trends Since 2000

- Total public spending on agricultural research and development (R&D) in Ethiopia increased significantly after 2000, peaking in 2001–02 as a combined result of government and donor support. By 2008, however, expenditures at the country’s main agricultural research agency, the Ethiopian Institute of Agricultural Research (EIAR), had returned to 2000 levels.
- Agricultural research staff numbers at the regional agricultural research institutes (RARIs) and at the country’s universities grew significantly since 2000; by 2008, the combined capacity of the seven RARIs was higher than that of EIAR in terms of staff numbers, but not postgraduate qualifications.
- Ethiopia’s agricultural research staffing is among the least qualified in Africa in terms of postgraduate degrees, and female participation is also comparatively low.
- Funding for agricultural research after 2000 was primarily derived from the government and through a number of large-scale projects funded by donors and development bank loans.

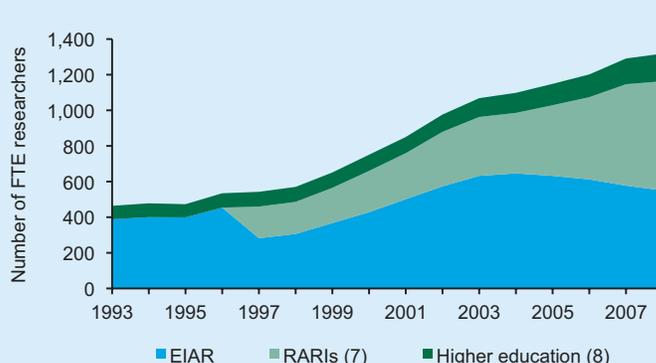
**Figure 1—Agricultural R&D spending adjusted for inflation, 1993–2008**



Sources: Calculated by authors from ASTI 2009–10, various financial files from EIAR, and Beintema and Solomon 2003.

Notes: Figures in parentheses indicate the number of agencies in each category. Dates represent fiscal years (July to June). EIAR data on spending for 1998–2005 were based in part on budgetary estimates rather than actual expenses. EIAR was known as the Ethiopian Agricultural Research Organization (EARO) until it was renamed in 2005. For more information on coverage and estimation procedures, see the Ethiopia country page on ASTI’s website at [asti.cgiar.org/ethiopia](http://asti.cgiar.org/ethiopia).

**Figure 2—Agricultural research staff in full-time equivalents, 1993–2008**



Sources: Calculated by authors from ASTI 2009–10, Beintema and Solomon 2003, AET-Africa 2010, and Mekele University 2010a and 2010b.

Notes: Figures in parentheses indicate the number of agencies in each category. EIAR was known as the Ethiopian Agricultural Research Organization (EARO) until it was renamed in 2005.

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

Type of agency	Total spending			Total staffing	
	Birr (million 2005 prices)	PPP dollars	Shares (%)	Number (FTEs)	Shares (%)
EIAR	76.2	33.8	48.6	550.0	41.7
RARIs (7)	62.2	27.6	39.6	613.3	46.5
Higher education (8)	18.4	8.2	11.8	155.0	11.8
<b>Total (16)</b>	<b>156.8</b>	<b>69.6</b>	<b>100</b>	<b>1,318.3</b>	<b>100</b>

Sources: Compiled by authors from ASTI 2009–10, various financial files from EIAR, AET-Africa 2010, and Mekele University 2010a and 2010b.  
 Note: Figures in parentheses indicate the number of agencies in each category.

This growth, however, was driven by the regional agricultural research agencies (RARIs) and the higher education sector, both of which almost doubled in size; capacity growth at EIAR was more erratic.

EIAR, which accounts for about half of Ethiopia’s agricultural R&D spending, conducts research through a coordinated but decentralized system encompassing a headquarters and 15 research centers located across the country. EIAR’s mandate is broadly defined to include crops, livestock, fisheries, forestry, and other natural resources. The institute’s spending was relatively low in the 1990s but more than doubled between 2000 and 2001 from 72 to 161 million birr, or 32 to 71 million PPP dollars (all in constant 2005 prices). Thereafter expenditures began to decline, reaching 76 million birr or 34 million PPP dollars in 2008.

