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VETERINARY EDUCATION - UNIVERSITY OF NAIROBI
A SPECIALIZED TECHNICAL EVALUATION

by

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INDEX

Introduction	p. 1
Background Information	p. 2
Conclusions.....	p. 15
Recommendations	p. 16
Appendix.....	p. 22

Veterinary Education - University of Nairobi
A Specialized Technical Evaluation

I. Introduction

An assessment of veterinary education in East Africa and the role of USAID in the development of this education touches on a number of related facets of the overall problem. Foremost are the manpower requirements for veterinarians in East Africa in the foreseeable future and the role of veterinarians in developing a viable animal industry. It is against this role as an inseparable part of an animal industry that the capability and suitability of a veterinary educational program should be measured in large part. Secondly, such an evaluation must also consider whether the program allows veterinarians to contribute in ancillary fields such as public health, food hygiene, marketing and exporting of animal products, and industries concerned with veterinary medicine.

This study tries to encompass all aspects of veterinary requirements in East Africa and the productivity of the University of Nairobi's (U. of N.) Veterinary College in meeting these requirements, both in its initial years of development and in its growth towards maturity at present and in the future. A number of studies and surveys have already been conducted covering various aspects of the problem, and these were freely drawn on as background material. The Veterinary College, U. of N., has attracted the wide attention of men with diverse interests and views. As much as possible, comments by a number of such men were considered and collated with written reports and direct observations (see Appendix 1) to arrive at conclusions and offer recommendations.

Much of the material presented herein may not be totally new to the reader, nonetheless is provided to emphasize and clarify certain points which lead up to the conclusions and recommendations. It is anticipated that these will serve at least in part as a guide for future action by USAID toward veterinary education at U. of N. and in East Africa.

II. Background Information

A. Animal Industry - East Africa

Much has been written concerning the potential role of animal agriculture in meeting world food requirements by utilization of land not suitable for cultivation and foodstuffs not readily adapted for consumption by man. Africa is a continent with vast areas suited best to an expanded "adapted" animal industry, and East Africa is one area of major potential in the rearing of cattle and other animals. To realize this potential requires the solution to many intricate economic, social, agricultural and animal health problems, each demanding attention by different groups of specialists, technical and/or political in outlook. Yet, the pressures for a solution on many fronts is ever increasing, including such items as rapidly expanding human population, increasing urbanization and improvement in buying power of the indigenous inhabitants, slight though the latter may seem in contrast to growth in other fields.

For an animal industry to keep pace with the increase in human population and expand to meet improved domestic and export demands, requires vigorous efforts and continual advancement in technology of animal production and in animal

health. Of all the factors involved in developing an animal industry, none is more important or so indispensable as that of the prevention and control of animal diseases. Improved pastures or sources of nutriment, advances in animal genetics, the introduction of new breeds or superior blood lines mean little if health problems prevent large areas of land from being utilized maximally, or if persistent endemic disease reduces reproductive or growth efficiency and is a constant source of wastage. A prerequisite then to successful cattle or other livestock production in East Africa is to be able to maintain a strict sustained vigilance against disease epidemics originating both within and outside the country, and to incorporate within such a program measures to combat ever-present conditions that, while less dramatic than epidemic, are equally important in terms of their influence on a productive animal program.

B. Veterinary Medicine -- East Africa

Historically, if one reviews the progress of economically successful animal industries in the so-called "developed" countries, it is apparent that it parallels the development of a well-trained and adequately staffed veterinary corps, not only skilled in implementing known disease control measures but motivated and capable of discovering and utilizing new data to meet its obligations.

In some ways, the need at this time for adequate veterinary medicine in Africa is more paramount than that of North America or Europe where a disease-medical skill equilibrium has been attained to a large degree. Not only are there decades of "catching up" ahead for the African countries but they are confronted with a

wide assortment of microbial and parasitic illnesses not found in temperate zones, as well as being plagued at the same time to an equal degree with most of the serious animal diseases found elsewhere in the world. In East Africa, the activities of a veterinary profession cover the same wide range of specific responsibilities as found elsewhere in the world, some of them partially satisfied, a few others only now being assumed, with the balance yet to command any real attention. Specifically, emphasis on microbial or parasitic disease control, both of an epidemic and endemic variety, the use of specific therapy as required, the application of animal hygiene on a herd basis, the understanding of reproductive disorders, the interrelation of animal nutritional requirements and health, and the conduct of diagnostic laboratories for disease differentiation are examples of immediate pressing needs demanding trained veterinarians. Current trends also indicate that veterinarians will be assuming an increasingly important role in food hygiene, meat inspection, toxicology of both plant and human sources, and public health problems. It must also be realized that as specialists become available in allied fields of the animal industry, veterinary collaboration will be increasingly necessary in such subjects as animal genetics, nutrition, and breeding, to mention only a few.

