

ASSESSMENT OF RUFORUM MEMBER UNIVERSITIES IN UGANDA

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BACKGROUND

Credible quantitative and qualitative information on existing capacities in agricultural higher education agencies in Africa are important for decisionmakers at national, regional, and international levels. Decisionmakers require data and indicators for strategic planning, policy formulation, setting priorities and benchmarks, measuring progress toward benchmarks, and identifying capacity gaps. Decisionmakers need a better understanding of the specifics of existing staffing and student capacities in the higher education sector, as well as in the wider agricultural innovation systems in Africa south of the Sahara. Access to such information will result in better policies addressing capacity issues in agricultural higher education, research, extension, and other areas. The existence of such information, however, remains extremely limited.

To fill this data gap, the International Food Policy Research Institute's Agricultural Science and Technology Indicators (ASTI/IFPRI) and the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) initiated a partnership to pilot the collection of this type of data for RUFORUM's member universities. During phase I of the collaboration, ASTI/IFPRI and RUFORUM developed and launched a prototype of the the Portal on Agricultural Capacity in RUFORUM Universities. Phase II, which is currently being implemented, aims to further develop and launch the portal, and to obtain more detailed quantitative and qualitative information for RUFORUM member universities in Kenya and Uganda. This report summarizes the findings of the in-depth assessment for Uganda.

TEACHING STAFF TRENDS

The general ASTI survey round comprises 15 agricultural higher education agencies in Uganda. These include various agricultural faculties and other agriculture-related units at the 7 RUFORUM member universities, as well as a small number of non-RUFORUM universities and other higher education agencies. The quantitative overview in this report comprises seven RUFORUM member universities with relevant colleges, faculties, schools, or departments (noting that Makerere University has three separate agriculture-related faculties, so the overall sample includes nine units:

- ✓ Busitema University, Faculty of Agriculture (BU-FA)
- ✓ Gulu University, Faculty of Agriculture and Environment (GUCCL-FAE)
- ✓ Kyambogo University, Faculty of Vocational Studies, Department of Agriculture (KYU-FVS-DA)
- ✓ Makerere University, College of Agricultural and Environmental Sciences (MAK-CAES)
- ✓ Makerere University, College of Veterinary Medicine, Animal Resources, and Biosecurity (MAK-COVAB)
- ✓ Makerere University, College of Natural Sciences, School of Biosciences (MAK-CONAS-SBS)
- ✓ Ndejje University, Faculty of Environment and Agricultural Sciences (NU-FAES)
- ✓ Uganda Christian University, Faculty of Science and Technology, Department of Agricultural and Biological Sciences (UCU-FOST-DABS)
- ✓ Uganda Martyrs University, Faculty of Agriculture (UMU-FA)

ABOUT ASTI/IFPRI AND RUFORUM

ASTI/IFPRI

Agricultural Science and Technology Indicators (ASTI) is widely recognized as the authoritative source of information on the status and direction of agricultural research systems in low- and middle-income countries. Facilitated by the International Food Policy Research Institute (IFPRI), the program functions through collaborative alliances with national research agencies, regional coordinating bodies, and international institutions. ASTI's mission is to support improved decisionmaking through high-quality data, research, and analyses; to disseminate the results of its analyses to promote advocacy and support policymaking; and to build national and regional capacity for data collection and analysis.

