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Department of Research and Development

TANZANIA

RECENT DEVELOPMENTS IN PUBLIC AGRICULTURAL RESEARCH

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

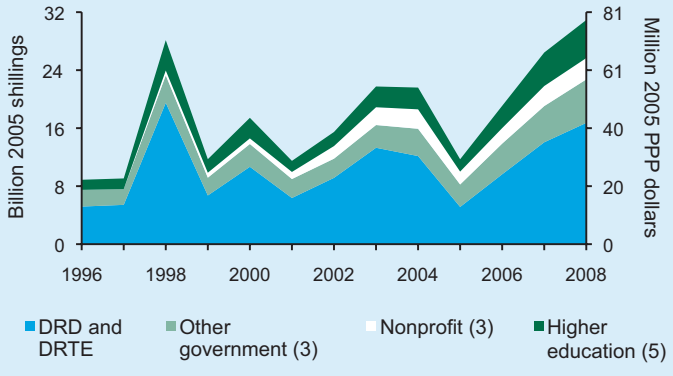
Public agricultural research and development (R&D) in Tanzania has traditionally been highly dependent on donor funding, which has fluctuated considerably year to year. Donor contributions fell particularly low in 2005, resulting in a total investment of only 12 billion shillings or 29 million PPP dollars that year, both in 2005 constant prices. Note that unless otherwise stated, all dollar values in this note are expressed in purchasing power parity (PPP) prices.[1,2] 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 (Figure 1, Table 1). By 2008, however, investment in public agricultural R&D had rebounded to 31 billion Tanzanian shillings or 78 million PPP dollars, both in 2005 constant prices.

Tanzania's agricultural research capacity declined slightly during the 1990s but began to rise in the early 2000s, reaching 675 researchers in full-time equivalents (FTEs) in 2006 (Figure 2). Staffing levels fell in 2007 due to the retirement of a number of staff, but by 2008 agricultural research staff numbers reached 674 FTEs, mainly due to the recruitment of BSc-qualified scientists.

Key Trends Since 2000

- Spending on agricultural research and development (R&D) in Tanzania rose significantly in 2008 after many years of comparatively low investment.
- The Department of Research and Development (DRD) under the Ministry of Agriculture, Food Security, and Cooperatives (MAFC), and the Department of Research, Training, and Extension (DRTE) under the Ministry of Livestock Development and Fisheries (MLDF) are the main agricultural research agencies in Tanzania; together they account for well over half of the country's agricultural research expenditures and staffing.
- Growth in the higher education sector has strengthened the role of Sokoine University of Agriculture (SUA) and the University of Dar Es Salaam (UDSM) in conducting public agricultural R&D.
- Funding for agricultural research in Tanzania has traditionally been highly donor dependent, but with a severe reduction in donor funding since 2005, the government has prioritized research and taken steps the bridge the funding gap.

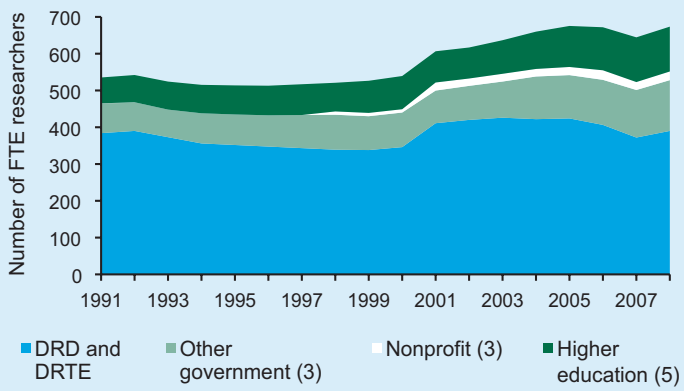
Figure 1—Public agricultural R&D spending adjusted for inflation, 1996–2008



Sources: Calculated by authors from ASTI–DRD 2009–10; Beintema, Ngahulira, and Kirway 2003; and UDSM various years.

Notes: Figures in parentheses indicate the number of agencies in each category. For more information on coverage and estimation procedures, see the Tanzania country page on ASTI's website at asti.cgiar.org/tanzania.

