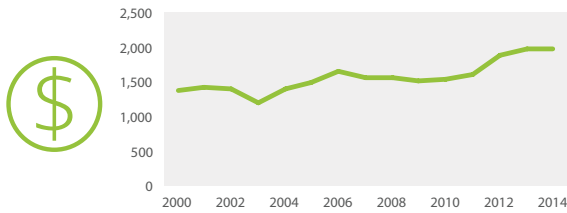


SOUTH AFRICA

Nienke Beintema, Lang Gao, and Petronella Chaminuka

AGRICULTURAL RESEARCH SPENDING



Million rand
(2011 constant prices)

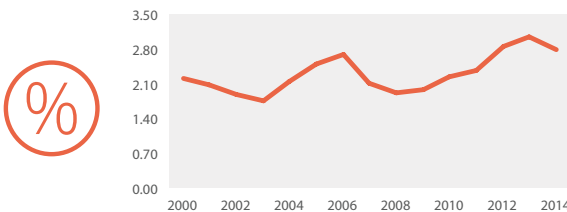
1,992.7

Million PPP dollars
(2011 constant prices)

417.4

	SOUTH AFRICA	GHANA	KENYA	NIGERIA
Million PPP dollars (2011 constant prices)	417.4	197.4	274.1	533.5

SPENDING INTENSITY

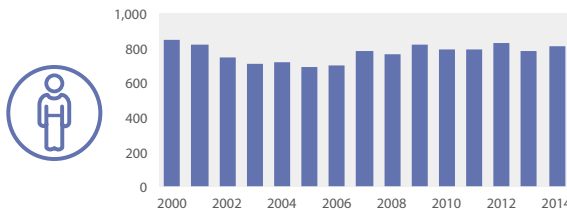


Agricultural research
spending as a share
of AgGDP

2.78%

	SOUTH AFRICA	GHANA	KENYA	NIGERIA
Agricultural research spending as a share of AgGDP	2.78%	0.99%	0.79%	0.22%

AGRICULTURAL RESEARCHERS



Full-time
equivalents

811.3

Share of researchers with
MSc and PhD degrees

89%

	SOUTH AFRICA	GHANA	KENYA	NIGERIA
Full-time equivalents	811.3	575.0	1,178.5	2,975.5
Share of researchers with MSc and PhD degrees	89%	95%	80%	33%

Notes: Data above are for 2014. Research conducted by the private for-profit sector is excluded from this factsheet due to lack of available data. Information on access to further resources, data procedures and methodologies, and acronyms and definitions are provided on Page 4. See www.asti.cgiar.org/South_Africa/directory for an overview of South Africa's agricultural R&D agencies.



Strong national investment

In terms of agricultural research investment and capacity levels, as of 2014 South Africa ranked second from a regional perspective, after Nigeria. Investment in agricultural research rebounded between 2008 and 2013 in inflation adjusted terms, after a period of decline. In 2014, South Africa's agricultural research spending as a share of AgGDP was unusually high by African standards (2.78 percent), but levels appear to have contracted since then.



Capacity strengthening at ARC

Compared with agricultural research agencies elsewhere in Africa, human resource capacities within ARC's institutes tend to be more balanced in terms of degree levels, gender balance, and age distribution. The number of PhD-qualified researchers increased over time, but an issue remains with replacing an aging pool of senior scientists. An effective succession plan is needed, including strategies for recruitment, training, and mentoring.



Funding diversification at ARC

The 2009 governmental restructuring that led to the transfer of some functions from the Department of Agriculture to a newly formed Department of Rural Development and Land Reform benefited ARC through funding for a number of new projects. During this time, however, funding from the country's commodity boards decreased significantly.