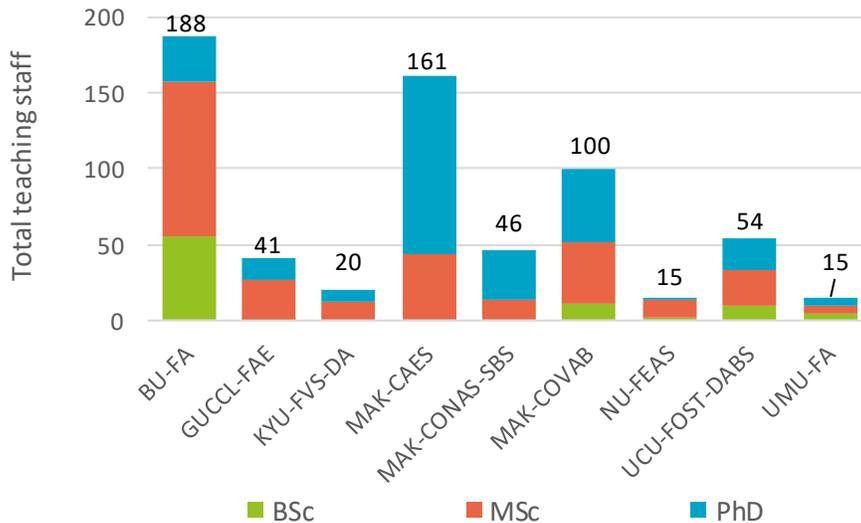
RUFORUM

RUFORUM is a network of 85 universities in 36 African countries. RUFORUM's mandate is primarily to strengthen the quality and relevance of postgraduate training and research in African universities—especially in agriculture, science, technology, and innovation. As such, RUFORUM engages in activities including benchmarking, tracer studies, and capacity building aimed at improving the capacity of African universities and research centers to generate knowledge relevant to Africa's development challenges.

Makerere University is Uganda’s oldest university involved in agricultural sciences. A number of new universities were established after 2000, including Busitema University, Gulu University, and Ndejje University. In 2016, the nine sample units accounted for a combined 83 percent of the teaching staff employed at Uganda’s 15 agriculture-related higher education agencies.

Total teaching capacity among the RUFORUM members in Uganda ranged from 15 staff at NU-FEAS and UNU-FA to more than 150 at MAK-CAES and BU-FA (Figure 1). The share of teaching staff with PhD degrees also differed widely. With shares 48, 72, and 73 percent, the three MAK faculties employed relatively more PhD-qualified teaching staff, as well as employing no teaching staff only qualified to the BSc-degree level. In contrast, only 13 percent of the teaching staff at NU-FAES and 16 percent of the teaching staff at BU-FA were trained to the PhD-degree level.

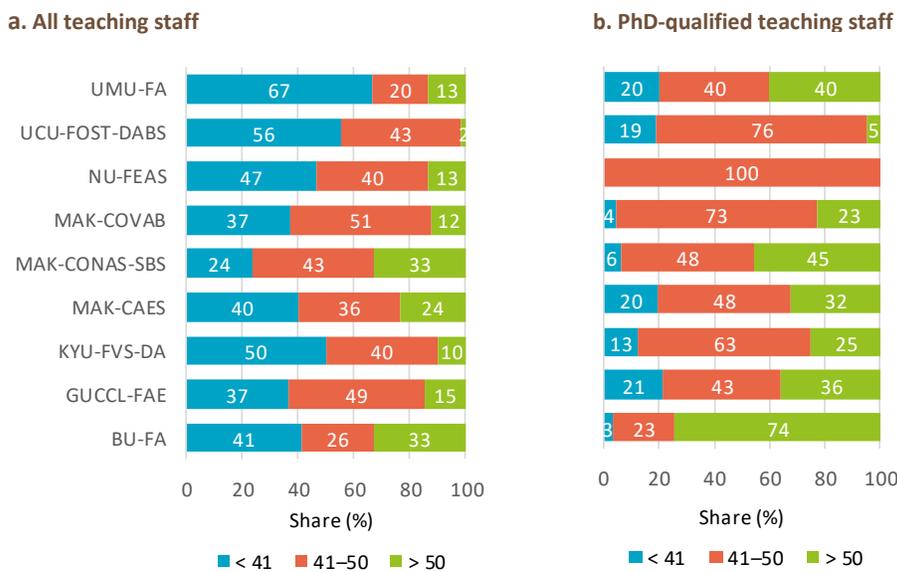
Figure 1. Total number of teaching staff by qualification level, 2016



Source: Compiled by authors from ASTI/IFPRI–RUFORUM surveys.

In general, the higher education agencies reported a relatively well-balanced distribution of teaching staff by age (Figure 2). Overall, one-third of the teaching staff with PhD degrees were in their 50s and 60s, but the share for BU-FA was particularly high. As a result, 74 percent of the PhD-qualified teaching staff at BU-FA will retire in the next 10 to 15 years.

