THREE NIGERIAN UNIVERSITIES AND THEIR ROLE IN AGRICULTURAL DEVELOPMENT

A.I.D. PROJECT IMPACT EVALUATION NO. 66
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FOREWORD

The Center for Development Information and Evaluation (CDIE) is responsible for the Agency for International Development's (A.I.D.) project impact and program policy evaluations. The goal of the evaluation program is to inform A.I.D.'s policymaking process and to improve project design, implementation, and evaluation. Through examinations of A.I.D. and of other donor and recipient country experience and the preparation of special syntheses, CDIE provides a better understanding of the characteristics of development programs and lessons of what works and does not work in various settings.

We believe that this review of Ahmadu Bello University, the University of Ife, and the University of Nigeria at Nsukka provides valuable insights into the process of institutional development and the factors affecting the success of A.I.D. projects in support of institutional development. We encourage A.I.D. staff and others engaged in similar programs to draw on this report in their planning, implementation, and evaluation of institutional development programs.

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and Evaluation
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PREFACE

The field portion of this study was undertaken between March 17 and April 13, 1986 to determine whether lasting impact had resulted from Agency for International Development (A.I.D.) support for cooperation between three Nigerian and three U.S. universities during the 1960s and 1970s. The three Nigerian universities and their three cooperating U.S. land-grant universities are Ahmadu Bello University and Kansas State University, the University of Ife and the University of Wisconsin, and the University of Nigeria at Nsukka and Michigan State University.

The team (see Appendix G for notes on team members) traveled more than 2,500 miles by road through the Western, Northern, and Eastern Regions to visit the three Nigerian universities and the sites where they are working on village or commodity projects.

The team used a rapid appraisal methodology (see Appendix A), interviewing more than 120 individuals and holding a number of group meetings. For the most part, team members worked independently on interviews but met daily to plan their work and to discuss their findings.

The excellent cooperation, cordiality, and openness to discussion of all those with whom the team met made it possible for the team to accomplish its mission and in no small way reflected the lasting goodwill established through the Nigerian-U.S. university partnership programs.

The team wishes to express its appreciation to the three Nigerian universities for their cooperation and to the International Institute of Tropical Agriculture (IITA) for its hospitality, which greatly facilitated the team's work. A special note of appreciation also is given for the guidance and cooperation of the staff of the U.S. Embassy, Lagos; Elizabeth Keys MacManus of USAID/Lagos; and Paul Lippold, the USAID Liaison Officer to IITA, Ibadan, without whom the mission would not have been possible.

SUMMARY

The purpose of this study was to identify internal and external impacts and lessons learned from the A.I.D. projects that provided support during the 1960s and 1970s for three newly established Nigerian universities via three cooperating U.S. land-grant universities: Ahmadu Bello University and Kansas State University, the University of Ife and the University of Wisconsin, and the University of Nigeria at Nsukka and Michigan State University. Cooperation between Michigan State University and the University of Nigeria was abruptly terminated after only 6 to 7 years because of the Nigerian civil war (1967-1970); nevertheless, during that period, Michigan State assisted in the founding and launching of the entire university. The Kansas State project with Ahmadu Bello University lasted from 1962 to 1978 and involved the establishment of faculties of agriculture and veterinary medicine as well as several off-campus agricultural training schools. Similarly, the University of Wisconsin contracted from 1962 to 1975 to establish the faculty of agriculture at Ife.

As background, it should be noted that all three Nigerian universities have grown exponentially since the 1960s. They have expanded from a few hundred students to 21,000 at Ahmadu Bello University (including its non-degree granting schools), 13,000 at Ife, and 12,000 at the University of Nigeria, Nsukka. Their brief history encompasses four eras of Nigerian history: the heady period of independence beginning in 1960, the 1967-1970 civil war, the oil-boom years of the later 1970s, and the oil-bust period from the early 1980s to the present.

Efforts to transfer the tripartite land-grant model (teaching, research, and extension) to the three Nigerian universities have had mixed success. Ahmadu Bello University comes closest to the model in practice. Staff at the other two universities understand and appreciate the concept but have been limited in their ability to practice it. All three universities adopted the teaching component of the model. However, of the three, only Ahmadu Bello, because of its incorporation of established Nigerian research institutes at the time of its founding, has produced a significant amount of locally relevant research and has been able to mount more than a minimal extension effort to reach local farmers.

All three Nigerian universities have had some impact on past and present agricultural problems of the country. Each has made a contribution through staff participation in state, federal, and parastatal commissions and through the development of improved food-crop varieties. Research in production economics, livestock nutrition, and animal health has also had an impact. However, except for Ahmadu Bello University, the impact has fallen short of project expectations. The transfer of the long-established Institute of Agricultural Research, the National Animal Production Research Institute, and the Extension Research Liaison Service to Ahmadu Bello from the Northern Region Government provided the the university a research and extension liaison base that gave it immediate contacts and credibility with farmers of the Northern Region. This was a distinct difference from the two other universities, which have been unable to achieve a similar impact at

the farm level.

Three factors seem to bear heavily on the impact that universities in Nigeria have been able to make. First is the extent of political support (or at least the absence of government competition). The degree to which government ministries are willing to transfer functions like research and extension to universities will, to a large extent, determine the universities' abilities to affect agriculture in Nigeria. Because research and extension functions are power (and employment) bases, ministries in Nigeria have been reluctant to release their hold over them. A second factor concerns the extent to which prevailing promotion and incentive systems of the universities reward research and outreach. There is little evidence to indicate that these activities are rewarded. Third, the financial health of universities affects their impact. At present, all Nigerian universities are in dire financial straits, reflecting declining government revenues as a result of the sharp drop in oil prices over the last several years.

Of the three components of the U.S. land-grant model of an agriculturally oriented university, teaching is the easiest to transfer. But structural factors in many countries inhibit both the development of relevant, problem-solving research and its dissemination to local farmers. Unless there is an appropriate institutional structure that rewards academics for problem-solving research and links research and extension in an interactive process, it is not realistic to expect a university to exert a major impact on the rural sector.

PROJECT DATA SHEET

Ahmadu Bello University/Kansas State University

1. Project Title: Faculty of Agriculture and Nondegree Schools, Ahmadu Bello University
2. Project No.: 620-11-110-743
3. Project Implementation: FY 1962 through FY 1978.
4. Project Cost: $6,899,350
   (Total amount reported in Appendix VI of the Terminal Project Report by Kansas State University, August 31, 1974)

1. Project Title: Faculty of Veterinary Medicine, Ahmadu Bello University
2. Project No.: 620-11-110-817
3. Project Implementation: FY 1971 through FY 1978.
4. Project Cost: $4,997,517
   (Estimated amount according to Terminal Project Report by Kansas State University, July 31, 1977)

University of Ife/University of Wisconsin

1. Project Title: Faculties of Agriculture and Science, University of Ife
2. Project No.: 620-11-110-742
3. Project Implementation: FY 1962 through FY 1975
4. Project Cost: $5,474,930
   (Total amount reported in Appendix E of the University of Wisconsin's report, "Ten Years at Ife," June 1975)

University of Nigeria/Michigan State University

1. Project Title: University of Nigeria
2. Project No.: 620-11-660-602
3. Project Implementation: FY 1960 through FY 1967
4. Project Cost: $9,943,610
   (Amount reported by Michigan State University in its final report on the project, which is based on expenditures through December 1968 for the total university project; only part of this was for agriculture, but the team could not identify the exact amount)

GLOSSARY

A.I.D. - U.S. Agency for International Development

BIFAD - Board for International Food and Agricultural Development

B.Sc. - Bachelor of Science Degree

GDP - gross domestic product

IAR - Institute of Agricultural Research

IITA - International Institute of Tropical Agriculture

IMF - International Monetary Fund

M.Sc. - Master of Science Degree

NAPRI - National Animal Production Research Institute

OPEC - Organization of Petroleum Exporting Countries

Ph.D. - Doctor of Philosophy Degree

Map of Nigeria

1. THE SETTING

With an estimated 100 million people in an area about one-tenth the size of the United States, Nigeria is the most heavily populated country in Africa. Nigeria is a member of the Organization of Petroleum Exporting Countries (OPEC) and is by far the largest oil exporter in Sub-Saharan Africa.

A.I.D.'s institution-building efforts in support of the three Nigerian universities can be properly understood only in the context of Nigeria's ethnic and ecological situation and its post-independence economic history.

Nigeria is ethnically and ecologically diverse. The three largest of Nigeria's many ethnic groups are the Yoruba in the southwest, the Ibo in the southeast, and the Hausa/Fulani in the north. The north is politically preeminent, with 11 of the 21 states. However, the populations of the north came belatedly to formal schooling, and the Yoruba and especially the Ibo have much higher indices of education.

Ecologically, Nigeria is divided into two very different zones. A tropical forest zone along the Atlantic Ocean in the south spans both the Yoruba west and the Ibo east. Tree and root crops predominate (cocoa in the west, oil palm in the east, and cassava in both). Most of the petroleum is in the Ibo areas of the east. Going north, the rain forest turns to savannah as precipitation decreases. The north is characterized by rainfed cereal crops and, until recently, groundnuts for export. Until the days of the oil-boom, agriculture dominated Nigeria's economy. Funds contributed by the regionally important marketing boards launched all three universities: money from cocoa receipts at Ife, palm oil exports at Nsukka, and groundnut exports at Ahmadu Bello.

But in common with other OPEC countries, Nigeria's emphasis on agriculture (and its receipts from agriculture) declined as oil revenues rose in the 1970s -- the "oil country syndrome," as the World Bank calls it. Between 1970 and 1980, agriculture declined from 45 percent to 27 percent of Nigeria's gross domestic product (GDP) (World Bank 1985). At the same time, the Government pursued an extensive, rather than an intensive, policy in higher education: instead of using revenues to improve and expand existing universities, such as the three examined in this report, the Government created 14 new institutions. As petroleum prices began to plummet in the 1980s, there were about three times as many universities as before the oil boom that now had to share rapidly shrinking funds. Revenues at all three universities studied have plunged to crisis levels over the last several years. All in all, however, Nigeria has developed one of the most elaborate university systems in Africa, as well as a host of federally supported agricultural institutes.

This picture is in stark contrast to the situation on the eve of independence. In 1959, agricultural training was confined to several non-degree-granting institutions in each of the three regions (Northern, Western, and Eastern) and a small agricultural program at the Federal University College at Ibadan (now the

University of Ibadan). The shortage of agricultural professionals was acute. Accordingly, a study was undertaken by the Government of Nigeria to investigate future needs in post-secondary education. The first report, known as the Ashby Report, recommended the establishment of new universities (including agricultural colleges) in the Eastern and Northern Regions and a liberal arts-oriented university in Lagos. Western Nigeria, it was argued, would be satisfied with the Federal University College at Ibadan, then capital of the Western Region. But Western Nigeria was not satisfied; it began creating the University of Ife. This reaction demonstrates the strong ethnic, geographic, and political imperatives that continue to affect educational and agricultural policies to the present day.

During the early years of independence, most influential Nigerians had an image of agricultural development that emphasized increased mechanization, purchased inputs, and larger farms to break the hold of tradition. (To a large extent this image of agricultural development still prevails.) However, despite this image, the traditional agricultural structure was still firmly in place. The system was one of small farms, with an emphasis on export commodities, such as cocoa, oil palm, and peanuts, and traditional food crops for home consumption. Few policy changes were made, and the chosen instruments for agricultural development continued to be government ministries and parastatals. Although the new universities being established were to have a land-grant university outlook, only the Northern Region shifted important responsibility for agricultural research and development to its new university, Ahmadu Bello.

During the Nigerian civil war in the late 1960s, agricultural development slowed. Shortly after the war, the Sahelian drought of 1972-1974 seriously affected agricultural production in the north, where most grain, pulses, and beef are produced. The post-civil war years also saw a steady rise in petroleum production, which led to massive nonfarm investment, disincentives to agriculture, neglect of agricultural support institutions including colleges of agriculture, and further acceleration of the rural-to-urban migration of the most able-bodied persons.

It was almost the end of the 1970s before attention in Nigeria was drawn seriously to the deteriorating state of agriculture. Although university professors had given warning in journal articles and elsewhere, responsibility for coping with the problems was again given to the Federal Ministry of Agriculture. University scientists were consulted for their individual skills, but there was no further recognition of the potential role of their universities as problem-solving institutions. The Federal Ministry of Agriculture, in collaboration with the International Institute of Tropical Agriculture (IITA), attempted to increase production through a National Accelerated Food Production project. Some increases in production were attained, but changes in Government and policies brought a new approach before the project could be fully implemented. The new approach was laid out in a Food Production Plan, which, since 1980, has evolved into the ongoing Agricultural Development

Program, which receives loan assistance from the World Bank.