A number of fields of endeavor requiring veterinarians are not directly associated with immediate disease problems such as drug and vaccine manufacture, regulatory medicine and legislation, animal product exportation (and importation), control of diseases of animals transmissible to man, and laboratory animal medicine.

Last but certainly not least is the need for a vastly expanded role of the African veterinarians in disease research, without which real advances in the future cannot be made.

III. Veterinary Manpower Requirements

To meet the demands of an animal industry and fulfill the responsibilities of a veterinary profession for East Africa, as described above, requires a projection as to the number of veterinarians needed currently and in the foreseeable future. Equally important is the question of how many a country can financially absorb at any given time. A number of studies have been conducted regarding veterinary manpower requirements in East Africa and especially for Kenya (FAO, 1966 and 1968; McFarland, 1969; Wieper, 1969; Murithi, 1969, 1970; Cheney, 1970). Conclusions vary depending on guidelines followed by the particular author. Even then, most projections are the result of professional judgement based on a desired veterinary-animal unit system. However, the animal unit system does not take into account the developing ancillary fields of endeavor requiring veterinarians. Furthermore, all projections are inadvertently affected by intangibles such as changes in rate of growth of the GNP, the buying power of the populous, and in breakthroughs as the result of research allowing for significant changes in animal technology and expansion of animal industries. Acknowledging these factors, there nevertheless is sufficient uniformity of opinion that the need for veterinarians in East Africa will be increasing. Using Kenya as an example and considering only the ratio of one veterinarian to 10,000 cattle units for

estimate purposes, it is expected that three or four times as many veterinarians will be required in the near future as are presently employed in the field. (As of the time of this study there were 40 to 50 available field posts not filled.) Similar comments can be made for the other East African countries. Yet, there are indications that many estimates regarding veterinary manpower requirements are too low. For example, it is possible that by 1985 to 1990 as many as 800 veterinarians may be needed in Kenya, which could require in the near future about 40 veterinary graduates per year to allow for a build-up of the veterinary force.

IV. Veterinary Education

In each developing country or region where veterinary manpower requirements justify it, the best long-term solution to satisfying this requirement is the establishment of a veterinary college. Such a college, staffed in the long run largely by indigenous personnel, serves not only to train veterinarians but functions as a focal point for continued viability of the veterinary profession in the area by individual leadership of the faculty members, release of new research data, and continuing education programs. While the curriculum of the school and scope of the research and graduate training should be geared to the needs and environment in which it is located, every effort should be made to maintain high academic standards of veterinary education, equal where all possible to that of the United States or other developed countries, even though the subject matter and emphasis may be different. Arriving at a correct solution to a disease problem, whether it involves differential diagnosis, therapy or control measures, is just as complicated in a "developing" country and requires as much in-depth knowledge of veterinary medicine as elsewhere in the world.

Fortunately, the establishment of the Veterinary College at the University of Nairobi was initiated with the intent to establish high standards, enabling the graduate of the school to meet his colleagues elsewhere in the world on an equal footing, and establishing a base line on which a sound veterinary profession can grow and mature. A multi-donor sponsorship of the College has not been without problems, but as a whole it would appear that most expatriate instructors have made an effort to promote high standards of education. There are examples of course where the visiting instructor did not appreciate or understand tropical animal medical needs or was not well oriented towards the country he was visiting. Some curriculums were not devised initially to fit the students' needs. Revisions were necessary and often came about rather slowly. Weakness in some subjects still exists, especially in the area of clinical studies. Inevitably, when two or more systems of education are being used side by side conflicts develop. Personality clashes (a worldwide problem) sometimes become exaggerated under the stress of a multinational effort in education. But, recognizing the problems that have existed, or may still exist, it is the considered opinion of a number of qualified observers that the establishment of this Veterinary College has been a highly successful project.