EIAR, known as the Ethiopian Agricultural Research Organization (EARO) until 2005, was formed in 1997 through a merger of the Institute of Agricultural Research (IAR) with several other research centers. Research capacity at these predecessor agencies steadily rose from the 1970s, but from the mid-1990s Ethiopia decentralized its agricultural research system, and a number of centers were transferred to regional authorities resulting in a short-term decline in expenditures and staffing levels. In 2001, Ethiopia employed 501 FTE agricultural researchers, increasing to 646 FTEs in 2004 before contracting to 550 by 2008. In 2009, an additional 32 staff departed. EIAR had accounted for more than 80 percent of Ethiopia’s agricultural research staff capacity before 1997, but by 2008 its share had fallen to 42 percent.

The original RARIs grew after their 1997 separation from EIAR, and several new regional institutes were established. By 2008, seven RARIs employed 613 FTE researchers compared with only 178 in 1997. The RARIs’ combined share of the country’s research capacity also grew, constituting close to 50 percent in 2008 (a higher share than EIAR).

The higher education sector in Ethiopia also underwent substantial growth after the 1990s. The eight higher education agencies identified in this study employed 155 FTE researchers in 2008 compared with 91 FTEs in 2001. The sector’s agencies grew more slowly than the RARIs, however, so their share of overall research capacity remained small in 2008 (12 percent). The largest higher education agency conducting agricultural R&D in 2008 was

## ASTI Website Interaction

 More details on institutional developments in agricultural research in Ethiopia are available in the 2003 country brief at [http://www.asti.cgiar.org/pdf/Ethiopia\\_CB9.pdf](http://www.asti.cgiar.org/pdf/Ethiopia_CB9.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/ethiopia/datatrends](http://asti.cgiar.org/ethiopia/datatrends).

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

Haramaya University (formerly Alemaya University of Agriculture) with 38 FTE researchers. Mekele University’s College of Dryland Agriculture and Natural Resources and College of Veterinary Sciences together employed 33 FTE researchers in 2008, and the Faculty of Veterinary Medicine at Addis Ababa University (AAU), which has conducted veterinary medicine research since the 1980s, employed 10 FTEs.

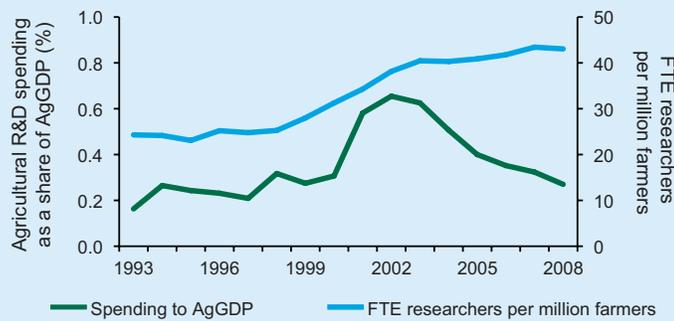
Nonprofit and for-profit private companies, although involved in some collaboration with EIAR and the universities, have minimal involvement in agricultural R&D in Ethiopia, so analyses in this country note exclude the nonprofit and private sectors.

Female researchers constituted 6 percent of agricultural research staff at EIAR in 2008 (ASTI 2009–10), representing little change since 2000 (Beintema and Solomon 2003). In general, the higher education agencies have higher shares of female agricultural researchers—16 percent at Haramaya University for example.

Overall, the ratio of support staff to researchers changed only slightly between 2001 and 2008, falling from 3.8 to 3.3 (ASTI 2009–10). In 2008, for every FTE researcher, Ethiopia employed 1.4 technicians, 0.9 administrative staff, and 1.1 other support staff. The government agencies generally employed higher ratios of technicians compared with the universities, which is common given that research is not the primary mandate of higher education agencies.

The agricultural research intensity ratio, or total public spending on agricultural R&D as a percentage of agricultural GDP, is a common indicator of comparative agricultural R&D spending across countries. Ethiopia’s ratio rose sharply after 2000, reaching \$0.65 in 2002. While this level is still comparatively low, it reflects the country’s increased spending on agricultural R&D at that time. By 2008, however, the ratio had returned to 2000 levels (Figure 3). That year, for every \$100 of agricultural output, \$0.27 was invested in agricultural R&D, which is very low compared with other countries, such as Kenya and Tanzania whose ratios that year were \$1.43 and \$0.50 respectively. Another ratio, the number of agricultural researchers per million farmers, rose more steadily in Ethiopia after the 1990s, reaching 43 FTEs in 2008.

