

NIGER

By Gert-Jan Stads, Mahaman Hamissou Kabaley, and Mahamadou Gandah

This brief reviews the major investment and institutional trends in public agricultural research in Niger since 1971, including a new set of survey data for 1991–2001 collected under the Agricultural Science and Technology Indicators (ASTI) initiative (IFPRI–ISNAR–CORAF/WECARD 2002–03).¹

INSTITUTIONAL DEVELOPMENTS

As one of the world's poorest countries, Niger recorded negative GDP throughout the majority of the 1990s, and was one of the countries most negatively affected by the devaluation of the CFA franc in 1994. Niger's major export commodity is uranium, which—despite an enormous drop in world prices in the 1980s—accounts for roughly 75 percent of the country's export proceeds. The vast majority of Niger is desert, so its agricultural sector is highly vulnerable to drought. Nevertheless, three-quarters of the active population is employed in agriculture, and the sector accounts for nearly half of Niger's GDP. Hence agricultural research and development (R&D) is an important factor in the country's future development (FAO 2004). In 2001, six agencies conducted agricultural research activities in Niger, and all six are included in our survey.² Combined, these agencies employed 109 full-time equivalent (fte) researchers and spent close to one billion 1999 CFA francs on agricultural R&D—equivalent to 6 million 1993 international dollars (Table 1).³

Niger's principal agricultural research agency is the National Agricultural Research Institute of Niger (INRAN),⁴ which accounted for three-quarters of the country's total agricultural research staff and close to 60 percent of agricultural research spending in 2001. Headquartered in Niamey and administered by the Ministry of Agricultural Development, INRAN was established in 1975 after the French agricultural research entities operating in the country at the time were nationalized (See *A Short History of Government-Based Agricultural Research*

KEY TRENDS

- Total agricultural researcher numbers in Niger rose steadily until 1996, after which they declined. Agricultural R&D expenditures showed an erratic upward trend until 1998 but fell sharply in recent years.
- The main agricultural R&D agency is the National Agricultural Research Institute of Niger (INRAN), which accounted for three-quarters of the country's researchers and nearly 60 percent of its agricultural R&D expenditures in 2001.
- During 1990–98, INRAN was largely dependent on funding from the National Agricultural Research Project (PNRA), drawn predominantly from a World Bank loan.
- The closure of PNRA in 1998 has left INRAN with a severe financial crisis. Many research programs have been cut, and many highly qualified researchers have left the institute. The future of INRAN's funding remains highly uncertain.

ABOUT ASTI

The Agricultural Science and Technology Indicators (ASTI) initiative comprises a network of national, regional, and international agricultural R&D agencies and is managed by the International Service for National Agricultural Research (ISNAR) division of the International Food Policy Research Institute (IFPRI). The ASTI initiative compiles, processes, and makes available internationally comparable data on institutional developments and investments in public and private agricultural R&D worldwide, and analyses and reports on these trends in the form of occasional policy digests for research policy formulation and priority setting purposes.

Primary funding for the ASTI initiative was provided by the CGIAR Finance Committee/World Bank with additional support from the Australian Centre for International Agricultural Research (ACIAR), the European Union, and the U.S. Agency for International Development (USAID).

Table 1—Composition of agricultural research expenditures and total researchers, 2001

Type of agency	Spending		Researchers ^a	Share		Agencies in sample ^b
	1999	1993		Spending	Researchers	
	CFA francs	international dollars		(percent)	(percent)	
	(millions)		(fte's)			(number)
INRAN	539.1	3.7	82.0	58.4	75.4	1
CMB-SE ^c	238.7	1.6	9.6	25.9	8.8	1
Higher education ^d	145.1	1.0	17.1	15.7	15.7	4
Total	922.9	6.3	108.7	100	100	6

Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–CORAF/WECARD 2002–03).

^a Includes national and expatriate research staff.

^b See note 2 for a list of the six agencies in our sample.

^c Staff at CMB-SE spent 80 percent of their time on research, resulting in 9.6 fte researchers.

^d Expenditures for the higher-education agencies are estimates based on the average expenditures per researcher in the government sector. Researcher totals for the Department of Biology of the Faculty of Sciences and IRSH were estimated using 1991 data from Mazzucato and Ly (1993) and the 2001 data for the two other higher-education agencies. Staff at the four higher-education agencies spent between 10 and 40 percent of their time on research, resulting in 17.1 fte researchers.

below). INRAN's primary purpose is to contribute to the attainment of food security and rural development in Niger. The institute is a semi-autonomous public agency, governed by a Board of Directors comprising 11 members of various ministries and national bodies involved in agricultural research.⁵ INRAN's research focus includes crops, agronomy, animal sciences, forestry, fisheries, and agroecological and environmental issues. These activities are carried out at four regional agricultural research centers based in Niamey, Kollo, Maradi, and Tahoua. Each center oversees various research stations and units known as development support points (PAD) (INRAN 2003; Mazzucato and Ly 1993). Since the 1998 closure of the National Agricultural Research Project (PNRA), an initiative largely financed by a World Bank loan, INRAN has been in severe financial crisis.