Figure 2—Public agricultural research staff in full-time equivalents, 1991–2008



Sources: Calculated by authors from ASTI–DRD 2009–10; Beintema, Ngahulira, and Kirway 2003; and UDSM various years.

Notes: Figures in parentheses indicate the number of agencies in each category. Data also include expatriate staff employed at DRD during the 1990s.

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

Type of agency	Total spending			Total staffing	
	Tanzanian shillings	PPP dollars	Shares	Number	Shares
	(million 2005 prices)		(%)	(FTEs)	(%)
DRD	12,191.6	30.8	39.4	294.0	43.6
DRTE	4,536.7	11.5	14.7	96.1	14.3
Other government (3)	5,994.2	15.2	19.4	138.0	20.5
Nonprofit (3)	2,951.5	7.5	9.5	23.6	3.5
Higher education (5)	5,245.5	13.3	17.0	121.9	18.1
Total (13)	**30,919.7**	**78.2**	**100**	**673.5**	**100**

Sources: Compiled by authors from ASTI–DRD 2009–10; Beintema, Ngahulira, and Kirway 2003; and UDSM various years.

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

Large variations occurred across agencies, with some recording net increases in their research staffing levels, and others net decreases. Overall, qualifications deteriorated somewhat with the retirement of experienced staff and the disproportionate employment of junior staff.

Tanzania's main agricultural research agency is the Department of Research and Development (DRD) under the Ministry of Agriculture, Food Security, and Cooperatives (MAFC). DRD oversees 16 agricultural research institutes located across the country and, in 2008, it accounted for around 40 percent of the country's public agricultural R&D spending and human resource capacity in FTEs. The Department of Research, Training, and Extension (DRTE) under the Ministry of Livestock Development, and Fisheries (MLDF) is the country's second-largest government agency. It accounted for one-seventh of public agricultural R&D spending and total FTE researchers in 2008. The spending and capacity trends of DRD and DRTE drove overall agricultural R&D fluctuations as they together account for well over half of total expenditures and researchers in the country.

ASTI Website Interaction

- More details on institutional developments in agricultural research in Tanzania are available in the 2003 country brief at http://www.asti.cgiar.org/pdf/tanzania_cb3.pdf.
- Underlying datasets can be downloaded using ASTI's data tool at www.asti.cgiar.org/data.
- This brief presents aggregated data; additional graphs with more detailed data are available at asti.cgiar.org/tanzania/datatrends.

www.asti.cgiar.org/tanzania

Three additional government agencies conduct agricultural research in Tanzania: the Tanzania Fisheries Research Institute (TAFIRI), the Tanzania Forestry Research Institute (TAFORI), and the Tropical Pesticide Research Institute (TPRI). These agencies accounted for 19 percent of national expenditures and 20 percent of FTE researchers in 2008. Of the three institutes, TAFIRI has the largest capacity (60 FTEs in 2008), followed by TPRI (45 FTEs) and TAFORI (33 FTEs). Spending and human resource capacity at these agencies has risen since 2001, reaching a combined total of 6 billion shillings or 15 million PPP dollars in 2008.

Three nonprofit agencies conduct commodity-based agricultural R&D in Tanzania: the Tanzania Coffee Research Institute (TaCRI), the Tobacco Research Institute of Tanzania (TORITA), and the Tea Research Institute of Tanzania (TRIT). Together, these three agencies accounted for 10 percent of spending and 4 percent of FTE researchers in 2008.

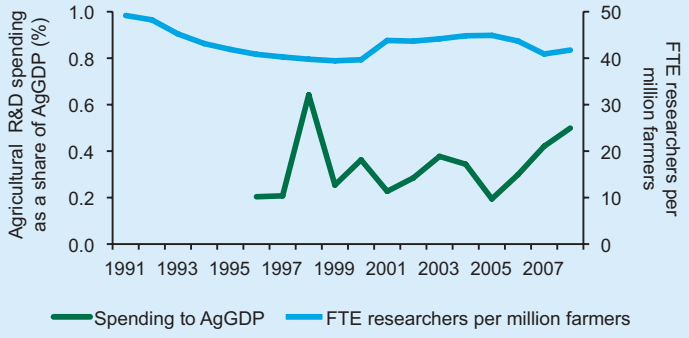
Growth in the higher education sector has strengthened the roles of the Sokoine University of Agriculture (SUA) and the University of Dar Es Salaam (UDSM) in conducting public agricultural R&D. In 2008, the sector contributed 17 percent of investment and 18 percent of research capacity. SUA is Tanzania's leading university for agricultural research, employing 99 FTE researchers in 2008, followed by the University of Dar Es Salaam's Department of Zoology and Marine Biology (8 FTEs), Institute of Resource Assessment (7 FTEs), Department of Botany (5 FTEs), and Institute of Marine Science (3 FTEs).