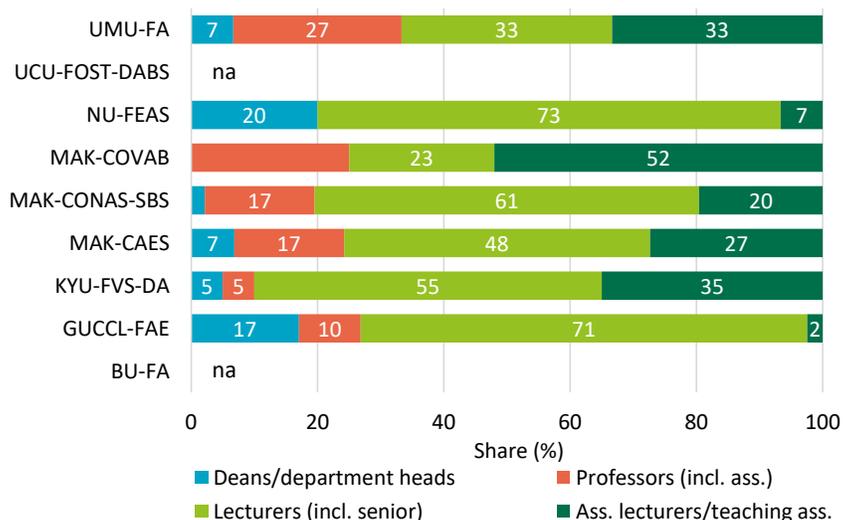
Figure 2. Total and PhD-qualified teaching staff by age, 2016



Source: Compiled by authors from ASTI/IFPRI–RUFORUM surveys.

The majority of teaching staff are lecturers and senior lecturers; about a quarter are deans, department heads, or (assistant) professors (Figure 3). MAK-COVAB employed a comparatively high number of assistant lecturers and teaching assistants.

Figure 3. Teaching staff by position, 2016



Source: Compiled by authors from ASTI/IFPRI–RUFORUM surveys.

Note: Data for UCU-FOST-DABS and BU-FA were not available.

Female professors and other teaching staff offer different insights from their male counterparts, so it is important for higher education agencies to employ a balance of male and female lecturers. With 47 percent of its teaching staff being female in 2016, only NU-FAES approached gender parity overall (Table 1). In comparison, BU-FA and GUCCL-FAE reported relatively low shares of female teaching staff (15 and 10 percent, respectively). One in four teaching staff was female at the three MAK faculties, whereas the ratio was one to three for the other agencies in the sample. In general, female teaching staff were younger and less qualified compared with their male counterparts.

Table 1. Share of female teaching staff, 2016

RUFORUM member	Share (%)						
	Total	PhD	MSc	BSc	<41	41–50	>50
BU-FA	15.4	19.4	10.8	21.8	21.8	16.7	6.5
GUCCL-FAE	9.8	7.1	11.5	—	6.7	15.0	—
KYU-FVS-DA	35.0	25.0	41.7	—	50.0	25.0	—
MAK-CAES	24.8	23.1	29.5	—	33.8	20.7	15.8
MAK-CONAS-SBS	23.9	18.2	38.5	—	36.4	25.0	13.3
MAK-COVAB	25.0	22.9	26.8	27.3	40.5	13.7	25.0
NU-FEAS	46.7	100.0	41.7	50.0	42.9	33.3	100.0
UCU-FOST-DABS	35.2	28.6	39.1	40.0	50.0	17.4	—
UMU-FA	33.3	—	33.3	75.0	50.0	—	—

Source: Compiled by authors from ASTI/IFPRI–RUFORUM surveys.

METHODOLOGY

In collaboration with the ASTI/IFPRI team, ASTI’s country focal points (that is, points of contact) at the Uganda’s National Agricultural Research Organisation (NARO) and the Kenya Agricultural and Livestock Research Organization (KALRO) developed a checklist to capture qualitative and quantitative information from RUFORUM member universities in both countries (Appendix A). The information captured was in addition to other data collected during ASTI’s regular 2017–2018 survey round, administered to all higher education agencies in Uganda. The information included, but was not limited to the following categories:

- Data management
- Research outputs and their dissemination
- Influence of research in the community
- Student trends and motivations
- Capacity building plans for students
- Benefits of being members of RUFORUM and suggested ways of improvement

In Uganda, deans and chairs of faculties and departments relevant to ASTI were interviewed by a team comprising Lang Gao (ASTI/IFPRI) and Daniel Kitone (NARO).