The term success must be qualified. The ultimate goal of being self-sustaining, especially in terms of indigenous faculty, has not been realized (see Africanization below). At the present time, approximately 40% of the faculty is African, with variations between departments from a high of 60% (Anatomy) to almost none (Clinical Studies). Most of these are in the junior faculty level. Additional experience is necessary at the

practical teaching level in order for these men to assume senior positions. Comments have been made that this percentage should be higher. In the short space of time in which the school has been functioning effectively, this view is unrealistic. However, vigilance must be maintained to assure that each expatriate not only instructs veterinary students but performs a specific training program, with one or more counterparts who will be assuming the expatriate faculty's position. Even this goal must be qualified. Plans and alliances should be formed now which will allow for an exchange of visiting professors with U.S. or European schools in the future. Such a need will continue long after africanization of the faculty has taken place, providing for an infusion of new ideas into the African school, helping it to keep abreast of the worldwide veterinary community, and serving to enrich the participating colleges.

It is not the intent of this study to examine the veterinary curriculum of the U. of N. Veterinary College in depth. This would be a task for a much larger body of veterinary educators. However, it is apparent on examining trends in curriculum change and in discussions with various faculty members that the program is becoming increasingly oriented towards tropical animal medical needs. While a well-rounded education is essential, this pattern of instruction should be continued and expanded in order to be fully sensitive to Africa's current needs. This is especially true for the applied or clinical studies including such subjects as differential diagnosis, preventive medicine, reproduction, herd health and production, as well as clinical pharmacology-toxicology, food hygiene and meat inspection. The two more basic subjects which support much of the clinical studies, namely microbiology and parasitology, need strong emphasis. Additional improvisation is needed to alleviate the present shortage of useful clinical material for teaching purposes.

V. Africanization

The problems of training Africans for faculty positions have been alluded to in the above section of this report. It must be recognized that even in the countries having years of veterinary experience, one can expect no more than 10% of a graduating class to be motivated in continuing their education and qualify as instructors. Thus, even in a class of 60 students, potentially only six would be available for graduate studies. Training of a student to assume a faculty position takes at least six to eight years. Obviously then, it takes time to develop a pool of motivated, qualified men from which to draw on. Premature appointment of faculty members who are not best qualified, especially at the senior levels, may only weaken the school in the long run. Once an appointment is made, changes are difficult. There are other factors which impose limitations on the number of men who may be stimulated to go on to academic pursuits in Kenya. These include the method used for selecting student candidates, the fact that few students have much of a concept of what veterinary medicine actually is, and even after graduation there are certain economic advantages which encourage men to accept field positions rather than go on to graduate school.

VI. Regional vs. National Veterinary Schools

A discussion of the Veterinary College, U. of N. would not be complete if the possible presence of additional veterinary colleges in the area were not explored. The fact that Uganda has decided to start a school July 1971 will undoubtedly have some influence on the present school, both in student enrollment and faculty availability. The reasons advanced for creating an independent college for veterinary training include the following:

(1) there appears to be limitations on the number of students that can receive effective training at U. of N., especially in the clinical studies area; (2) there is a limitation on the number of students that can be housed at Kabete; (3) lecture room size and laboratory space are limited; (4) the veterinary school is now under direct control of Kenya and there is some question as to whether a full quota of Ugandans will be admitted; (5) if the full cost of training plus housing a student is charged, it will make sending students to Kenya too expensive; (6) training is not well oriented to tropical animal medicine and Uganda's needs. Some of these points have validity. The school at U. of N., especially the unit at Kabete, probably should not have more than 50 to 60 students per class until larger lecture rooms are made available, the junior faculty can assume a greater responsibility and the clinical field teaching resources are greatly improved. The concern regarding tropical medicine has also some facts to support it, if one considers some of the earlier emphasis on subjects such as mastitis and equine surgery which are not of major importance to Africa's current needs.

While a new school in Uganda may cause a drop in student enrollment at Kabete for a short time, if the projections for veterinary manpower in Kenya and some neighboring countries are correct, it seems probable that the total school enrollment can be maintained at economic levels. One intangible factor is the possible transfer of Ugandan faculty members from Kenya to Uganda. Faculty replacements may become necessary.

VII. Contributions of Other East African Scientific Organizations to Veterinary Education

Collaboration with other nearby organizations such as the East African Veterinary Research Organization or the Kenya Veterinary Services Department has not been as active as would be desirable. No joint appointments exist with the Faculty of Veterinary Science. Utilization of staff and materials from those organizations, especially for the Clinical Studies curriculum, could materially enrich the veterinary program.

