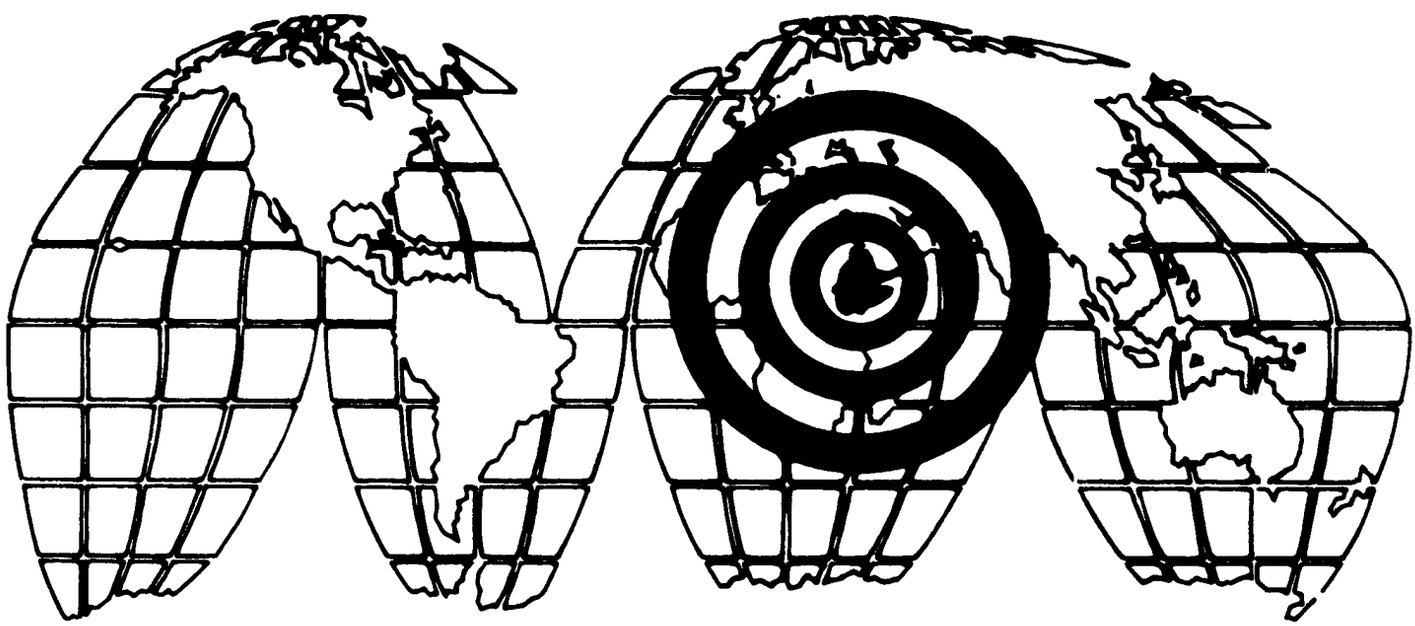
A.I.D. Project Impact Evaluation Report No. 71

Ethiopia: Alemaya University of Agriculture



June 1989

Agency for International Development (A.I.D.)

Washington, D.C. 20523

PN-AAX-219

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ETHIOPIA: ALEMAYA UNIVERSITY OF AGRICULTURE

A.I.D. PROJECT IMPACT EVALUATION REPORT NO. 71

by

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U.S. Agency for International Development

June 1989

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PREFACE

This report reviews the evaluation of Alemaya University of Agriculture, its impact on Ethiopia, and future directions for the university. The evaluation was conducted in Ethiopia from January 19 to February 5, 1988, with the team spending a week on the Alemaya campus in Harar Province, a day in Debre Zeit, and the remainder of the time in Addis Ababa.

The team leader Dr. Edwin Price, of Oregon State University, and Dr. Conrad L. Evans, a plant scientist from Oklahoma State University, were greatly assisted by the Commission for Higher Education in the Ministry of Education and the faculty and staff of Alemaya. Special thanks are due Dr. Taye Gullelat, Commissioner for Higher Education; Dr. Mulugetta Semru, Deputy Director; Dr. Agadew Redi, Director of External Relations; and Ato Tamiru Haile. At Alemaya, we are especially indebted to Dr. Dejene Makonnen, President; Dr. Asfaw Zelleke, Vice President for Academic Affairs; and Ato Negussie Seifu for establishing the itinerary and providing the logistics. We are also grateful to the many department heads, directors, faculty, and staff from Alemaya, the Ministry of Agriculture, the Ministry of Tea and Coffee, and the Institute for Agricultural Research in Addis Ababa who assisted us in collecting information for this report.

SUMMARY

Alemaya University of Agriculture is the primary institution of agricultural higher education in Ethiopia and the only higher education institution offering the B.S. and M.S. degrees in agriculture. Established as a college in 1952, the university was the recipient of major institutional development assistance from Oklahoma State University, which was under contract with the U.S. Agency for International Development (A.I.D.) for a 16-year period ending in 1968. Alemaya has a small faculty numbering 97. Current enrollment is 419 diploma students, 1,138 B.S. students, and 35 M.S. students.

Since its establishment, Alemaya has granted 1,629 diplomas, 2,558 B.S. degrees, and 81 M.S. degrees. Alemaya graduates are employed at all levels in administrative and educational sectors of Ethiopian society, from ministers, vice ministers, department heads, directors, and professors to secondary school teachers.

Research results produced by Alemaya faculty are eagerly awaited by the Government and by farmers. Many of the plant varieties developed by the university are in use throughout the agricultural economy. Similarly, in the livestock sector, much success has been realized through implementation of Alemaya-developed techniques in animal breeding and in conversion of waste by-products for valuable protein and energy sources.

The accomplishments described above have been achieved under conditions of considerable hardship. Many faculty have heavy teaching responsibilities and have also been assigned significant administrative responsibilities. Some have two administrative roles and still carry a significant teaching load. Alemaya faculty work from early morning to late evening hours to cover their responsibilities, and do this with a sense of sustaining the university against great odds.

The necessity of such effort is clear. Ethiopian faculty members holding a Ph.D. degree currently number 14, down from 47 in better days. During and after the revolution in 1974, Alemaya and its faculty were considered a threat to the new regime. Many faculty feared for their lives and fled the country. Nevertheless, the university is not highly politicized, but rather presents the image of a technocracy, heavily oriented to achieving breakthroughs in agriculture. Thoughts of loss and deprivation among faculty members give way very easily to excitement over new potato cultivars, areas converted to new tree species, or introduction of a vegetable crop at a nearby production cooperative, or to concern over soil profiles that indicate apparent soil loss in the surrounding region.

Alemaya has solid leadership and appears poised for rapid progress toward excellence and responsiveness to Ethiopia's agricultural needs. Unfortunately, no donor nor the Ethiopian Government appears inclined to provide the university with the support needed to fully attain its goals. This is unfortunate, because with added resources and a vote of confidence, Alemaya could assume a more productive role in the development of agriculture in Ethiopia.

1. PROJECT SETTING

Alemaya University of Agriculture is located in east-central Ethiopia 300 miles east of Addis Ababa on a spur of the high plateau that separates the Danakil plains on the north from the Ogaden region on the south. It is located 25 miles south of Dire Dawa, a city of approximately 98,000 people lying along the Addis Ababa-Djibouti railroad and nestled at the western foot of the Chercher Highlands. The university is 12 miles north of Harar, the ancient capital of Harar Province, which has an estimated population of 62,000. Dire Dawa and Harar are active manufacturing and trade centers with schools, hospitals, churches, and other facilities.