**Figure 3—Intensity of agricultural research spending and capacity, 1993–2008**



Sources: Calculated by authors from ASTI 2009–10, Beintema and Solomon 2003, World Bank 2009a, and FAO 2009.

## INSTITUTIONAL STRUCTURE AND POLICY ENVIRONMENT

The institutional structure of Ethiopia’s agricultural R&D system has evolved and grown since the 1990s. EIAR reports to the Ministry of Agriculture and Rural Development (MoARD), and while it remains the primary agricultural research agency, it also coordinates national research and has undergone numerous rounds of restructuring. As previously mentioned, centers have been separated from and added to EIAR over the years, and whereas some subcenters were upgraded to create new centers, others were merged. The RARIs, which have expanded significantly over time, are managed by regional state governments. The Ministry of Science and Technology originally began as a commission and was then promoted to an agency and finally a ministry, but it has virtually no connection with EIAR.

In the past decade, the long established colleges of agriculture in Ethiopia have been restructured and expanded to include additional agriculture-related departments. Mekele University established a College of Veterinary Science in 2003. Ambo College of Agriculture became Ambo University College in 2007. Hawassa College of Agriculture became Hawassa University and now encompasses faculties of veterinary medicine, natural sciences, and technology, along with the Wondo Genet College of Forestry and Natural Resources. Jimma College of Agriculture was merged with the Institute of Health Sciences to become Jimma University in 1999. The fast expansion of the universities has raised questions about the quality of resulting degrees and research. The need to fill teaching positions has meant that students without experience have been hired upon graduation. In addition, the expansion has attracted researchers away from EIAR and other government agencies on the basis of more attractive benefits such as further training and housing allowances.

A government initiative known as the Business Process Restructuring (BPR) has recently been implemented at EIAR, other government agencies, and the universities for the purpose of increasing efficiency. The complete effects of this process remain to be seen, but changes have already occurred. Around 200 staff members departed EIAR in October 2008 during the restructuring. Some staff were laid off, while others chose early

## ASTI Website Interaction

-  A list of the eight government and eight higher education agencies included in this brief is available at [asti.cgiar.org/ethiopia/agencies](http://asti.cgiar.org/ethiopia/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/ethiopia/datacoverage](http://asti.cgiar.org/ethiopia/datacoverage).
-  More relevant resources on agricultural R&D in Ethiopia are available at [asti.cgiar.org/ethiopia](http://asti.cgiar.org/ethiopia).

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retirement or work at other agencies due to the uncertainty that the BPR process generated. Job cuts affected research, administrative, and support staff, and combined with the usual departures of older staff, resulted in the loss of experienced staff members and the accelerated hiring of junior staff.

Collaboration with regional and international agencies continues to be a significant aspect of research at EIAR and the higher education agencies in Ethiopia. Major collaborative projects are implemented jointly with centers of the Consultative Group on International Agricultural Research (CGIAR), such as the International Maize and Wheat Improvement Center (CIMMYT), International Livestock Research Institute (ILRI), International Center for Agricultural Research in the Dry Areas (ICARDA), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Institute of Tropical Agriculture (IITA), International Center for Tropical Agriculture (CIAT), and Bioversity International. In addition, EIAR has collaborative projects with other international agencies such as the International Fertilizer Development Center (IFDC), the International Center for Insect Physiology and Ecology (ICIPE), and a number of universities in countries like Germany, the Netherlands, and the United States. As a member of the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), EIAR collaborates with neighboring countries, and because of its national coordination role, it engages in various types of collaborative projects with other government agencies and universities.

## RESEARCH STAFF QUALIFICATIONS AND TRAINING

Average qualifications of agricultural research staff in Ethiopia have changed little since 2001. While the number of researchers with PhD degrees has doubled, the share of PhD-qualified staff in 2008 was only 12 percent (Figure 4). The share of MSc-qualified staff that year was 35 percent, and the share of BSc-qualified staff was 54 percent. The majority of agricultural research staff employed at EIAR in 2008 were trained to the postgraduate level, with 17 percent holding PhD degrees, and 42 percent holding MSc degrees. The number of PhD-qualified female researchers is very low at EIAR. In absolute numbers they increased from 1 FTE researcher in 2000 to 4 FTEs in 2008, but this still only resulted in a 4 percent share (Beintema and Solomon 2003; ASTI 2009–10). The majority of staff at the RARIs were only qualified to the BSc level, (71 percent of researchers in 2008). Shares of PhD- and MSc-qualified staff that year were 4 and 25 percent, respectively. The higher education agencies generally have a higher share of well-qualified staff given their teaching mandate, but in Ethiopia these shares were not much higher than at EIAR: 22 percent of FTE researchers at universities held PhD degrees in 2008, and 45 percent held MSc degrees.