The contributions of nearby institutions could have greatest impact in the graduate studies area. This would be especially true if the proposed International Animal Disease Research Center is established in Kenya. It seems probable, as the undergraduate program stabilizes and greater emphasis is placed on graduate training, that closer collaboration with these organizations will be necessary and should evolve.

VIII. AID Contribution to Veterinary Education

The contributions of the various donors, both from the public and private sectors from Europe and the United States, for buildings, equipment and teaching staff are well documented and need not be repeated here. The USAID program for veterinary education via a contract with Colorado State University (CSU) has provided significantly to the actual teaching program in training veterinarians. This contract, plus support for construction and equipment, has been a major factor for the present state of success of the school and should not be downgraded, either by AID officials or outside observers. What has not been accurately assessed is the impact CSU may have had on developing a satisfactory curriculum and influencing the long-term growth of the school. To provide such an evaluation, an examination of their specific contributions and, for proper perspective, some of the weaknesses of the group is necessary. These may be seen in Appendix 2.

As may be noted, and as might have been anticipated, CSU made a few "errors" due in large part to lack of past experience in a multinational educational program. These are situations that might have developed regardless of which U. S. university held the contract. Considering the complexities of having two or even three systems of education working in parallel with an expatriate faculty from several countries, it is surprising in retrospect that more problems did not arise. This is a tribute to the maturity and good judgement of all concerned.

Perhaps the single biggest weakness was the fact that CSU did not appear initially to understand and appreciate the fact that the University College Nairobi (now U. of N.) followed largely the British educational system and, consequently, the amount of power held by the department heads in controlling the course of a given department. Only one CSU faculty member achieved department head status, which placed limitations on the group for representation at academic committees above the veterinary faculty board level where all the faculty of the College has a voice. However, in spite of this, or perhaps even because of this, CSU's influence on curriculum development had to be carried by persuasion and instructional example, stimulating them to try harder than would otherwise have been necessary.

It is apparent on examining the data that CSU has made a significant impact on the curriculum and in cooperation with one other donor group appears to be continuing to do so in the area of greatest need, namely the field of Clinical Studies. Furthermore, the current emphasis by the CSU group is in the general area of clinical studies. Even the subject of pharmacology has also been oriented markedly toward clinical pharmacology-toxicology, in part by a CSU member. It is encouraging also to note that the

CSU group has taken the initiative in utilizing for lectures and teaching aids some of the men and resources from nearby veterinary organizations mentioned earlier in this report. There is every indication that this effort will be expanded, even though it seems to be looked upon with disfavor by some members of other donor groups.

In terms of instructional ability and enthusiasm, it is very evident that the CSU group cannot be faulted. This is especially true of the present CSU team. It appears also that the African student appreciates and enjoys the somewhat more "democratic" approach of the American education system.

It can be argued that development of the undergraduate program was a major responsibility of all donor groups for the past several years. Certainly, the CSU group as a whole has considered undergraduate instruction to be their prime responsibility. This is demonstrated by the fact that in addition to curriculum changes, laboratory manuals have been compiled for a number of subjects by the CSU team -- a contribution of considerable significance in the educational program. While CSU input did not solely make the school what it is, the cumulative effort of all donor groups is such that the undergraduate phase of the Veterinary College program seems to be well on the way to maturity -- recognizing, of course, that updating and improvements are a continual phenomenon in the field of professional veterinary education.

The responsibility of training Africans for faculty positions has been carried out at a slower pace than the education of field veterinarians for various reasons, as outlined elsewhere in this report. With a gradual accumulation of qualified Africans to select from, graduate education and africanization of the faculty should assume a more rapid pace. It is only by advanced studies in specific subjects that a well qualified African

faculty can be trained and placed in positions of responsibility. This phase of the program should be considered the next important step in the evolution of the Veterinary College to that of a self-sustaining organization. It is at this graduate level that USAID could make its next major contribution toward veterinary education.

Some of the CSU team members in the past have had experience more suitable for undergraduate training, without research experience and academic rank sufficient for a major graduate studies program. Some shifts in personnel would be required to more fully satisfy this objective. It should be emphasized, however, that the CSU group appears to have always recognized the need for counterpart training and, in the past several years, has probably been as active, or even more so than most donor groups in this regard. The criticism that the CSU faculty has not carried out effective research while in Kenya is partially valid, although there is some question as to whether more research could have been done in the formative years of the college without sacrificing the development of the undergraduate program. Even then, the group has not been completely inactive as can be seen by the list of research projects and publications developed by various members of the group. (Appendix 3).