At an elevation of 6,400 feet, the city of Alemaya is at about the same elevation as Harar, and about 2,000 feet above Dire Dawa. Rainfall averages 36 inches per year, largely concentrated in the "short rains" between February and April and the "long rains" between June and September. An extremely dry season extends from October to February. Rainfall is highly variable and drought is common (occurring on average every third year). Excellent groundwater resources are largely unused off campus, except in a few vegetable fields operated by production cooperatives. Average mean annual high temperature is 25.5 ^{o}C and mean annual low temperature is 14.5 ^{o}C, with lower nighttime temperatures from December through February.

Soils are mainly sandy loams of granitic origin and highly erodible. Deep gullies transect the landscape off campus, suggesting that extreme care is required to prevent erosion once scrub vegetation--mainly cactus--is removed. While much of the landscape around the campus is settled and cultivated, scrub vegetation is close by and wildlife is abundant.

Most agricultural households in the region have been relocated from scattered dwellings on individual small farms into villages connected with farmer associations, service cooperatives, or production cooperatives. Farmer associations are a first step toward full collectivization; within them, most resources are individually owned. Service cooperatives are an intermediate form of organization. Within production cooperatives, all productive resources are commonly owned and the output is allocated according to household members' recorded efforts over the year. The organization of cooperatives has been under way for about 10 years and has been accompanied by rapid technological change.

2. HISTORICAL OVERVIEW OF ALEMAYA UNIVERSITY OF AGRICULTURE

The College of Agriculture (the present Alemaya University of Agriculture) was established in 1952 with technical assistance from Oklahoma State University, under contract with the U.S. Agency for International Development (A.I.D.). The organization of the college was modeled on the land grant college system of the United States, and the college was administered jointly by the Ministry of Agriculture and Oklahoma State University.

In 1961, the college became part of Haile Selassie I University (now Addis Ababa University) within the national university system under the Ministry of Education. Responsibility for national extension remained with the Ministry of Agriculture. As a result of the Ethiopian Government's decision in 1984 to place more emphasis on agriculture, specifically on increasing food production, the College of Agriculture at Addis Ababa University was made an autonomous university in 1984.

The granting of autonomy placed the newly created Alemaya University of Agriculture on a level equal with all other Ethiopian universities. The university could now present its own budget directly to the Ministry of Education rather than having to go through a spokesperson at a higher administrative level within the greater university system. Likewise, Alemaya could more actively seek assistance from international organizations through its direct contact with the relevant ministries, thus bypassing the arduous administrative ladder it had previously encountered as a department within Addis Ababa University.

Alemaya is now funded and administered by the Commission on Higher Education, a semi-autonomous body within the Ministry of Education. Research and extension conducted at the university are funded through the commission; however, Alemaya does not have exclusive responsibility for these functions. Agricultural research is also conducted by the Institute for Agricultural Research, a semi-autonomous body within the Ministry of Agriculture. Under a cooperative agreement with the university, the Institute conducts research at Alemaya's Central Experiment Station at Debre Zeit.

The College of Veterinary Medicine at Debre Zeit is not a part of the Alemaya University of Agriculture, but rather a college of Addis Ababa University. Although it has been proposed that the College of Veterinary Medicine be transferred to Alemaya, this proposal has been rejected.

Alemaya conducts research at many of the stations used by the Institute for Agricultural Research, especially its own at Debre Zeit. Alemaya's cereals breeding program is located at Debre Zeit. Research responsibilities of the Institute and Alemaya are in some cases divided geographically or by subject matter; in other cases, the two organizations cooperate on research projects.

Agricultural extension is conducted largely by the Ministry of Agriculture. Alemaya conducts localized field extension activities in communities near the campus. The university also supports extension at the national level by developing extension materials, training personnel, and conducting research on extension methods.

Alemaya has 72 Ethiopian faculty members, of whom 14 have a Ph.D., 41 the M.S. degree, and 17 the B.S. degree. In addition, there are 25 expatriate faculty, of whom 16 hold a Ph.D. By the beginning of the 1970s, over 80 percent of the staff was Ethiopian. As a result of the political and social unrest resulting from the revolution in 1974, many Alemaya faculty fled Ethiopia, thereby creating a severe shortage of qualified faculty to teach and conduct research. Faculty holding doctoral degrees declined from 49 prior to 1979 to 7 by the fall of 1979.

Current enrollment at the university is distributed across three programs: the diploma program, with 419 students; the B.S. program, with 1,138 students; and the M.S. programs, initiated in 1981, with 35 students. Alemaya is the only institution of higher education in Ethiopia that offers the B.S. and M.S. degrees in agriculture; three other institutions offer diploma degrees in agriculture.

Because Alemaya was a college of agriculture within Addis Ababa University until 1984, its academic units still reflect its previous organizational structure and are referred to as departments or parts of departments. A tentative transition is now being made to create faculties (or colleges) from certain departments in agriculture, and possibly new departments (e.g., "Plant Protection," which is now a division of Plant Science).

Alemaya's current organizational structure is as follows:

College of Agriculture
- Department of Agricultural Economics
- Department of Agricultural Engineering
- Department of Animal Science
- Department of Plant Science

Department/College of Forestry
Division/College of Natural and Social Sciences[1]
Continuing Education

Several departments established in the early years of the college have been terminated or transferred to other higher education institutions. For example, for the Department of Home Economics (established in 1967-1968), a curriculum was developed for a 2-year diploma program designed to prepare teachers of home economics for employment in the secondary schools of Ethiopia. This program was shifted to the Awasa Agricultural Junior College in the early 1970s. In another example, a Department of Agricultural Education that began operation in 1967 with the objective of training secondary school teachers of agriculture was discontinued in 1971 because of a lack of student interest and low demand from the secondary school system in Ethiopia.

3. ROLE OF A.I.D. AND OKLAHOMA STATE UNIVERSITY

The "Agreement for a Cooperative Agricultural Education Program Between the Imperial Ethiopian Government and the Government of the United States of America" was formally signed on May 15, 1952, in Addis Ababa, Ethiopia. Over the next 16 years, Oklahoma State University (under contract with A.I.D.) assisted Alemaya University of Agriculture in the development of B.S. programs in the agricultural sciences and in the development of major agricultural research and extension programs.

When Oklahoma State University signed the agreement to assist in the development of an agricultural education, research, and extension system in Ethiopia, the equivalent of a B.S. graduate was not to be found in the entire country. Therefore, contract faculty of Oklahoma State University assumed the entire

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[1]Formerly known as the Department of Arts and Sciences, this new division has responsibility for the curriculum of all agricultural students for their first two semesters. Some research in this division (particularly in the biological sciences) has been started, and requests for approval of social studies research have been made.

responsibility for the development and operation of a college of agriculture. They served as instructors, advisers, and work supervisors.

The first four presidents of the College of Agriculture (the present Alemaya) were officers of Oklahoma State University, replaced in 1966 by an Ethiopian Dean of Agriculture when the college was incorporated into Addis Ababa University. In 1984, when the college was upgraded to university status, a president was named.

During the 16-year period of cooperative educational endeavor, 185 faculty and staff from Oklahoma State University served in Ethiopia. During this period, 57 Ethiopian students were sent abroad for graduate studies. The cooperative agreement also included the development of the physical plant of the present Alemaya University of Agriculture.