The second government agency conducting agricultural research in Niger is the Directorate of Cattle Breeding Centers and Livestock Stations (CMB-SE), under the Ministry of Animal Resources (MRA). In 2002, CMB-SE employed 10 full-time researchers and spent 2 million dollars on agricultural R&D, a quarter of Niger's total agricultural research expenditures. CMB-SE comprises seven research stations, one in each of the country's administrative regions. Researchers at these stations conduct research on livestock genetic improvement, and cattle selection and breeding.

Four higher-education agencies conduct agricultural R&D activities, all within the Abdou Moumouni University (UAM) in Niamey. Together these agencies employed an estimated 17 full-time researchers in 2001, 16 percent of the country's total agricultural research staff. UAM is administered by the Ministry of Secondary and Higher Education, Research, and Technology (MESSRT). The largest of these four UAM units is the Faculty of Agriculture, which conducts applied research on vegetables, livestock, soil, water, forestry, agricultural engineering and socioeconomics. The three remaining higher-education agencies are the Biology Department of the Faculty of Sciences, focusing on crops and natural resources; the Human Sciences Research Institute (IRSH), focusing on the socioeconomics of rural life in Niger; and the Radioisotopes Institute (IRI), focusing on nuclear research.

Unsurprisingly, no private companies directly conduct agricultural research in Niger. As in other countries in the region, however, various producer organizations and private

enterprises engage the public agencies to conduct research on their behalf. In Niger, INRAN is prominent in this regard.

Niger's agricultural research agencies also participate in a significant amount of collaborative research nationally, regionally, and on an international basis. A formal agreement between INRAN and UAM has led to the establishment of a joint research laboratory. In addition to conducting joint projects with CMB-SE and UAM, INRAN participates in regional initiatives such as the Cowpea Project for Africa (PRONAF), the International Sorghum and Millet Collaborative Research Support Program (INTSORMIL), the Regional Center for Training and Application in Agrometeorology and Operational Hydrology (AGHRYMET), and the West and Central African Millet Research Network (ROCAFREMI), and maintains close ties with agricultural research institutes in Algeria, Egypt, Japan, and Tunisia. INRAN also collaborates with international agencies like the Institute of Research for Development (IRD, France), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the International Development Research Center (IDRC, Canada), the Sahel Institute (INSAH), the West Africa Rice Development Association (WARDA), and the World Agroforestry Center (ICRAF).

CMB-SE jointly conducts a project on artificial insemination with Italy's University of Turin, and projects on azawak—a variety of bovine—and red goats in cooperation with Belgian development agencies. UAM works closely with various African, European, and U.S. universities, including the universities of Abomey-Calavi (Benin), Cairo, Gembloux, Hohenheim, Louvain, Paris, Toulouse, and Turin. Other UAM research partners include the Agricultural and Veterinary Institute (IAV) Hassan II, Morocco; the Advanced National School of Agriculture (ENSA), Senegal; and the Swiss Federal Institute of Technology.

HUMAN AND FINANCIAL RESOURCES IN AGRICULTURAL R&D

Overall Trends

Total agricultural researcher numbers in Niger increased by 8.7 percent per year on average during 1971–96 (Figure 1a).⁶ At the time of INRAN's creation in 1975, Niger had minimal national agricultural researchers, necessitating substantial recruitment of expatriates, and then national researchers as they were trained, over the two following decades. The institute's total researcher

A Short History of Government-Based Agricultural Research

Niger's first agricultural research institutions were created in the 1920s and 1930s, and acted as satellites for activities undertaken by the French colonial government through its principal regional agricultural research station, located in Senegal. In 1960, the year of independence, the new Nigerien government created the National Agricultural Research Committee (CNRA) to set national agricultural research priorities and to propose financing levels. This committee still exists today, carrying out the same functions. In 1961, Niger signed a cooperation agreement with France allowing its former colonizer to continue managing and conducting agricultural research through its existing Nigerien agricultural and veterinary institutes.

In 1975, all agricultural research agencies in Niger were nationalized, and the National Agricultural Research Institute of Niger (INRAN) was created. INRAN, currently under the Ministry of Agricultural Development, took over the activities of the five French institutes with permanent structures in Niger. From 1975 until 1984, French funding and personnel progressively withdrew from Niger. French expatriates were quickly replaced by U.S. counterparts, who remained until the mid 1990s, by which time a sizable national research contingent had been trained.