In order to fulfill teaching and research mandates effectively, it is important for higher education agencies to have a well-balanced pool of researchers, not only in terms of qualification levels, age distribution, and gender, but also in terms of disciplines. Except for MAK-COVAB, the RUFORUM member universities' overall focus was agricultural and, as a result, the teaching staff employed by most agencies was qualified across a wide variety of disciplines (Table 2). Makerere University reported understaffing across a number of disciplines, including poultry, animal breeding/genetics, and plant and animal physiology.

Table 2. PhD- and MSc-qualified teaching staff by discipline, 2016

Discipline	GUCCL-FAE	KYU-FVS-DA	MAK-CAES	MAK-CONAS-SBS	MAK-COVAB	NU-FEAS	UMU-FA
Plant breeding/genetics (incl. biotechnology)	10.0	10.0	1.9	10.9	—	—	36.4
Plant pathology	7.5	15.0	2.5	6.5	—	7.7	9.1
Plant physiology	—	—	1.2	4.3	—	—	—
Botany	7.5	—	0.6	23.9	—	7.7	9.1
Seed science and technology	2.5	—	0.6	4.3	—	—	—
Other crop sciences	7.5	25.0	2.5	13.0	—	15.4	—
Animal breeding/genetics	—	—	3.1	—	1.1	—	—
Animal husbandry	5.0	—	3.1	—	1.1	7.7	—
Animal nutrition	7.5	5.0	4.3	—	3.4	—	—
Dairy science	2.5	—	1.2	—	2.2	—	—
Poultry	2.5	—	0.6	—	—	—	—
Veterinary medicine	5.0	—	1.2	—	88.8	7.7	—
Zoology/entomology	—	—	—	15.2	2.2	—	—
Other animal and livestock	—	—	0.6	—	—	7.7	—
Forestry and agroforestry	2.5	—	13.7	—	—	15.4	—
Fisheries and aquatic resources	5.0	—	—	10.9	1.1	—	—
Soil sciences	2.5	—	8.1	—	—	7.7	—
Natural resources management	2.5	—	8.7	—	—	7.7	—
Water and irrigation management	5.0	5.0	2.5	—	—	—	—
Ecology	—	—	1.9	6.5	—	—	9.1
Biodiversity conservation	—	—	7.5	4.3	—	—	—
Food sciences and nutrition	15.0	30.0	9.3	—	—	—	—
Socioeconomics (incl. agricultural economics)	7.5	—	12.4	—	—	—	36.4
Extension and education	2.5	10.0	9.3	—	—	7.7	—
Other sciences	—	—	3.1	—	—	7.7	—
<i>Total no. of PhD- and MSc-qualified teaching staff</i>	<i>40</i>	<i>20</i>	<i>161</i>	<i>46</i>	<i>89</i>	<i>13</i>	<i>11</i>

Source: Compiled by authors from ASTI/IFPRI–RUFORUM surveys.

DEGREE PROGRAMS AND STUDENT POPULATION

The three Makerere University faculties are the only RUFORUM member agencies in Uganda that offer PhD programs. KYU-FVS-DA only offers BSc degree training, and the other units in the sample only offer BSc and MSc programs. Of the nine-unit sample, MAK-CAES was by far the largest in terms of the variety of programs offered (Table 3).

Table 3. Number of degree programs offered during 2015–2016

RUFORUM member	PhD programs	MSc programs	BSc programs
BU-FA	—	2	7
GUCCL-FAE	—	3	4
KYU-FVS-DA	—	—	3
MAK-CAES	10	17	14
MAK-CONAS-SBS	5	2	4
MAK-COVAB	1	11	4
NU-FEAS	—	1	5
UCU-FOST-DABS	—	4	5
UMU-FA	—	1	3

Source: Compiled by authors from ASTI/IFPRI–RUFORUM surveys.