The students who had gone abroad for graduate studies were given responsibilities commensurate with their level of education and practical training when they returned to the College of Agriculture. During this period, the Oklahoma State University contract faculty assumed an increasingly advisory role as they worked with Ethiopian counterparts who would eventually assume complete responsibility for their respective positions. This evolution of the role of contract faculty from one of complete responsibility to an advisory one also applied to administrative positions.

On June 30, 1968, complete responsibility for the operation of Alemaya University of Agriculture (formerly the College of Agriculture) was passed to the Ethiopian Government, thus terminating 16 years of cooperative work between Oklahoma State University and the Government of Ethiopia.

4. IMPACT OF ALEMAYA UNIVERSITY OF AGRICULTURE

4.1 Impact Through Its Graduates

The Alemaya University of Agriculture has emphasized classroom instruction throughout its 36-year history. The impact of this emphasis is difficult to quantify, but it may readily be detected both within and outside Ethiopia. It has resulted in the placement of Alemaya graduates in Ethiopia's ministries, educational system, and the Institute of Agricultural Research, as well as in international organizations. The university's strong focus on classroom instruction has also resulted in the

development of a continuing education program at two off-campus locations.

In the Ethiopian Government ministries, Alemaya graduates are found at all levels of responsibility, from ministers and vice ministers to department heads and directors. Many Alemaya graduates are also found in the educational systems throughout Ethiopia. In addition to Alemaya, Ethiopia has three junior colleges of agriculture and a college of veterinary medicine. Each of the junior colleges is headed by an Alemaya graduate, and most, if not all, of the teaching staff received their B.S. or M.S. degree from Alemaya. Several Alemaya students interviewed by the evaluation team indicated that some of their elementary and secondary school teachers were graduates of either Alemaya or the agricultural junior colleges. These teachers were primarily responsible for their choosing to attend Alemaya to pursue agriculture as a career.

Ethiopia's Institute of Agricultural Research (described in Section 2) is responsible for national research coordination as well as for research in specific subject areas. All Ethiopian researchers working with the institute are Alemaya graduates. Likewise, graduates of the Alemaya College of Forestry constitute the leadership and essentially the entire technical staff of the Department of Forestry within the Ministry of Agriculture.

Alemaya faculty conduct continuing education classes four nights a week and on weekends at two off-campus locations (Dire Dawa and Harar) for persons who are unable to attend regular daytime classes at the main campus. Laboratory classes are offered only on weekends for those who will eventually receive B.S. degrees.

Alemaya's continuing education program has had considerable impact on the advancement of people employed in the two large population centers of Dire Dawa (100,000 people) and Harar (65,000 people). In the past, many people from these cities migrated to the capital, Addis Ababa, in search of jobs and education beyond secondary school. With the advent of the continuing education program, people living in the Dire Dawa and Harar areas are able to study in their home areas and find productive employment.

More Alemaya graduates are needed throughout Ethiopia to serve as department heads, researchers, extension agents, and secondary school teachers. The private sector absorbs few graduates because nearly all business enterprises are within the socialized economy. In the past, this sector provided an important employment base for Alemaya graduates.

Outside of Ethiopia, Alemaya graduates are found in such organizations as the World Bank, the Food and Agriculture Organization of the United Nations, other United Nations organizations, the Organization of African Unity, and nearly all of the international agricultural research centers. Alemaya graduates are also found in colleges and universities throughout the world as professors of agriculture involved in agricultural research, teaching, and extension.

4.2 Impact Through Research

Alemaya's impact on agricultural technology in Ethiopia, including forest technology, derives both from new techniques developed at the university and from the import and adaptation of foreign technology. As in most other countries' agricultural improvement programs, Alemaya's strong research programs in wheat, sorghum, maize, potato, vegetable, and horticultural crops; forest species; and dairy animals and poultry have relied heavily on international breeding programs and imported materials. However, the teff-breeding program is entirely indigenous. (Teff is a very small-grained cereal, which is made into a bread that is a staple food in Ethiopia.) In fact, many aspects of the plant and animal improvement programs reflect the use of local materials and a responsiveness to Ethiopia's conditions and needs. Many of the wheat varieties developed by Alemaya reflect local breeding objectives and have been highly successful in Ethiopia. For example, a new wheat variety was recently bred in Ethiopia for tolerance to water-logging. In most of the commodity areas in which Alemaya has worked, the university has recommended technologies that farmers have adopted.

It is difficult to know what the aggregate impact of technologies developed at Alemaya has been because other organizations have acquired responsibility for seed reproduction and all other aspects of technology dissemination. Nevertheless, the most visible results of agricultural research at the Alemaya University of Agriculture are in crop agriculture or, more specifically, plant science, including horticulture.

Interviews conducted at local production cooperatives revealed a much expanded use of horticultural crops and improved varieties of maize, sorghum, teff, and wheat. Many of the newly introduced horticultural crops, such as eggplant, were originally intended for export production but are now widely used in the local diet. Many other crops have similarly been introduced by Alemaya and later incorporated into the local diet.

Interviews with representatives of Government ministries indicated that Alemaya's research results are much needed and sought after. Likewise, local production cooperatives and farmer associations have come to recognize the value of agricultural research and readily accept new crop varieties and agricultural methods. Likewise, they depend heavily on university staff for solutions to soil, insect, and disease problems. The university's Department of Forestry not only recommends varieties of trees and supplies them to local producers, but also uses these plantings as teaching and research laboratories.

The Department of Plant Science has released many crop varieties during its 36 years of existence. A variety of maize (Alemaya Composite) released in 1973 is still widely used throughout Ethiopia, and reports from the Ethiopian Seed Corporation indicate it to be one of the most requested varieties throughout the maize-growing area of the country. Interviews conducted at production cooperatives indicated that the use of improved varieties is widespread.

The Debre Zeit Central Experiment Station, a part of Alemaya University of Agriculture, is located 50 kilometers outside the capital city of Addis Ababa on the Addis-to-Nazareth Highway. During its 33 years of existence, the center's agronomic research findings and technological developments have been quite extensive. The center has developed and released more than 20 varieties of cereals and legumes. In the early 1970s, the optimum techniques for breeding teff, Ethiopia's staple food grain, were finally determined at the center. The center has also released seven varieties of peppers, tomatoes, and potatoes. Many of the varieties of bread wheats developed in the center's earlier years are still in production on farmers' fields and state farms.

Production cooperatives, farmer associations, and state farms seek the assistance of faculty from the Department of Plant Science for solutions to their numerous production problems. They also look to the department to provide advice on seeds of new varieties as well as new production and tillage practices. Recent crop yield surveys throughout Ethiopia indicate that yields are highest in areas immediately surrounding Alemaya University of Agriculture, the Central Experiment Station at Debre Zeit, and other research stations throughout the country, with yields diminishing in fields far enough from these sites that extension assistance is not available.

In the livestock research sector, Alemaya has had much success in converting former waste by-products of agricultural industry to valuable sources of protein and energy. The university has carried out extensive cross-breeding of local breeds with exotic breeds, and productivity tests for milk and meat have been

conducted and are ongoing. Alemaya has also introduced and screened for adaptation more than 10 poultry breeds. Finally, the university has widely distributed breeding stock to farmers throughout the country.