IX. Conclusions

Based on the brief background and information presented above, the following conclusions are made:

1. As in other parts of the world, a successful animal industry in East Africa is dependent to a large degree on a well balanced animal health program.
2. A strong, well-oriented veterinary profession is the key to maintaining health.
3. Veterinary education within the area or country of need is the most satisfactory means of providing and maintaining an effective veterinary group.
4. The development of a veterinary school at the University of Nairobi has been a successful project within the framework of the short time devoted to the subject.
5. Maximal africanization of the faculty, especially at the senior levels, is not completed and is the next major phase in the development of the school.
6. Additional training of faculty is best conducted at the graduate educational level. A graduate program should be carried out to a large degree by the same faculty that provides undergraduate instruction.
7. Even though graduate training is an important aspect of the program, certain portions of the undergraduate program, especially Clinical Study areas, need to be strengthened.
8. In spite of certain weaknesses, CSU has made significant impact on the curriculum development and the direction which veterinary training is taking. Some strengthening of the CSU team for graduate training needs to take place.
9. Withdrawal of AID support at this time would seriously handicap the final evolution of the undergraduate program and markedly slow down the recruitment and training of the African faculty.
10. Withdrawal of AID support at such a crucial "midstream" time could markedly affect "credibility" concerning AID where support of long-term projects is involved.

X. Recommendations

1. AID should continue to give veterinary education in East Africa high priority, recognizing that veterinarians are essential for animal health and animal health is the cornerstone of a viable animal industry.
2. AID's contribution to the Veterinary College at U. of N. should continue through a contract with a U.S. veterinary college. Such a college would best have:
 - (a) a detailed knowledge concerning veterinary education;
 - (b) the knowhow in recruiting suitable faculty members;
 - (c) the capability of providing material and logistic support through its pre-existing organizational structure and backlog of files;
 - (d) the ability to provide direction, continuity of training and cohesiveness of action as a group (this latter is extremely important if a U.S. group is to exert maximum influence concerning the direction the educational program will take and the areas where emphasis should be placed);
 - (e) the possibility of offering a base for the training of African graduate students in the U.S., either at the institution holding the contract or by arrangement with other universities;
 - (f) the ability to provide a faculty for U. of N. with interests that blend with the African needs in terms of research and graduate training.
3. The contract should be renewed with Colorado State University for the following reasons:
 - a. They have gone through the preliminary phase of veterinary school development in Kenya and, hence, have accumulated direct personal experience.
 - b. They now understand more thoroughly the interrelationship of European and American training and, hence, appreciate the needs and problems of the

- school more completely than would a new contractor. They have also established a rapport with men of other donor groups.
- c. CSU is located in a geographical area in the U.S., surrounded by a livestock that more nearly approximates the East African situation than would a school in a dairy or in an urban location.
 - d. CSU has available faculty members trained in the specific fields which this review recommends should be emphasized during the next several years in a new AID contract.
 - e. In spite of certain early shortcomings, the CSU group has made a significant impact on the development of the undergraduate veterinary educational program. Current trends in CSU performance indicate a real awareness of the need and ways of approaching graduate training.
4. It is recommended that the following outline be a guide for renewal of a contract with CSU to provide continuing assistance to the Veterinary College, U. of N. For clarity, these recommendations are divided into three parts:

Undergraduate program - Faculty should be provided that can make greatest contributions in the Clinical Studies area and in the basic subjects which directly support the clinical subjects in terms of East Africa's current needs.

This should include:

- (1) Clinical Studies, such as medicine, diagnostic procedures, preventive medicine, applied surgery for food producing animals, clinical pathology, herd health, and reproductive program. Three faculty members
- (2) Clinical pharmacology, toxicology, food hygiene and meat inspection. One faculty member.

- (3) Parasitology. One faculty member.
- (4) Microbiology. One faculty member.

Graduate program - While establishment of an undergraduate veterinary education program was of paramount importance in the initial stages of the school's development, and while it needs continual attention and improvement, it is now apparent that the program should place greater emphasis on graduate training. This could consist of:

- (1) Training in a given field which will provide experience which may or may not lead to a degree; or if a degree is granted, one at the M.S. level granted by U. of N.
- (2) For the foreseeable future for well qualified students, there should be provisions for increasing scholarships for Ph.D. or Specialized Board training in the United States. Funds for this should be provided through the contract, in addition to the usual USAID participant training program. It is strongly recommended that the African candidate for a Ph.D. degree be sent to the U.S. for his formal education. It is equally strongly recommended that he return to Kenya for his thesis investigation under the supervision of a CSU faculty member on the scene, or, by agreement, a faculty member from one of the other donor universities. This probably will require some adjustment in the attitude of the graduate school of CSU and at times, by negotiation, with graduate schools of other U.S. universities where an African student may elect to study even though he comes to the U.S. via a scholarship sponsored by the contract.