The majority of technicians at the government, nonprofit, and higher education agencies had some type of diploma or degree, but relatively few technicians were qualified to the BSc level or higher. At EIAR, 22 technicians held BSc degrees in 2008—a small number compared with the 1,139 technicians with a diploma or other type of degree (IFPRI 2009–10).

The Agricultural Research and Training Project (ARTP), which ran from 1999 to 2005 and was cofinanced by a World Bank loan and the Ethiopian government, included a capacity development component for staff at EIAR (at that time EARO), Haramaya University, and the regional research centers (World Bank 1998). The Rural Capacity Building Project (RCBP), an ongoing project that followed ARTP, has a small training component focusing on priority areas such as biotechnology and training female staff. Training takes place at local universities, which is sometimes problematic

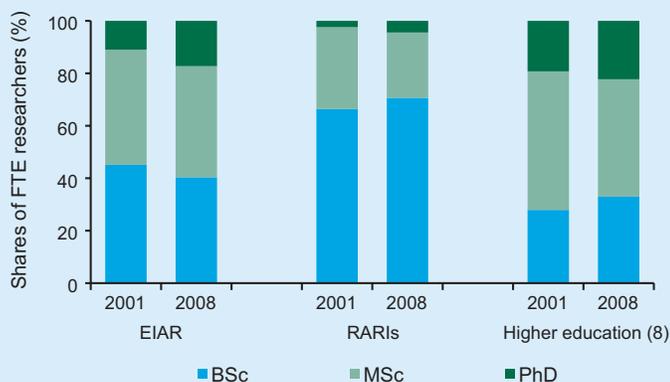
because it limits the types of specialization and training available. Staff members have also received scholarships from bilateral agencies to pursue studies at European and U.S. universities. In addition, an increasing number of Ethiopian researchers are obtaining their degrees at African universities, particularly in South Africa.

## INVESTMENT TRENDS

From 1993 until 2000, EIAR recorded higher than average shares of operating costs and capital investments due to the upswing in support for agricultural research by the government and through the aforementioned World Bank loans. As a result, EIAR and the regional research centers were able to invest significantly in infrastructure, equipment, and staff training during this time. In particular, ARTP provided funding for the rehabilitation of research infrastructure, including improvements to housing facilities, laboratories, libraries, and office space, along with the purchase and upgrade of farm and laboratory equipment, vehicles, and furniture. RCBP continued to fund these types of investments. Detailed cost category data were not available for the 2001–08 period; nevertheless, available 1998–2009 data indicate that government-funded capital investments were relatively high during this period (Figure 5).

Both human and financial resources are allocated according to research programs. The resulting budget is then reviewed by process directors and the Planning Department of the Ministry of Finance and Economic Development (MoFED). Agencies are often allocated 10 to 15 percent less than their requested budgets, and there is typically a two-month time lag between budget approvals and the disbursement of funds. In addition, the release of the budget is usually delayed by several months or more after the beginning of the fiscal year in July. Funding is often borrowed from multi/bilateral donor projects for the first couple of months of the year, which is a key period for many agricultural operations because it is the rainy season. The funding gap complicates operations and the efficient management of expenditures at this time of year.

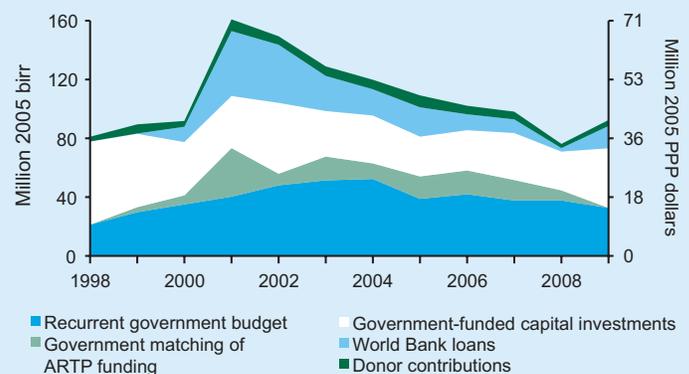
**Figure 4—Qualifications of researchers by institutional category, 2001 and 2008**



Sources: Calculated by authors from ASTI 2009–10, Beintema and Solomon 2003, AET-Africa 2010, and Mekele University 2010a and 2010b.