Female researchers constituted 21 percent of total agricultural research staff in Tanzania in 2008 (ASTI–DRD 2009–10). The share of female staff varied significantly across agencies and has changed little since 2000 (Beintema, Ngahulira, and Kirway 2003; ASTI–DRD 2009–10).

In 2008, there were 1.6 technicians, 0.7 administrative staff, and 0.4 other support staff per researcher (ASTI–DRD 2009–10). The total number of support staff at the government agencies and nonprofit institutions increased since the turn of the millennium. This trend, combined with a relatively steady number of researchers, led to an increase in the ratio of support staff per researcher from 2.3 in 2001 to 2.7 in 2008.

Total spending on agricultural R&D as a percentage of agricultural GDP—an often-used indicator of comparative national investment in agriculture—varied significantly as a result of fluctuating agricultural research spending. The ratio fell to a low of 0.19 in 2005 but rose consistently thereafter to reach 0.50 in

Figure 3—Intensity of agricultural research spending and capacity, 1991–2008



Sources: Calculated by authors from ASTI–DRD 2009–10; Beintema, Ngahulira, and Kirway 2003; UDSM various years; World Bank 2009a; and FAO 2009.

2008, indicating that for every $100 of agricultural output, $0.50 was invested in agricultural R&D (Figure 3). Starting in the early 1990s, the number of FTE agricultural researchers did not keep up with the increasing number of farmers despite some improvement during the 2000s. By 2008, Tanzania employed 42 agricultural researchers per million farmers.

INSTITUTIONAL STRUCTURE AND POLICY ENVIRONMENT

The Commission for Science and Technology (COSTECH) coordinates all science and technology policy and research agencies in Tanzania, including the agricultural sector. The major change to the agricultural research system in the 2000s was the establishment of DRTE in 2001. At that time, all livestock capacity was transferred from DRD, although DRTE did not become operationally independent of DRD until 2006 because they received joint donor funding. The Tse-Tse and Trypanosomiasis Research Institute (TTRI) was also consolidated within DRTE in 2001. MLDF became responsible for fisheries in 2008, at which time it took over the administration of TAFIRI from the Ministry of Natural Resources and Tourism (MNRT). MNRT, however, continues to administer TAFORI and TPRI.

The three nonprofit agencies were formed by transferring the respective commodity researchers from DRD. TRIT was established in 1996, but did not begin operating until 1998; similarly, TACRI was established in 2000 and began operating in 2001, and TORITA was created in 2000 and became operationally independent of DRD in 2003 (Beintema, Ngahulira, and Kirway 2003).

Collaboration at national, regional, and international levels continues to be a significant aspect of agricultural research in Tanzania. Many collaborative projects are implemented jointly between government or higher education agencies and the centers of the Consultative Group on International Agricultural Research (CGIAR) and cover research on different commodities and thematic issues. At a regional level, Tanzania belongs to the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and the East African Community (EAC). The country has ties with the Lake Victoria Fisheries Organization and the Southwest Indian Ocean Fisheries project. The nonprofit commodity agencies also partner with regional organizations. TRIT, for example, works with the Tea Research Foundation of Kenya and the Tea Research Foundation of Central Africa (TRIT 2010).