In the area of forestry, 43 species of trees are currently under trial at Alemaya, of which 13 are regarded as promising. Species are screened for their contribution to soil conservation, building materials, and fuel wood. Species under trial mainly comprise acacias and eucalyptuses, with trials being conducted in different agroecological zones. Alemaya's researchers express a strong understanding of the cultural techniques and tree attributes required for the different zones and the extent to which different techniques and species meet these requirements. This understanding extends to the social as well as to the physical environment.

4.3 Impact Through Extension

Alemaya University of Agriculture has adhered to the U.S. land grant model of interlinked programs in teaching, research, and extension, despite strong attempts to remove the extension and research functions from the campus. Although the national extension organization was moved to the Ministry of Agriculture and headquartered in Addis Ababa, a small extension activity is still maintained at the university, with the purpose of keeping the agricultural sector well informed of Alemaya's research and teaching programs.

Alemaya established the gene banks, nurseries, breeding strategies, and other components of the national crop and animal improvement programs that have now been largely taken over by the Institute for Agricultural Research and other organizations. Nevertheless, Alemaya's scientists continue to make many of the key advances in these fields, and have clearly not given up their intent to maintain productive research programs. Individual faculty members express strong convictions about the need for Alemaya to keep alive interrelated programs in teaching, research, and extension. (The emphasis each of these activities received in interviews, incidentally, was in that order.)

Faculty and students frequently visit the production cooperatives in the area and offer improved plant materials and technical assistance. A number of these relationships with cooperatives are formalized as interdisciplinary research and extension projects.

Crop and animal scientists, economists, foresters, engineers, and others are cooperating in several community development projects. On campus, this interdisciplinary cooperation is reflected in research projects; for example, soil scientists and agricultural engineers are working to improve soil conservation practices that will be recommended to farmers. The structure of Alemaya--having relatively few colleges (or faculties) and divided into few departments--supports a highly integrated approach to teaching, research, and extension, particularly among the crop and animal sciences.

The university's rural environment helps it to maintain strong community outreach and interdisciplinary programs in teaching, research, and extension. Although its geographical remoteness has been a political disadvantage and a hardship for faculty and their families, it also encourages students and faculty to remember their objectives and responsibilities as an agricultural university. Alemaya's rural setting must be counted among its assets as an institution of agricultural education and has been a contributing factor to its success.

5. EXTERNAL CONSTRAINTS FACING ALEMAYA UNIVERSITY OF AGRICULTURE

Alemaya's budgets have remained severely constrained, while enrollments have expanded rapidly. Although faculty and administration have requested smaller incoming classes, increasingly larger classes have been enrolled each year. Students are crowded eight to a dormitory room meant for two, and recreational and service spaces have been converted to large sleeping wards.

There is a strong feeling among Alemaya faculty and administration that the university is treated far less favorably in Government budgets than are most other teaching and research institutions. Indeed, other Ethiopian agricultural institutions did appear to the evaluation team to be far better equipped, and the head of one large, new research agency stated that money has not been a problem for his agency.

Institutional rivalry and proliferation of services similar to those performed by Alemaya have adversely affected the university. Commodity organizations with a mandate to organize the production and marketing of agricultural products also seek to build their own research, training, and extension organizations. The Institute for Agricultural Research is anxious to claim exclusive responsibility for as many commodities as possible and for as much of the country as possible. The institute is also developing its own extension capabilities. Additional agricultural teaching institutions are being formed, some under the

administration of the University of Addis Ababa. All of these institutions compete with Alemaya for resources, and thanks to their location in Addis Ababa, they have effectively promoted their interests with the central Government.

In this competitive environment, Alemaya has been financially and politically disadvantaged because of its remote location, far from the decision-makers. Alemaya is also vulnerable because its mandate and influence were once so broad that it attracted jealous opposition, and almost any agricultural development that was independent of Alemaya necessarily encroached upon the university's domain. The national extension service once operated out of Alemaya, and major varietal improvement programs in wheat, maize, sorghum, potatoes, forestry--all successful--operated out of Alemaya. Now these services have been partly or wholly moved to other institutions, or at least other institutions claim them, and the infighting continues.

International organizations operating in Ethiopia have not helped this situation. They are surprisingly "Addis Ababa oriented," are predisposed to employing expatriate expertise and sending students abroad rather than building and utilizing Alemaya faculty and facilities, contribute to the divisiveness among institutions, and generally ignore sound principles of institution building. The World Bank, for example, is funding a fellowship program for the International Livestock Center for Africa to send Ethiopian M.S. students to Australia. With a little support, Alemaya could train the students as well and at lower cost. A new World Bank program is said to be coming that will give some support to Alemaya, but to date the international organizations have mainly ignored the university.

The common perception among Alemaya's competitors that Alemaya is weak is more debilitating to Alemaya than are its real weaknesses and resource constraints. Officers of competing institutions happily report that Alemaya is on a slide, which in turn becomes an excuse for ignoring the university and further reducing its mandate and access to resources. However, the evaluation team believes that Alemaya is far stronger than its detractors suggest, and this strength derives from the continued dedication of senior faculty, backed by young faculty who continue to be inspired by the traditions of the university.

Campus faculty assert that Alemaya remains an excellent institution, despite its constraints, and resent the politics that lead others to assert otherwise. The danger is that ultimately the external perception and continual promotion of the view that Alemaya is weak will eventually erode the morale of its faculty, a situation that will then truly weaken the university.

Alemaya's latent strength is its alumni. Its graduates are the backbone of the Ethiopian agricultural industry and bureaucracy. Competing organizations are led by Alemaya graduates, and graduates are found far beyond agriculture in many other areas of Government and in international organizations. So the jealousies are those among colleagues and the competition is, in a sense, intramural.

A degree from Alemaya is still highly valued, and officers in most organizations say that Alemaya graduates remain their first choice as new employees. While faculty and administrators believe that the quality of the university's education has slipped, and corrective steps are being taken, Alemaya graduates generally remain the elite of Ethiopian agriculture. A nod in the right direction by the central Government or attention from an international donor agency could easily spark renewed faith in Alemaya, mobilization of its alumni, and a resurgence of its influence and contribution to Ethiopia.

6. THE FUTURE OF ALEMAYA UNIVERSITY OF AGRICULTURE

Alemaya University of Agriculture benefits from the service of a highly motivated, talented, and loyal faculty. In addition to its competent and dedicated faculty, influential alumni, and graduates of continuing high quality, Alemaya's other strengths are its educational outreach programs to surrounding communities; an interdisciplinary approach to research and extension; continuing efforts to implement teaching, research, and extension in a coherent, interlinked model; a zonal approach to agricultural research and development; programs of technology adaptation and generation; and its rural setting. Nevertheless, despite these strengths, the university lacks confidence. Faculty often express confusion about Alemaya's national role. Mixed signals from Addis Ababa, the encroachment of other organizations, and the perceived danger of being assertive have all eroded Alemaya's former positive image of itself.

As a result of the conditions described above, Alemaya has retreated to a regional role and a mechanical pursuit of tried and true production agriculture. Except for the neglect of the sociology, economics, and politics of development, the university carries out this regional role well, but it is not a role befitting a national agricultural university. There should be no higher priority at Alemaya than that of discerning and promoting an understanding of its national role.

