

# BOTSWANA

Kathleen Flaherty, Nienke Beintema, and Neo Sharon Bodilenyane

## Key Trends

- ▶ Ongoing economic difficulties have constrained agricultural research spending in Botswana since 2006. Expenditure levels dropped by 40 percent during 2006–2011, and thereafter remained fairly constant, in inflation-adjusted terms.
- ▶ The country invests a relatively high share of its AgGDP in agricultural research (2.27 percent in 2016), but this is not uncommon among countries with small populations and relatively high per capita income levels. Small countries are unable to take advantage of economies of scale, so basic research infrastructure and staffing constitute greater shares of investments compared with larger countries. Comparisons among countries with similar economic structure indicate that Botswana appears to be underinvesting by about one-third.
- ▶ Botswana's total number of agricultural researchers has risen over time, initially due to an increase in the number of BSc-qualified researchers, but more recently due to the recruitment of researchers qualified to the MSc- and PhD-degree levels.

## Current Challenges

- ▶ BUAN was created in 2016 from the former Botswana College of Agriculture. The university's upgraded status and facilities allow for a greater number of students, but

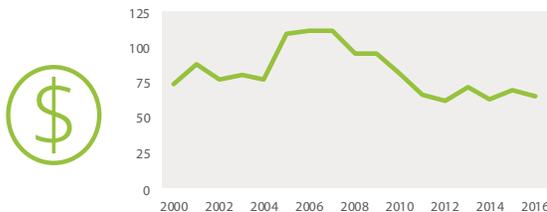
research continues to be constrained by limited project funding. Provision of postgraduate training is also limited, so most MSc and PhD degrees are still obtained abroad.

- ▶ Agricultural research in Botswana is almost entirely funded by the government. Budget cuts in recent years have left the main agency, DAR, with insufficient resources to conduct research and maintain its infrastructure. During 2015–2016, the department released no new crop varieties or other technologies.
- ▶ Botswana has a limited number of skilled and experienced agricultural researchers. DAR needs senior PhD-qualified researchers to devise research proposals and lead research programs.

## Policy Developments and Options

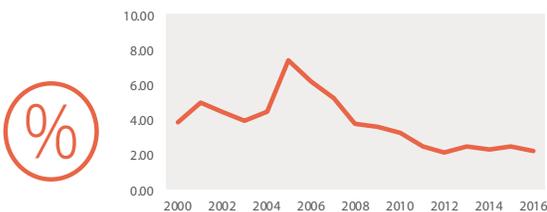
- ▶ It is important that DAR take steps to address its human resource capacity constraints, in particular, training and mentoring its young, inexperienced researchers. It is also important that the government supports BUAN in increasing the number and size of the MSc- and BSc- degree programs offered.
- ▶ DAR needs to diversify its funding sources. For example, competitive regional grants and donor calls for proposals offer a potential new source of research funding. The department would also benefit from being able to retain the revenues it generates through the sale of goods and services; currently, such revenues are channeled back to the national Treasury.

## AGRICULTURAL RESEARCH SPENDING



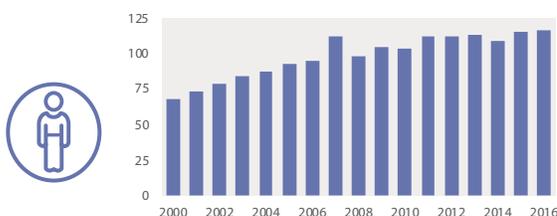
	BOTSWANA	MOZAMBIQUE	ZAMBIA	ZIMBABWE
Million pula (2011 constant prices)	65.8			
Million PPP dollars (2011 constant prices)	17.5	29.3	26.9	43.4

## SPENDING INTENSITY



Agricultural research spending as a share of AgGDP	2.27%	0.36%	0.51%	1.44%
--	-------	-------	-------	-------