In 1985, the Western Africa Regional Office of the World Bank released a report (No. 4723) analyzing each element of agricultural performance in Nigeria. The report noted the effects of the "oil country syndrome" in the neglect and repression of agriculture. But the report also noted a shift from the old agricultural model of the small family farm, relying on its own labor and shifting slowly from subsistence crops, toward marketed commodities under the influence of price incentives. Six related elements of change are identified: (1) traditional subsistence farms are slowly giving way to a small but growing class of progressive farmers with expanding farms; (2) a gradual shift from family labor to wage labor is occurring; (3) more farm households are converting to part-time farming; (4) mechanization and animal power are replacing hand tools and human energy and more purchased inputs are being used; (5) single-crop commercial farming is gaining at the expense of mixed cropping; and (6) more women are shifting from subsistence food production to commercial production.

Interestingly, the World Bank report ends by claiming that current agricultural trends present a dilemma. Although Nigeria is still a country of small farm holdings (averaging 2 1/2 hectares), the trend is toward less demand for farm labor as farms become larger and more mechanized and small farms become food gardens for part-time farmers. This trend would make sense if the oil-boom were continuing, but it is not. A huge labor surplus is almost certain to arise while the arable land frontier is disappearing. The dilemma Nigeria will have to solve is how to lay a basis for the agricultural sector to absorb surplus labor while transforming traditional agriculture into a more modern form.

2. PROJECT DESCRIPTIONS

Soon after Nigeria's independence, the Agency for International Development (A.I.D.) launched the largest U.S. assistance program in Africa. A key element in that aid was the institution-building assistance to Ahmadu Bello University, the University of Ife, and the University of Nigeria, Nsukka. A.I.D. hoped to transfer the U.S. land-grant university model to the Nigerian universities. This model comprises the three areas of teaching, relevant research, and outreach/extension to the surrounding population. The times seemed auspicious for the transfer of this democratic, grass-roots concept of education. Matching Nigeria's independence-era euphoria was the U.S. spirit of the 1960s embodied in President Kennedy's inaugural exhortation: "Ask not what your country can do for you ...." As the decade wore on, increasing social concern and activism characterized the U.S. climate -- a good match for the implementation phase of these institution-building projects.

A.I.D. chose three top U.S. land-grant universities for this

Nigerian cooperation. Michigan State University was involved in the planning and creation of the entire University of Nigeria, Nsukka from its inception. The university is located in the eastern, mainly Ibo area, which now has many visible indicators of modern development. High rates of schooling and the proliferation of three- and four-story apartment buildings even in outlying towns attest to this. But the campus still exhibits visible reminders of the 1967-1970 civil war: an air-raid siren in the once-bombed conference center and the roofless shell of the campus auditorium. At the University of Ife, by comparison, the architecture is world- class and spectacular and contrasts starkly with the nearby, typically Yoruba city of Ile-Ife, with its densely clustered earthen buildings topped by rain-rusted tin roofs. At Ife, the University of Wisconsin cooperated with the faculty of agriculture for more than a decade. Only Ahmadu Bello University, built near the ancient Muslim walled city of Zaria, was not created from scratch. Kansas State University and Ahmadu Bello University had a foundation on which to base their efforts to create faculties of agriculture and veterinary medicine: two British colonial-era research centers dating from the 1920s. The established prestige of the Institute of Agricultural Research and the attached extension liaison service provided Ahmadu Bello's fledgling Faculty of Agriculture with advantages in pursuing and disseminating locally relevant research.

Under all three projects, long- and short-term U.S. university staff were sent to assist in establishing the agricultural faculties. During the life of the project, Michigan State University sent 18 long-term advisers to assist in the development of the agricultural faculty at Nsukka, while Kansas State University provided 37 advisers to Ahmadu Bello and the University of Wisconsin provided 43 for Ife. All these advisers served for at least 2-year assignments and undertook a wide range of roles in the design and conduct of teaching, research, and extension programs.

The remainder of this report explores the impact of the projects on the three universities and the universities' impact on Nigerian agriculture and then extracts the lessons learned from the projects as they relate to policy considerations.

3. IMPACT OF A.I.D. ASSISTANCE

3.1 Background

A discussion of university impact requires the consideration of the environment in which the universities operate. A.I.D. assistance to the three Nigerian universities began at almost the same time that these universities were founded, soon after the country's independence. Each university has been affected by Nigeria's colonial past, ethnic and geographical factors, the federal and state governments under which they have operated, and the activities of several donors.

Nigeria had been a British colony for decades before the three universities under review were established. Only one institution of higher education, the Federal University College at Ibadan, was functioning prior to independence. The few Nigerians who held degrees in agriculture at the time of independence had been educated in Great Britain, where the primary function of a university at that time was to teach and engage in some academic research. Unlike the U.S. land-grant universities, British universities had no role in providing direct benefits to farmers because agricultural research and extension were firmly controlled by Government ministries. These British ideas and practices had a considerable influence on university development in Nigeria.

The three universities under study were established at a time when there were no models of a university that focused on African or Nigerian problems. Nigerians viewed universities as symbols of prestige and progressiveness and as institutions representing the culture and values of the three main ethnic groups -- the Yoruba, Ibo, and Hausa/Fulani. The location of universities at Ife, in the Yoruba heartland, and Nsukka, in the Ibo zone, clearly supports the latter point.

The timing of the U.S. assistance effort in Nigeria was fortuitous in many respects. In the absence of a clear Nigerian philosophy of higher education, the U.S. presence in Nigeria gave it an excellent opportunity to influence university development. From its beginning in 1959, the U.S. assistance program in Nigeria made agricultural training its highest priority. The United States supported the Future Agricultural Leaders Project for degree training of Nigerians in U.S. universities before Nigerian universities were established. A few Nigerian officials had studied in the United States and were impressed with the bounty of U.S. agriculture and the land-grant university system.

The new independent Nigerian Government in Lagos and the Kennedy Administration in Washington were installed within a few months of each other, both bringing with them a heightened optimism and idealism about the future. Educators from U.S. land-grant universities emphasized "working with one's hands," problem-solving, and university outreach, all of which seemed appropriate for nation-building. Moreover, Nigeria was one of two countries (Brazil was the other) selected in 1961 for long-term U.S. commitment of funds for development, and institution-building was high on A.I.D.'s list of priorities. It was natural, therefore, for the United States to assist the new universities in Nigeria.

Given this background, over the past decade what difference have these Nigerian universities made in agricultural development, service to government, service to their students and faculties, educational progress, economic policy guidance, research direction and results, and benefits to farmers? What lasting imprints were left by the U.S. universities that assisted them? How can we explain what did or did not happen in the communities where the

universities are located? What lessons can be learned for the universities themselves and for A.I.D. as an agency? The purpose of this study was to seek answers to these questions and to assess the impact that has been engendered.

3.2 University Development During the Period of A.I.D. Assistance

The three newly established universities all received major support from A.I.D. during the 1960s. Aid to the University of Nigeria, Nsukka was interrupted in the late 1960s by the civil war; A.I.D. support was terminated and was not renewed when the University reopened after the civil war. Ahmadu Bello University and the University of Ife received continuous support from A.I.D. into the mid-1970s.

All three universities have experienced rapid growth in enrollment in nondegree programs, degree programs, and post-graduate programs. All three universities have exceeded their growth targets. Enrollment has grown from a few hundred students in each university to 21,000 at Ahmadu Bello (including non-degree-granting schools), 13,000 at the University of Ife, and 12,000 at the University of Nigeria, Nsukka. Small departments of agriculture at each university have been expanded into faculties or colleges of agriculture, with six or seven departments each. Strong postgraduate programs have been established. Methods of teaching, examination procedures, curricula, and student/faculty relationships have all undergone significant changes since independence. Success is evident in the rapid pace and quality of staff training and the high retention rate, which are reflected in the high proportion of Ph.D.s in each department of each university. Staff quality throughout would be creditable at any institution of higher learning.

In all three universities, the imprint of the U.S. counterpart universities is marked. Universities that were just being established at the time cooperation was initiated are now strong institutions. While A.I.D. cannot take sole credit for the development of the universities, it was a substantive partner during their important formative years. In the case of the University of Nigeria, Nsukka, A.I.D. provided support for its total development. At the University of Ife, A.I.D. support was in agriculture, and at Ahmadu Bello, A.I.D. support was in agriculture and veterinary medicine at the degree level and for non-degree-granting schools as well. Even in these latter two universities there has been an obvious spill-over effect from agriculture to the rest of the university in methods of teaching, examination procedures, curricula, and student/faculty relationships. In short, at all three universities, both agricultural and nonagricultural students take specific courses in a formal curriculum. The British-derived tutorial system of study has been replaced by an educational model resembling the teaching component of the U.S. land-grant universities.

3.3 Determination of the Impact of A.I.D.'s Assistance

This study views impact from several perspectives. First, the team wanted to assess the nature and degree of project impact within the three universities (internal impact) and within the larger community (external impact). Second, given that the three universities were in the same country but under different ecological and social influences, the team tried to identify elements of impact that were common among the three universities and those that differed and to determine the reasons for the similarities and differences.

3.3.1 Internal Impact

"Internal impact" as used in this study means observable outcomes of the projects within the campus and on outlying university components such as subcampuses or the university farm.

Common Elements of Internal Impact. Elements of internal impact that were observed at all three Nigerian universities relate to several broad but critical issues and subissues. The first issue has to do with the growth patterns of Nigerian universities. As noted previously, the three universities rapidly expanded their enrollment and exceeded their growth targets. In addition to size, each can be noted for its high standards, vitality, approach to education, high quality of staff, method of teaching, curricula, and examination procedures. The pool of professional talent at these three universities is outstanding among all Sub-Saharan African countries.

Other internal attributes are common to the growth patterns of the three universities. The Joint Admissions and Matriculation Board for Nigeria ensures that enrollment is democratized, with some 60-70 percent of the student body coming from rural areas. This is reflective of the general distribution of the population.{1} Notwithstanding the colonial heritage, each university professes attachment to a land-grant concept of integrated teaching, research, and service. Change and progress in development have indeed been profound in these three universities in the space of one generation.

In all three Nigerian universities the imprint of U.S. counterpart universities is marked. Contract staff from U.S. universities taught and assumed leadership roles as department heads, deans, and even vice-chancellors. They selected staff for overseas training, laid out laboratories, and installed equipment. They encouraged research and changes in the style of teaching, and they helped to modify other practices. Veterans of this period who are still on the agricultural faculties assert that the hard work, zeal, and mature guidance of U.S. staff during the formative years of these universities are still remembered fondly. The mutual respect and goodwill between the Nigerian and U.S. universities, and to an extent between the two countries, are still strongly evident.

{1} In Nigeria, however, the distinction between rural and urban becomes fuzzy. Members of nuclear families and extended families regularly alternate between rural and urban places of residence to grow crops and raise small animals.

These positive internal impacts are not, however, without opposing constraints, negative impacts, and contradictions. This assertion leads to the second overarching issue. Spectacular growth patterns reached a plateau between the late 1970s and early 1980s. Well-established and originally well-funded libraries and staff support have seriously deteriorated. Books and research journals are no longer being ordered; refresher training for faculty members is rare; faculty travel, including travel for research, is almost at a halt; and partially constructed buildings remain unfinished on all campuses. All these factors have adversely affected the academic atmosphere. How do we explain this turn of fortune?

The major constraint at each of the three universities is funding, which is the second critical issue affecting impact. The universities never shared sufficiently in government revenue, even during the oil-boom era. Most new funds earmarked for higher education went to establish new state universities, including faculties of agriculture and infrastructure, rather than to meet the long-term development needs of existing universities. Now, in the post-oil-boom period, university and departmental budgets have been cut to the point where almost no funds are available beyond those for salaries and limited maintenance costs.

The three universities are adversely affected not only by the overall level of funding for higher education but also by the prioritization of needs and the allocation of scarce resources. For example, Nigeria has greatly democratized enrollment in higher education and has reached an all-time high of 130,000 students in colleges and universities. This has been very costly to the quality of education itself. With some 30 colleges and universities in operation, it is clear that Nigeria has greatly overexpanded its educational facilities. Moreover, a considerable number of Government-supported agricultural research institutes continue to be funded, while little effort is made to use the universities' capabilities for collaborative research. In theory these institutes and universities are to be complementary, but in fact the faculties of agriculture and the commodity institutes located across the country derive little mutual benefit from each other. Rather, they appear to compete actively for dwindling resources.