Alemaya's posture of detached competence does not serve it well politically. The university could gain from exercising more entrepreneurship. Alemaya apparently does not attempt to

convince commodity organizations that the university could cooperate with or serve them, by researching problems they might identify, providing short-term training, or better tailoring academic programs to meet their needs. Although Alemaya is revising its curriculum, such measures need to be better marketed to the commodity organizations, the Institute for Agricultural Research, the extension agency, planning agency, and other bodies. Although its competitors would likely resist cooperating with Alemaya, fearing any enhancement of its credibility, nonetheless Alemaya could be doing more to break down this resistance. Alemaya cannot afford to remain detached and above the fray.

To their credit, Alemaya faculty have defined the physical regimes toward which its efforts are directed. Faculty have adopted a zonal approach to technology development as a basis for their work on crop, livestock, and forestry improvement and natural resource conservation. The agroclimatic aspects of the region around the university have been partially described, and the process is continuing. Comparable regimes have also been identified for cases in which technology is being developed for areas outside the local region of Alemaya's primary influence. The Department of Agricultural Economics is conducting a survey of farming systems in the region, and this perhaps is a beginning toward a better understanding of social, economic, and other aspects of the region most immediately served by the university.

Weaknesses in Alemaya faculty's understanding of the socio-economic environment toward which their technical efforts are directed are reflected in the status of the university's departments of Agricultural Economics and Natural and Social Sciences. Faculty of both departments feel like second-class citizens within the university, with the crop sciences dominating the institution. Most administrative posts are filled by crop scientists. However, there are so few scientists with advanced training in other fields that placing them in administration would severely impair Alemaya's teaching capacity in these fields. The Department of Natural and Social Sciences is regarded as solely a teaching unit, with no role in research and extension. Its faculty is hard-pressed simply to fill the teaching demand placed on it, leaving little time to interact with faculty in other units.

The Department of Agricultural Economics fares somewhat better, in that it has a graduate program and engages in teaching and extension activities. But agricultural economists also feel left out of the mainstream of university affairs. The department has no faculty members with Ph.D.s. One explanation is that economists with advanced degrees are more likely to take other jobs, particularly with international organizations, than to seek a position at Alemaya. Another explanation is found in Alemaya's

initial emphasis on crop and animal sciences in response to the urgent need for improved technologies, a need that could be identified and met without economics or other social science research.

Agricultural education for women appears somewhat neglected at Alemaya (see Tables A-2 through A-5 in Appendix A). Female students comprise less than 4 percent of students enrolled in the B.S. program, yet women are major participants in the agriculture of the region. Underrepresentation of women at the college level reflects their underrepresentation in lower level institutions nationwide. Alemaya administrators state that women who are qualified are admitted; the problem, according to administrators, is that few qualify. At no level in the administration of higher education did there appear to be much concern for this problem or any intent to institute measures that would increase the number of women admitted to B.S. programs.

Recently Alemaya has been posting students to various commodity organizations and the extension service. These positions should offer valuable practical experience for the students and establish useful linkages between the university and other organizations. However, no hands-on educational activities have yet been introduced on campus. Some planning is being done, but critical decisions remain to be made on whether such activities will be offered during school breaks, as a standard 1-year course, or within courses at the option of the teacher.

In summary, Alemaya Agricultural University is surviving, and surviving remarkably well given the many impediments to its welfare. It has solid leadership and appears poised for rapid progress toward excellence and responsiveness to Ethiopia's agricultural needs. Unfortunately, no donor nor the Ethiopian Government appears inclined to provide Alemaya with the support needed to fully obtain its goals. This is unfortunate, because with added resources and a vote of confidence, Alemaya could assume a more productive role in the development of agriculture in Ethiopia.

7. LESSONS LEARNED

1. An agricultural college or university that operates under a ministry of education is unlikely to achieve its maximum impact unless institutional measures are taken to link the university more directly to the ministry of agriculture.

The structure of the environment greatly influences the impact that an organization can exercise on its intended clientele. In general, agricultural colleges that operate under a ministry of education frequently have a much diminished role compared with those governed by a ministry of agriculture. Alemaya University of Agriculture is no exception to this rule. The university was initially under the Ministry of Agriculture but was later transferred to the Ministry of Education.

With no primary authority over Alemaya, the natural tendency is for the Ministry of Agriculture to create agricultural research and extension organizations that duplicate and compete with activities pursued by the university. In this situation, everyone loses: Alemaya because of its declining role and the Government because of the excessive burden associated with a proliferation of new institutions.

2. A lack of institutional autonomy can reduce the entrepreneurship required to vitally link a college to its environment.

Institutional entrepreneurship is critical to ensuring that a college responds to major needs within its environment and that the faculty are being utilized in the most effective manner possible. In order to foster such entrepreneurship, an institution requires some degree of autonomy. Either because of the university's own perception of its position or because of limitations applied by the central Government, it is not clear that Alemaya has sufficient autonomy to exercise a leadership role beyond its local setting.

3. A concerted effort is required to build an effective social science program that can move an agricultural college from a narrow emphasis on agricultural production to a broader emphasis encompassing agricultural productivity and sustainability.

The initial emphasis at Alemaya on increasing agricultural production led to the development of strong programs in the

biophysical sciences and the consequent neglect of the social sciences. Nevertheless, many of the more difficult problems of agricultural development in Ethiopia concern complex interactions involving farming and natural resource systems and the necessary macro policy and institutional incentives required in supporting a more productive and sustainable agriculture. Alemaya is beginning to address these issues, but much greater support is required from Alemaya and the central Government in expanding the role of the social sciences in designing policy and institutional initiatives in agricultural development.

APPENDIX

ALEMAYA UNIVERSITY OF AGRICULTURE'S COLLEGE OF AGRICULTURE

For most of its history, the Alemaya University of Agriculture has been in name and function a college of agriculture. Presently, the College of Forestry (formerly a division of the Department of Plant Science) is clearly separated from the College of Agriculture, and the Department of Natural and Social Sciences is on the way to becoming an independent college. Nevertheless, it remains somewhat fictitious to distinguish the College of Agriculture from the university. Many of the objectives and accomplishments of the university should be understood to represent those of the College of Agriculture.

In the following sections, the extension, research, and teaching aspects of Alemaya are described and selected units within the College of Agriculture are briefly reviewed. Information on the student body, graduates, and faculty of Alemaya and on students enrolled at Ethiopia's other agricultural colleges is given in Tables A-1 through A-7 at the end of this appendix.

1. EDUCATION

Higher education in agriculture, research, and extension in Ethiopia began in 1952 with the establishment of the Imperial Ethiopian College of Agriculture and Mechanical Arts at Jimma in Kafa Province. The college was moved to its permanent site at Alemaya, Harar Province, in 1956. Initially, the college was responsible for agricultural instruction, research, and extension on a national basis. Classroom instruction has always received major emphasis.

In October 1953, 14 students enrolled at the college in Jimma. In 1957, 11 of the original 14 received the B.S. degree at the new college site at Alemaya. Nine of the 11 graduates later received advanced degrees in the United States and returned to faculty positions in the College of Agriculture and to departmental positions in the Ministry of Agriculture, Ministry of Public Health, Pasteur Medical Institute, and Awash Valley Development Authority. This process has been repeated with each successive graduating class, with the number of graduates increasing each year.

Faculty at Alemaya appear to give higher priority to teaching than to research or extension. With faculty constraints and limited budgets, the teaching is done at the sacrifice of research and extension. Teachers express dedication to their students, and there appears to be good rapport between students and

faculty. In interviews, many students evinced respect for teachers and a seriousness about learning.