This recommendation is made because it is vital in most instances that the thesis involve work concerning African veterinary medical problems. Yet, economics make it apparent that the final examination, which is usually in defense of the thesis, be conducted without the necessity of a return visit to the U. S. for a one- to three-hour examination. Questions for a final examination can be submitted by the U. S. members of the students' graduate committee and the examination itself carried out by an ad hoc committee chaired by a CSU team member in Kenya and invited members of the school's faculty regardless of national origin.

- (3) The graduate training program could be stimulated and improved by allowing funds through the contract to hire undergraduates as laboratory helpers for one or more years during the undergraduate veterinary program, providing first hand information concerning a student's ability and motivation. In order to provide greater resources for graduate training, if during the new contract period it is apparent that an African counterpart can assume the responsibility of a CSU faculty member, and if this faculty position is then not really needed elsewhere in the school, these monies should then be converted to additional scholarships.

Procurement of the faculty by CSU

- (1) The contract should allow for the procurement of six faculty members to cover the fields outlined in the section above on Undergraduate Program. At the beginning of the new contract period, replace those men who would normally be returning to the U. S. with individuals having adequate

academic experience in education and research to participate in both an undergraduate and graduate program. All members of the CSU team in Kenya must be qualified to accept graduate students according to CSU graduate school standards. Screening should be carried out to assure that CSU faculty candidates have an interest and are knowledgeable in African veterinary problems. Specifically, faculty selection should include the following:

- (a) Clinical Studies - one senior man appointed with sufficient academic background and years of experience to be capable of assuming a professor or visiting professor appointment, and two junior faculty of somewhat less experience as long as they meet the general provisos listed above. Between the three there should be experience to include all facets of clinical studies listed above.
- (b) Clinical pharmacology, toxicology and food hygiene - It is recommended that the contract retain Dr. Parsons, presently on the scene. This would be especially valuable if U. of N. accepts NORD offer to construct a new pharmacology building at Kabete and Dr. Parsons could become head of the department.
- (c) Microbiology and Parasitology - One member each qualified for both undergraduate and graduate studies.

- (2) The selection of the faculty should take into consideration the advice of the former Chief of Party at CSU and the Chief of Party, Nairobi, in consultation with the Dean of School in Kabete on an informal basis before the candidate is formally submitted to U. of N.
- (3) If CSU does not have an individual who can qualify in all respects for the particular position, recruitment from another university should take place through the CSU contract.
- (4) The present Chief of Party should be retained on duty in Nairobi for another tour of duty or at least until satisfactory replacement is available and well oriented.
- (5) The semi-annual reports, evaluation of achievements and appraisal of objectives should stem primarily from the Chief of Party at Nairobi.
- (6) The CSU(Fort Collins) campus coordinator might best be a former member of the team who has spent several years at the Kenya veterinary school.
- (7) A review of progress by an outside qualified team should be made at periodic intervals at the discretion of AID consisting of two or three trained veterinary educators, only one of whom should be from CSU.
- (8) Faculty members selected by CSU for appointment at U. of N. should be given a series of orientation courses on African veterinary medical problems and African philosophy by the cadre of veterinarians who has previously been assigned to the Kenya Veterinary School and who, by their own experience, can best provide such orientation.

Appendix 1

Men Interviewed Regarding Veterinary College, University of Nairobi

(not listed in order of importance)

R. H. Udall - CSU	USAID/Entebbe F&A Officer
R. Jensen - CSU	USAID/Dar-es-Salaam F&A Officer
H. Deane - CSU	P. Nderito - Vet. Science/U. of N.
N. Booth - CSU	Dean M. Braend - NORD
O. Adams - CSU	I. Murithi - Kenya Vet. Service
R. Chamberlain - CSU	A. Krauss - Germany
R. Tietz - CSU	I. McIntyre - Glasgow
D. Alexander - CSU	A. Grieg - Glasgow
L. Luoto - CSU	S. Muhammed - Tanzania
L. Parsons - CSU/N	L. Smith - Vet. College, Saskatchewan
J. Cheney - CSU/N	C. Cornelius - Kansas State U.
C. Kimberling - CSU/N	R. Flouwright - EAVRO
G. Gilbert - CSU/N	W. Malinquist - EAVRO
J. Moulton - U. of Colo./N	M. Cunningham - EAVRO
AID/W Africa Bureau staff	J. Pino - Rockefeller Foundation
USAID/N staff	J. McKelvey - Rockefeller Foundation
USAID/Regional East Africa staff	