ASTI Website Interaction

- A list of the five government, three nonprofit, and five higher education agencies included in this brief is available at asti.cgiar.org/tanzania/agencies.
- Detailed definitions of PPPs, FTEs, and other methodologies employed by ASTI are available at 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/tanzania/datacoverage.
- More relevant resources on agricultural R&D in Tanzania are available at asti.cgiar.org/tanzania.

www.asti.cgiar.org/tanzania

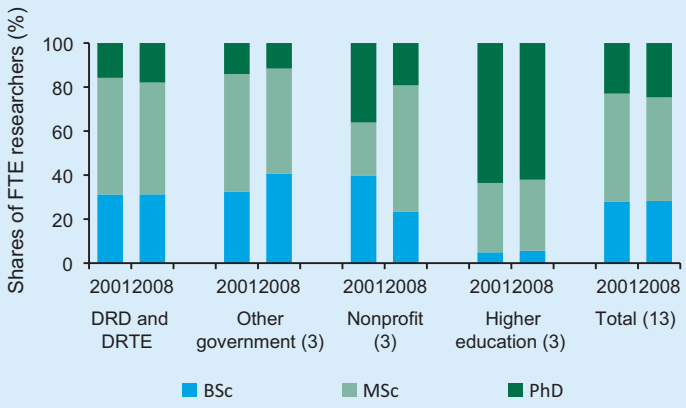
RESEARCH STAFF QUALIFICATIONS AND TRAINING

The average qualifications of agricultural research staff in Tanzania have changed little since 2001. A majority of the agricultural research staff are trained to the postgraduate level. In 2008, 25 percent of researchers held PhD degrees, and 47 percent held MSc degrees, compared with 23 and 49 percent, respectively, in 2001 (Figure 4). The number of female researchers with PhD degrees and MScs increased only slightly from 2000 to 2008, while the number of female researchers with BSc degrees almost doubled, increasing the share of BScs from 30 to 40 percent of all female researchers (ASTI–DRD 2009–10; Beintema, Ngahulira, and Kirway 2003).

As is the case in most universities in Africa and other regions of the world, a greater share of staff in the higher education sector in Tanzania hold postgraduate degrees compared with staff at the government agencies. At DRD, 18 percent of researchers were PhD qualified and 56 percent held MSc degrees compared with 62 and 32 percent, respectively, at higher education agencies.

A civil service hiring freeze was in effect in Tanzania from 1992 until mid-2002. As a result, a majority of staff in recent years were over 45 years old. With many PhD-qualified staff retiring, agencies have recruited many new staff in recent years, but they

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



Sources: Calculated by authors from ASTI–DRD 2009–10; Beintema, Ngahulira, and Kirway 2003; and UDSM various years.

Notes: Figures in parentheses indicate the number of agencies in each category. Data are for researchers only and therefore exclude 0.3 FTE technicians with MSc degrees and 2 FTE technicians with BSc degrees.

tend to be younger and less well-qualified and hence need MSc and PhD training. In response, SUA has increased its PhD and MSc programs so that each department now has an MSc and a PhD program. However, no major training programs are in place for the government-based staff.

INVESTMENT TRENDS

Expenditures

As the allocation of research budgets across salaries, operating costs, and capital investments affects the efficiency of agricultural R&D, detailed cost-category data were collected from the government agencies as part of this study. Since 2001, the cost of salaries doubled at DRD and DRTE, although the share of salaries fell due to increased operating and capital expenditures. In 2008, salaries accounted for 29 percent of total spending, while operating costs amounted to 39 percent and capital costs to 32 percent (Figure 5). Operating and capital expenses fluctuated considerably throughout the 2001–08 period based on variations in donor funding, as previously discussed.

Despite the increases, salary levels were low in the past decade, creating serious difficulties in recruiting and retaining researchers. Salaries at government agencies were lower than those offered by the universities, but even universities have had a retention problem. A task force was specifically appointed to look into this issue to ultimately make government salary packages more attractive. As of July 2010, the government increased researcher salaries by more than 80 percent.

Infrastructure and research facilities are also a concern at many agencies because capital investments have generally been low and erratic.

Funding Sources

As previously discussed, Tanzania has traditionally been highly dependent on donor contributions in addition to government funding for agricultural research (Figure 6). When donor funding plummeted in 2004/05, government funding necessarily increased over time. The higher level of government investment also reflects an increasing policy commitment to agricultural research and to the agricultural sector in general. In 2009, a government initiative was launched with high-level political support to develop the country's agricultural sector. Under this initiative, public research investment is expected to increase to 1 percent of GDP across all research sectors. For example, in fiscal year 2010/11, 30 billion shillings (in current prices) have been allocated to research. Of this, agriculture and livestock research will receive a 60 percent share (18 billion shillings).