A thorough curriculum review and revision was recently conducted at Alemaya, which included broad inquiry concerning the changing needs of industry and Government for Alemaya graduates. The review and revision appear to have been carefully done, with wide faculty participation. The new curriculum was to be introduced in fall of 1988.

The proportion of coursework dedicated to practical experience has declined in recent years. Both faculty and students want to increase the practical content of courses. However, it is apparent that students are seeking "high tech" practical experience in laboratories, with computers and other modern equipment, whereas faculty are thinking of incorporating practical experience in farm work.

Considerable effort is made to make teaching effective at Alemaya. A comprehensive student evaluation of teachers is carried out in each course. Evaluations of teaching quality constitute 40 percent of the overall rating used in determining faculty promotions from assistant professor to associate professor.

2. OUTREACH

With the inception of the College of Agriculture at Alemaya in 1956, Alemaya carried the national mandate for teaching, research, and extension. At its peak, the Extension Department of the College of Agriculture had 77 extension agents located throughout Ethiopia. Many of these agents were trained abroad in nondegree programs of 6 months to 1 year in duration. In 1963, the Ethiopian Government moved responsibility for national extension activities from the College of Agriculture to the Ministry of Agriculture, thereby contracting the boundaries of Alemaya's extension activities to the region surrounding the university.

Alemaya's extension or outreach activities were soon limited to the local efforts of individual faculty members to identify topics for research and to measure the results of research. Consequently, Alemaya's greatest impact is found in the area surrounding the university. Extension responsibility on a national basis still rests within the Ministry of Agriculture.

In 1984, the College of Agriculture (at that time a part of the Addis Ababa University) was made an autonomous university, to be known as Alemaya University of Agriculture. With this change

in national status, the newly organized university was given extension responsibility within Harar, the largest province in Ethiopia. To accommodate this new responsibility, Alemaya has developed an administrative infrastructure that includes a vice president of research and extension. Each college and each division of each college now has an extension committee, which directs the outreach for its respective department, division, or college.

Alemaya's past accomplishments in national extension are substantial, but this history of extension activities is now associated with the Ministry of Agriculture. Some of Alemaya's most recent extension activities, within its revised extension mandate, are listed below. All the activities were carried out on land belonging to production cooperatives or individual farmers.

1. Conducted demonstrations on rate and time of fertilizer applications for maize, wheat, and sorghum
2. Demonstrated seed-multiplication techniques for cereal crops
3. Set up seed-multiplication plots on three cooperatives involving 88 hectares of land
4. Distributed 160,000 tree seedlings to production cooperatives and individual farmers
5. Introduced and multiplied four potato varieties on production cooperatives
6. Constructed and demonstrated use of improved potato seed storage
7. Demonstrated methods of composting
8. Conducted maize pest survey
9. Studied and developed biocontrol methods for nematodes on tomatoes
10. Evaluated performance of seed potato lines
11. Conducted survey of fruit production and marketing
12. Conducted training in afforestation for farmers and technicians

Within the Ministry of Agriculture, which has national responsibility for agricultural extension, the majority of department heads and directors are B.S. or M.S. graduates of Alemaya. The Ministry of Agriculture funds scholarships for selected B.S. graduates within the Ministry to study for M.S. degrees at Alemaya University.

Despite the initiatives that have been taken to reestablish an extension program at the university, those involved with the program believe that it is severely underfunded and understaffed. This can be attributed largely to the fact that it is a new program. It clearly has a long way to go toward achieving good integration with teaching and research programs at the university and receiving substantial backing from faculty.

3. RESEARCH

Research has been an important part of Alemaya University of Agriculture since its creation in 1952. Because Alemaya was established in the mode of the U.S. land grant college system, research and its results have been a vital part of classroom instruction. Much of the early research was of an inventory nature, but as specific constraints to agricultural production were identified, research was instituted to alleviate or remove those constraints. Thus the current research system at Alemaya focuses on a problem-solving approach.

Alemaya places a strong emphasis on the development and use of the team approach to problem solving. This has engendered close cooperation between the university and its Debre Zeit Central Research Station and, to some extent, with the Institute of Agricultural Research and the junior colleges of agriculture.

Priority for national research is established by the Food and Agricultural Council of the National Science and Technology Commission. Alemaya University of Agriculture is represented on the council.

The Institute for Agricultural Research, located in the capital city of Addis Ababa, is the national coordinator of agricultural research. All Ethiopian professional staff of the institute are graduates of Alemaya. All decisions are made by a committee with representatives from both the institute and Alemaya. At present, responsibility for specific crop, soil, or animal research is allocated, with many research programs having shared responsibilities. All research projects are selected and allocated for implementation according to priorities established for national agricultural research.

Table A-8 at the end of this appendix shows the cultivars from Alemaya breeding programs that were recommended for planting in 1987-1988. Table A-9 shows the number of quintals of improved seed distributed for some of the varieties released by Alemaya, and Table A-10 shows the total quintals of seed of improved varieties distributed in 1987 and the estimated number of hectares planted.

Interviews conducted at production cooperatives indicated that the use of improved varieties is widespread. Greater use appears to be in the vicinity of agricultural education institutions and research stations.

Because of the limited research resources and the faculty's heavy teaching load, many faculty on the Alemaya campus report that they do little research. The research that is done at the Alemaya campus is mainly concentrated in the plant sciences and focuses on crop improvement. Substantial research is going on in sorghum and maize improvement. Vegetable crop trials; grain, legume, and oilseed trials; forest species trials; and soils research laboratories were also visited at Alemaya. A large portion of the university's research is carried out at the Debre Zeit Central Experiment Station.

4. DEBRE ZEIT AGRICULTURAL RESEARCH CENTER

The Debre Zeit Central Experiment Station, a part of the Alemaya University of Agriculture, is located 50 kilometers outside the capital city of Addis Ababa on the Addis-to-Nazareth Highway. The main center comprises approximately 170 hectares of land. The soil is of volcanic origin and is suited for the production of cereals, pulses, and oilseeds. The elevation at Debre Zeit is 1,860-1,900 meters above sea level, and the center maintains three substations that respectively represent the highlands, the intermediate region, and the lower area of Ethiopia. Chefa Doura, with an elevation of 2,450 meters and a mean annual rainfall of over 800 millimeters (mm) per year, represents the highlands; Koka, with an altitude of less than 1,500 meters and a mean annual rainfall of less than 500 mm, represents the lower moisture-stressed areas. Akoki (and Debre Zeit) represents the intermediate region, with altitudes of 1,900-2,000 meters and a mean annual rainfall of 650 mm.

Three distinctive seasons characterize the Debre Zeit area. The rainy season (also known as the long-rain season), which begins in June and continues through September, with mean seasonal rainfall of about 650 mm; the post-rainy season of October through January, which is dry and hot, with mean seasonal rain-

fall of less than 100 mm; and the short-rain season of February through March, with a mean seasonal rainfall of 200-300 mm. Annual temperature over a 22-year period has varied from 9 °C to 20 °C, with an overall mean of 19.1 °C.

The Debre Zeit Agricultural Research Center was established in 1955 as a satellite research station for what was then the College of Agriculture, located at Alemaya. The center remained a functional part of the Alemaya College of Agriculture until the mid-1970s, when its linkage with the College of Agriculture was terminated and it became a semi-independent center under Addis Ababa University.