Distortions in funding and the constraints they create are noticeable everywhere. Highly trained staff are underused. University farms that were once well maintained are now deteriorated; income from the farms goes into a general fund rather than for the farms' operating expenses.

Although U.S. universities contributed to university growth in Nigeria, the lack of sufficient long-term planning and continuity during the contract periods may also have contributed to the slowdown in growth and development. Nigerians contacted by the team all commented that the tours of duty of contract professionals were limited almost invariably to a brief 2 years and that the tenure in Nigeria of U.S. counterpart universities was too short and their departure too abrupt. They noted that the U.S. land-grant universities were operational half a century before they were able to offer effective and sustained contributions to agriculture. In Nigeria, the consequences of early and abrupt departures are easy to identify.

A number of Nigerians commented that U.S. professors and administrators assigned to Nigeria's universities had too little time to work closely with returning Nigerian staff. The Nigerians who were replacing U.S. contract staff were often young people fresh from graduate school, whose dissertations had dealt with agricultural problems outside Nigeria and whose lack of experience made them reluctant to try to introduce changes.

Another problem with the project that contributed to the present malaise was the failure to ensure adequate equipment maintenance. Mute symbols of this failure can be seen in every laboratory, on every university farm, and in vehicle graveyards, where worn-out, broken down, and useless relics of equipment purchased under the project remain. Sophisticated dairy equipment, for example, was purchased under one of the contracts to accommodate imported exotic dairy cattle. One Nigerian professor remarked, "We were glad to get the equipment, but it was ordered and installed before considering whether the exotic cattle would survive [they didn't], or even whether Nigerians liked milk." Attention to training technicians for equipment maintenance and to ensuring maintenance facilities would have increased the benefits derived from the equipment supplied to the three Nigerian universities.

A large obstacle to greater involvement by these Nigerian universities in locally relevant research is the system of prestige, promotions, and rewards that is common in many universities and is highly evident in Nigeria. In the 1960s and 1970s, high-quality U.S. (and other) universities moved toward stronger, increasingly specialized departments. At the same time, the "publish or perish" criterion for promotion increasingly became defined as narrow, discipline-oriented research appearing in specialized, prestigious, refereed journals. Since academic advancement in the three Nigerian universities is based primarily on publication in international-standard, highly specialized journals, time spent on locally relevant research or outreach could work against career advancement. Only at Ahmadu Bello University's Institute of Agricultural Research do clearcut opportunities exist for publishing and gaining recognition from broad, locally focused research and outreach activities. Accordingly, it is at Ahmadu Bello that most such activity takes place, although it is not the dominant focus even there. In short, a major reason for the paucity of problem-solving research and its dissemination at these Nigerian universities appears to

be the potentially negative impact of such work on career advancement, given the current reward system.

At the time the projects were initiated, there evidently was little or no recognition by the relevant authorities of the important role of Nigerian women in agriculture nor of how, within the social and cultural value system, a university could and should work with women as producers. During the course of university development in Nigeria, little progress has been made on this subject. Even today, in all three universities studied, male farmers are receiving agricultural production technology assistance while women are generally assisted with home economics and handicraft projects. In all areas visited by the team, a large number of women involved in agricultural production voiced a strong desire to receive information and technological assistance for agricultural production.

It appeared to the team that even in the northern, predominantly Muslim sections of the country, where for religious reasons women must work only with women, the universities have done little or nothing to increase the number of women researchers and extension personnel needed to work with female farmers. Yet women play a major productive role in agriculture, raising poultry, goats, and sheep; threshing grain; and processing agricultural products for sale. Future A.I.D. contracts should be sensitive to this issue and should provide greater support for training women who are interested in agriculture; technology for agricultural production should be offered to women farmers as well as to men.

Differences in Internal Impact. While many common elements have affected internal impact at the three universities, differences also are clearly evident. Most of them relate to university outreach and are discussed in Section 3.3.2 (External Impact), but a few differences concern matters internal to the universities.

It is worth repeating that at the point of independence in 1960, approaches to teaching, research, and extension, and the vested interests associated with them, had already been established. Federal and state agricultural ministries, for the most part, retained control of research and extension. In western Nigeria, the government's indicated intent in the 1960s to release the research and nondegree training functions to the University of Ife has been fulfilled only to a very limited extent. In eastern Nigeria, where the University of Nigeria, Nsukka is located, the agricultural research and extension functions remain solidly with the state ministries.

Although the universities shared a common Nigerian heritage and many common problems, Ahmadu Bello University evolved differently from the other two universities, which enabled it to more nearly approach the land-grant model. The well-established Institute of Agricultural Research at Samaru and the National Animal Production and Research Institute at Shika were transferred to the new Ahmadu Bello University. Both institutes date back to the 1920s and were going concerns under the former Northern Region's

government, with a strong cadre of experienced and well-qualified research staff. Moreover, the Extension and Research Liaison Section, which was created by the Northern Region's government in 1963 as a link between agricultural research and the ministry's extension service, was transferred to Ahmadu Bello University in 1969, where it was merged with the Institute of Agricultural Research. In 1975, it became a separate institute under the University, now called the Agricultural Extension and Research Liaison Service. The transfer of these key institutes to Ahmadu Bello University gave it a research and extension capability unique for Nigeria and perhaps for all Africa.

Another internal difference concerned the breadth of the technical assistance provided to the University of Nigeria at Nsukka. Whereas the University of Wisconsin was concerned only with the College of Agriculture at the University of Ife and the scope of work for Kansas State University at Ahmadu Bello University covered agriculture, veterinary medicine, and a few off-campus agricultural training schools, work under the Michigan State University contract at Nsukka called for involvement "in the development of the total University." The scope included everything from advice on construction to provision of the first two vice-chancellors. We can only speculate on what would have happened at Nsukka had the civil war not caused abandonment of the contract activity.

3.3.2 External Impact

The team uses "external impact" to encompass those elements of university activity that were identifiable and important in the larger community. As with internal impact several critical issues and their related subissues stand out. The state of the economy and related budgetary decisions were found to influence external impact by affecting job opportunities for graduates, by limiting what the universities can do, and by influencing what faculty members are willing to do. In addition, the way a university organizes, administers, and controls its work greatly influences its external impact.

Common Elements of External Impact. Faculty members at each of the three universities serve regularly on state, federal, and parastatal boards and commissions. By doing so they are able to influence government budgets and development plans and even policy. To a more limited extent, faculty members also serve as consultants to financial institutions and private enterprises, an indication of the wide recognition accorded to faculty competence and expertise. However, because none of the universities has yet developed a philosophy that projects a unique professional image, it is the individual consultant, rather than the university, who generally receives the recognition

The team also found that each university has made important external contributions through research. Each university has developed and released improved varieties of agricultural

commodities, including cowpeas, maize, guinea corn, numerous vegetables, and condiments. Also, promising progress has been made in production economics, livestock, and animal health research.

In assessing impact it is necessary first to determine whether the expectations for the projects were realistic. Considering that all three Nigerian universities were novel in concept and that U.S. universities were immersed in many phases of university activity almost from the Nigerian universities' inception, it is now clear that A.I.D.'s expectations were overly optimistic. In the time allotted to the projects, the U.S. universities were unable to set all the wheels in motion required to establish the basis for effective external impact. The average 2-year tours of duty of U.S. university staff were too short to provide the continuity needed for development. Also, the goal for full-scale university development in less than 20-25 years was unrealistic.

All university staff interviewed by the team commented on the acute shortage of funds for both capital and operational budgets as a major constraint to external impact. Although it was evident to the team that the shortage of funds was a serious constraint, it was equally evident that an increase in funds would not automatically lead to greater external impact. To improve external impact, changes are required in several areas: (1) the basis for university staff promotion, (2) incentives for farmer-oriented research, and (3) government funding commensurate with the universities' capabilities to carry out much needed research.

The team found several cases indicating that a small but reliable source of local funds, complemented by a modest amount of foreign exchange, would go a long way toward keeping the research momentum going. In one case, an enterprising professor sought and received from an overseas donor a small research fund which he is using to conduct vital studies among small-scale farmers. In another case, the U.S. Board for International Food and Agricultural Development (BIFAD) funded a project that is providing critically needed research funds. Without some outside funding the team fears that university researchers will not be able to engage in the fruitful research for which they are so well qualified.

The post-oil-boom budget crisis in Nigeria is also affecting the universities' ability to achieve external impacts through their graduates because it has severely constrained employment opportunities. Typically, university graduates have been employed mainly in the public sector -- federal, state, and local governments; parastatals; and agricultural development projects supported by Nigeria with loan funding from the World Bank, river basin projects, and banks -- and to a lesser extent by oil-related businesses and private firms. Under the present severe budget crunch (see Appendix D), public institutions are underfunded and the supply of college graduates far exceeds demand. Students are well aware of this. Some students attempt to prolong their

graduate work to ride out the job depression; others cluster into departments like agricultural economics, which give them more flexibility in the job market; still others are beginning to seek lower paying jobs in secondary and elementary teaching. Meanwhile, the ranks of the degree-holding unemployed are swelling.

At the same time, the team was assured, obtaining land for farming is not difficult. A repeated question, therefore, was why didn't more agricultural graduates seek careers as active farmers? The team received several replies to this question.

Nigerian economists pointed out that farmers without capital must rely on back-breaking, labor-intensive methods using hand-tools, and the returns to labor are miserably low -- much lower on average than salaries that college graduates have come to expect in cities. Thus, based on opportunity costs, even the remotest prospect of a nonfarm job is more appealing than farming. The negative attitude of graduates toward engaging in farming, combined with the large numbers of students in universities and heavy subsidization of university education, may mean that Nigeria is rapidly "educating itself out of farming." The need appears urgent for Nigeria to make farming more attractive and to create more job opportunities in the private sector.

In summary, it is evident that the current budgetary crisis in Nigeria is adversely affecting the operation of the universities at-large and employment opportunities for university graduates, as well as making it extremely difficult for faculty members to engage in external research. If economic conditions fail to improve, Nigeria may need to reduce student enrollment, limit scholarship subsidies for students, or even close some of the newer colleges.

Differences in External Impact. The point has been made that although all three universities engage in off-campus activities, Ahmadu Bello University in northern Nigeria has more off-campus influence than do the other two universities. Evidence for this conclusion includes the following findings concerning Ahmadu Bello compared with the other two universities: (1) it has released more improved varieties of crops to farmers, (2) it gives more attention to cropping systems and livestock diseases, (3) its staff visit villages with more regularity, (4) trials were more in evidence on farmers' fields, and (5) farmer criticisms were less strident. In general Ahmadu Bello University seems to be looked upon more as a regional center of excellence than do the other two universities. What accounts for these differences of external impact?

The team probed this question with care. The differences did not arise from lower quality departmental staffs at Ife and Nsukka; their staffs are as competent as Ahmadu Bello's. The top administrators at all three universities are of the highest intellectual caliber. Budgets and other resources are short at all three universities. The critical differences seemed to stem from the formative years of these institutions and their

organizational structure.

At the time the universities were established, there was no doubt about the need for more professional manpower and the need for universities to supply it. Many people assumed that because the three U.S. contract universities were land-grant agricultural universities, the Nigerian universities would be encouraged to undertake research and extension, as well as teaching, that would be complementary to the work in the ministries. It was also assumed that the ministries would relinquish their research and extension activities or, at least, support university efforts. As it turned out, government officials were not willing to transfer research and extension functions to the universities because these functions represented important power bases. An exception, to a limited extent, was in the Northern Region, where the government transferred existing research and extension organizations to Ahmadu Bello University, where they became elements of a larger agricultural complex. With this transfer to Ahmadu Bello came resources enabling the university to achieve external impact.

Concluding Comments. The team believes that a university's impact in Nigeria should not be measured according to how closely the land-grant model is followed. There are other factors, such as historical circumstances and resources, that have had an important role.

The lack of impact in the area of research and extension has been very noticeable in all three universities. The effectiveness and credibility of the faculties of agriculture are being questioned by many who now believe that the universities should be more relevant to the agricultural problems of the country. The team suggests that even if the land-grant model is not followed, the universities can, and should, become more involved in problem-solving research. This will require university recognition and credit toward staff promotion for practical problem-solving research, transportation for on-farm investigation of constraints to farming, greater attention to meeting the needs of women in agriculture, and the availability of funds for research.

Greater collaboration is needed between the universities and the ministries concerned with agriculture in the areas of research problem selection and funding. The ministries and agricultural research institutes can be a source of farming problem identification and research funding, and staff from these institutions and the universities should work jointly to develop productive means of collaboration. The universities have a number of very well qualified but underutilized staff who should be working in collaboration with others on practical research problems.