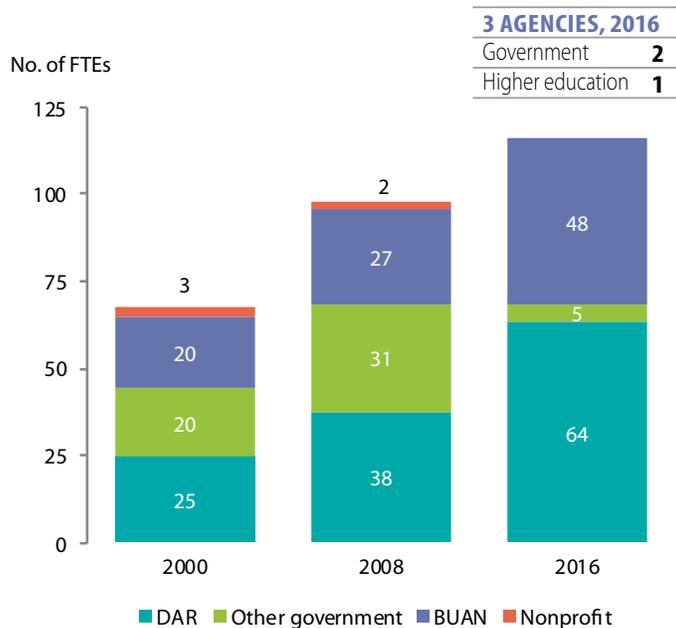
## AGRICULTURAL RESEARCHERS



Full-time equivalents	116.0	308.4	245.6	208.7
Share of researchers with MSc and PhD degrees	66%	56%	57%	58%

## Institutional composition of agricultural research

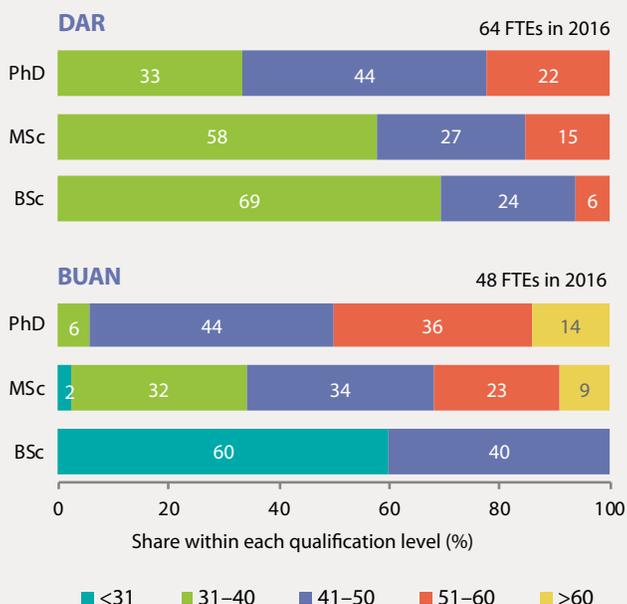
The sectoral composition of agricultural research in Botswana has shifted over time. DAR and BUAN account for higher and growing shares of researchers, whereas the roles of other government and nonprofit agencies have contracted. As of 2016, DAR accounted for half of the country's agricultural researchers.



Note: Veld Products Research and Development, a nonprofit agency, discontinued its research activities in 2010.

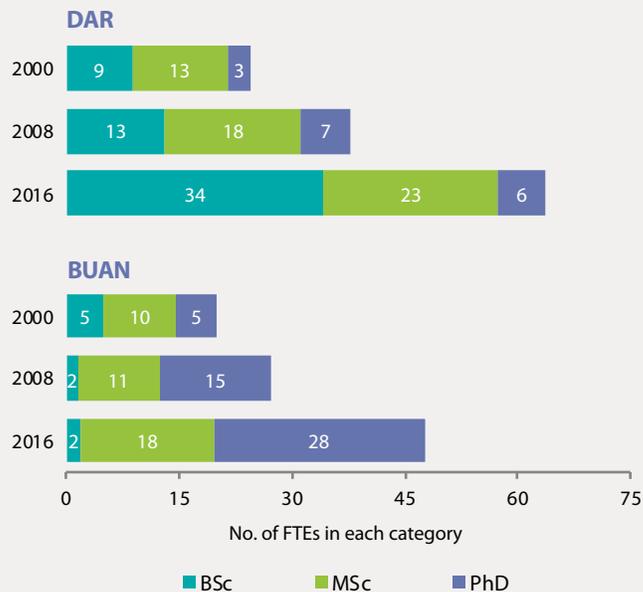
## Distribution of agricultural researchers by qualification level and age bracket

Most researchers employed at DAR are in their 30s and 40s. The department's PhD-qualified researchers are also unusually young. In contrast, as of 2016, half the agricultural researchers with PhD degrees at BUAN were more than 50 years old.