Notes: Figures in parentheses indicate the number of agencies in each category. Data are for researchers only and therefore exclude 24 FTE technicians holding BSc degrees.

**Figure 5—EIAR spending by funding source, 1998–2009**



Sources: Calculated by authors from ASTI 2009–10, EIAR financial data, and Beintema and Solomon 2003.

Notes: Dates represent fiscal years (July to June). Spending data for EIAR during 1998–2005 were in part based on budget estimates rather than actual expenses.

In recent years EIAR offered competitive salaries compared with other government and higher education agencies, but this is no longer true because salaries have not kept pace with inflation. This issue has affected morale at EIAR and increased staff turnover.

Primary funding sources for agricultural R&D in Ethiopia include the national government, multi- and bilateral donors, and development bank loans. The World Bank and the International Fund for Agricultural Development (IFAD) have been the main sources of finance for agricultural research in Ethiopia. Inflows from the ARTP program in particular have accounted for a significant share of EIAR's funding, most noticeably in 2001 and 2002. With cofinancing by the national government, ARTP provided US\$60 million dollars in funding over the period 1999–2005 (World Bank 2007), allocated across three components: managing agricultural research, strengthening the agricultural research system, and developing human resource capacity. EIAR received funding to build capacity; Haramaya University received funding to develop infrastructure and support the decentralization of research. In addition, research-extension advisory councils and farmer research groups were established at the federal, regional, and zonal levels to improve linkages with farmers, and a competitive funding mechanism, the Agricultural Research Fund (ARF), was established.

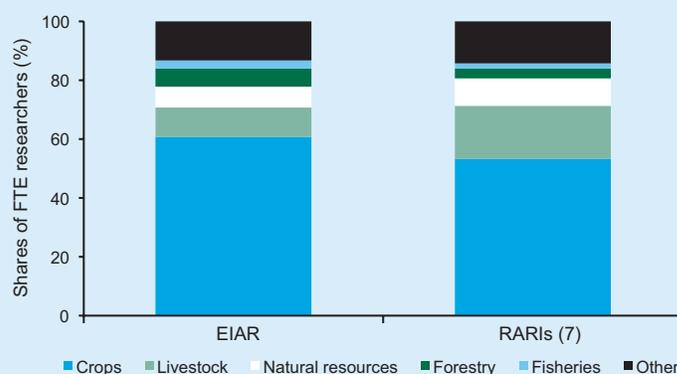
RCBP followed ARTP from 2004, focusing on agricultural services, including building agricultural education and training capacity, developing agricultural extension services, strengthening agricultural research institutions, improving information and communication systems within MoARD, and developing market institutions for agriculture.

Ethiopia currently receives World Bank funding through the Eastern Africa Agricultural Productivity Program (EAAPP), which began in 2009 and is expected to run until 2015. The program is slated to provide US\$30 million to the Ethiopian government; EIAR is the primary partner; and research will focus on regional crop priorities (World Bank 2009b). One of EIAR's research subcenters has been designated a center of excellence for wheat under EAAPP.

Bilateral funding to EIAR and the universities mostly targets crop-based projects, such as those conducted by the International Sorghum/Millet Collaborative Research Support Program (INTSORMIL-CRSP). Some funding, however, is allocated regionally. Funding from the Japan International Cooperation Agency (JICA), for example, focuses on the Rift Valley. Donors that have provided funding support to the RARIs in recent years include the United States Agency for International Development (USAID), the Swedish International Development Cooperation Agency (Sida), and Irish Aid. Other bilateral, multilateral, and nongovernmental donors include the European Union, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP), the Government of Denmark, the Netherlands Development Organization (SNV), the U.K. Department for International Development (DFID), the Alliance for a Green Revolution in Africa (AGRA), and Sasakawa 2000 (SG 2000), in addition to the CGIAR centers already mentioned.