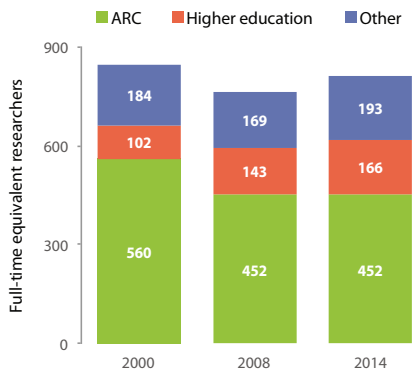


ARC's Biotechnology Platform

ARC's Biotechnology Platform was established in 2010 as a research and service-driven mechanism targeting the development of agricultural biotechnology. Through the platform, resources are developed for the application of advanced genomics, molecular breeding, and bioinformatics for dissemination within ARC, to the Council's collaborators, and to the private sector and other research agencies throughout Africa. The platform also provides an environment in which the next generation of highly skilled young researchers can be developed.

Institutional composition of South Africa's agricultural research

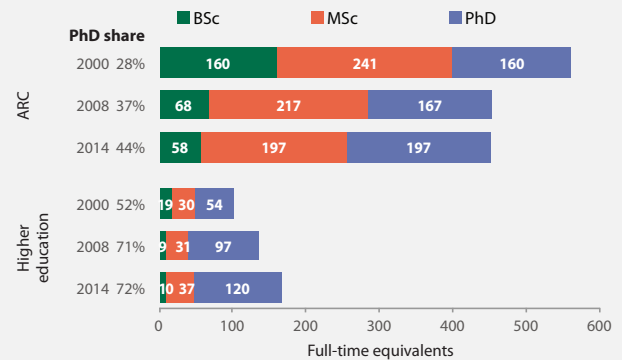
The total number of researchers employed by ARC fell during 2000–2014, resulting in a decline in the Council's share of the national total from 66 to 56 percent. In contrast, strong growth in the number of researchers employed in the higher education sector caused its share to increase from 12 percent in 2000 to 20 percent in 2014.



Notes: Data for the higher education sector in 2014 are from DHET–HEMIS. "Other" includes other government and nonprofit agencies, the data for which were estimated based on expenditure data from IHSRC–CeSTII and spending per researcher data from ARC and the higher education sector.

Agricultural researchers employed at ARC and in the higher education sector by qualification level

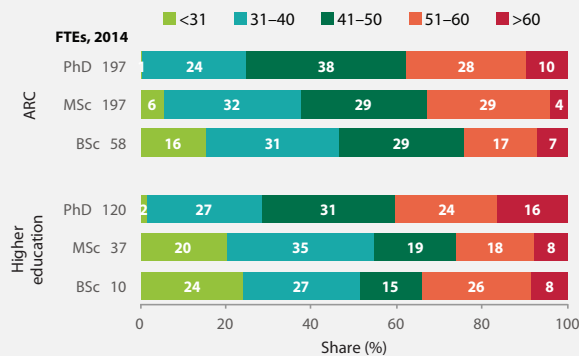
Although the higher education sector employs far fewer agricultural researchers than ARC (in FTEs), its share of researchers with PhD degrees rose considerably. ARC's share of PhD-qualified researchers also rose over time, and numbers and shares of researchers qualified to the BSc-degree level declined at both ARC and in the higher education sector.



Notes: Data exclude other government and nonprofit agencies due to lack of availability. Data for ARC and higher education agencies exclude a substantial number of technical support staff with BSc and MSc degrees because they do not hold official researcher status.

Agricultural researchers employed at ARC and in the higher education sector by age bracket

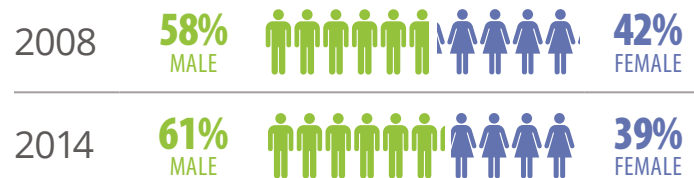
As of 2014, about 40 percent of the PhD-qualified researchers employed at ARC and in the higher education sector were in their 50s and 60s. Although substantial, this share is lower than corresponding shares in many other African countries.



Note: Data exclude other government and nonprofit agencies due to lack of availability.

Share of female researchers employed at ARC and in the higher education sector

The combined share of female researchers employed at ARC and in the higher education sector declined from 42 percent in 2008 to 39 percent in 2014; this decline occurred at both ARC and the higher education sector. ARC's institutes employ relatively more women than the higher education agencies.