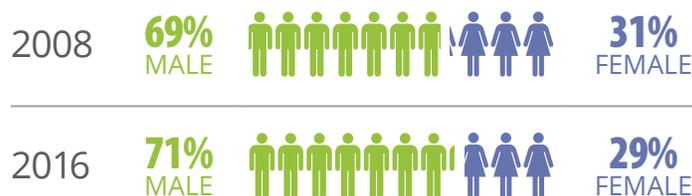
## Agricultural researchers by sector and qualification level

In many African countries, recent growth in agricultural researcher capacity has been driven by the higher education sector. In Botswana, however, DAR was the main source of growth during 2000–2016, primarily due to an influx of BSc-qualified researchers. While growth at BUAN was less pronounced, it was largely due to the addition of PhD-qualified researchers (in FTEs).



## Agricultural researchers by gender

Overall, the country's share of female researchers contracted slightly in recent years, from 31 percent in 2008 to 29 percent in 2016. In general, female researchers were relatively younger and less well-qualified than their male colleagues.



### Share of women within each qualification level, 2016

BSc	29%	MSc	34%	PhD	23%
-----	-----	-----	-----	-----	-----

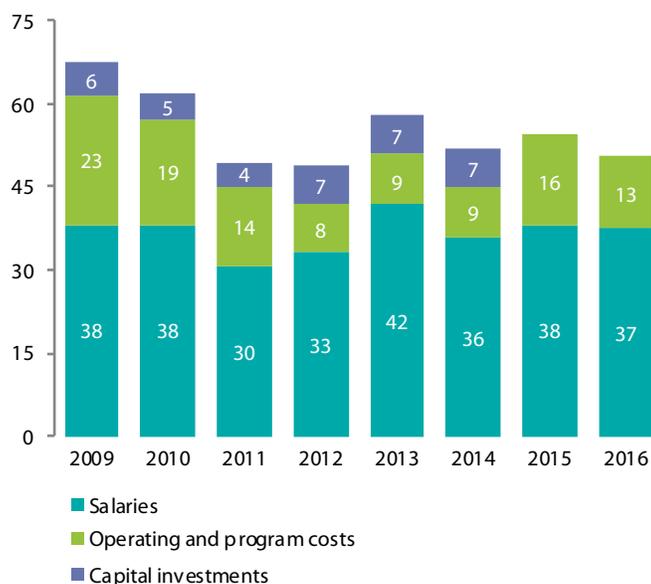
### Share of women by age bracket, 2016

< 41	35%	41–50	27%	> 50	21%
------	-----	-------	-----	------	-----

## DAR's spending by cost category

Salaries and related expenses accounted for an increasing share of DAR's total spending during 2009–2016. Nonsalary-related spending contracted during this timeframe, limiting DAR's ability to conduct research or maintain its infrastructure and equipment.

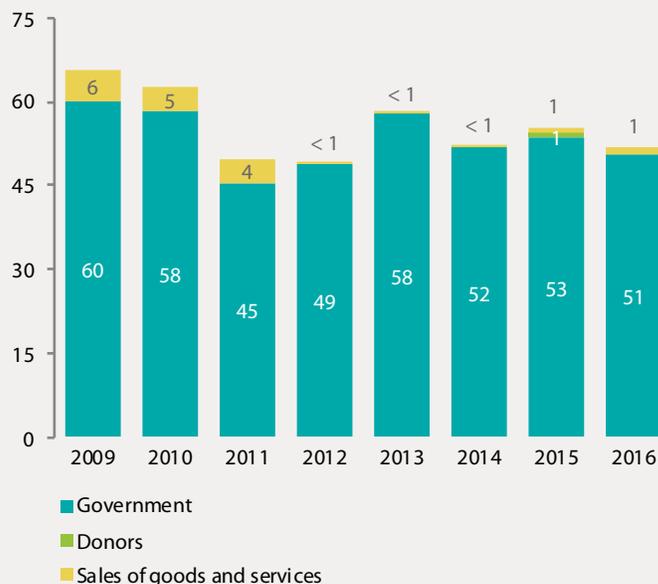
Million pula (inflation-adjusted; base year = 2011)



## DAR's funding sources

The national government provides almost all of DAR's funding. Some funds were raised through the sale of goods and services during 2009–2016, but such revenues are channeled back to the national Treasury. In 2015, the CGIAR funded a small-scale beef production research project.