Opportunities for collaboration between the universities and the agricultural ministries and research institutes should have been explored and stimulated during the project period, as evidence accumulated that the land-grant university model was not

going to be fully adopted in Nigeria. Such collaboration, particularly in times of budget constraint, needs to be fostered in order to ensure greater relevance to the work of the universities and the utilization of the important pool of talent in their faculties of agriculture.

Many of the issues related to external impact remain unresolved. It was not clear to team members how or when university impact will be accelerated. Will universities become campus bound because of depressed budgets, or will they find ways to serve farmers effectively? Will they be brought into the large agricultural development project system that is partially funded by a World Bank loan? (The World Bank recognizes that universities should handle the training of extension agents who, according to plan, are to be released by the states and brought brought under this program.) Can, or should, these large federal universities become the core of an effective national research system by forming networks with commodity institutes and state colleges? Current budget problems are so severe that few people in Nigeria are thinking ahead to issues like these.

4. LESSONS LEARNED

1. While the precise organizational structure of the U.S. land-grant model may be incompatible with the institutional history of many countries, the linkage of training, research, and extension remains a necessary but generally neglected function in the management of agricultural institutions.

Universities in Nigeria are under the Ministry of Education, yet the locus of resources and decision-making for agriculture resides within the Ministry of Agriculture. This ministry has built its own parallel research structures that consume the preponderance of available research resources. Thus, the agricultural colleges must function without a natural constituency of support within the Ministry of Agriculture. In addition, the agricultural colleges are only minor players within their home universities. Without an institutional patron to support a research/extension role, the pattern of faculty members seeking to market their individual services apart from that of their college is likely to persist. Likewise, this condition will continue to reduce the prospect of attracting visionary leadership within the agricultural colleges to marshall faculty resources around an agenda of institutional priorities in research and outreach.

2. Under conditions of high levels of social and political mobilization, agricultural colleges may function primarily as a medium for providing social goods to students (i.e., the granting of degrees) and only secondarily as a mechanism for generating and transferring skills, technology, and services for the agricultural sector.

The attainment of national independence, followed by the

civil war and the ensuing oil boom, served to generate high levels of social and economic expectations among the Nigerian populace. Education was viewed as a primary vehicle for advancing one's status and income. State and federal authorities have responded to these pressures by adopting educational policies that support high enrollment, free tuition, and the proliferation of new universities, particularly at the undergraduate level. Thus, the agricultural colleges have become primarily instruments of social mobility rather than instruments for agricultural change.

3. The Nigerian experience suggests that donor resources should be stretched over a longer time period and distributed more evenly throughout the institutional development process, with the intent of generating impact both internal and external to the university setting.

The A.I.D. investment at Ife, the University of Nigeria, Nsukka, and Ahmadu Bello helped create a highly trained Nigerian faculty at each of the agricultural colleges. However, sufficient time was not allowed for the assistance effort to create necessary organizational structures, incentive systems, and linkages with important institutions and clients. By the time many of the Nigerian faculty were returning from overseas training, the resident U.S. advisers were completing their assignments. Thus, the new Nigerian faculty frequently functioned without the guidance and support of more experienced advisors in designing and implementing effective internal programs and linkages with relevant external agencies and constituencies.

4. In the absence of strong external pressure groups, additional organizational forms, such as the Institute of Agricultural Research at Ahmadu Bello University, that complement discipline-based academic departments should be used to enable an agricultural university or college to respond to the needs of its environment.

The Nigerian experience represents an effort in transferring the disciplinary organization of the land-grant college. But because of the lack of any external pressure to address critical production, processing, or marketing problems, this effort has tended to strengthen the orientation of Nigerian agricultural universities toward advancing knowledge within a particular discipline rather than toward directing efforts at problems within Nigerian agriculture. Only at Ahmadu Bello University has the existence of the Institute of Agricultural Research served to bring a more problem-solving, field-based orientation to the research and outreach activities of the faculty.

Historically, in the United States a wide range of public and private sector organizations, including farmer organizations, agri-service agencies, and local legislatures, has functioned as sources of countervailing and complementary pressures in ensuring that knowledge generated within a college is applied within the agricultural sector. Likewise, the private sector has assumed an ever larger role in developing and transmitting applied technology to farmers.

In the third world, linkages to user and pressure groups are weak if not nonexistent, and the private sector exercises an insignificant role in technology development and dissemination. This condition brings into question the utility of organizing college curricula and faculties solely along disciplinary lines or departments. In developing countries, agricultural colleges and universities require an organizational framework that is related to the problems of client farmers and other users of agricultural technology that graduates will confront after leaving the college or university. Therefore, in addition to adherence to disciplines, organizational arrangements are needed to facilitate an interdisciplinary approach to problem identification, problem resolution, and dissemination of information in keeping with the particular characteristics of client farmers and their ecosystems.

APPENDIX A

METHODOLOGY

The methodology employed in this impact evaluation is that of rapid appraisal. This involves a combination of largely qualitative research techniques applied over a short but intense period of time by an experienced, multidisciplinary team whose members continually refine what they have learned individually by discussing their preliminary findings with each other. The basic principle behind this rapid appraisal methodology is "triangulation" -- an attempt to approach a particular topic from more than one perspective. This technique, combined with the expertise of team members, is aimed at generating findings that are reasonably valid even though samples may not be random and time in the field may be short.

Among the data collection techniques used for this study were group interviews, key informant interviews, analysis of available documentation and statistics, participant observation, and "mini-surveys" that generally involved purposive samples aimed at representatives of relevant population subgroups (rather than random sampling methodology). During this process, the team looked for comparisons and contrasts, for example, between those who received project inputs and those who did not, between the impressions of team members who interviewed community leaders and the impressions of those who interviewed small-scale farmers.

The objective of this methodology is not a "quick and dirty" look at an area and a particular issue, but rather, a "quick and fairly clean" research process that provides a valid basis for the resultant findings. When team members reach a deeply felt consensus on the major parameters, problems, and lessons learned, based on a multiplicity of data resources, rapid appraisal may be considered to be completed to reasonable satisfaction, independent of the time spent in the field. Typical rapid appraisals involve three to six team members who spend 2 to 6

weeks in the field. For this study, a four-person team spent nearly 4 weeks in the field and emerged with findings they believe to be valid even though they may not be quantitatively based.

APPENDIX B

POLICY IMPLICATIONS OF LESSONS LEARNED

1. INTRODUCTION

The Agency for International Development (A.I.D.) distinguishes between achievement of immediate project objectives and broader impact on development goals. As the main body of the report demonstrates, all three universities/faculties of agriculture helped by A.I.D. and its contractor U.S. land-grant universities benefited greatly. All three projects achieved their immediate objectives, and in these terms the projects can be considered to have been effective. Viable faculties were created; equipment and buildings were put in place; people were trained and returned in high proportions to do high-quality work; and undergraduate and graduate students were enrolled in the called-for number of departments. In fact, both the number of students enrolled and the number of departments created surpassed the original targets.

A major impact of the three university projects has been to transform the instruction system of the Nigerian universities from the British-derived tutorial system to a style that mirrors the "teaching component" of the tripartite U.S. land-grant model. Thus, regularized course schedules, exams, and credit systems define the basic parameters of the academic program. The projects were less successful in promoting the research and extension aspects of that model. This may have been due, in part, to the time horizon for the projects, which was considered too short by most people in Nigeria who were associated with the projects. However, it is doubtful that a longer time span, in itself, would have enabled the universities to take over research and extension functions from the government ministries.

Several factors account for the failure to give greater support to research on current problems of agriculture and outreach functions: (1) a reward/incentive system biased toward academic research and publications rather than problem-solving research and extension; (2) a lack of attention to or recognition of agricultural producers, both male and female, as clients of the universities' agricultural program; and (3) insufficient study and understanding of the constraints to production faced by both men and women engaged in agricultural production and insufficient efforts to engender among university staff a feeling of responsibility to work to overcome the constraints within the socioeconomic and cultural system of the areas served by the universities.

The team recommends that the following lessons from the Nigeria study be considered as they relate to project approval, design, implementation, and institutional linkages.

2. PROJECT APPROVAL

Before approving new projects in support of agricultural facilities and research, A.I.D. should examine an institution's staff strength and its potential for contributing to teaching and research that are relevant to agricultural problems and development in Africa. Project approval should be based on the following factors:

-- The extent of faculty organization and the number of well-trained staff who can, with external resource support, provide a solid base for development and service to a wider community

-- Recognition within the university that the faculty of agriculture is one of its most important faculties, as demonstrated by clear evidence of administrative and budget support, as well as the verbal support of the university administration

-- Evidence of support for, and the integration of, teaching and research on African agricultural problems

-- Interest and unqualified support by university administrators for a network that links universities and research institutions both inside and outside the home country

-- A more explicit definition of roles, in advance, of the university relationship with extension, so that agricultural problems requiring research are identified and understood by university research staff members and research results are effectively applied in agricultural production

3. PROJECT DESIGN

1. In designing projects in which faculties of agriculture are the central focus, A.I.D. should go beyond project content and host-country concurrence to consider what, at the outer limit, can be achieved in the African agricultural environment.

2. The design should be based on a "worst-case" scenario, especially with respect to the resources that can be expected from host governments in the long run and the degree of cooperation and complementarity that may be expected from government research and extension organizations, development authority organizations (such as river basin project authorities),

and parastatal organizations. Basing a project on the "expectation" that effective cooperation will be worked out after the project has been initiated has been shown to be simply wishful thinking.

3. Realistic time requirements need to be built into the project design. Few direct external impacts should be expected in the first 5 to 10 years of support, even when the institution being supported has a good starting base. The U.S. land-grant universities required more than 50 years to become fully functional even though they had strong political support. The initial planning and implementation periods for establishing strong agricultural institutions in Africa should be 20 to 25 years.

4. The transfer of the land-grant model to Africa's universities may not be possible. A realistic compromise with much potential would be for colleges of agriculture to administer both teaching and research (with appropriate on-farm testing), while government ministries retain responsibility for extension activities.

5. Equipment planning must parallel program planning. Project designs should include a plan and support for the development of a maintenance program that includes qualified technicians (who will require training support), well-equipped maintenance facilities, and allowances for repairs and replacements.

6. Project planners should identify a firm source of support for research projects that will provide the incentive and the means for faculty members to undertake research -- outside the university campus or farm -- that addresses problems or constraints to agricultural production and development. It cannot be assumed that universities will provide such research support because university budgets are often the first to be cut during periods of economic stress. Moreover, present staff promotion policies in many African universities favor "academic" research over research on local problems.

7. Project designers should consider joint research between the host university and the U.S. university to maximize the comparative advantage of each.

8. Project design should take into account the present numbers of trained staff in determining the kind of training to be provided. Future projects may not require large sums for postgraduate training. When institutions selected for institution-building projects already have a sufficient number of staff, funds are more usefully provided for short-term, in-service professional training than for postgraduate training. A possible exception would be women trained in agricultural sciences and social scientists who are in very short supply and who have an important role in Nigerian and African agriculture.

4. PROJECT IMPLEMENTATION

1. Participation in agricultural programs should be assured for both female and male students. An increase in the number of female students could be encouraged by providing research support for problems relevant to women's roles in agriculture.

2. In proposals that emphasize research as a part of the faculty/college or university program, step-by-step "impact planning" should be incorporated in the implementation plan. Experience in northern and eastern Nigeria suggests that the first step toward meaningful contribution to agricultural development is to study the existing farming systems and identify specific factors that constrain production. These early studies are best done by staff who gather and interpret meaningful data, thus setting the stage for problem identification and the setting of research priorities.

3. U.S. universities selected for collaboration in such projects should have a strong interest in and commitment to cooperation and should have policies that enable their staff to benefit from participation rather than jeopardize their promotions because of service outside the home campus. Two-year staff appointments by U.S. universities, which has been the norm in the past, is not long enough; 4- to 6-year staff appointments should be considered. Project planners should also identify U.S. university staff with special competence that may be required for periodic, short-term work with the host-country university.

4. Where postgraduate participant trainees are part of the project, arrangements should be made for them to conduct their research in their home country or, at a minimum, in African institutions that deal directly with the problems of their home country. When possible, their degrees should be awarded by the African institution.

5. Attention and follow-through support must be maintained for all aspects of the project, including maintenance of equipment, networking, research incentives, and continuing linkages.

6. If A.I.D. is going to provide special assistance only to selected, high-potential countries, networking within a selected country and among neighboring, lower potential countries becomes essential. This is certain to be the most difficult element of new university-related projects. Success within the high-potential countries will depend on complementarities and cooperation in each selected country; success in terms of the relationship between high-potential and lower potential countries will depend on a clear indication of "what's in it" for the lower potential countries. In both cases, getting the politics right will be crucial to success.