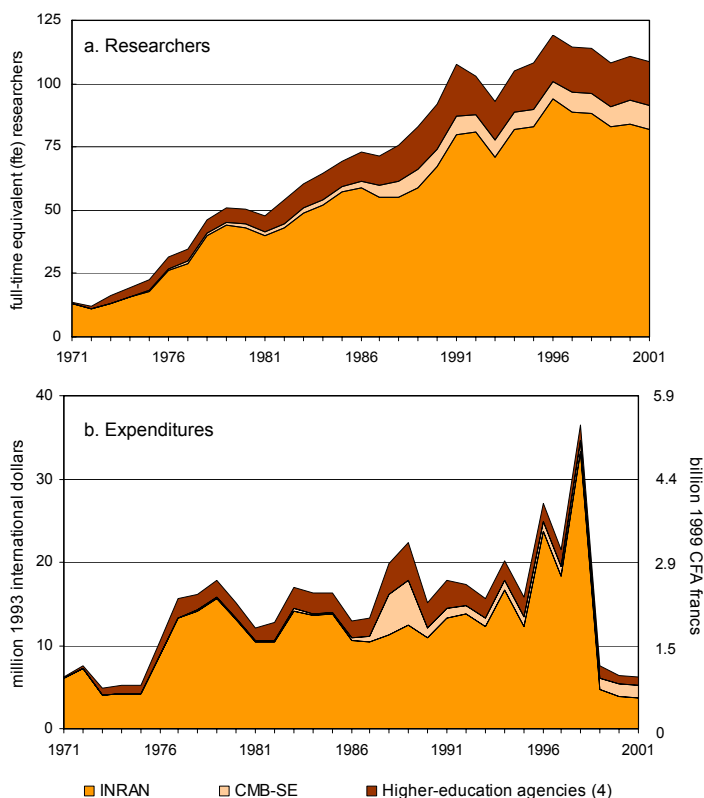
The Directorate of Cattle Breeding Centers and Livestock Stations (CMB-SE) was established in 1974 to conduct livestock research. In 1987, it became a semi-autonomous agency capable of generating much of its own funding through the sale of milk, cheese, and cattle.

Sources: Mazzucato and Ly (1993).

numbers grew steadily during 1975–96, with the exception of 1993 when many expatriate researchers from Japan, the Netherlands, and the United States departed. After peaking at 119 fte researchers in 1996, Niger's total number of agricultural researchers began to contract, falling by 1.8 percent annually until 2001. Retiring researchers ceased to be replaced following a public-sector recruitment freeze, and numerous highly qualified researchers sought employment elsewhere—particularly in the United States and at international organizations—in response to funding and related problems upon the completion of PNRA in 1998. In contrast, agricultural researcher numbers at CMB-SE, which generate a high share of its own funding, and the higher-education agencies, whose research programs are small compared with INRAN, remained fairly stable on average in the late 1990s.

Agricultural R&D spending followed an erratic trend during 1971–2001, increasing overall by an average of 2.3 percent per year (Figure 1b). Strong expenditure growth in expenditures of 15.6 percent annually occurred in the 1970s as a combined result of the creation of INRAN in 1975 and generous financial support from the U.S. government (Mazzucato and Ly 1993). Between 1981 and 1991, agricultural research expenditure growth slowed to 3.0 percent per year. Spending surged in the 1990s as a result of PNRA funding but promptly fell with the completion of PNRA at the end of 1998. INRAN's annual expenditures were slashed from \$36 million in 1998 to only \$7 million in 2001.

Figure 1—Agricultural R&D trends, 1971–2001

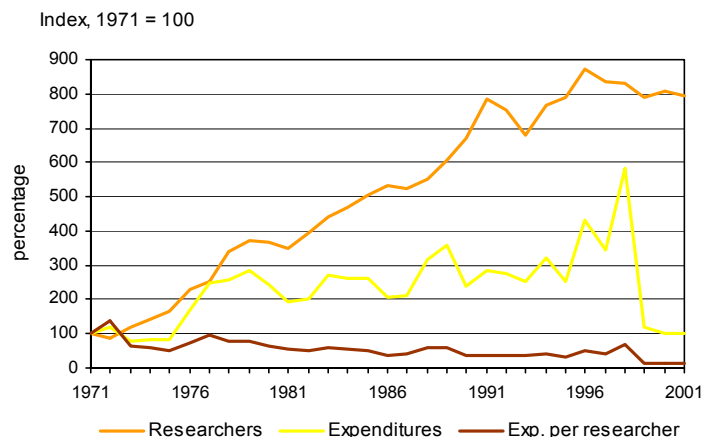


Sources: Compiled by authors from ASTI survey data (IFPRI–ISNAR–CORAF/WECARD 2002–03) and Mazzucato and Ly (1993).

Notes: Figures in parentheses indicate the number of agencies in each category. Expenditures for the higher-education agencies are estimates based on combined average expenditures per researcher for the government agencies. Underlying data are available at the ASTI website (<http://www.asti.cgiar.org>).

The disproportionate rise in agricultural research spending during 1991–98 compared with the rise in researcher numbers caused expenditures per researcher to escalate, peaking at \$320,000 in 1998, though—mirroring total expenditures—they plummeted thereafter, reaching \$58,000 in 2001—well below the 2001 West African average of \$87,000 (Figure 2).

Figure 2—Trends in expenditures, researchers, and expenditures per researcher, 1991–2001

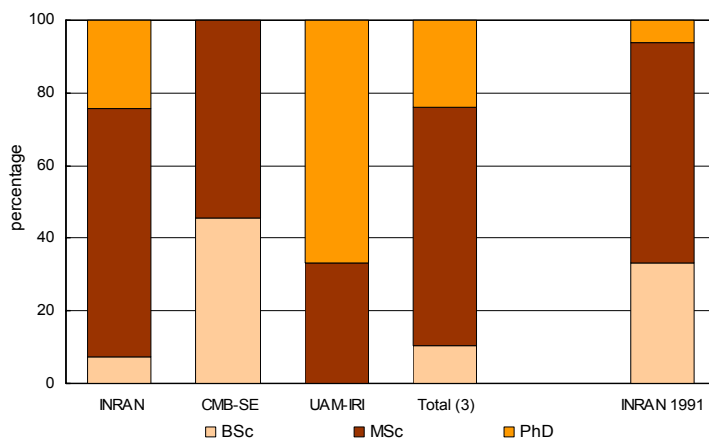


Source: Figure 1.