Although funding levels are moving in a positive direction, disbursement procedures are often cited as an ongoing constraint. DRD and DRTE, for example, operate on a monthly cash budget. Disbursement to the agencies depends on the availability of government revenues, which makes the planning and management of research difficult—particularly in the context of agriculture's seasonality. The government receives basket funding on a quarterly basis, depending on the flow of funding from donors. Given uncertainty, agencies sometimes receive only 70–80 percent of their budgeted funding.

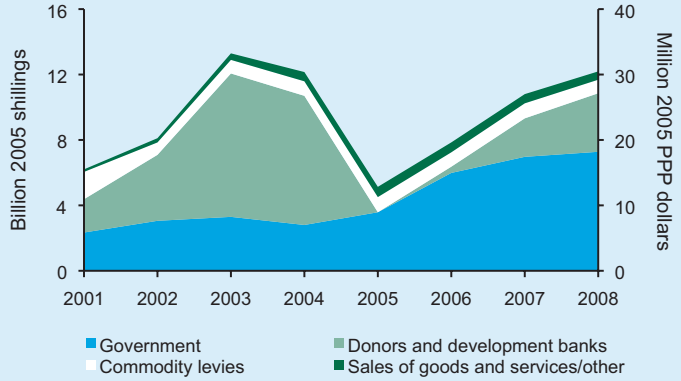
These issues were particularly relevant in 2005 because the Tanzania Agricultural Research Project (TARP) II, which was funded through a World Bank loan, ended in 2004, and the subsequent project, the Agricultural Sector Development Project (ASDP), did not begin until 2007. TARP II ran from 1998 to 2004 at a total cost of US$ 21.8 million (World Bank 2004). It focused solely on agricultural research, and extension activities were addressed through the parallel program, the National Agricultural Extension Project (NAEP II). ASDP is a multi-donor program expected to run from 2007 to 2013. It is funded by a US$90 million loan from the World Bank in addition to co-funding from the Government of Tanzania and additional contributions from the African Development Bank, the International Fund for Agricultural Development (IFAD), the European Union (EU), Ireland, and Japan (World Bank 2006). Local governments are expected to receive 75 percent of this funding, with agricultural research sharing the remaining 25 percent with initiatives focusing on national irrigation investment and food security.

In 2010, Tanzania began to receive funds from the World Bank through the Eastern Africa Agricultural Productivity

Figure 5—Cost category shares of DRD and DRTE, 2001–08

Source: Calculated by authors from ASTI–DRD 2009–10.

Figure 6—Funding sources of DRD, 2001–08



Source: Calculated by authors from ASTI–DRD 2009–10.

Program (EAAPP). Expected to run until 2015, the program will provide US$30 million to MAFC to focus on regional crop and livestock priorities such as rice, wheat, cassava, and dairy. The program will also support a regional center of excellence for rice in Tanzania (World Bank 2009b).

Other donors that contribute to agricultural research in Tanzania include the Food and Agriculture Organization of the United Nations (FAO), the U.K. Department for International Development (DFID), the German Agency for Technical Cooperation (GTZ), the Norwegian Agency for Development Cooperation (NORAD), the Swedish International Development Corporation Agency (Sida), the Danish International Development Agency (Danida), the Millennium Seed Bank Project, the Rockefeller Foundation, the Darwin Initiative, and the Biodiversity Information Facility.

Funding sources vary at the other government agencies. TAFORI, for example, became highly dependent on government funding after donor contributions from Finland ceased in 2001. TAFORI derives minor revenues from the sale of research products and receives a small amount of funding through a Danida-financed project. In contrast, TAFIRI receives much more donor funding than government funding, such as from the World Bank-supported Marine and Coastal Environmental Program (MACEP).