Two competitive research funds are currently available in Ethiopia. ARF, as mentioned earlier in connection with ARTP, is a competitive funding scheme with a total value of US\$2–3 million. It is open to proposals from either individuals or institutes on the basis that they not exceed US\$50,000 and that funding only

Figure 6—Research focus by major commodity area, 2008



Source: Calculated by authors from ASTI 2009–10.

Notes: Figure in parentheses indicate the number of agencies in this category. The higher education agencies were excluded from the sample because of data unavailability.

supports operating costs, not salaries. The second competitive funding source is provided by the Ministry of Science and Technology in the form of 25,000 birr grants.

Funding for agricultural research in the higher education sector is mainly derived from the government through EIAR, as well as through a number of donor-financed research funds.

## RESEARCH ALLOCATION

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). Unfortunately, data on research focus were not available for Haramaya, Mekele, and Hawassa universities, so the higher education sector had to be excluded from the following analysis.

Crop research dominates the focus of agricultural research in Ethiopia, accounting for 61 percent of FTE researchers at EIAR and 53 percent of FTE researchers at the RARIs in 2008 (Figure 6). More researchers focused on livestock at the RARIs (18 percent) compared with EIAR (10 percent). At EIAR, 7 percent of researchers focused on natural resources, 6 percent focused on forestry, and 3 percent focused on fisheries. At the RARIs, 9 percent of researchers focused on natural resources, 3 percent focused on forestry, and 2 percent focused on fisheries. These commodity focus shares have changed very little since 2001 (Beintema and Solomon 2003).

## CONCLUSION

Agricultural R&D investment and human resource capacity have both grown since the early 1990s in Ethiopia. Agricultural research spending doubled between 1993 and 2000, and then doubled again during 2000–01. The 2008 value of investment at 157 million birr or 70 million PPP dollars (both in 2005 constant prices), although lower than in 2001–02, was still significantly higher than 1990s levels. The increased expenditures were driven by considerable growth in both government and donor funding, and in particular the World Bank–loan financed project ARTP.

Nevertheless, despite the expenditure growth of the 1990s and early 2000s, by 2008 investments had contracted to levels similar to those recorded in 2000. The 2008 agricultural intensity ratio of \$0.27 is one of the lowest ratios in the region, and funding remains highly dependent on donors and development bank loans. Delays in the disbursement of funds also present a significant challenge to the effective management of research expenditures.

The RARIs and many of the higher education agencies have expanded significantly since 2000, strengthening their role in Ethiopian agricultural R&D. In contrast, growth at EIAR was not sustained beyond 2001–04. The recent government initiative BPR brought about major changes in the structure of the country's agricultural R&D agencies, the effects of which will not be known for a number of years. Ethiopia's agricultural research agencies have some of the lowest levels of postgraduate qualifications in the region. Although the seven RARIs combined now employ more research staff than EIAR, these staff members are less well qualified in terms of postgraduate degrees. In addition, female participation in agricultural R&D remains low. The challenges of training staff, providing competitive salaries, and properly equipping the expanded agricultural research agencies should be primary areas of focus in the coming years.

## NOTE

<sup>1</sup> Financial data are also available in constant 2005 U.S. dollars via ASTI's data tool ([www.asti.cgiar.org/data](http://www.asti.cgiar.org/data)).

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### IFPRI-ROME

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EIAR is the principal agricultural research agency in Ethiopia. The institute holds a broad mandate covering crop, livestock, forestry, and natural resources research. To learn more about EIAR visit <http://www.eiar.gov.et/>.

The Agricultural Science and Technology Indicators (ASTI) initiative compiles, analyzes, and publishes data on institutional developments, investments, and human resources in agricultural R&D in low- and middle-income countries. The ASTI initiative is managed by the International Food Policy Research Institute (IFPRI) and involves collaborative alliances with many national and regional R&D agencies, as well as international institutions. The initiative, which is funded by the Bill & Melinda Gates Foundation with additional support from IFPRI, is widely recognized as the most authoritative source of information on the support for and structure of agricultural R&D worldwide. To learn more about the ASTI initiative visit [www.asti.cgiar.org](http://www.asti.cgiar.org).

The authors thank the 12 agricultural government and higher education agencies that participated in the ASTI survey, without whose commitment this country note would not have been possible. The authors also thank Michael Rahija for his research assistance, and Nienke Beintema and Gert-Jan Stads for valuable comments on an early draft of this note. ASTI gratefully acknowledges the generous support from the Bill & Melinda Gates Foundation.

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