Human Resources

In 2001, 89 percent of the 95 fte researchers in a three-agency sample were trained to the postgraduate level, and 24 percent held PhD degrees (Figure 3). Research staff at UAM-IRI, the only higher-education agency for which data were available, reported a higher share of research staff trained to postgraduate level than staff at the two government agencies, which is a consistent finding across most African countries (Beintema 2003; Pardey et al. 1997). The education levels of INRAN researchers improved significantly throughout the 1990s; 67 percent of researchers held postgraduate degrees in 1991 compared with 93 percent a decade later. Most of this growth represents increased numbers of fte researchers with PhD

Figure 3—Educational attainment of researchers, 1991 and 2001



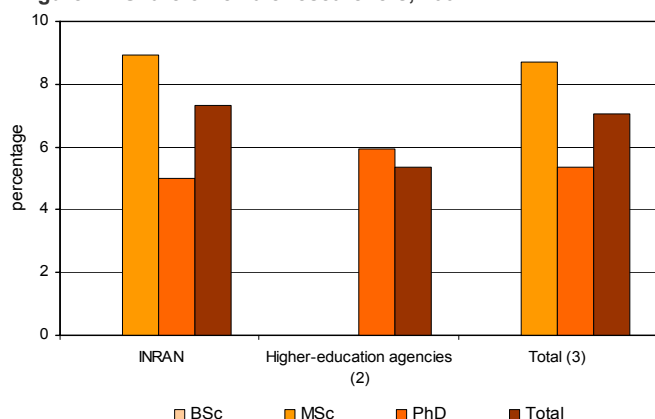
Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–CORAF/WECARD 2002–03) and Mazzucato and Ly (1993).

Notes: Figures in parentheses indicate the number of agencies in each category. Data exclude expatriate staff.

degrees—20 in 2001 compared with only 4 in 1991. PNRA included an important training program for INRAN personnel jointly financed by the World Bank loan, (which funded local training) and the French and the US governments (which funded overseas training). Overall, the number of scientists in Niger with MSc degrees or higher doubled during the course of PNRA (World Bank 1990, 1999).

In 2001, based on a sample comprising INRAN and two of the higher-education agencies, 7 percent of Niger's researchers were female (Figure 4), which is low compared with ratios in many West African countries. In terms of education levels, 9 percent of Nigerien researchers holding MSc degrees and 5 percent of those holding PhD degrees were female. The proportion of female researchers at INRAN changed little in the decade from 1991–2001 (Mazzucato and Ly 1993).

Figure 4—Share of female researchers, 2001

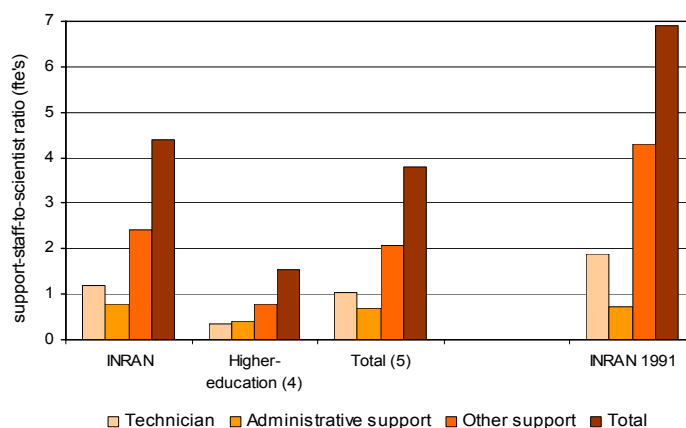


Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–CORAF/WE CARD 2002–03).

Note: Figures in parentheses indicate the number of agencies in each category. Data exclude expatriate staff.

In 2001, the average number of support staff per scientist in a five-agency sample, excluding CMB-SE, was 3.8—1.0 technician, 0.7 administrative personnel, and 2.1 other support staff, such as laborers, guards, and drivers (Figure 5). INRAN had a higher ratio of support staff per scientist (4.4) than the higher-education agencies (1.5), which once again is a common trend in the region and elsewhere. Ten years earlier, INRAN's support staff-to-researcher ratio was 6.9. This moderate decline in the 1990s mainly occurred in the “technician” and “other” categories and can be ascribed, in part, to the training and promotion of technicians to researcher positions in response to the aforementioned public-sector recruitment freeze (World Bank 1999).