By qualification level, 2014

BSc	39%	PhD	33%
-----	-----	-----	-----

By institutional category, 2014

ARC	40%	Higher education	34%
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Note: Data exclude other government and nonprofit agencies due to lack of availability.

MSc- and PhD-qualified agricultural researchers employed at ARC and in the higher education sector by discipline

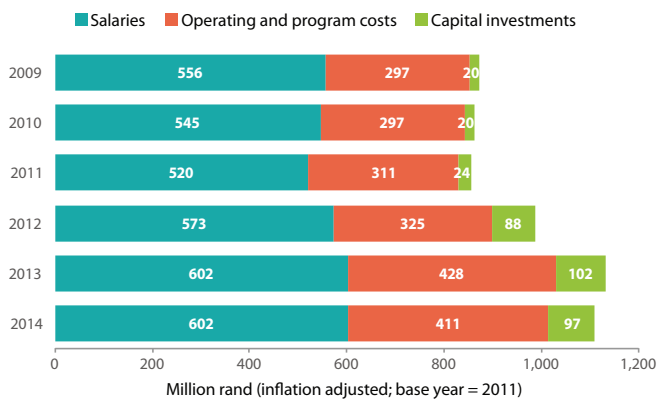
The highest proportion of researchers employed at both PhD and MSc levels are mainly in the plant and crop science fields. As of 2014 there were no researchers specializing in poultry, dairy sciences, or fisheries and aquaculture.

Agricultural researchers, 2014	FTEs		Share (%)	
	MSc	PhD	MSc	PhD
Plant breeding/genetics (incl. biotechnology)	25	20	11	6
Plant pathology	11	13	5	4
Plant physiology	2	2	1	1
Botany	3	17	1	5
Other crop sciences	17	38	7	12
Animal breeding/genetics	5	11	2	3
Animal husbandry	5	1	2	0
Animal nutrition	5	5	2	1
Dairy science	–	–	–	–
Poultry	–	–	–	–
Veterinary medicine	4	7	2	2
Zoology/entomology	10	18	4	6
Other animal and livestock	7	21	3	7

Agricultural researchers, 2014	FTEs		Share (%)	
	MSc	PhD	MSc	PhD
Forestry and agroforestry	2	2	1	1
Fisheries and aquatic resources	–	–	–	–
Soil sciences	20	18	9	6
Natural resources management	6	8	3	3
Water and irrigation management	2	4	1	1
Ecology	5	3	2	1
Biodiversity conservation	–	–	–	–
Food sciences and nutrition	8	19	3	6
Socioeconomics (incl. agricultural economics)	8	10	3	3
Extension and education	2	3	1	1
Other sciences	85	98	37	31
Total	234	317	100	100

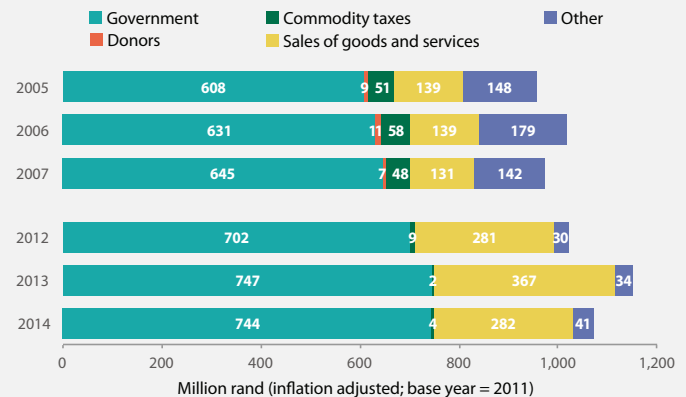
ARC's spending by cost category

During 2009–2014, salaries accounted for close to 60 percent of ARC's expenditures. Recent growth in spending was partly driven by increased operating and program costs, as well as increased investment in capital infrastructure.