Table 4. Student population by degree, 2015–2016

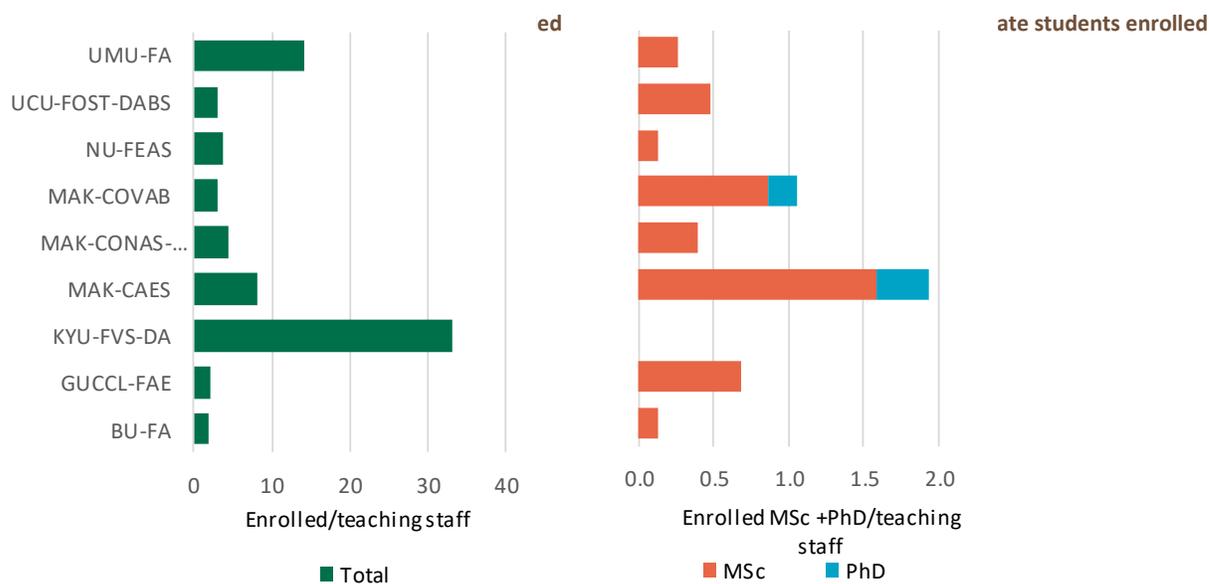
RUFORUM member	Students enrolled			Students graduated		
	PhD	MSc	BSc	PhD	MSc	BSc
BU-FA	—	24	332	—	18	324
GUCCL-FAE	—	28	60	—	3	51
KYU-FVS-DA	—	—	664	—	—	636
MAK-CAES	55	256	996	9	123	461
MAK-CONAS-SBS	—	18	187	6	19	293
MAK-COVAB	19	86	204	14	34	51
NU-FEAS	—	2	53	—	2	43
UCU-FOST-DABS	—	26	144	—	—	33
UMU-FA	—	4	209	—	3	195

Source: Compiled by authors from ASTI/IFPRI–RUFORUM surveys.

The majority of students in the sample were enrolled in BSc-level training (Table 4). Students enrolled in PhD programs numbered 55 at MAK-CAES and 19 at MAK-COVAB. Being new agencies, Gulu University and Ndejje University only have small numbers of students enrolled in their agricultural science programs. Although Busitema University is also fairly new, it has a much larger number of students enrolled, especially in its BSc programs. Possible explanations for this are that other universities have higher cutoff points for entry; many BSc programs and the Government Loan Scheme (through the Higher Education Students’ Financing Board) prioritize science programs; and Busitema has opened up five new campuses (Arapai, Mbale, Namasagali, Nagongera, and Pallisa).

Whereas the student/teacher ratio is an indicator of the quality of training offered by universities, the value of this indicator can be influenced by the large number of BSc-level students enrolled. It is therefore more accurate to look at the ratio of the number of teaching staff to the number of MSc- and PhD-level students (Figure 4). At UMU-FA and KYU-FVS-DA—agencies that either only offer BSc degree programs or a small number of MSc programs—the numbers of students enrolled are relatively high (12 and 33 students per teaching staff member). Unsurprisingly the ratio of teaching staff to enrolled MSc and PhD students is much lower. MAK-COVAB and MAK-CAES, the two agencies with the largest pools of enrolled MSc and PhD students, also have the highest ratios of students to teaching staff members.