5. PROJECT INSTITUTIONAL LINKAGES

1. Provision should be made for continuing linkages between the host country university and the collaborating U.S. university. This should be a mature partnership designed to maximize the comparative advantage of each university. In some cases, in order to assist the host-country university to reach the stage of development required for a mature collaborating arrangement, a strengthening grant might be provided similar to those provided to U.S. universities under Title XII.

2. Networking between universities will need regular monitoring and support. Even though many past attempts have not been successful, there are good examples of successful commodity research networks that should be studied. They offer mechanisms that will facilitate this important cooperation.

APPENDIX C

FINDINGS AND ANALYSIS OF IMPACT AT THE THREE UNIVERSITIES

1. AHMADU BELLO UNIVERSITY

1.1 Internal Impact

The association between Ahmadu Bello University in Zaria, Nigeria, and Kansas State University in Manhattan, Kansas, between FY 1962 and FY 1978 resulted in a very substantive internal impact on the development of Ahmadu Bello University. However, it must be recognized from the outset that there were other sources of support to Ahmadu Bello University at the same time. First and foremost was the Government of Nigeria, but there was also, among others, substantial support from the British Government, the Dutch Government, and the Ford Foundation. Therefore, it is difficult to ascribe the progress at Ahmadu Bello solely to the A.I.D. project. There is no doubt, however, that the project had a very considerable impact on the organization of the Faculties of Agriculture and Veterinary Medicine, the Division of Agricultural Colleges, and the Extension Research Liaison Service. The project was probably an essential factor in the rapid progress at Ahmadu Bello University but not a sole and sufficient condition.

At the time of the founding of Ahmadu Bello University in 1962, there was already a well-established Institute of Agricultural Research (IAR), which had been in operation since 1922 in the Northern Region of Nigeria, and a livestock management and cattle breeding program, which was established in 1928. Together they formed a basis for the agricultural program of the university. These well-established programs had a positive effect on the university's credibility but posed some problems for the project because, with their well-established procedures, organization, and administration, they were initially reluctant to be absorbed into a land-grant college model. The livestock management and cattle

breeding program was first made a part of IAR, but in 1975 it became the National Animal Production Research Institute (NAPRI), an autonomous institute administratively attached to Ahmadu Bello University.

The internal impact on Ahmadu Bello University resulting from its cooperation with Kansas State University was timely and effective in terms of staff development, organization, curriculum development, the initiation of a course work system, and the institutionalization of the land-grant concept of a university with its three functions of teaching, research, and service. Further, certain individuals from Kansas State clearly left an enduring impact. For example, the "farming sytems" approach to research promoted by David Norman remains a major component of the IAR program. Moreover, personal, professional, and some institutional contacts resulting from the project have made important and lasting contributions.

Of the 43 persons from the Faculty of Agriculture, the Extension Research Liaison Service, the Division of Agricultural Colleges, and IAR who were supported abroad for M.Sc. or Ph.D. programs under the project, 22, or 51 percent, are still with Ahmadu Bello University. Excluding those who have retired or died, the retention rate is 58 percent. This is a very high rate 10 years after the return of the participant trainees, particularly given the rapid growth in the number of universities and parastatal organizations that have drawn on the university's staff. Of the 35 members of the Faculty of Veterinary Medicine who were supported abroad for postgraduate studies under the project, 40 percent are still on the faculty staff.

The effect of the project on the organization of the university is seen not only in the Faculties of Agriculture and Veterinary Medicine, but also in the total Agricultural Complex.{1} During the course of the project, the Kansas State team suggested the creation of the new position of provost to head the Agricultural Complex. This suggestion was accepted, and the position was initially funded by the Rockefeller Founda- tion in 1969; later the Kansas State chief of party served as provost. The position has been continued and is currently held by a Nigerian who also serves as director of NAPRI. During the course of the project, several organizational changes took place as a part of the growth and development process of Ahmadu Bello University. The Agricultural Complex was formed as noted above, and joint appointments for teaching and research were established between some IAR and Faculty of Agriculture staff members. The Extension and Research Liaison Service was first incorporated into IAR and later separated as an autonomous unit under the provost. The Faculty of Agriculture started with a single department, agriculture, but gradually expanded into its present six departments: agricultural economics and rural sociology, agronomy, animal science, crop protection, plant sciences, and soil sciences. The Faculty of Veterinary Medicine also has six departments: veterinary anatomy, parasitology and entomology, pathology and microbiology, physiology and pharmacolocy, public health and preventive medicine, and surgery and medicine.

In 1971, the Division of Agricultural and Livestock Services (later changed to the Division of Agricultural Colleges) was established to direct and coordinate the nondegree schools of agriculture at Kabba, Kaduna, Samaru, and Bakura. Curricula were modified for the schools, new buildings were constructed, student enrollment was increased, and the prestige and stature of the schools were elevated.

From the outset of the project, Ahmadu Bello University and Kansas State University established an institutional and professional partnership that prevailed not only through the contract period but continues to be viable. Clearly, members of the staff within the Agricultural Complex of Ahmadu Bello University highly value their association with Kansas State University. Several staff made pointed reference to their active and frequent professional contact with former Kansas State professors. During the first years of the project, Kansas State professors served as heads of departments and the chief of party was elected dean while Nigerian staff were being trained to take over these positions. Throughout the tenure of Kansas State staff, they laid the foundation of the land-grant model, in which teaching and research are coordinated at the department level. This involved both joint appointments between the departments and IAR and close contact with the Agricultural Extension and Research Liaison Service, which, as organized, can draw upon expertise from any agricultural (including livestock) discipline.

An area in which there appears to have been little lasting internal impact, or perhaps an issue that was never given sufficient consideration, is that of women's role in agricultural production, marketing, and decision-making.

Another area that did not receive sufficient attention is equipment maintenance. The project provided important and useful equipment, although not all of it was fully appropriate to Nigerian conditions, but there is no evidence of any effort to establish a cadre of qualified maintenance technicians and an organization (and budget) to keep equipment working or to replace equipment and spare parts essential for teaching and research. Hence, most of the equipment is now inoperative.

{1} The Agricultural Complex is made up of the Faculties of Agriculture and Veterinary Medicine, the Institute of Agricultural Research, the Division of Agricultural Colleges (composed of four 2-year and 3-year diploma-level colleges), the Agricultural Extension and Research Liaison Service (formerly called the Extension and Research Liaison Service), and the National Animal Production Research Institute.

1.2 External Impact

The external impact of Ahmadu Bello University has been very noticeable and can be traced to the well-established research and demonstration work of IAR (dating from 1922) and the livestock

program (dating from 1928) in the Northern Region of Nigeria. Thus, when these units were incorporated into Ahmadu Bello University, they gave the university an agricultural presence in northern Nigeria and credibility and capability in serving the agricultural development needs of the savanna region of Nigeria and similar regions throughout Africa. In addition, the transfer of the Agricultural Extension and Research Liaison Service to the University in 1968 helped it to link research and extension.

The staff of the department of agricultural economics of the Faculty of Agriculture, in close cooperation with IAR, carried out extensive multidisciplinary studies in the region served by the university in order to understand the farming systems and to identify constraints faced by farmers and their reasons for adoption or nonadoption of research results. These studies adopted the farming systems research perspective that Kansas State University, particularly David Norman, helped to pioneer. The interaction between the staff of the department of agricultural economics and the researchers in IAR on the results of these studies had a very positive effect in ensuring greater relevance of the research and better awareness of the real constraints on adoption of research results. This work, although closely linked with the Kansas State team, was supported to a large extent by the Ford Foundation.

The early farming systems studies of the department of agricultural economics apparently did not consider the role of women in farming in sufficient detail. To a small extent this was corrected as the studies progressed, but this failure to fully consider the role of women in agriculture has prevented accurate problem identification and maximization of the benefits of research for members of the farm family engaged in agricultural production. This problem applies not only to the studies conducted by the department of agricultural economics, but may be generalized throughout the units of the Agricultural Complex, where the importance of women in farming and of how to reach them effectively has received very little attention.

The units of the Agricultural Complex, both individually and collectively, have developed improved crop varieties and relevant research and extension on agronomic problems, crop protection, animal health, livestock feeding, social and economic issues, and livestock improvement. Some results that have been adopted by producers in the northern states of Nigeria include the following:

-- New cowpea, maize, millet, and sorghum varieties

-- Crop protection and agronomic practices for these crops and for cotton and groundnuts

-- Identification of critical animal health problems and establishment of programs for prevention and control of rinderpest, contagious bovine pleuropneumomia, clostridial diseases, and avian diseases

-- Participation in regional vaccination programs for livestock and assistance from ambulatory clinics

-- Feeding systems based on rough forage and browse

-- Socioeconomic evaluation of farming systems

The Agricultural Extension and Research Liaison Service was transferred to Ahmadu Bello University from the Ministry of Agriculture in 1968, with the strong support of Kansas State staff. It was then merged with IAR, but in 1975 it became a separate unit in the Agricultural Complex. The Liaison Service has played an important role for the university in linking research with extension, particularly in the 10 northern states, thereby improving the external impact of the university.

The university's ability to continue to have a strong external impact now faces serious problems because of severe financial constraints. IAR has had to reduce staff, and departmental funds for research are extremely scarce. This financial situation affects all units of the Agricultural Complex.

2. UNIVERSITY OF IFE

2.1 Internal Impact

Since its founding less than 25 years ago, the University of Ife has become well respected throughout Africa for the quality of its staff and graduates. Its Faculty of Agriculture, with the A.I.D.-supported cooperation of the University of Wisconsin, has become one of the strongest faculties at the university. It now has a very capable and dedicated staff in six departments and one institute. The cooperative program with the University of Wisconsin greatly assisted this rapid development of the Faculty of Agriculture through support for postgraduate training for faculty members, the development of curricula relevant to Nigeria, and the transfer of the land-grant university concept of teaching, research, and service.

All 38 faculty members sent abroad for postgraduate training for M.Sc. or Ph.D. degrees under the project returned to Nigeria, and 20 are still on the staff, which gives a retention rate of 53 percent. Taking into account those who have died or retired, the retention rate is 59 percent, which is very good, given the demand for well-trained staff by the large number of new Nigerian universities.

Without a doubt the impact generated by the University of Wisconsin on the Faculty of Agriculture and other internal elements of the university of Ife was, and still is, tremendous. Veterans from the project period who are still on the agricultural faculty assert that the hard work, zeal, and mature guidance of the Wisconsin staff during the university's formative years was of immeasurable value. A total of 42 University of Wisconsin

professionals served at Ife in every department of the agricultural faculty over 10 years and helped to convert agriculture from a department to a faculty of the university. From 39 students at the beginning of the project in 1964, enrollment in the Faculty of Agriculture grew to almost 1,000 students in 1986.

During the first project year, 1964/1965, a few Wisconsin professors taught a total of 26 courses. At the request of their Nigerian counterparts, they assumed administrative leadership roles as deans and department heads. They recommended curriculum reforms and submitted their proposals for change to the university senate. They encouraged modification in teaching methods toward "open door" contacts between students and staff, internal examinations, and outside readings as a complement to textbook teaching. Perhaps the most profound impact of the Wisconsin staff was on local staff development. The Wisconsin staff helped to select candidates for graduate training in the United States and provided predeparture tutoring.

Wisconsin faculty members worked side by side with Nigerians in establishing the university farm and its several livestock and crop enterprises for teaching purposes. Under the contract, equipment and supplies worth almost $500,000 were ordered and installed in every department of the university and on the farm. The mutual respect and goodwill between the two universities are still strong, and the internal impact generated by the University of Wisconsin is as evident today as at the time the project ended.

The project was not without flaws, however. For example, the relics of now-obsolete, worn-out, and broken-down equipment that had been provided under the contract are visible in every laboratory, on the farm, and in vehicle graveyards, mute testimony to the failure to ensure adequate equipment maintenance and, in some cases, to select appropriate equipment. In discussing sophisticated dairy equipment, which was provided to accommodate the imported exotic dairy cattle, one Nigerian professor remarked, "While we were glad to get the equipment, it was ordered and installed before considering whether the exotic cattle could survive [they didn't], or even whether Nigerians liked milk."

Although it is readily evident that the land-grant university philosophy is firmly understood and that its teaching component has been incorporated at the University of Ife, there is only limited evidence that the philosophy has been put into practice in research and extension. Moreover, although supported verbally, the integrated farming systems approach is not really practiced. Students are given a joint curriculum for their first 3 years and then take a "farm year" before specializing in their fifth year. But they are rotated through individual, specialized branches of study rather than provided with a vision of how these disciplines are interrelated within the context of the local agricultural system.