An agricultural junior college program was added to the center in the mid-1970s and the name of the institution was changed to the Debre Zeit Agricultural Junior College and Research Center. This program remained in effect until the 1984/1985 academic year, when responsibility for the academic and research program was transferred to the Alemaya College of Agriculture and the offices and laboratories were given to the newly created Ethiopian Management Institute. The center once again became an integral part of Alemaya University of Agriculture when the university was granted autonomy in 1984.

The Central Experiment Station at Debre Zeit is nationally responsible for conducting research on five crops: durum wheat, teff, chickpeas, and lentils. To the extent possible, research is conducted using a multidisciplinary team approach. Linkages with international research centers have grown over the years, and collaborative research, material exchanges, and staff training and development have been initiated with the International Livestock Center for Africa (ILCA), the International Maize and Wheat Improvement Center (CIMMYT), the International Center for Agricultural Research in the Dry Areas (ICARDA), and the International Crop Research Institute for the Semiarid Tropics (ICRISAT). The research center works closely with national institutes such as the Institute for Agricultural Research, the Plant Genetic Resource Center/Ethiopia, the Ministry of Agriculture, State Farm Development, and the Relief Rehabilitation Commission for Ethiopia.

5. DEPARTMENT OF PLANT SCIENCE

The Department of Plant Science is the largest of the various departments that constitute Alemaya's College of Agriculture. During the 1987/1988 school year, total enrollment for the department was 306 students (108 third-year students, 111 fourth-

year students, 31 in continuing education programs, 25 diploma students, and 31 M.S. students).

Of the 31 postgraduates, 10 were second-year postgraduates specializing in agronomy (7), horticulture (1), and crop protection (2), and 21 were first-year postgraduates specializing in agronomy (14) and crop protection (7).

The faculty of the Department of Plant Science is composed of 71 academic and technical staff members located at Alemaya and the Debre Zeit Central Experiment Station. The academic faculty comprises 10 Ph.D., 18 M.S., 9 B.S., and 8 diploma degree holders. Of 26 faculty on study leave, 15 are doctoral candidates studying abroad.

Departmental activities center around the basic activities of teaching, research, and extension. The first year of undergraduate coursework for the B.S. degree is spent in general coursework in the Division of Natural and Social Sciences. This is followed by 3 years of agricultural coursework emphasizing plant science. Plant science subjects include plant pathology, entomology, soils, and range sciences, which elsewhere are often taught by separate departments. There has been no fragmentation of subject matter areas at Alemaya, but rather a high degree of integration.

Coursework for graduate studies is offered at the master's level. Ninety percent of all Ethiopians with an M.S. degree in agriculture have earned their degree at Alemaya University of Agriculture.

Faculty in the Department of Plant Science are presently involved in 177 ongoing research projects. Eight projects have recently been completed, and 14 have recently been approved and will be implemented with the beginning of the new growing season. The Government is the major source of funding. Some out-of-country funding for research is available, mostly from the international research centers. Although the research is valuable and is badly needed for increased food production, it adds a considerable burden to an already overburdened faculty.

The Institute for Agricultural Research, located in Addis Ababa, has responsibility for overall coordination of national crop research. Alemaya University of Agriculture has responsibility for research on durum wheat, potatoes, chickpeas, lentils, and teff at the national level. Maize and sorghum research is shared with the Institute for Agricultural Research. Alemaya has responsibility for all other crop research, both field crops and horticulture, in the Harar administrative region, with the excep-

tion of coffee, responsibility for which lies with the Ministry of Tea and Coffee.

Individual faculty members are encouraged to submit research proposals with an attached budget under guidelines established by the National Food and Agriculture Council of Science and Technology. All agricultural research is expected to focus on food production, with a secondary focus on export potential, and to emphasize a concern for soil and water conservation.

All proposals are presented annually for review at the Alemaya University of Agriculture. National and local representatives from the Ministry of Agriculture, Ministry of Tea and Coffee, and Planning Office are invited. At this review, an annual extension report is given by the Farming Systems Research Extension section of the university. Research considered to meet the national criteria is approved and sent to the national Crop Improvement Committee for further screening and final approval by the Supreme Council.

The Department of Plant Science is very active in extension work with local cooperatives and individual producers. Faculty are expected to engage in such activities, and the extent of a faculty member's involvement in extension is taken into account during faculty evaluation by the department head and higher administration. Theoretically, one-third of each faculty member's time is spent teaching, one-third in research, and one-third in extension work. In fact, most time is spent on teaching, with research and extension getting a lesser portion of faculty time, mainly because of the shortage of faculty with research degrees.

6. DEPARTMENT OF ANIMAL SCIENCE

The Department of Animal Science was formally organized in 1959, the year when specialization was first initiated in the College of Agriculture. Four sections were originally developed: animal husbandry, dairy science, poultry science, and a veterinary section. A nutrition section was added later. A graduate program was initiated in 1979, and the first M.S. degree was granted in 1980.

The Department of Animal Science has 25 faculty members, including those stationed at the Debre Zeit Central Experiment Station. There are four associate professors and six assistant professors, with six holding Ph.Ds. The remainder of the staff comprises 3 doctors of veterinary medicine, 10 lecturers, 3

graduates, and 9 technical assistants. Four faculty are on study leave pursuing an M.S. or a Ph.D. degree.

The student population is composed of 23 diploma students, 16 B.S. candidates, and 13 graduate students (M.S.). Of the B.S. candidates, four are second-year students, six are third-year students, and six are fourth-year students.

Faculty place major emphasis on classroom instruction, with a secondary emphasis on research and extension. Ideally, teaching, research, and extension should receive equal consideration; however, limited faculty resources dictate the present division of time. A new curriculum will be introduced in the fall of 1988.

7. DEPARTMENT OF AGRICULTURAL ENGINEERING

When classwork began at the College of Agriculture in 1956, only a B.S. in general agriculture was offered. In 1960, the Department of Agricultural Engineering was established and a B.S. degree in this area was offered. The Department of Agricultural Engineering presently offers undergraduate degrees in four specialties: soil and water conservation engineering (including irrigation), farm power (animal and internal combustion) and machinery, farmstead structures, and agricultural processing engineering (processing and handling of farm products).

The department also offers coursework for degree candidates in other fields of study. Presently, the Department of Agricultural Engineering has 175 students enrolled as B.S. candidates. The department does not offer a graduate degree because of insufficient faculty and research equipment.

The Department of Agricultural Engineering conducts research in three major areas: irrigation water regulation on certain selected crops, farm implement survey, and underground and surface grain storage. All research is conducted as an interdisciplinary effort primarily with the Plant Science and Agricultural Economics Departments. The Department of Agricultural Engineering has been involved with agricultural development requests from relief agencies and has been asked to participate in military agricultural development efforts and the establishment of an orphanage farm in the Errer Valley. The latter effort involved development of a 76-hectare irrigation farm, begun in late 1987 with irrigation equipment purchased by an international relief agency and put into operation by the Department of Agricultural Engineering.

Table A-1. Graduates of Alemaya Agricultural University, by Degree, 1949-1979 (Ethiopian calendar 1957-1987)

Degree	Graduates
M.S.	81[a]
B.S.	2,558
Diploma	
Regular	639
Evening Programs	228
Home Economics	56
Science Teachers Program	706
Total	4,268

[a]For the years 1981-1987.