Figure 5—Support-staff-to-researcher ratios, 2001



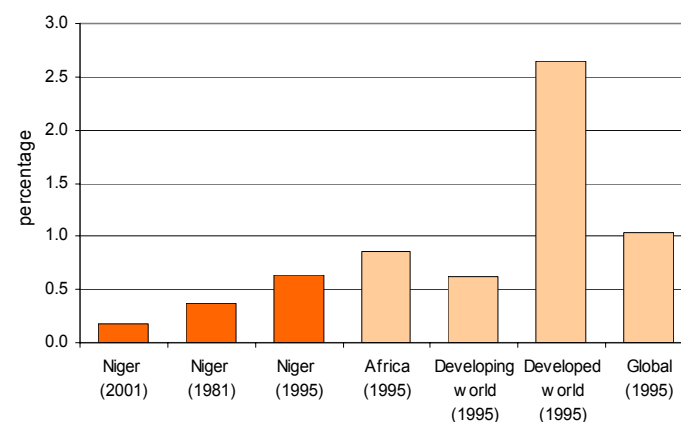
Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–CORAF/WE CARD 2002–03).

Note: Figures in parentheses indicate the number of agencies in each category. Data exclude expatriate staff.

Spending

Total public spending as a percentage of agricultural output (AgGDP) is a common research investment indicator that helps to place a country's agricultural R&D spending in an internationally comparable context. In 2001, Niger invested \$0.17 for every \$100 of agricultural output, one of the lowest shares for Africa. This ratio was also much lower than corresponding ratios recorded in 1981 (0.37) and 1995 (0.64) (Figure 6). By way of comparison, the 1995 ratio for Niger was below the reported 1995 average for Africa (0.85) though it was close to the 1995 average for the developing world (0.62).

Figure 6—Niger's public agricultural research intensity compared regionally and globally

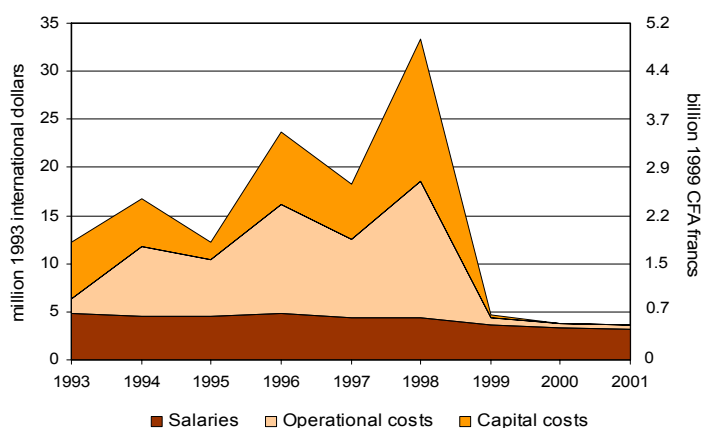


Sources: Niger compiled from Figure 1b; AgGDP from World Bank (2003); other intensity ratios from Pardey and Beintema (2001).

During 1993–2001, operating costs accounted for 39 percent of INRAN's total expenditures on average, while salaries and capital costs accounted for 29 and 32 percent, respectively (Figure 7). Important fluctuations occurred throughout the period, however. In the post-PNRA period (1998–2001), for example, salaries accounted for over 80 percent of INRAN's total expenditures and capital investments were completely halted. PNRA supported large shares of INRAN's operating and capital costs. Through PNRA, INRAN's regional centers in

Kollo, Niamey, and Maradi were renovated; the center at Tahoua was constructed; and various other research stations were upgraded. Capital expenditures accelerated greatly toward the end of 1998, in efforts to disburse all the available funding before the completion of PNRA. By the project's end, major scientific, laboratory, computer, irrigation, and station equipment had been acquired, along with 8 tractors and 82 vehicles, including 4 trucks. All planned renovation and construction was completed with the exceptions of a new conference and training center at INRAN's headquarters in Niamey and a new regional center in Zinder (World Bank 1999).

Figure 7—Cost-category shares in INRAN's expenditures, 1993–2001



Source: Compiled by authors from ASTI survey (IFPRI–ISNAR–CORAF/WE CARD 2002–03).

Notes: Data include estimated salaries for expatriate staff (see Methodology on page 8).

With the completion of PNRA, INRAN's financial future became extremely uncertain. This precarious situation remains to this day, with the institute's research agenda severely disrupted. Five research programs were terminated because of insufficient funding, and researcher salaries are no longer paid on a monthly basis, fueling the aforementioned exodus of highly qualified staff (INRAN 2003). INRAN is currently focusing on research programs that can generate necessary funding for the institute to remain in operation. The Seed Unit shows promise, given the high producer demand for the new varieties.