Many faculty members commented that the time period for the project was too short and the withdrawal too abrupt. An extended period of support and contact between the two universities would

have been welcome and would have greatly assisted in producing lasting benefits.

2.2 External Impact

External impact reflected by the outreach work of the Faculty of Agriculture has been far less dramatic than the internal impact. The University of Wisconsin staff and their Nigerian counterparts drew up meaningful research plans to assist small-scale farmers in western Nigeria, but they never provided a mechanism for institutionalizing these efforts.

Although the heavy teaching load and lack of facilities hampered research at the beginning of the project period, the need for coordination of research, teaching, and extension was firmly established. By 1967, when the Ife campus was completed, the faculty research committee was chaired by a member of the Wisconsin team and practical problem-solving research was strongly encouraged. But without structural supports and incentives for such research, the amount actually carried out has proved less than originally had been hoped.

The University of Wisconsin recommended from the very beginning, and imparted this recommendation clearly to Nigeria, that all agricultural research and training being fostered by government ministries of agriculture would, as agreed, be transferred to the University of Ife. This has been accomplished only in part. The Institute of Agricultural Research and Training, with its non-degree granting school at Akure, has been incorporated into the University of Ife but is still headquartered in Ibadan. The move and the integrated relationship that was anticipated have not yet been completed. Moreover, agricultural extension is now under state ministries of agriculture, with little or no no university contact. The Institute of Agricultural Research and Training was to form the research, training, and, later, the extension arm of the Faculty of Agriculture. Its physical separation from the faculty and the university has been a handicap, and support for the Institute has been sporadic. The certificate- and diploma-granting school at Akure operates as a unit of the Institute, and its graduates continue to have a good reputation. But this does not mitigate the problem caused by the continued chasm between the university and the Institute.

External service to farmers is thus fragmented despite the good intentions of highly qualified scientists at the university. The department of agricultural extension and rural sociology (which also includes a program in home economics) has the primary responsibility for outreach work among farmers, but integrated, systematic research with other departments is sporadic. There is little support or reward for researchers during this period of severe budget constraints. Much of the research performed is on topics related to the agriculture of western Nigeria, but it is not based directly on village data and village problems.

Some external impacts have been achieved. Two new crop varieties have been developed by Ife and appear to have fairly wide acceptance in the region: the Ife brown cowpea and the Ife plum tomato.

A second type of wider impact involves the adoption by state and national policymakers of ideas and advice from Ife faculty members. These ideas have been disseminated via published articles in refereed journals, other publications, talks, and consultancies. Several sources mentioned this type of impact.

A specific example was given by a faculty member in the home economics program of the department of agricultural extension and rural sociology, who had published two articles in the Nigerian Journal of Nutritional Science in 1981. These articles detailed her research in training private vendors to prepare and sell nutritious weaning foods for preschool children. The articles were read by people in the Ministry of Health, and the idea of using private vendors -- who receive some training in nutrition enhancement -- struck fertile ground. According to our informant, the Ministry of Health now has turned to such private vendors to assist with feeding primary and secondary school students throughout the country.

Since 1969, the department of agricultural extension and rural sociology has been involved in development activities in nine villages around Isoya, with occasional collaboration by members of other departments -- not only from the Faculty of Agriculture, but also, for example, from health sciences. These villages are located in the tropical forest zone, quite close to the university. Over the last 3 years, three more-distant villages located on the edge of the savanna zone near Ede, have been included in these activities. Team members visited four of these villages with staff from the Faculty of Agriculture and held discussions with groups and individual farmers to gain a first-hand impression of "impact."

The first benefit mentioned by a leader of a men's cooperative in the Isoya area was the "promotion of social interaction and integration." Another member mentioned the enhanced ability to generate capital within the group, an especially relevant benefit given the present hard times and resource scarcity affecting Nigeria as the price of oil plummets. Similarly, the benefit most stressed and appreciated by the leader of a women's cooperative was the "loan and savings scheme" they were able to undertake after learning to organize themselves into cooperative bodies. Nevertheless, both men and women have asked for additional help in generating funds (via credit or other means). The men want the funds for agricultural inputs ranging from tractors to fertilizer to files to sharpen their hand tools. The women want funds to be used initially as working capital for trade -- their traditional economic activity -- and eventually to enhance the scale of their trade in agricultural products. But they also asked for help with precisely the same range of agricultural inputs as the men: tractors, fertilizers, and files. Many women would like to get into market-oriented

farming, using their profits from increased trade as a springboard.

One of the striking findings from the village group meetings was the uniformity of both the men's and the women's wants. In all four villages, the men stressed their need for inputs -- tractors, fertilizer, pesticides, herbicides, chemicals for stored corn, credit. Surprisingly, since we had been told that the women's main income activity was trade and that "they only helped on the farm," the women emphasized their need for precisely the same agricultural inputs; they wanted to farm to produce more income and food. In one of the villages where the women were organized, they wanted to parlay enhanced trade earnings (including income from project-taught handicrafts, which had not yet produced any income) and savings or loans into a poultry project. In short, both sexes wanted help with income-producing agricultural production projects. But whereas the men were receiving project assistance in this direction, the women were not. Project efforts for women were focused on home economics activities and handicrafts. The problem, the home economists explained, is that they are afraid to launch the women into high-investment, high-risk, high-gain projects involving agricultural production or processing (e.g., palm oil, melon seed oil, kola nuts, corncrib storage) when they do not have the time, training, resources, or vehicles to follow up this kind of assistance. So they demonstrate low-investment, low-risk, low-gain handicrafts to the women.

Other specific examples of impact include soil mapping and classification; socioeconomic studies and the utilization of the results to improve income; goat production under confinement; animal nutrition; and crossing of tsetse-tolerant N'dama cattle with white Fulani breeds to augment size and body weight.

The impact of the university through its graduates has been an important factor. Also, Ife faculty members serve on boards and commissions and as consultants to local, state, and federal governments, parastatals, and private firms and thus have some external impact on important national programs and policies. One senses, however, that the university has yet to develop a philosophy that can project its professional image and worth; off-campus work reflects more the individual's credits than the university's.

Financial constraints in recent years have greatly hindered research work that might have an external impact. However, it must also be recognized that despite the adoption of a land-grant university philosophy, the university provides few incentives or rewards for faculty members to do "relevant" research. Promotion within the faculty is, to a large extent, based on "high quality" research published in well-recognized international journals, and little recognition is given to activities that ease constraints at the farm level.

3. UNIVERSITY OF NIGERIA, NSUKKA

3.1 Internal Impact

At the outset, it should be noted that there were specific conditions that affected the project involving the University of Nigeria, Nsukka and Michigan State University that did not apply to the other two Nigerian universities and their U.S. counterparts. These distinctions affected outcomes in agriculture and other departments of the several faculties.

First, paralleling the activities of the all-Nigerian study team that produced the Ashby Report recommending establishment of a university in eastern Nigeria were the activities of a second team that was also invited to the region to study the situation and make specific recommendations concerning a new university at Nsukka. Two members of this three-person team were from Michigan State University. Notwithstanding the tremendous difficulty of converting a small college of arts, science, and technology at Enugu (as a second campus) and building a new campus at Nsukka, the team's 1958 report was positive. It recommended that the new university be established as soon as possible and be based on "service to problems and needs of Nigeria." Considerable attention was to be given to planning, with emphasis on academic fields in the sciences, agriculture, engineering, medicine, law, home economics, education, and several other disciplines. Thus, unlike the University of Wisconsin and Kansas State University, Michigan State University was able to generate a degree of impact at the very beginning of the planning process.

Other distinctions in this project were also noted. Whereas the University of Wisconsin was concerned only with the college of agriculture at Ife and the scope of work for Kansas State at Ahmadu Bello University covered agriculture, veterinary medicine, and a few off-campus agricultural training schools, the scope of work for this project called for Michigan State University to participate "in the development of the total university." This involved help with site plans, construction, certain administrative functions including the vice-chancellorship, and other general elements of assistance, with the goal of "enrolling 6,000 students by 1972." More specifically, the project's activity targets included assistance with physical planning, staff development, curriculum development, development of terms of reference for research, and the provision of equip- ment and the supervision of construction and program layout for a continuing education center and an economic development institute. Planning postgraduate programs, establishing laboratories, and building relations with the regional government also were expected. In fact, Michigan State University was involved in a beehive of on-campus activities between 1960 and 1967, when the imminent civil war caused an abrupt break in activities. Thus, whereas internal impact was strong and unmistakable, external impact was curtailed by the lack of time for planning and implementation.

The predecessor of the Faculty of Agriculture was established as an academic unit of the Faculty of Science when the university was

was founded in October 1960. In 1961, it assumed full faculty status and comprised six departments. Several changes in departments took place in the ensuing years, and in 1980 the departments concerned with veterinary medicine were combined and became the Faculty of Veterinary Medicine. The Faculty of Agriculture now comprises seven academic departments: agricultural economics, agricultural extension, animal science, crop science, food science and technology, home science and nutrition, and soil science.

All departments, in addition to their undergraduate programs, have developed postgraduate programs leading to the award of M.Sc. and Ph.D. degrees.

After almost 25 years, including 3 years of war when the university was abandoned, the imprint of Michigan State University is still strong in the several agricultural departments. Faculty members assert that despite almost insurmountable odds, a strong faculty has held together and has some of the most competent agricultural scientists in all of Africa.

This feeling of self-confidence, many say, can be traced back to the formative years of the university, when Michigan State staff were active in all departments and in Nigerian staff development. The need for all senior staff members to engage in meaningful research was emphasized, and a fully equipped university farm and experimental station were laid out for teaching purposes. Finally, to round out the land-grant approach, Michigan State hoped that equitable extension schemes could be worked out with the regional ministry of agriculture. In any case, extension work and extension training for agricultural officers and assistance were highlighted in workshops and conferences at the new Continuing Education Center. Without doubt, Michigan State University influenced almost every internal element of university development during its formative years, and the land-grant philosophy at the university was anchored in a burst of academic activity representative of a newly independent country.

Although only five people received postgraduate training in agriculture under the project, this training set the stage for extensive postgraduate training in the 1970s and early 1980s. Also, following the civil war, many persons who had remained outside Nigeria during the war and had completed their post -graduate studies during this period returned to eastern Nigeria. Not only have many persons been trained (almost all members of the Faculty of Agriculture have Ph.D. degrees), but the training has also greatly influenced the relationship between education and research. Especially encouraging is the reservoir of goodwill, camaraderie, and shared identity that has persisted between the two universities. Nigerian staff strongly and openly identify with staff and departments at Michigan State and other U.S. universities they attended. The number of staff trained is important, but of equal or greater importance is the impact the U.S. university had on university philosophy and development and the role of a university in the society it serves.

Impact on curricula relates directly to the philosophy and

skills of the staff who prepare them. The Michigan State University group was influential in initially shaping the land-grant approach and promulgating it through the Nigerian staff trained in the United States. Although some adjustments have been made to meet local conditions and accommodate the views of administrators and faculty members trained elsewhere, the land-grant approach has prevailed. From the start, a course-work system was introduced on the land-grant university model and has remained intact.

The Faculty of Agriculture, despite the potential of its very capable staff and an agriculturally productive region and country, has not fared very well in terms of resources. It is poorly housed and almost without funds for research, equipment, and supplies. It appears to have fared less well than other faculties in the university. It is a tribute to the dedication of the staff and students that morale appears to be reasonably high and that a willingness to continue prevails. Although the University of Ife and Ahmadu Bello University face similar financial constraints, they do not seem to be as severe as those at the University of Nigeria.

One manifestation of the magnitude of the Faculty of Agriculture's financial plight can be seen in the University farm. During the current financial crisis, many of its operations were wiped out (e.g., most poultry raising had to stop when feed could no longer be purchased). Although some operations continued, recently the proceeds from the sale of the farm's produce have been diverted to the university's general fund rather than to the farm. With little revenue going back to support the farm, it is clear that any incentive to increase production is being destroyed.

For the most part, equipment supplied under the project was damaged or destroyed during the civil war. Some items of scientific equipment have subsequently been salvaged and put back in operation, reflecting a noteworthy sense of initiative in making things work.

In summary, the internal impact of the project on the Faculty of Agriculture has been large in terms of organizational structure, curricula, course-work concept, and the desire for continuing contacts with Michigan State University. This is especially notable given the short period of association and the abrupt project cut-off because of the civil war in Nigeria. The desire for a renewal of an association with Michigan State or another leading U.S. land-grant university was very strongly voiced by all those at the University of Nigeria, Nsukka with whom the study team members spoke.