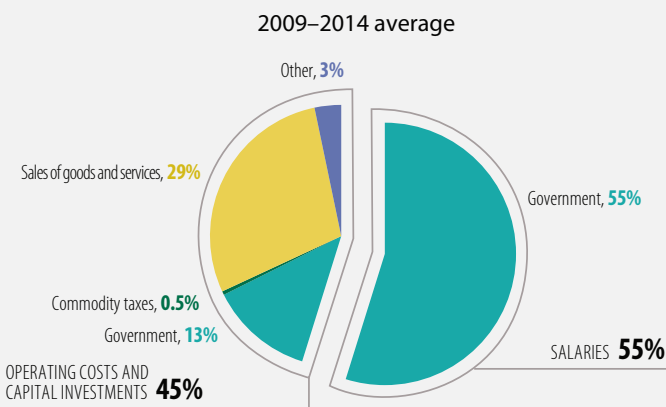
Sources of ARC's funding

During 2012–2014, ARC received about two-thirds of its funding from the government. Changes in the funding allocation of the country's commodity trusts caused funding generated through commodity taxes to decline significantly during this timeframe. In contrast, during 2010–2014, revenues generated through the sale of goods and services more than doubled due to an increase in project-based funding stemming from government restructuring.



ARC's spending and funding compared, 2012–2014

Although government support to ARC remained stable during 2009–2014, it was only sufficient to cover salary-related expenses and a portion of the Council's operating costs. ARC generates substantial revenues through the sale of its products and services, and depends on these revenues to support its institutes' research activities.



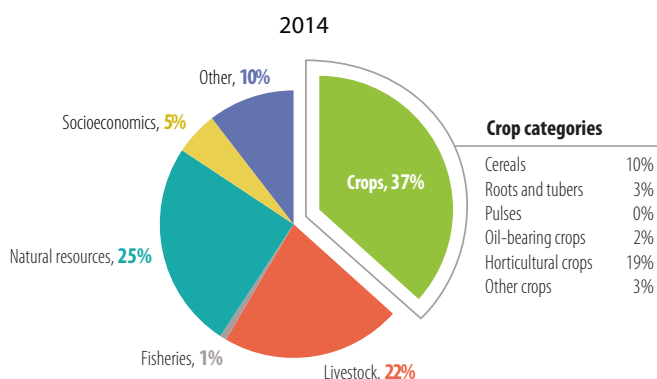
ARC's recent peer-reviewed publications

ARC published an average of 187 journal articles per year during 2012–2014, primarily in international journals. Publications per researcher averaged 0.5 per year.

Type	Number of publications, 2012–2014 yearly average	Per FTE researcher
Journal articles		
International	186.7	0.285
Regional	23.7	0.036
National	60.7	0.093
Books	1.3	0.002
Book chapters	27.0	0.041
Total	299.4	0.457

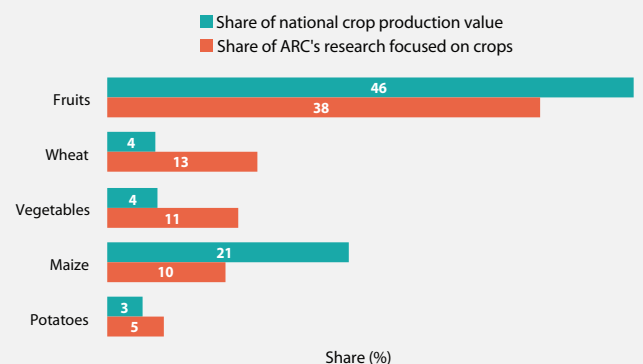
ARC's agricultural researchers by area of focus

In 2014, more than one-third of ARC's researchers were conducting crop research, 22 percent were undertaking livestock research, and 25 percent were focused on research related to natural resources. That year, 38 percent of all crop researchers were focused on issues related to fruit. Other important crops being researched were wheat, vegetables, and legumes and pulses.



Alignment of research focus with production value, selected crops

Data for 2013–2014 indicate that the level of research undertaken on fruit and maize was lower than their crop production values would indicate, whereas wheat, vegetables, and potatoes received significantly more research attention than would appear to be warranted purely based on production values.



Notes: Data on production values are from FAO (<http://faostat.fao.org>); data on research focus are from ASTI.