Reports, Surveys and Articles as Source Material

- CSU Semi-annual Reports
- CSU Initial Recommendations (1963)
- CSU Review of Curriculum (1967)
- Veterinary Manpower Requirements - Cheney (1970)
- Kenya Veterinary Needs - Murithi (1968, 1970)
- Summary of Donor Contributions and Africanization - Cheney and Udall (1969)
- Animal Agriculture in Africa - Konnerup
- Veterinary College Development Plans - Triennium - 1967-69
- Triennium - 1970-73
- Pharmacology-Toxicology Program - NORD
- Survey of Veterinary Manpower, East, Northeast and Central Africa - Wieper
- Agriculture Education, East Africa - McFarland, et al
- "Wein" Report - Rep. of Kenya Agricultural Commission
- Role of Expatriates - Linton (1970)
- Veterinary Training Report - Ahmadu Bello University (1970)
- Livestock Development, Tanzania - Bell et al (1969)
- FAO Reports on Veterinary Education, Africa and Developing Countries (1963, 1965)
- FAO Surveys - Veterinary Manpower (1966, 1968)
- Protein Foods through Improving Animal Health - Pritchard (1966)

Appendix 2

Assessment of CSU Performance at the Veterinary College University of Nairobi

A. Weaknesses

1. The single biggest "error" was the fact that CSU neither recognized nor appreciated the magnitude of the difference between the American and European (especially British) educational system, and the power of the department head in controlling the direction his department will take. Accordingly, insufficient attention was given to selecting CSU faculty who could qualify at the professorial level and become department heads. Since the higher University committees are composed of department heads or professors, this factor limited CSU impact at that level. Even as instructors, some men were selected without much academic experience. Even though they did teach enthusiastically, such appointments served to diminish the stature of the team as far as other donors are concerned. (Note: At the present time, however, the greatest offender in this regard appears to be the British group).
2. The CSU team in Nairobi did not always appear to have the full sympathy or understanding of the "home" office and the CSU Campus Coordinator at Fort Collins appeared to be rigid in outlook.
3. As a whole, the CSU team did not pursue research as vigorously as might have been done, although teaching pressures modify this comment somewhat.
4. Faculty sent to Kenya did not receive orientation prior to leaving Fort Collins. (This criticism is true for most donor groups, however).

5. A review of CSU performance and curriculum development was carried out by CSU men. The use of outside advisors would have been valuable.

B. Contributions and Strength

It is apparent from an evaluation of the CSU faculty and their performance at the Veterinary College that they considered their primary role that of education or instruction, and in this regard they have played a strong role in the development of the school since its inception.

1. The CSU was part of the original team in 1964 to draft the first curriculum, although some of it was either never implemented or drastically altered to suit the desires of the initial faculty. No timetables for implementation of the curriculum were worked out.
2. Changes in the curriculum and specific timetables for the second year curriculum were drafted by the CSU team in 1967-68 and accepted in toto by the school.
3. In 1968, CSU proposals to improve the third year curriculum, including a detailed breakdown of the course in medicine to identify subject matter, were accepted in large part.
4. The CSU proposals regarding curriculum and timetables for the fourth year were not accepted and, as a result, it appears to be at the present time the curriculum requiring the greatest amount of change and improvement.
5. The present CSU faculty in clinical studies has implemented a number of changes informally, including important ones such as (1) developing a herd health program in the field, and (2) planned clinical demonstrations giving the students a greater

chance to be exposed to diseases and problems that they will face once they graduate. These are new methods of instruction, common in the U.S. but not used before at U. of N.