Commodity levies fund a higher share of research in Tanzania than in many African countries (Beintema, Ngahulira, and Kirway 2003). Initially, funds were channeled directly from stakeholders (farmers or commodity boards), but as of 2005, funds have been collected by the Tanzania Revenue Authority and remitted via the Treasury to the respective commodity research agencies. Amounts received vary significantly, largely depending on commodity prices. In 2008, DRD received 7 percent of its funding from commodity levies, compared with a high of 27 percent in 2001, in part reflecting the establishment of TACRI and TORITA and the shift of commodity levy income to these institutes. TACRI's commodity levy funding varied from 38 percent in 2006 to only 14 percent one year later due to fluctuations in coffee prices (TACRI 2008). TACRI received most of its funding from donors, such as the EU, with some support from the government. TRIT was primarily funded by a levy on processed tea until 2006. Donor funding from DFID and the EU was allocated to extension services and research facilities and equipment during this time period. In 2006, TRIT's dependence on government support and the sale of services increased because tea processing companies contracted the Institute to perform extension activities (TRIT 2010).

Funding for research at the higher education agencies is highly donor dependent. For example, NORAD funds more than half the costs of research at SUA's Faculty of Veterinary Medicine. Although the government funds faculty salaries, no government funding is allocated specifically for research. However, whereas most researchers receive research funding through individual proposals, they can also collaborate on research projects with government agencies.

Tanzania currently has only one source of competitive research funding: the Zonal Agricultural and Livestock Development Fund or ZARDEF, formerly known as the Zonal Agricultural Research Fund (ZARF). The National Agricultural Research Fund (NARF) is no longer operational. ZARF was co-funded by district councils and donors, the World Bank, the Netherlands, and Sweden. ZARDEF is funded by numerous contributors and provides research grants to both public and private zonal agencies that address stakeholder priorities for research on crops and livestock in the seven agroecological zones. It is anticipated that ZARDEF will provide around 2 billion shillings of research funding each year.

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).

The focus of agricultural research in Tanzania, excluding the higher education sector for which data were unavailable, is predominantly on crops. In 2008, 52 percent of researchers were involved in crop research, whereas 17 percent focused on livestock, 11 percent focused on fisheries, 8 percent focused on natural resources, and 6 percent focused on forestry (Figure 7).

Commodity Focus

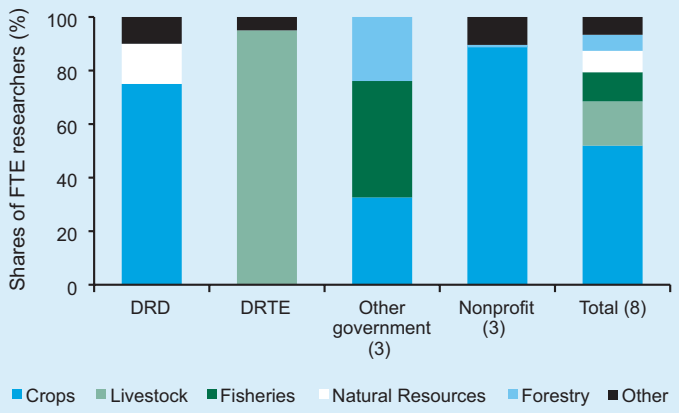
Maize was the most heavily-researched commodity at DRD in 2008, constituting 16 percent of all crop and livestock research undertaken by the agency in terms of FTEs. Cassava and rice were also prominent, with shares of 8 percent each (Table 2). Other significant crops at DRD were soybeans, cotton, wheat, sorghum, and vegetables (recording shares of 5 percent each). At the commodity-based nonprofit institutes, coffee dominated research efforts because TACRI is the largest of these three agencies.

Within livestock research, dairy attracted the attention of most livestock research, constituting 25 percent of researchers employed at DRTE, followed by beef and poultry with shares of 16 percent each.

Thematic Focus

In 2008, crop genetic improvement accounted for 17 percent of total FTE researcher time, whereas 9 percent of researchers focused on crop pest and disease control (Table 3). Two percent of researchers focused on livestock genetic improvement, while 6 percent focused on livestock pest and disease control.

Figure 7—Research focus by major commodity area, 2008



Source: Calculated by authors from ASTI–DRD 2009–10.

Notes: Figures in parentheses indicate the number of agencies in each category. Higher education agencies were excluded from this figure due to lack of data.