Table A-2. 1985/1986 Graduates of Alemaya Agricultural University, by Degree, Specialty, and Gender

Degree/Specialty	Female	Male	Total
M.S.			
Agricultural Economics	0	0	0
Agricultural Engineering	0	0	0
Animal Production	0	1	1
Crop Protection	0	1	1
Total	0	2	2
B.S.			
Agricultural Economics	2	57	59
Agricultural Engineering	0	30	30
Animal Production	2	45	47
Crop Protection	1	74	75
Total	5	206	211
Two-Year Diploma			
Agricultural Economics	0	46	46
Agricultural Engineering	0	0	0
Animal Production	3	21	24
Crop Protection	3	25	28
Total	6	92	98
Extension Diploma			
Animal Science	9	30	39
Plant Science	4	16	20
Total	13	46	59

Source: Commission on Higher Education, Ministry of Education, Government of Ethiopia.

Table A-3. Diploma Student Enrollment at Alemaya Agricultural University in 1985/1986, by Department and Gender

Department	General			Extension		
	Female	Male	Total	Female	Male	Total
Freshmen	8	106	114	22	100	122
Agricultural Economics	6	45	51			
Animal Science	3	23	26	9	33	42
Plant Science	5	25	30	5	29	34
Total	22	199	221	36	162	198

Table A-4. B.S. Student Enrollment at Alemaya Agricultural University in 1985/1986, by Department and Gender

Department	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
	F	M	F	M	F	M	F	M	F	M	F	M
Agricultural Economics	-	-	-	-	4	65	2	61	-	-	6	126
Agricultural Engineering	-	-	0	67	0	57	2	40	-	-	2	164
Animal Science	-	-	-	-	3	43	3	58	-	-	6	101
Plant Science	-	-	-	-	1	67	5	79	-	-	6	146
Pre-Agriculture	-	-	10	264	-	-	-	-	-	-	10	264
Freshman Program	10	297	-	-	-	-	-	-	-	-	10	297
Veterinary Science	2	59	0	31	1	18	0	20	2	24	5	152
Total	12	356	10	362	9	250	12	258	2	2	45	1,250

Table A-5. M.S. Student Enrollment at Alemaya Agricultural University in 1985/1936, by Department and Gender

Department	Year 1		Year 2		Year 3		Total	
	F	M	F	M	F	M	F	M
Agricultural Economics	0	5	-	-	0	3	0	8
Animal Science	0	5	1	4	0	1	1	10
Plant Science	0	10	0	4	0	2	0	16
Total	0	20	1	8	0	6	1	34

Table A-6. Number of Students at Ethiopian Agricultural Colleges in 1985/1986

College	Diploma	Extension Diploma
Awasa Junior College of Agriculture	633	252
Ambo Junior College of Agriculture	221	-
Jimma Junior College of Agriculture	391	-
Debre Zeit School of Animal Health	178	72
Alemaya Agricultural University*	221	198
Total	1,644	522

*Includes diploma students only. Unlike other agricultural colleges in Ethiopia, Alemaya also enrolls B.S. and M.S. students.

Table A-7. 1985/1986 Faculty of Alemaya Agricultural University, by Department, Degree, and Gender

Department	Ethiopian						Expatriate						Ethiopian Faculty on Leave	
	B.S.		M.S.		Ph.D.		B.S.		M.S.		Ph.D.			
	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Agricultural Economics	1	3	0	6	0	1	-	-	2	0	2	2	1	14
Agricultural Engineering	0	1	0	2	0	1	0	2	1	1	0	2	0	2
Animal Science	0	1	0	6	0	4	-	-	-	-	0	2	2	9
Arts & Sciences	0	1	1	11	0	0	-	-	2	0	0	2	0	8
Plant Science	0	5	1	13	0	8	-	-	1	0	0	4	1	21
Total	1	11	2	37	0	14	0	2	6	1	2	12	4	54

Table A-8. Cultivars From Alemaya Agricultural University Breeding Programs Recommended for 1987/1988

Crop	Variety	Altitude (in meters)	Rainfall (in millimeters)	Planting Period
Wheat	Enkoy	1,800-2,800	500-800	June 20-July 21
	Dereselgn	1,800-2,200	400-500	July 1-10
	Boohai	1,850-2,400	500-900	July 1-10
Sorghum	Bakamash 80	1,600-1,900	600-900	May 1-15
	Gambella 1107	1,000-1,600	600	June 10-30
	Melkamash 79	1,000-1,600	600	June 10-30
Maize	Alemaya Composite	1,600-2,300	975-1,925	April 10-20
	EAH 75	1,600-2,300	975-1,925	April 10-20
	A 511	1,000-1,700	900-1,300	May 1-10
	KCC/KCB/BC	1,000-1,900	900-1,300	May 1-10
	Katamani	1,000-1,900	500	May 20-June 10
	Abo-Bako/T25R-W	1,000	500	May 20-June 10
	Imports introduced by Alemaya: H625, H632, H622	1,700-1,900	1,000-2,100	April 15-May 10
Teff	DZ-01-354	1,600-2,400	300-700	July
	DZ-01-787	1,800-2,500	400-700	July
	DZ-01-196	1,800-2,400	300-700	July
	DZ-01-99	1,400-2,400	300-700	July
	DZ-Cross 37	1,860-2,000	134-500	July
	DZ-Cross 44	1,800-2,400	400-600	July
Chickpea	K 850xF3 78	1,700-2,300	700	Aug.20-Sept. 10
Lentil	NEL 358	1,860-2,400	700	July 1-15

Table A-9. Quintals of Improved Seed of Alemaya-Released Varieties, Ethiopian Seed Corporation 1984/1985 to 1987/1988

Crop and Variety Name	1984/ 1985	1985/ 1986	1986/ 1987	1987/ 1988
Maize				
Alemaya Composite	1,714	4,684	2,400	1,185[a]
Wheat, Enkoy	187,801	238,170	248,222	105,122[b]
Teff				
DZ-01-354	589	3,584	1,584	4,702
DZ-01-196				9,000
Sorghum				
All Alemaya Varieties	8,151	6,955	15,863	na

Note: na = not available.
[a]Reduced amount affected by more widespread use of other hybrids.
[b]Reduced production due to erratic rainfall in the seed increase area.

Table A-10. Quintals of Improved Seed Distributed and Estimated Number of Hectares Planted, 1987

Crop[a]	Quintals Distributed	Hectares Planted (est.)
Wheat	63,352	63,352
Maize	43,916	175,664
Teff	2,008	8,032
Sorghum	4,017	40,170

[a]All varieties.

Source: Ministry of Agriculture, Government of Ethiopia.

The following reports on related topics are available from CDIE:

AGRICULTURE

Higher Agricultural Education

Impact Evaluations

Malawi: Bunda Agricultural College, July 1987, No. 64 (PN-AAL-094).

The Hassan II Institute of Agriculture and Veterinary Medicine in Morocco: Institutional Development and International Partnership, July 1987, No. 65 (PN-AAL-096).

Three Nigerian Universities and Their Role in Agricultural Development, March 1988, No. 66 (PN-AAX-200).

Dominican Republic: The Superior Institute of Agriculture--Development of a Private Institution of Higher Agricultural Education, March 1988, No. 67 (PN-AAX-201).

Universities for Development: Report of the Joint Indo-U.S. Impact Evaluation of the Indian Agricultural Universities, September 1988, No. 68 (PN-AAX-206).

Kasetsart University in Thailand: An Analysis of Institutional Evolution and Development Impact, September 1988, No. 69 (PN-AAX-207).

Indonesia: The Bogor Institute of Agriculture, March 1989, No. 70 (PN-AAX-216).