FINANCING PUBLIC AGRICULTURAL R&D

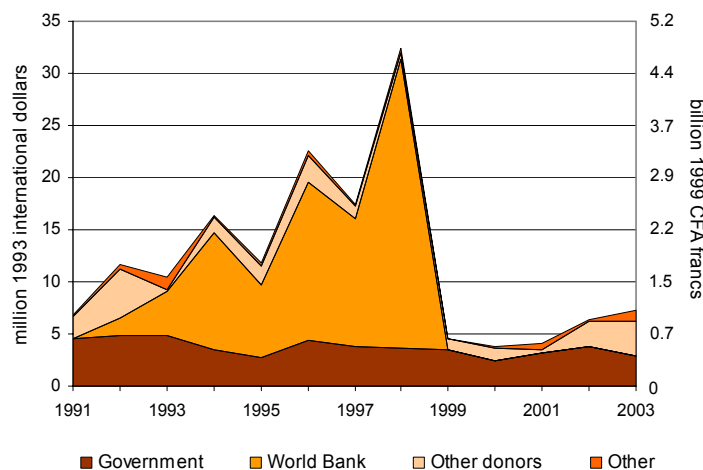
Major contributors to Niger's national agricultural research system in the 1980s and 1990s were the national government, the World Bank (through loans), and foreign donors (through development aid), supplemented by support from public and private enterprises through research contracts and collaboration, and resources generated in-house through the sale of products and services. In addition to national government funding, CMB-SE received support from the Belgian government for its red goat and azawak research projects, and the University of Turin contributed to the center's artificial insemination research. In 2001, nearly 45 percent of CMB-SE's total budget was financed through the sale of the center's products, including meat, cheeses, and other dairy products. Of all the government agencies, the four higher-education agencies were particularly

dependent on national government funding for their research activities. A specific research budget is nonexistent at UAM (UAM 2002). Certain UAM partners, including the Swiss Federal Institute of Technology, the University Paul Sabatier of Toulouse, the University of Hohenheim, and the University of Louvain, contribute financial support to UAM's agricultural research activities.

National Agricultural Research Institute of Niger

During 1991–2003, INRAN relied heavily on foreign donor funding; over half of its budget was generated from a World Bank loan, through PNRA; about 30 percent was contributed by the Nigerien government; and the remainder was derived from foreign donors, public and private enterprises, and self-generating funding sources (Figure 8). USAID was a major donor to agricultural research in Niger from the time of INRAN's establishment in 1975, and continued to fund programs on sorghum, millet, beans, cowpeas, and natural resource management in the 1990s and early 2000s.

Figure 8—INRAN's funding sources, 1991–2003



Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–CORAF/WE CARD 2002–03).

Notes: "Other" includes internally generated income, contributions from private enterprises, and nonidentified sources of income. INRAN's funding levels are lower than its expenditure levels because estimated salaries for expatriates are not included.

PNRA ran from 1990 to 1998, with the principal objectives of reinforcing Niger's capacity for agricultural research planning and implementation by improving priority setting and resource allocation methodology; by coordinating research programs, including formulation and execution, budgeting and financial management, personnel management, and training; and by strengthening linkages between research and extension. A key component of the project was upgrading INRAN's research infrastructure and equipment and training its national research staff.

The initial project budget totaled US\$28 million and—in addition to a World Bank loan of US\$19.9 million—included US\$3.5 million from the Nigerien government and US\$4.6 million from bilateral donors such as France and the United States. On the whole, PNRA was successful in terms of improving research planning and coordination, financial management, and linkages between research and extension, and in providing researcher training and new and rehabilitated

infrastructure. The project, however, was unable to support INRAN in achieving autonomous management in terms of funding and staffing, including the associated governance structures and funding bodies. By the project's end, the World Bank had contributed US\$20.4 million in loans (slightly higher than had initially been budgeted). USAID supported PNRA's training component through a separate bilateral project valued at US\$1.37 million. However, the Nigerien government was only able to raise about a quarter of the agreed counterpart funding under PNRA. It is most unlikely, therefore, that the government will be in the position to bear recurrent costs, which have risen as a result of the project (World Bank 1999). More disappointingly, gains achieved through PNRA have eroded since the project finished as a result of the dire funding situation, which has halted research activities and forced newly qualified national researchers to seek employment outside the country. Annual government contributions are insufficient to cover yearly salaries, let alone the operating costs associated with maintaining research programs. Circumstances went so far as to leave the institute without electricity, water, and telecommunications for sustained periods of time (INRAN 2003). INRAN has made efforts to explore alternative funding methods. In 2003, for example, 15 percent of the institute's total budget was generated internally, largely through sales by its Seed Unit, as previously discussed.

Additional contributing donors to INRAN from 1991 to 2003 included ICRAF, INSAH, WARDA, and CORAF/WECARD, and the Government of France. At the end of PNRA, projects such as INTSORMIL—largely financed by American university consortiums—and PRONAF—launched in May 2000 and financed by the International Fund for Agricultural Development (IFAD) and the government of Switzerland—have financed some of INRAN's research expenditures. INRAN also received limited funding through a US\$12.1 million project launched in January 2001—the Agro-Pastoral Export Promotion Project (APEPP)—largely funded by World Bank loans (World Bank 2000). The purpose of APEPP, which began in 2001 and is scheduled to run until 2005, is to enhance Niger's agricultural exports by distributing tools to the private sector and to farmers that will increase production and profitability. Specifically, the project builds technical, organizational, and institutional capacity in businesses, professional organizations, and producer groups to empower them to take advantage of opportunities in regional and international markets (World Bank 2000).

INRAN's future funding is highly dependent on the institute's ability to generate resources through its products and services and to attract contributions from regional projects and foreign donors. No large projects were on the horizon as of mid-2004, however. Further exacerbating this situation, the Nigerien government is not in a position to contribute to INRAN's research activities.