Million pula (inflation-adjusted; base year = 2011)

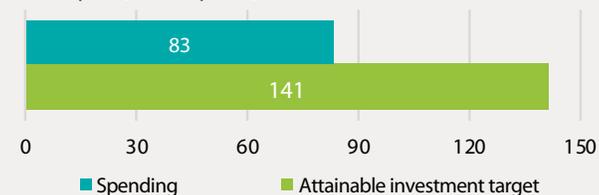


## Investment levels needed to close the intensity gap

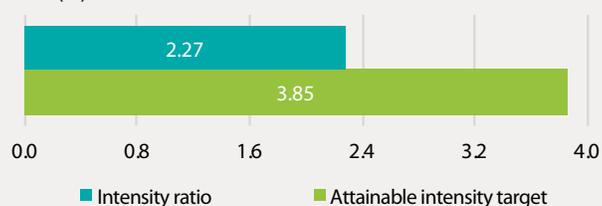
Botswana invests a relatively high share of its AgGDP in agricultural research, which is not uncommon for countries with small populations and relatively high per capita incomes. Comparisons among countries with similar economic structure indicate that Botswana appears to be underinvesting. An additional 58 million pula would be needed to bridge the gap.

### Actual and attainable spending, 2016

Million pula (current prices)



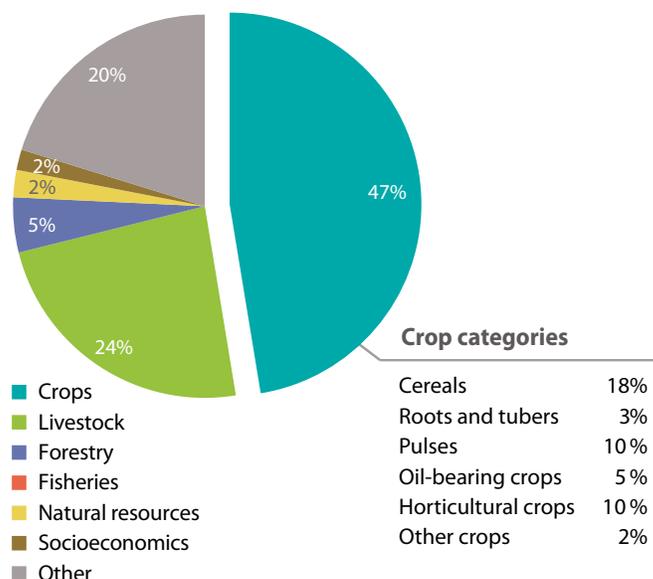
Ratio (%)



## Agricultural researchers by area of focus

In 2016, 47 percent of the country's FTE researchers conducted crop research, and 24 percent conducted livestock research. Major crops under investigation were beans; the cereals sorghum, maize, and millet; vegetables; fruit; and the oilcrop safflower.

### Share of researchers, 2016



Notes: Traditionally, agricultural research intensity ratios compare investment and agricultural GDP levels to determine whether countries may be underinvesting. ASTI's Intensity Index incorporates additional factors that account for the size and nature of a nation's economy; hence, facilitating more accurate cross-country comparisons. For more information, see <https://astinews.ifpri.info/2017/07/01/a-new-look-at-research-investment-goals-for-ssa/>.

## Resources for Botswana

This factsheet presents recent data on the performance of agricultural research in Botswana, 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](http://www.asti.cgiar.org) and include:



ASTI's **interactive country page** for Botswana 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 Botswana and many other countries.



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

## 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 and international organizations is excluded.
- ▶ 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](http://www.asti.cgiar.org/methodology).

## Acronyms

AgGDP	agricultural gross domestic product
BUAN	Botswana University of Agriculture and Natural Resources
DAR	Department of Agricultural Research
FTE(s)	full-time equivalent(s)
PPP(s)	purchasing power parity (exchange rates)
R&D	research and experimental development

## About ASTI, IFPRI, and DAR

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 facilitated 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 **Department of Agricultural Research (DAR)**, which falls under the Ministry of Agriculture, is Botswana's principal agricultural research agency. In addition to holding a broad mandate covering crop and livestock management research, DAR provides research support services in the areas of seed production and certification; soil, plant, and feed analysis; and genetic resource conservation.

ASTI/IFPRI and DAR 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. 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 DAR.

Copyright © 2018 International Food Policy Research Institute and Department of Agricultural Research. Sections of this document may be reproduced without the express permission of, but with acknowledgment to, IFPRI and DAR. For permission to republish, contact [ifpri-copyright@cgiar.org](mailto:ifpri-copyright@cgiar.org).