3.2 External Impact

Because of the severe dislocation caused by the civil war, impact can be discussed only in a postwar time frame. As in the

case of the other two universities, the greatest external impact of the project has occurred through the university graduates who are employed in ministries of agriculture, departments of agriculture, parastatal organizations, and a few private firms.

Some professors serve on government boards and commissions and are thus able to influence policy. According to the staff members of the Faculty of Agriculture, some of these staff prepared much of the analytical framework for the 1981-1985 Nigerian development plan. Beyond this influence, other university-related impacts are fragmentary.

-- One professor has developed a preferred chili pepper that is in widespread production.

-- A former student is the Federal Director of Rural Development (i.e., the National Agricultural Development Program).

-- Others have found ways to process yam flour and mass produce moi-moi, a nutritious food substance made from ground cowpeas.

-- The university is engaging in collaborative research with the cowpea Collaborative Research Support Project, the International Institute of Tropical Agriculture, and in some technical assistance to the National Root Crop Production Company.

-- Work on livestock feeds has had an impact, and contact with livestock producers is maintained through an ambulatory clinic and vaccination program.

On the whole, however, these are isolated instances of impact that bear little if any institutional imprint. The University has no guiding philosophy that would propel it to external achievement. The heavy teaching load (an average of 22 credit hours in agricultural economics) limits faculty participation in research and outreach activities. University management provides only limited and sporadic support, and in any case, no resources are are available for transport, supplies, enumerator costs, and related related research and outreach needs. Conditions within the soils department provide an apt illustration of these constraints. It has competent staff who are tied to the campus because of budget and resource constraints that frustrate all attempts toward serious research and community service. With an extremely small budget spread among nine professors and two graduate assistants, little can be accomplished. Even the cost of laboratory chemicals or trips to potential research areas must often be borne as personal expenses by the staff.

Nonetheless, there are individual exceptions. One staff member successfully applied for a research grant from an external source and is conducting an important study in the yam-producing area. The results of the study will provide valuable information to guide production, marketing, and

nutrition research, which, in the long run, could have an important impact on Nigerian agriculture.

Certain characteristics of African universities both inside and outside of Nigeria raise serious questions concerning what should and should not be reasonably expected in terms of external impact. Three examples from the Nigerian experience are offered in support of this concern. First, Nigerian professors, even those trained in U.S. land-grant universities and fully capable as scientists, have only a limited understanding of how or why farmers do what they do. Thus, it is doubtful whether Nigerian universities can have any meaningful external impact in, say, a yam-producing area before they have more information about the farming system.

Second, even if the university of Nigeria, Nsukka had sufficient information about the farming system, it would be able to provide farmers with very little direct assistance. The university cannot manage input supplies, the lack of which is a constant complaint of farmers. In the four states of eastern Nigeria, agricultural extension is firmly in the hands of state governments and in time may be passed to state agricultural development projects; the university currently has no role in extension.

Third, no university graduates have chosen farming as a career, so there has been no university impact on farming through the direct involvement of graduates. Graduates of institutions of higher education do not consider farming as an option. Thus, in a sense, Nigeria, with its intense interest in and high expenditures on university development, is "educating" itself out of agriculture.

Much more thought should be given to how, not whether, universities in a developmental environment like Nigeria's can have an active and positive impact on farming communities. Too little has been done to date.

APPENDIX D

ECONOMIC FACTORS AND UNIVERSITY IMPACT IN NIGERIA

In a rapid appraisal study, full attention to the general state of the host country's economy is beyond the usual terms of reference. Nonetheless, as the team moved from one university to the other and noted impacts from internal and external viewpoints, it became increasingly clear that the most common constraint on Nigerian universities is inadequate funding. In the past, all three universities had engaged in outreach work supported by competent staffs. But despite farmers' continuing critical need for information, inputs, and guidance, university outreach efforts are curtailed by depleted budgets, especially in eastern and western Nigeria.

Since the budget of each university is dependent almost entirely on government allocations, which in turn are tied to federal (and to a lesser extent state) revenues, economic conditions in Nigeria significantly affect the impact the universities can have. What are the prospects that economic conditions will improve?

1. STATE OF THE ECONOMY

There are some positive aspects of the economic picture in Nigeria. The present level of infrastructure -- roads, buildings, schools, universities, river basin development, input supply depots, and so on -- far surpasses earlier levels. More imported consumer goods are available in local markets than in prior years, despite newly imposed import restrictions.

Negative economic signs are more numerous, however. Microeconomic indicators are puzzling. Local prices are extremely high. For example, at official exchange rates of US$1.00 = 1.00 naira (N), the approximate price of a chicken during the team's visit in March-April 1986 was $16.00; a goat, $85.00; a yam, $1.50; and gasoline, $2.20 per gallon. Farm laborers earn up to N1.00 per hour digging yam mounds, yet unemployment at all levels is rising rapidly. We asked why, at current prices, weren't more farmers raising goats and chickens? And since yam cultivation in southern Nigeria is so widespread, why are prices so high? One will always get a reply to questions like these, but few replies are based on hard evidence. Obviously much research needs to be done, yet too little is being undertaken.

At the macro level, the Nigerian economy is in a state of crisis, with no short-term relief in sight. The Government's current plans call for export earnings of N15.6 billion for the current fiscal year, of which N14.1 billion would come from oil and N1.5 billion from tin and agricultural and livestock products. However, because of the fall in oil prices, the revenue shortfall relative to projections already surpasses N6.0 billion. Debt service alone (principal and interest) amounts to N5.3 billion, leaving little for running the Government and even less for development. Delays in payments on letters of credit discourage those who export to Nigeria; thus few raw materials and spare parts are arriving in the country.

The new military Government has not negotiated an agreement with the International Monetary Fund (IMF), but it has put forward its own plans for meeting the crisis. These emphasize private initiative and austerity, with particular emphasis on agriculture (60 percent of the population live in rural areas).

2. THE FUTURE OF AGRICULTURE

What can be said about the future of agriculture in Nigeria and the institutions, such as universities, that are to support

it? With an overflowing treasury during the oil boom, Nigeria went through the motions of professing interest in agriculture, and the World Bank invested billions of dollars in the agricultural development projects. It seems evident, however, that everybody, especially the Government, was dazzled by the flow of oil revenue and saw no immediate end to it. Why bother about slow-moving agriculture? Agriculture, therefore, was neglected. (Ironically, it is the nonagricultural elements of the economy that are in deepest trouble, including the one steel mill that has gone in and out of operation.)

In the absence of an IMF agreement, the Government banned imports of wheat, corn, and rice -- all major imports in the past. Sugar imports also are to be restricted. These actions are causing temporary hardships and fueling inflation.

Team members who know Africa well and can compare present agricultural conditions with those at the time of independence see grounds for optimism in Nigeria's agriculture. In effect, the country is being forced to produce. Several points can be made in this regard.

1. Despite the present economic crisis and its adverse effect on agricultural research and outreach by universities and other organizations, the number of commercial farmers in Nigeria has increased significantly. These farmers are not totally dependent on government and can obtain improved inputs on the open market. They have a far better response potential than very small-scale farmers.

2. More and more food farmers are moving into commercial production. The team talked with large-scale yam producers whose farms, although modest in appearance, use considerable capital and hire as many as 26 persons for land preparation and weeding. Other investors have large poultry units.

3. The International Institute of Tropical Agriculture is playing a major role on and off station in Nigeria. This international center assists universities and the agricultural communities; through joint efforts, highly promising new varieties of many crops have been released. Hybrid corn farmers, for example, harvest several hundred hectares of high-yielding corn varieties when weather is favorable. Indeed there is currently a surplus of corn in Nigeria.

4. Farmers in every village know that they must improve inputs if production is to increase, which is quite a change from the past. If the farmers were to form strong pressure groups (which they seem angry enough to do), they and the institutions that serve them would benefit.

3. UNIVERSITY OUTREACH

Nigeria does not need large amounts of funds, but it does need moderate amounts of well-placed funds to put idle capacity to productive work. A small-scale Collaborative Research Support Project in northern Nigeria has been highly successful; a single scientist with modest funds is doing an excellent research job not because the supply of funds is large but because it is reliable.

The process of agricultural development in Nigeria could be accelerated if universities with the capacity to do creditable research and outreach work would cut their dependence on government oil revenue and forge an alliance of mutual interest and support with farmers. By regaining the support of agriculture, universities, as part of a university-farmer team, could put more pressure on government for the funds needed to serve farmers. Conversely, if universities continue to rely fully on government revenue without developing a strong constituency among farmers, universities will be among the first to bear the impact of budget cuts.

APPENDIX E

GENDER, WOMEN IN FARMING, AND UNIVERSITY FACULTIES OF AGRICULTURE

The extent of female training in agriculture is remarkably uniform and low at all three universities, despite large differences in women's agricultural roles in the respective catchment areas of the three universities. First, at all three universities, the proportion of men enrolled in the faculty of agriculture is in the mid-90-percent range. Second, at all three universities, the amount of agricultural training offered to the overwhelming number of female students in home economics is similarly low -- at best, several introductory-level courses. Third, none of the three universities has any initiatives to deal with women in their productive roles in farming. Yet women's actual participation in the farming systems of all three regions ranges from considerable to overwhelming. The following sections describe the situation by region, arranged in order of ascending female participation.

1. AHMADU BELLO UNIVERSITY: THE NORTHERN, HAUSA/FULANI AREA

An estimated 80 percent of the population of the Hausa /Fulani-dominated catchment area for Ahmadu Bello University is Muslim. In theory, most Muslim women observe the rules of seclusion (kulle) and do not leave their compounds during daylight hours. This would seem to preclude most women's participation in fieldwork. (Rainfed cultivation of cereal grains constitutes the main agricultural emphasis in the region.) But, as first described by Simmons (1976) and verified during the current study, even secluded Muslim women are intensely involved in farming activities from within their

compound walls. They raise numerous poultry, goats, and sheep; carry out postharvest processing (especially threshing of grains) for pay; utilize agricultural products and by-products for cottage industries and handicrafts; process food for sale by nonsecluded members of the compounds; and keep "kitchen gardens."

Only women are allowed to enter a compound where women are in seclusion, and only Hausa-speaking women can collect information on their economic roles. But the university cannot gather data on this neglected but important contribution to local income and agriculture because its Institute of Agricultural Research has not a single woman among its 100 remaining professional staff (at its height a few years ago, it had 600 professional staff, including a woman groundnut breeder). On the infrequent occasions that data on women's activities are collected, they are already twice-removed from their original source, having been filtered through two sets of men: the enumerators who collect the data and the male heads of household who provide the data (and who typically spend their time in the fields, not in the compound, and thus may know little about what work goes on there). These data are then interpreted by a third set of men, the university researchers.

Despite the predominant Muslim culture, substantial proportions of women in the region do work in the fields (Olayiwole 1984). First, even in Muslim kulle-observing areas, poorer women and widows do fieldwork, and in the smaller, non-nucleated villages (perhaps 40 percent) wives may help harvest a crop in which they have a subsequent economic activity or interest. Second, among roughly 20 percent of the population that is not Muslim, most are from ethnic groups in which women are the principal farmers (Olayiwole 1984). Third, the women of the nomadic "cattle Fulani" group process and sell dairy products, walking the roads of Nigeria with huge calabashes of milk and dairy items balanced on their heads.

Thus, although women's agricultural role in the area is extensive, almost no information on their activities is included in the vigorous and high-quality farming systems research of the Institute of Agricultural Research. In fact, the only activity of Ahmadu Bello University that is directed at rural women is traditional home economics.

2. UNIVERSITY OF IFE: THE WESTERN, YORUBA AREA

In the traditional gender-based division of labor among the Yoruba, men are the principal farmers, and their wives are primarily traders and also help their husbands in agriculture. Several university informants considered this to be the still prevailing pattern. Yet recent research documents how extensive male outmigration and declining female profits in trading have pushed women to take a much more important role in farming than is generally perceived.

The team's experiences support this revised picture. The team made four field trips to meet with the men's and women's groups from the 12 villages where the Faculty of Agriculture of the University of Ife has research and outreach/extension programs. In three of the meetings, the team met with separate women's groups, and their leaders asked for precisely the same assistance as that requested by the men: fertilizer, technical assistance, and other inputs for their farming. We also noted a dearth of young men between 18 and 35 years old. Only the men are receiving the requested types of agricultural assistance (although not at the levels they desire), while the women are receiving only home economics assistance, predominantly through handicrafts projects. The home economists would like to change this, but they lack the necessary training, resources, and transport. The net result is that no agricultural extension is directed to women.