RESEARCH ORIENTATION

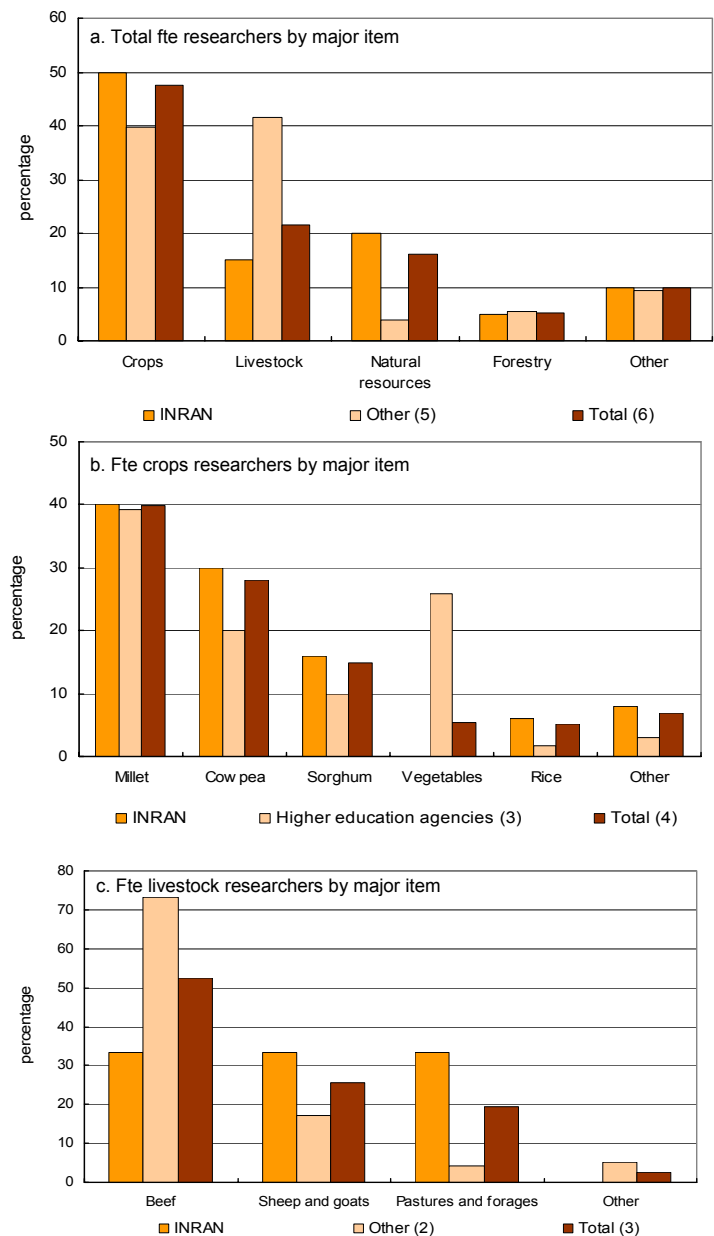
Commodity Focus

The allocation of resources among various lines of research is a significant policy decision; hence detailed information was collected on the number of fte researchers working in specific commodity and thematic areas.

In 2001, close to half of Niger's 109 fte researchers conducted crop research (Figure 9a). Livestock research accounted for 22 percent, research on natural resources for 16 percent, and forestry research for 5 percent. INRAN's researchers spent relatively less time on livestock research and more time on natural resources than their counterparts at the other five agricultural R&D agencies.

In 2001, the most researched crops were millet (40 percent), cowpea (28 percent), sorghum (15 percent), vegetables (5 percent) and rice (5 percent) (Figure 9b). Researchers at the three agencies involved in livestock research spent more than 50 percent of their time on beef, followed by sheep and goats (26 percent), and pastures and forages (20 percent) (Figure 9c).

Figure 9—Commodity focus, 2001



Source: Compiled by authors from ASTI survey data (IFPRI–ISNAR–CORAF/WECARD 2002–03).

Notes: Figures in parentheses indicate the number of agencies in each category. Figure 9b only includes agencies involved in crop research; Figure 9c only includes agencies involved in livestock research.

Thematic Focus

In 2001, 15 percent of INRAN's researchers focused on crop genetic improvement, 15 percent on soils, and 10 percent on crop pest and disease control (Table 2). The remaining researchers concentrated largely on other crops, livestock, and natural resources. Crops, soil, and livestock themes represented the most important research themes at the three higher-education agencies in our sample.

Table 2—Thematic focus, 2001

	Numbers of researchers		Shares	
	INRAN	Higher education (3)	INRAN	Higher education (3)
	<i>(in fte's)</i>		<i>(percent)</i>	
Crop genetic improvement	12.3	1.0	15.0	5.9
Crop pest and disease control	8.2	1.3	10.0	8.1
Other crop	12.3	6.1	15.0	37.5
Livestock genetic improvement	—	0.5	—	3.0
Livestock pest and disease control	—	0.2	—	1.2
Other livestock	12.3	1.5	15.0	9.4
Soil	12.3	1.7	15.0	10.3
Water	4.1	0.7	5.0	4.4
Other natural resources	8.2	0.5	10.0	3.0
Postharvest	4.1	0.1	5.0	0.6
Other	8.2	2.7	10.0	16.8
Total	82.0	16.3	100	100

Source: Compiled by authors from ASTI survey data (IFPRI-ISNAR-CORAF/WECARD 2002-03).