6. The CSU Clinical Studies faculty has invited members of the Kenya Veterinary Service and the East African Veterinary Research Organization to present lectures at the College, something that has also been completely ignored in the past. Material resources from these organizations are being used as teaching aids. Such collaboration not only provides more input in tropical medical education, but helps form a basis for a closer alliance between the College, the Veterinary Service Department, and EAVRO -- something that has lacked in the past.
7. CSU has initiated some courses that were not planned originally, such as epizootiology, clinical pathology, and toxicology.
8. They have been operating diagnostic laboratories for microbiology, parasitology, and clinical pathology for the benefit of the Clinic Studies Department and as a teaching aid. This is also relatively new.
9. Laboratory manuals have been prepared by CSU where none existed previously, covering the subjects of biochemistry, microbiology, pharmacology and parasitology. These are invaluable aids for instruction which are time-consuming to prepare.
10. The clinical medicine group has prepared a series of tapes as supplementary lectures, including visual aids, for use by students in their free time. They have also arranged for the loan of IAO films on infectious diseases which, strangely enough, had not been utilized previously.

11. The CSU team appears to have taken the initiative to train African counterparts more than most of the donors. The exception to this comment may be the German faculty, especially in the subject of anatomy which has been in existence the longest.
12. CSU, Fort Collins, has provided teaching aids and educational material such as:
 - a. in medicine, over a thousand slides depicting clinical material -- the only such resource in the school;
 - b. over 500 clinical pathology slides, again the only such contribution;
 - c. a large number of blocked tissues for pathology covering subjects not readily available in Africa;
 - d. most of the cultures used for teaching microbiology;
 - e. a number of bacterial cultures for similar purposes;
 - f. various teaching aids, instruments and some hard-to-obtain drugs;
 - g. a number of books and references for the library were given as gifts to the veterinary library. Furthermore, the CSU library has made available to the U. of N. veterinary faculty its MEDLAR research facility.
13. As a volunteer effort, the CSU men in parasitology and microbiology have been providing instruction in these subjects to the certificate and diploma program for food technology and meat inspection for all of East Africa, and similar instruction to the two-year certificate medical technology program with the Kenya Polytechnical Institute.

It also should be noted unequivocally that all available sources of information indicate that the CSU faculty cannot be faulted for lack of enthusiasm or ability to instruct the veterinary students. In fact, several independent appraisals provided by men in the Nairobi area have indicated that almost in its entirety the CSU faculty has been popular and appreciated by the African students. In many respects, it appears that the African appreciates and prefers the somewhat more democratic approach of the U. S. educator in contrast to the more rigid or stereotyped approach presented by some of the European counterparts.

Appendix 3

Research Projects of Colorado State University Personnel at the Veterinary College, University of Nairobi

1. A study of the molecular weight distribution and ion-binding character of bovine plasma proteins. R. H. Udall
2. A study of protein-calorie nutrition in bovines by measuring the plasma amino acid, urea and creatinine. R. H. Udall
3. Duration of Brucella ovis infections in ewes. S. I. Muhammed and L. H. Lauerman, Jr.
4. Field survey of bovine mastitis in Kenya. A. Greig, W. Lutu, H. Buck and L. H. Lauerman, Jr.
5. Immunological response of cattle to Rhipicephalus appendiculatus infestations. R. Purnell and L. H. Lauerman, Jr.
6. Tolerance period in the bovine fetus to tissue homographs. L. H. Lauerman, Jr.
7. Foot abscesses in sheep in Kenya. J. Cheney and L. J. Lauerman, Jr.
8. Self cure in cattle. J. Cheney
9. Perineal malignant carcinoma in Airshire cattle. G. Gilbert
10. Evaluation of Rompun in ruminants. C. Kimberling and G. Gilbert
11. Hematology of bovine petechial fever. C. Kimberling and B. Jeraj
12. Effect of corticosteroids on isolated rabbit hearts. L. Parsons
13. Pharmacological screening of native plants used in African folk medicine. L. Parsons and Mithi
14. Pharmacological action of Catha edulis variety forsk in laboratory animals. L. Parsons

Publications by Colorado State University Personnel
(from the Veterinary College, University of Nairobi)

- Kramer, T. and Nderito, P.: A Study of the Pathogenic Role of *E. coli* in Diarrheas of Clostrium-Deprived Pigs. *American Journal of Veterinary Research*.
- Cameron, R. D. A., Carles, A. B. and Lauerman, L. H., Jr.: The Incidence of *Brucella ovis* in some Kenya Flocks and its Relationship to Clinical Lesions and Semen Quality. *Australian Veterinary Journal*. (Submitted for publication).
- Krauss, H., Wandero, J. G. and Lauerman, L. H., Jr.: Isolation, Identification and Serological Investigation of a Chlamydia in Kenya Sheep. *American Journal of Veterinary Research*. (Submitted for publication).