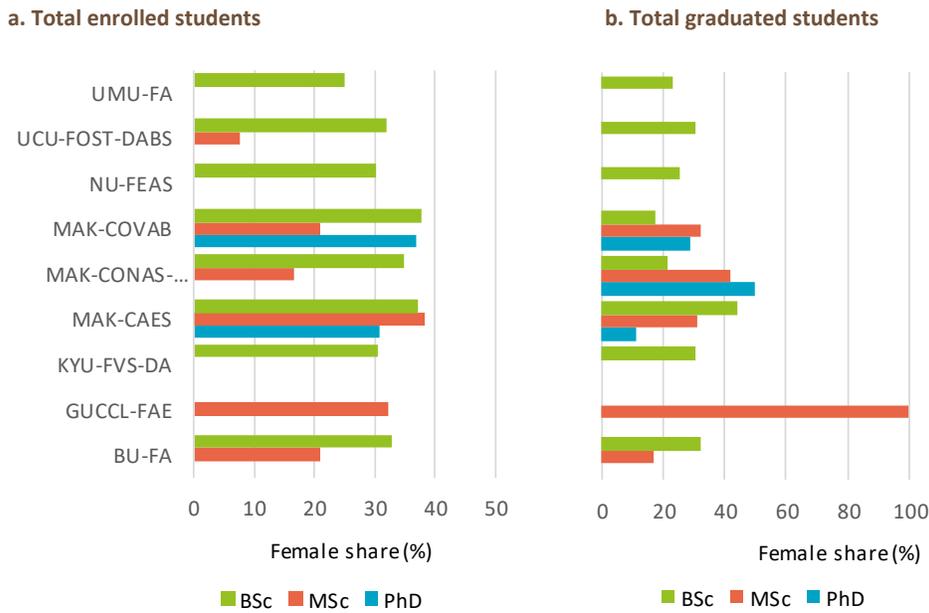
Figure 4. Student/teacher ratio, 2016



Source: Compiled by authors from ASTI/IFPRI–RUFORUM surveys.

Overall, in 2015/16 about one-third of the students enrolled in agriculture-related programs at the sample agencies were female, but shares differed by agency and degree (Figure 5). In general, the share of female graduating students was lower than the share in female students enrolled—the exception being GUCCL, where only three students graduated with MSc degrees in 2015/16 and all were female.

Figure 5. Share of female students, 2016



Source: Compiled by authors from ASTI/IFPRI–RUFORUM surveys.

DATA-MANAGEMENT PROCEDURES

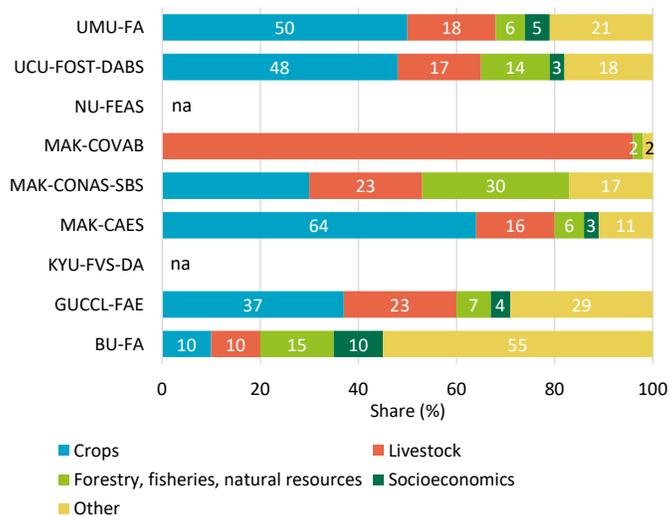
Staff members at the agencies visited keep their own records digitally, but pass on relevant data—such as records of grades—to the dean’s office. Data are checked at the department and faculty levels, before being forwarded to the central academic office. The quality assurance department within the central academic office then validates the data and any resulting reports before making them publicly available to stakeholders.