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

CONCLUSION

Total agricultural researcher numbers in Niger rose steadily until the mid-1990s, after which they contracted slightly. The country's agricultural R&D expenditures showed an erratic upward trend until 1998, but fell drastically with the completion of the major World Bank-led initiative, PNRA. PNRA was funded by a World Bank loan, the national government, and the governments of France and the United States. The project provided substantial financial support to INRAN for capital and operating infrastructure (such as renovation and construction of several of the institute's research centers and stations and the purchase of research and related equipment and vehicles). PNRA also funded extensive training, leading to important increases in the qualification levels of the institute's researchers.

The completion of PNRA in 1998 left INRAN in a bleak financial situation, with its total budget cut by 85 percent between 1998 and 1999. As a result, some of its most senior staff sought employment elsewhere and the institute has been forced to terminate a number of research programs. The only remaining programs are those that support INRAN in generating sufficient internal funds to continue operations. The national government's inability to provide funding to the institute, along with the lack of important donor projects on the horizon, have all but halted INRAN's ability to function. Further, many of the gains made under PNRA have been or remain under threat of being totally eroded.

NOTES

1. The authors are grateful to Soumaïla Abdourahamane, Bassirou Kirgni, and Basso Yacouba for their time and assistance with the data collection, and thank Nienke Beintema, Kristin Davis, and Mahaman Issaka Mahamane for useful comments on drafts of this brief. The authors particularly recognize Chétima Maï Moussa, a valued contributor to this project, who passed away in 2003.
2. The six-agency sample consisted of:
 - Two government agencies/units: *Institut National de la Recherche Agronomique du Niger* (INRAN) and *Direction des Centres de Multiplication du Bétail et Stations d'Élevage* (CMB-SE); and
 - Four higher-education agencies: *Faculté d'Agronomie, Département de Biologie* of the *Faculté des Sciences*, *Institut de Recherches en Sciences Humaines* (IRSH), and *Institut de Radio-Isotopes* (IRI)—all within *Université Abdou Moumouni* (UAM).

3. Unless otherwise stated, all data on research expenditures are reported in 1993 international dollars or in 1999 CFA francs.
4. English translations of agency names have been used throughout the brief except in note 2, where the original French is provided.
5. Two additional deliberating bodies under INRAN—the Scientific Council and the Advisory Council—will not become operational until the institute's financial situation improves.
6. Annual growth rates are calculated using the least-squares regression method, which takes into account all observations in a period. This results in growth rates that reflect general trends that are not disproportionately influenced by exceptional values, especially at the end point of the period.

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METHODOLOGY

- Most of the data in this brief are taken from unpublished surveys (IFPRI, ISNAR, and CORAF/WECARD 2002-03).
- The data were compiled using internationally accepted statistical procedures and definitions developed by the OECD and UNESCO for compiling R&D statistics (OECD 1994; UNESCO 1984). We grouped estimates using three major institutional categories—government agencies, higher-education agencies, and business enterprises, the latter comprising the subcategories private enterprises and nonprofit institutions. We defined public agricultural research to include government agencies, higher-education agencies, and nonprofit institutions, thereby excluding private enterprises. Private research includes research performed by private-for-profit enterprises developing pre, on, and postfarm technologies related to agriculture.
- Agricultural research includes crops, livestock, forestry, and fisheries research plus agriculturally related natural resources research, all measured on a performer basis.
- Financial data were converted to 1993 international dollars by deflating current local currency units with a Nigerien GDP deflator of base year 1993 and then converting to U.S. dollars with a 1993 purchasing power parity (PPP) index, both taken from World Bank (2003). PPP's are synthetic exchange rates used to reflect the purchasing power of currencies, typically comparing prices among a broader range of goods and services than conventional exchange rates.
- The salaries and living expenses of many expatriate researchers working on donor-supported projects are paid directly by the donor agency and are often excluded in the financial reports of the agricultural R&D agencies. These *implicit* costs have been estimated using the average cost per researcher in 1985 to be \$160,000 1993 international dollars and backcasting this figure using the rate of change in real personnel costs per full-time researcher in the US state agricultural experiment station system. This extrapolation procedure has the assumption that the personnel-cost trend for US researchers is a reasonable proxy of the trend in real costs of internationally recruited staff in the agricultural R&D agencies.

See the ASTI website (<http://www.ASTI.cgiar.org>) for more details on methodology.

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ABOUT THE AUTHORS

Gert-Jan Stads <g.stads@cgiar.org> is a consultant for the ASTI initiative based at IFPRI.
 Mahaman Hamissou Kabaley <inran@intnet.ne> is a researcher at INRAN.
 Mohamadou Gandah <inran@intnet.ne> is INRAN's Scientific Director.

CONTACT ASTI INITIATIVE <http://www.asti.cgiar.org>

Nienke Beintema, Head ASTI initiative <ASTI@cgiar.org>

International Food Policy Research Institute (IFPRI)
 2033 K Street, N.W.
 Washington, D.C. 20006 U.S.A.
 Phone +1 (202) 862-5600
 Fax +1 (202) 467-4439
<http://www.ifpri.cgiar.org>