3. UNIVERSITY OF NIGERIA, NSUKKA: THE EASTERN, IBO AREA

This is a classic "female farming" area, and the fact has long been known. If anything, we were told by university informants, today women do even more in farming and men do relatively less. Men are involved significantly only in land clearing and preparation and in making mounds for yams, which constitute men's highest profit, highest prestige crop. After completing their yam mounds, many men leave the area for several months, until close to harvest time; they control the yam proceeds. There has been substantial male outmigration in recent years. As a result, women farmers perform most of the operations on their husband's plots (with the help of male and female hired labor) and also intercrop their own crops or farm their own plots on their own account. University informants estimated that women do some 60-90 percent of the farming.

Yet we found no evidence that female farmers were being addressed in the university's farming system research and outreach activities. To the contrary, on one visit to interview a progressive farmer collaborating with the university on research, I also interviewed the farmer's two wives and learned the following. Extension agents and researchers -- all males -- come frequently to the farm. Recently, they have been emphasizing fertilizer and chemical application, both of which are the responsibility of the junior wife (who appears to play the most active role in cultivation). The junior wife only sometimes gets to listen to the visitors' recommendations, she told us. She noted, however, that her husband generally does try to tell her what he learned. Then the woman indicated her clear preference for dealing directly with the extensionists, although she added softly that she accepts the present system. It is logical to assume, however, that a system that deals directly with the actual cultivator would have a more direct impact on productivity than one that does not.

APPENDIX F

STATISTICAL DATA ON ENROLLMENT, FACULTY DEGREES,
AND RECURRENT COST BUDGETS FOR THE THREE UNIVERSITIES

Table F-1. Ahmadu Bello University, Zaria, Faculty of Agriculture:
Summary of Total Student Enrollment, 1985/1986 Session

	Undergraduate				Postgraduate									
					1st-Yr Master's			2nd-Yr Master's			Ph.D.			
	1st Yr	2nd Yr	3rd Yr	4th Yr	FT Grad.	Asst	Othr	FT Grad.	Asst	Othr	PT Grad.	Asst	Othr	Total
Discipline														
Faculty of Agriculture	110	119	89	67	-	-	-	-	-	-	-	-	-	385
Agr. Economics and Rural Sociology	-	-	-	-	5	-	-	37	-	3	2	-	13	60
Agronomy	-	-	-	-	9	-	-	27	-	1	-	-	9	46
Animal Science	-	-	-	-	3	-	-	14	-	13	2	-	5	37
Crop Protection	-	-	-	-	-	-	2	17	-	2	-	-	6	27
Plant Science	-	-	-	-	3	-	-	2	-	-	-	-	3	8
Soil Science	-	-	-	-	4	-	-	8	-	-	-	-	7	19
Total	110	119	89	67	24	-	2	105	-	19	4	-	43	582

Note: FT = Full-time, PT = Part-time.

Table F-2. Ahmadu Bello University, Zaria, Faculty of Agriculture:
Statistics on Final-Year Students by Gender and by Option, 1965-1985

			Total Number By Option{a}				
Year	No. of Grad.	No. of Male	Female	Agr. Econ. & Rural Soc.	Agri. Ext. Sci.	Animal Prod./ Protec.	Crop Prod./ Soil Fer.	Total Grad.
1965	5	-	-	-	-	-	-	5
1966	4	-	-	-	-	-	-	4
1967	10	-	-	-	-	-	-	10
1968	18	-	-	-	-	-	-	18
1969	19	-	-	-	-	-	-	19
1970	28	-	-	-	-	-	-	28

1971	15	-	-	-	-	-	-	15
1972	23	-	-	-	-	-	-	23
1973	10	-	-	-	-	-	-	10
1974	26	-	-	-	-	-	-	26
1975	32	-	-	-	-	-	-	32
1976	50	-	-	-	-	-	-	50
1977	47	-	-	-	-	-	-	47
1978	64	-	-	-	-	-	-	64
1979	68	-	-	-	-	-	-	68
1980	-	-	-	-	-	-	-	-
1981	40	5	15	-	4	5	21	45
1982	50	4	27	5	9	2	11	54
1983	58	5	16	4	18	17	8	63
1984	60	2	29	-	8	11	14	62
1985	70	6	32	3	8	18	15	76
Total	697	22	119	12	47	53	69	719

{a} Options may cross departmental lines. Information on options as provided by the Office of the Dean of the Faculty of Agriculture.

Table F-3. Ahmadu Bello University, Zaria, Faculty of Agriculture: Highest Degrees Held by Nigerian Teaching and Research Staff, 1985

Highest Degree Held	No.
Bachelor of Science	14
Master of Science	40
Doctorate	69
Total	123

Table F-4. Ahmadu Bello University, Zaria, Faculty of Agriculture: Budget for Recurrent Costs{a}, 1976-1985

Fiscal Year	Totalb (naira)
1976	840,890
1977	1,289,450
1978	1,312,800
1979	1,352,400

1980	1,478,932
1981	1,603,894
1982	1,934,102
1983	2,019,254
1984	2,429,692
1985	2,814,822

{a} Budget includes salaries, supplies, and equipment for all departments and the dean's office.

{b} In current naira (N) (i.e., not adjusted for inflation). During the period 1976-1985, the naira was devalued against the U.S. dollar from approximately US$1.90 = N1.00 to US$1.10 = N1.00; in 1986, the dollar and the naira were at par.

Table F-5. University of Ife, Faculty of Agriculture: Student Enrollment, 1962/1963 to 1984/1985 Sessions

School Year	No. of Students
1962/1963	8
1963/1964	13
1964/1965	26
1965/1966	39
1966/1967	47
1967/1968	72
1968/1969	114
1969/1970	126
1970/1971	150
1971/1972	211
1972/1973	242
1973/1974	225
1974/1975	236
1975/1976	244
1976/1977	348
1977/1978	480

1978/1979	459
1979/1980	517
1980/1981	563
1981/1982	713
1982/1983	627
1983/1984	723
1984/1985	804

Table F-6. University of Ife, Faculty of Agriculture:
Undergraduate Enrollment by Specialization{a}
and by Gender, 1980/1981 to 1985/1986 Sessions

Department	1980/81		1981/82		1982/83		1983/84		1984/85		1985/86		Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Agricultural Economics	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	77	4	NA	NA
Agr. Extension & Rural Soc.	4	2	3	2	4	2	13	3	19	3	24	2	67	14
Animal Sci.	NA	NA	NA	NA	NA	NA	39	8	22	7	44	5	NA	NA
Home Economics (4-yr course)	-	-	2	2	0	11	1	14	1	17	4	33	8	77
Plant Science	NA	NA	NA	NA	NA	NA	17	3	8	3	12	5	NA	NA
Soil Science	4	0	10	0	16	2	10	1	6	2	8	1	54	6

Note: NA = Not available
- = Specialization started 1981/1982

{a} Undergraduate students have a 3-year common program, then 1 year of practical work followed by a year (5th year) of specialization. Home economics is only a 4-year course.

Table F-7. University of Ife, Faculty of Agriculture:
Postgraduate Enrollment by Specialization and by Gender,
1980/1981 to 1985/1986 Session

Department	1980/8		1981/82		1982/83		1983/84		1984/85		1985/86		Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F

Agricultural Economics	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	40	3	NA	NA
Agr. Extension & Rur Soc.	NA	NA	2	0	NA	NA	2	0	2	0	5	2	11	2
Animal Sci.	4	2	5	3	6	2	7	2	8	1	7	3	37	13
Plant Sci.	14	0	5	0	1	1	9	1	4	1	4	2	37	5
Soil Sci.	8	1	1	0	1	0	1	0	3	1	5	0	19	2

Note: NA = Not available

Table F-8. University of Ife, Faculty of Agriculture: Highest Degree Held by Nigerian Staff, 1985

Highest Degree Held	No.
Bachelor of Science	8
Master of Science	15
Doctorate	47
Total	70

Table F-9. University of Ife, Faculty of Agriculture: Budget for Recurrent Costs{a}, 1976 to 1985

Fiscal Year	Total{b} (naira)
1976	767,878
1977	996,392
1978	1,097,623
1979	NA
1980	NA
1981	NA
1982	1,698,233
1983	2,198,344
1984	2,216,846
1985	1,949,386

{a} Budget includes salaries, supplies, and equipment for all departments and the dean's office.

{b} In current naira (N) (i.e., not adjusted for inflation). During the period 1976-1985, the naira was devalued against the U.S. dollar from approximately US$1.90 = N1.00 to US$1.10 = N1.00; in 1986, the dollar and the naira were at par.

Table F-10. University of Nigeria, Nsukka, Faculty of Agriculture: Undergraduate Enrollment by Specialization and by Gender, 1975/1976 to 1985/1986 Sessions

To see Table F-10, please order a paper copy of Document Number PN-AAX-200

Table F-11. University of Nigeria, Nsukka, Faculty of Agriculture: Postgraduate Student Enrollment by Specialization and by Gender, 1975/1976 to 1985/1986 Sessions

To see Table F-11, please order Document Number PN-AAX-200

Table F-12. University of Nigeria, Nsukka, Faculty of Agriculture: Highest Degree Held by Nigerian Staff, Selected Years

Highest Degree Held	1974			1982			1985		
	No. in Residence	No. On Leave	Tot.	No. in Residence	No. On Leave	Tot.	No. in Residence	No. On Leave	Tot.
Bachelor of Science	1	9	10	6	2	8	4	-	4
Master of Science	6	5	11	6	-	6	9	1	10
Doctorate	11	5	16	52	2	54	49	6	55
Total	18	19	37	64	4	68	62	7	69

Table F-13. University of Nigeria, Nsukka, Faculty of Agriculture: Budget for Recurrent Costsa, 1976 to 1985

Fiscal Year	Total{b} (naira)
1976	1,922,681
1977	1,484,660
1978	1,503,707

1979	1,478,860
1980	2,198,909
1981	1,764,490
1982	2,768,490
1983	3,054,262
1984	2,946,711
1985	1,865,807

{a} Budget includes salaries, supplies, and equipment for all departments and the dean's office.

{b} In current naira (N) (i.e., not adjusted for inflation). During the period 1976-1985, the naira was devalued against the U.S. dollar from approximately US$1.90 = N1.00 to US$1.10 = N1.00; in 1986, the dollar and the naira were at par.

APPENDIX G

NOTES ON THE AUTHORS

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William K. Gamble is retired from the position he held for the past 5 years as the founding director general of the International Service for National Agricultural Research (ISNAR). Prior to this assignment, he resided 8 years in Nigeria: 3 years as representative of the Ford Foundation for West Africa and then for 5 years as director general of the International Institute of Tropical Agriculture (IITA). His 15 years of field experience prior to Nigeria were in Burma, Mexico, Central America and the Caribbean, Colombia, and Venezuela. He has traveled widely in Africa, Asia, and Latin America in his work with the Ford Foundation and as director general of IITA and

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Vernon Johnson is an A.I.D. retiree who, beginning in India in 1957 as agricultural program assistant, moved to A.I.D.'s Africa Bureau in 1959 and remained with that bureau until his retirement at the end of 1979. During the interim he served as agricultural economist in USAID/Nigeria; as agricultural officer in charge of A.I.D.'s agricultural program in western Nigeria; as deputy director of A.I.D.'s agricultural office in the Africa Bureau (1964-1966); as trainee at the National War College, Ft. Nair, Washington; as deputy director of USAID/Nigeria (1968-1970); as director for USAID/Uganda and USAID/Tanzania; and finally as deputy assistant secretary in the Africa Bureau, Department of State (1977-1979). Upon retirement in 1979, Mr. Johnson was employed by the Office of International Cooperation and Development of the United States Department of Agriculture and subsequently by International Programs, College of Agriculture, University of Maryland, College Park, Maryland. Under this employment he was detailed to the Agricultural Office of A.I.D.'s Africa Bureau. He departed that work on December 31, 1985.

Ned S. Raun is the regional representative in Washington for the Winrock International Institute for Agricultural Development. Previously, he was acting president and vice-president for programs of the former Winrock International Livestock Research and Training Center. He served in Latin America for 14 years as a Rockefeller Foundation staff member assigned to the Instituto Nacional de Investigaciones Pecuarias in Mexico, the Instituto Colombiano Agropecuario in Colombia, and the Centro Internacional de Agricultura Tropical in Colombia. He has provided short-term technical assistance in 20 countries. He served in the Development Support Bureau (now the Bureau for Science and Technology) of A.I.D. and in the Animal Science Department of Oklahoma State University. He has a Ph.D. in animal nutrition from Iowa State University and a B.Sc. in animal science from the University of Nebraska.

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