RESEARCH ACTIVITIES

Research proposals are developed both by individual lecturers and by groups of lecturers. Students can be recruited or co-opted to contribute to the resulting research, with lecturers providing supervision. Some funding is used for laboratory and field equipment. In the case of Makerere University, the Directorate of Quality Assurance aids in improving the standard of research and the quality of services offered by the University. The Department of Planning and Development generates information and data to facilitate strategic planning in the areas of enrollments, human resources, cost analyses, and research and innovation. At Makerere University, most research activities are collaborative, and they generally involve extension experts. The Directorate of Training and Research provides advice, funding to certain research activities, and connections to funding sources. The Directorate has multiple partners, including the Swedish International Development Cooperation Agency. At MAK-CAES, the participation of extension officers is limited due to the short duration of study leave

and the limitations of funding. This is also the case at other member universities, such as UCU, Kyambogo, and UMU. Researchers work as part of interdisciplinary teams comprising members from national agricultural research institutes, universities, nongovernmental organizations, and the private sector; researchers also work with farming communities. In this way, researchers develop an understanding of the prevailing research needs so that projects address grassroots issues and, hence, are demand-driven. Researchers also work with extension agents and local governments through community outreach programs in efforts to make viable connections with farming communities.

Figure 6. Focus of research activities, 2016



Source: Compiled by authors from ASTI/IFPRI–RUFORUM surveys.

Most agriculture-related research undertaken at the universities can be categorized either as applied or adaptive research. Data from the surveys received indicates that crop research is the predominant focus among the higher education agencies (Figure 6). The obvious exception is MAK-COVAB, whose mandate is veterinary medicine. BU-FA’s research focus encompasses a wide range of nontraditional research areas, such as agricultural engineering, natural resources, socioeconomics, and extension.

Table 5. Publications per teacher per year, 2012–2016

Type of publication	BU-FA	GUCCL-FAE	KYU-FVS-DA	MAK-CAES	MAK-CONAS-SBS	MAK-COVAB	UMU- FA
Journal articles							
International	0.02	0.25	0.69	0.28	0.85	0.18	0.04
African	0.01	0.11	0.19	0.09	0.07	0.04	—
National	0.01	—	0.05	0.07	0.08	0.03	—
Books	—	—	—	—	0.25	—	—
Book chapters	—	—	0.08	—	—	—	—
Other peer-reviewed	—	—	—	0.02	0.01	0.01	0.04
Total	0.03	0.36	1.02	0.46	1.25	0.25	0.07

Source: Compiled by authors from ASTI/IFPRI–RUFORUM surveys.

Note: Data for NU_FEAS and UCU-FOST-DABS were not available. Data indicate the yearly average for the period 2012–2016, or for a subset of years for which data were available.

Research Funding

Funding for research varies by university. Generally, the Ugandan government provides little financial support to agricultural research conducted by universities both at the institutional and individual levels.

Research Outputs

Data on the number of yearly peer-reviewed publications were available for seven RUFORUM member universities in Uganda (Table 5). International journal articles, including those published in African journals, accounted for the majority of publications. Publications per teaching staff member per year numbered more than one at KYU-FVS-DA and MAK-CONAS-SBS, whereas ratios were particularly low at BU-FA and UMU-FA (0.03 and 0.07, respectively). In addition to publications, other research outputs include new crop varieties, breeds, methods, and formulae, as well as postharvest handling technologies (that is, prototypes). Such technologies are not the major focus for universities, however.

THE RUFORUM PARTNERSHIP

Benefits of Membership

Activities being implemented through the RUFORUM network include curriculum development, capacity building through training, linkages with donor agencies, and the development of funding proposals. The perceived benefits of membership, for both staff and students, are opportunities to (1) receive training and scholarships, (2) receive funding and build linkages with development partners, (3) form partnerships with other actors, and (4) contribute to publications.

Suggested Areas for Improvement

RUFORUM collaborates with several member universities in Africa by providing funding for postgraduate training through a process that involves competitive grants. While the arrangements have conferred several benefits on the recipients, still more could be achieved. The following are some of the areas suggested by the interviewees:

- Weak monitoring and evaluation (M&E) systems. It is suggested that RUFORUM design an effective mechanism to track the performance of its research grants. Each principal investigator should prepare a performance-monitoring plan and budget to support M&E activities. Currently, RUFORUM focuses on timelines proposed by students, which may not be adequate for monitoring performance.
- Limited number of research disciplines. It is requested that RUFORUM equitably allocate research funds in support of interventions in such disciplines as natural resource management, livestock, and engineering, to mention but a few. Currently, crops receive the largest share of available resources.
- Institutional arrangements. To strengthen collaborative research and training facilities, it is suggested that RUFORUM allocate more funding for the purchase of specialized laboratory equipment and chemicals that are not affordable, yet are highly important for the conduct of effective research.
- Limited exposure and support to students. RUFORUM should increase interactive sessions for students; for example, international students from French-speaking countries should be given English lessons.
- Formalizing agreements. It is recommended that RUFORUM institute memorandums of understanding between principal investigators and students, stipulating (1) agreed outputs for delivery, (2) that students who transfer to other programs/sponsors be required to return all stipend funds received, and (3) that principal investigators pay students' full stipend.
- Overhead costs. Institutional/administrative costs should be explicitly stated in the research agreement between RUFORUM and principal investigators so that universities do not charge 15 percent in overhead.
- Feedback on unsuccessful proposals. As an aid to capacity development and learning, RUFORUM should always provide feedback on unsuccessful proposals, stating weaknesses or reasons for their rejection.

- Focus on youth. RUFORUM focuses on young scientists in order to build capacity; however, an equitable mix is appropriate when awarding grants, given that the older, more experienced scientists are needed to mentor the younger ones.
- Students abandoning their studies. The majority of RUFORUM-funded projects are student-led, but on several occasions, students have abandoned their studies, causing setbacks in project's execution. Under alternative funding arrangements, students fit into projects in such a way as to enable those projects to continue irrespective of a student's decision to stay or leave.
- It is requested that RUFORUM work to overcome the limiting administrative issues outlined below:
 - Normally, RUFORUM releases an initial deposit of 60 percent of the grant amount for the first two years through the university system; however, unnecessary delays in processing payments can result in two to three-month delays in the disbursement of funds to principal investigators/students, which stalls the implementation of projects that are designed to be completed within two years.
 - When a project is granted, RUFORUM retains a significant part of the grant as a retainer or contingency fee of about 5 percent. As a result, projects are left with a shortfall in funding based on their original, approved budgets, which compromises the quality of fieldwork.
 - Funds allocated as incentives for early graduation (\$1,000 per student) are rarely paid, in part because the timing of graduation is not something the project team can influence. As a result, these funds would be better allocated to research activities.
 - Of the total project cost, 15 percent is allocated to administrative costs, yet for budgeting purposes, RUFORUM allows a maximum of 5 percent; this encroaches substantially on the budget for research funds.
 - Some students are not fully paid their stipend because funds are usually deposited into accounts held by the principal investigator, at whose discretion payments are made.

CONCLUSIONS AND WAY FORWARD

RUFORUM's partnership with member universities in Uganda has conferred significant benefits both to the agencies and their students through capacity building and the creation of linkages and partnerships. It is recommended that disciplines be broadened beyond the dominant focus on crops; that monitoring and evaluation be strengthened; and that agreements be formalized, overhead costs minimized, and administrative issues addressed.

Appendix A. Checklist for RUFORUM Member University Visits in Kenya and Uganda

ASTI regular survey tool

- ✓ Validate 2012–2014 data and revise where needed (teaching staff, student population by degree program specifically)
- ✓ Update data for 2015 and 2016
- ✓ Explore whether additional years are available for teaching staff and student population
- ✓ Explore additional relevant indicators (for example, nationality of student population, more detailed output data)

Data management

- ✓ How are data organized?
- ✓ What is available and where (central database or multiple datasets at different offices)?
- ✓ What is missing?
- ✓ Are there data-quality checks in place?

Research activities

- ✓ How are outputs are generated (technologies, varieties, breeding, agricultural implements, publications, patents)?
- ✓ How are they captured?
- ✓ Dissemination activities?
- ✓ What are the linkages with farming communities and extension agents (how, what stage of research, when, how long)?
- ✓ What are the linkages with NARs and other research agencies, and other universities?
- ✓ How is research being funded (government, S&T, university budget, donors, regional organizations, and so on)?
- ✓ What is the status of agriculture as a field of study: are there more or fewer students interested to study; are numbers of MSc and PhD programs increasing?
- ✓ Major constraints to research (if not already covered?)

Partnership with RUFORUM

- ✓ What activities are being implemented through the RUFORUM network?
- ✓ What are the benefits of being a member of RUFORUM, what have been challenges, what could be improved?

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