Resources for South Africa

This factsheet presents recent data on the performance of agricultural research in South Africa, primarily focusing on key financial, human resource, institutional, and output indicators, while also highlighting relevant trends, challenges, and institutional changes. Additional resources are available at www.asti.cgiar.org and include:



ASTI's **interactive country page** for South Africa features national agricultural research investment and capacity data, a data exploration and download tool, as well as access to a variety of country publications.



ASTI's **benchmarking tool** allows key agricultural research indicators to be ranked and compared across African countries.



ASTI's **data download tool** provides access to more in-depth ASTI datasets and graphs for South Africa and many other countries.



ASTI's **agency directory** provides a view of agencies that conduct agricultural research in South Africa, along with their locations and key agency-level indicators.

The screenshot shows the ASTI website interface for South Africa. At the top, there are language options (français, español, contact) and the title 'ASTI led by IFPRI'. Below this is a navigation bar with links for Home, Data, Regions, Publications, Projects, News, Partners, About, and a Country Selector. The main content area is titled 'SOUTH AFRICA' and contains three columns of text. The first column discusses 'Strong national investment', the second 'Capacity strengthening at ARC', and the third 'Funding diversification at ARC'. Each column has a small image and a link to a 'Latest Factsheet'. At the bottom, there are links for 'Key Indicators', 'Financial Resources', 'Human Resources', 'Research Focus', '{country-profile}', and 'Regional comparison'.

ASTI Data Procedures and Methodologies

- ▶ The **data underlying this factsheet** were predominantly derived through primary surveys, although some data were drawn from secondary sources or were estimated.
- ▶ **Agricultural research** includes research conducted by the government, higher education, and nonprofit sectors; research conducted by the private for-profit sector is excluded due to lack of available data.
- ▶ ASTI bases its calculations of human resource and financial data on **full-time equivalent (FTE) researchers**, which take into account the proportion of time staff actually spend on research compared with other activities.
- ▶ ASTI presents its financial data in 2011 local currencies and **2011 purchasing power parity (PPP) dollars**. PPPs reflect the relative purchasing power of currencies more effectively than do standard exchange rates because they compare prices of a broader range of local—as opposed to internationally traded—goods and services.
- ▶ ASTI estimates the **higher education sector's research expenditures** because it is not possible to isolate them from the sector's other expenditures.
- ▶ Note that **decimal rounding** can cause totals to be one point higher or lower than the sum of their parts.



For more information on ASTI's data procedures and methodology, visit www.asti.cgiar.org/methodology.

Acronyms

AgGDP	agricultural gross domestic product
ARC	Agricultural Research Council
HSRC-CeSTII	Centre for Science, Technology and Innovation Indicators of the Human Sciences Research Council
DHET-HEMIS	Higher Education Management Information System of the Department of Higher Education and Training
FTE(s)	full-time equivalent(s)
PPP(s)	purchasing power parity (exchange rates)
R&D	research and development

ABOUT ASTI, IFPRI, AND ARC

Working through collaborative alliances with numerous national and regional R&D agencies and international institutions, **Agricultural Science and Technology Indicators (ASTI)** is a comprehensive and trusted source of information on agricultural R&D systems across the developing world. ASTI is led by the **International Food Policy Research Institute (IFPRI)**, which—as a CGIAR member—provides evidence-based policy solutions to sustainably end hunger and malnutrition and reduce poverty. The **Agricultural Research Council (ARC)** is the country's principal agricultural research agency. The council falls under the Department of Agriculture, Forestry and Fisheries and drives research and development, and disseminates knowledge in the agricultural sector.

ASTI/IFPRI and ARC gratefully acknowledge participating agricultural R&D agencies for their contributions to the data collection and preparation of this factsheet. ASTI also acknowledges the Bill & Melinda Gates Foundation and CGIAR Research Program on Policies, Institutions, and Markets for their generous support of ASTI's work in Africa south of the Sahara, and Frikkie Liebenberg for his contribution to ASTI over more than a decade. This factsheet has been prepared as an ASTI output and has not been peer reviewed; any opinions are those of the authors and do not necessarily reflect the policies or opinions of IFPRI or ARC.

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