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

	DRD	DRTE	Nonprofit (3)	Total (5)
Crop items	Shares of FTE researchers (%)			
Maize	16.0	—	—	10.6
Cassava	8.0	—	—	5.3
Rice	8.0	—	—	5.3
Coffee	—	—	61.6	3.9
Soybeans	5.3	—	—	3.5
Cotton	5.3	—	—	3.5
Wheat	5.3	—	—	3.5
Sorghum	5.3	—	—	3.5
Vegetables	5.3	—	—	3.5
Other crops	41.3	—	38.4	29.8
Livestock items				
Dairy	—	26.3	—	7.2
Beef	—	15.8	—	4.3
Poultry	—	15.8	—	4.3
Other livestock	—	42.1	—	11.5
Total crop and livestock	**100**	**100**	**100**	**100**

Source: Calculated by authors from ASTI–DRD 2009–10.

Notes: Figures in parentheses indicate the number of agencies in each category. TAFORI and TAFIRI conduct neither crop nor livestock research. TPRI conducts crop research, but disaggregated commodity data were not available. Higher education agencies were excluded due to lack of data.

Table 3—Research focus by major theme, 2008

	DRD	DRTE	Other government (2)	Nonprofit (3)	Total (7)
	Shares of FTE researchers (%)				
Crop genetic improvement	20.0	—	14.1	57.9	17.0
Crop pest and disease control	10.0	—	12.8	11.2	8.6
Other crop	30.0	—	14.1	13.3	20.8
Livestock genetic improvement	—	10.0	—	—	2.0
Livestock pest and disease control	—	20.0	10.3	—	5.5
Other livestock	—	40.0	—	—	7.8
Soil	8.0	—	0.8	9.2	5.4
Water	4.0	—	—	7.1	2.7
Other natural resources	2.0	10.0	28.8	—	7.7
Postharvest	4.0	—	—	—	2.4
Other	22.0	20.0	19.1	1.4	20.2
Total	**100**	**100**	**100**	**100**	**100**

Source: Calculated by authors from ASTI–DRD 2009–10.

Notes: Figures in parentheses indicate the number of agencies in each category. This table excludes one government agency and five higher education agencies for which data on thematic focus were unavailable.

Natural resources were also a major theme. The focus of the remaining researchers included farming systems, food safety, socioeconomics, capacity training, and postharvest issues.

CONCLUSION

Agricultural R&D expenditures in Tanzania rose significantly in 2008 after many years of relatively low investment. That year, investment reached 31 billion Tanzanian shillings or 78 million PPP dollars (both in 2005 constant prices) compared with a low of 12 billion shillings or 29 million PPP dollars in 2005. Prior to 2005, spending was highly dependent on donor funding, which fluctuated considerably from year to year. Donor funding plummeted after the 2004 conclusion of a large-scale World Bank loan-funded project. Thereafter the Tanzanian government made a clear policy commitment to the agricultural sector and agricultural research, increasing its funding over time to bridge the gap. In 2009, a government initiative was launched with high-level political support to develop the country's agricultural sector. Under this initiative, public research investment is expected to increase to 1 percent of GDP across all research sectors, meaning that agriculture and livestock research would receive 60 percent of the 30 billion shillings allocated to research for fiscal year 2010/11 (in current prices). Also, effective July 2010, the government reformed the conditions of researchers' service by increasing their salaries by more than 80 percent.

DRD and DRTE are the main agricultural research agencies in Tanzania and together they account for well over half of the country's agricultural research expenditures and research staffing. Expanded capacity in the higher education sector has strengthened the role of universities in the performance of public agricultural R&D. Capacity growth, however, has not been accompanied by improved researcher qualifications. A dearth of training programs, along with a hiring freeze from 1992 to 2002, has resulted in a lack of well-qualified senior staff. Additional issues, such as the need for infrastructure maintenance and development, and the lack of timely and complete disbursement of budgeted funding, pose constraints to effective research. While investment levels appear to be following a positive trend, many years of underinvestment in agricultural research in Tanzania have taken their toll on the country's agricultural research agencies. Rectifying these issues will require time and ongoing commitment.

NOTES

[1] For more detailed information on private agricultural R&D in Tanzania, see Ubwe, Odame, and Kangai 2010 forthcoming.

[2] Financial data are also available in constant 2005 U.S. dollars via ASTI's data tool, available at www.asti.cgiar.org/data.

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DRD is the principal agricultural research agency in Tanzania. The department falls under the Ministry of Agriculture, Food Security and Cooperatives (MAFC) and focuses on crops and natural resources research.

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.

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