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KANSAS STATE UNIVERSITY

COLLEGE OF AGRICULTURE

DEPARTMENT OF GRAIN SCIENCE AND INDUSTRY

ANNUAL TECHNICAL REPORT OF 211(d) PROJECT

This report was prepared prior to receipt of the AID "Guidelines."
Supplemental material called for in the "Guidelines" appears on pp. 51-53.

1971-1972

June 30, 1972

Title: Grain Utilization in India

Grantee: Kansas State University
Department of Grain Science and Industry
Food and Feed Grain Institute

Director: Dr. David R. Lineback

A. Statistical Summary:

Period of Grant: July 1968 to June 1973. Amount of Grant: \$200,000
Expenditures for Report Year: \$50,575 Accumulated: \$129,201
Anticipated for Next Year: \$36,299

B. Narrative Summary

Two students completed research projects at the Central Food Technological Research Institute, Mysore-2A, India during the report period. One project concerned quality evaluation of Indian wheats. Physical, chemical, milling, rheological and baking tests were conducted on 33 Indian varieties of wheat (54 samples) collected from two crop years. A number of the recently introduced high-yielding Mexican varieties of wheat and a few Indian varieties were found to have high loaf volume potentials when measured on a constant protein basis. The second project involved application of insect control chemicals to three grains (rice, wheat and sorghum), milling of these grains and preparation of traditional foods using methods commonly employed, and analysis for the presence of chemical residues in the milled products and prepared foods. Both of these projects were of mutual interest due to the expanding use of chemical for grain storage in India and to the rapidly expanding milling and baking industries in India.

A very significant relationship has been established between Kansas State University and the Central Food Technological Research Institute in Mysore during the life of the grant. This is the most outstanding accomplishment of the grant to date and has significantly increased the competency of Kansas State University to render assistance to India and other developing nations in food grain utilization and to train graduate students in food grain utilization in such nations. This relationship has been strengthened by exchange visits of scientists from each institution. Many areas of endeavor have been involved including information exchange, consultation, stimulation and initiation of research of mutual interest relating to grain utilization in India and other developing nations. The relationships between these two institutions and between scientists who now know each other on a personal basis promise to be very useful for mutual cooperation in the future, providing international political situations as interpreted by AID do not prevent future exchange of personnel.

KANSAS STATE UNIVERSITY

DEPARTMENT OF GRAIN SCIENCE AND INDUSTRY

Manhattan, Kansas

FOURTH ANNUAL REPORT AID 211(d)
GRANT TO DEVELOP SPECIALIZED COMPETENCIES
ASSOCIATED WITH GRAIN UTILIZATION IN INDIA - 1971-72
June, 1972

I. SUMMARY

The 211(d) program has progressed during 1971-72 in the manner planned and presented in previous annual technical reports, with the exception of the plans for Mr. Alvin Siegel to conduct his Ph.D. dissertation research at the Central Food Technological Research Institute (C.F.T.R.I.) in Mysore. Mr. Patrick Finney completed his research investigation at C.F.T.R.I. concerning a baking quality evaluation of Indian wheats and returned to Kansas State University (K.S.U.) to write his dissertation. Writing of the dissertation is nearly completed and Mr. Finney should complete the requirements for his Ph.D. degree in the near future. Mr. Merrick Lockwood continued his research investigation at C.F.T.R.I. concerning the application of chemical agents to grains and the presence of residues from these agents in food products prepared from the grain. The laboratory work in this investigation was completed in June, 1972 and Mr. Lockwood will be returning to Kansas State University in July, 1972 to write his dissertation and to complete requirements for his Ph.D. degree. Mr. Alvin Siegel completed the course requirements for his Ph.D. program during 1971-72 and took his preliminary examinations for the Ph.D. Upon completion of these, he was ready to depart for C.F.T.R.I. to begin his research work. However international politics forced cancellation of these plans and alternative plans have been developed for Mr. Siegel to do his Ph.D. dissertation research at the Institute of Food Research and Product Development, Kasetsart University, Bangkok, Thailand.

Expenditures for the past year include major items for travel, salaries and equipment. Travel billings were finally received from previous years of the grant (estimated expenditures for these items were included in the annual technical reports for those years) and are reflected in the expenditures for 1971-72. The 211(d) professor and Dr. R. Carl Hosenev, associate professor, Department of Grain Science and Industry, Kansas State University, travelled to Mysore in December, 1971-January, 1972 to consult with the two students doing research there and with the Indian scientists co-directing their work, to evaluate the progress of their programs and to complete arrangements for the third student to study there. Travel expenses and per diem for the return of Mr. Finney, his wife and infant child from India, are included. Major items of research equipment (listed in the third annual technical report) purchased from U.S. manufacturers and shipped to India for use by the two students in their research projects were paid for during the current fiscal year. Some equipment was purchased for use at Kansas State University in research generated by work of the students in India.

Dr. H. A. B. Parpia, Director, Central Food Technological Research Institute came to Kansas State University for a brief visit during May, 1972 under the provisions of the 211(d) grant. During his short visit at the University, he consulted with students and faculty members and presented a seminar. Arrangements for the cooperative program at C.F.T.R.I. had been made through Dr. Parpia, who has had considerable interest in the program and in the students during their time in Mysore.

The objectives of the 211(d) program have been adhered to and the program has developed nearly as planned. Interest in international agriculture has continued to be stimulated among undergraduate students, graduate students and faculty members. Particular interest and discussions have been directed to

the uniqueness of the 211(d) concept and the flexibility of the program with regard to selection of research problems and areas, a feature which was especially utilized this year in the case of Mr. Siegel. Experiences gained from the 211(d) program have been used to enrich course content in several existing courses by inclusion of material with international orientation. Personnel involved with the program have continued their interchanges and cooperation with the South Asia Center, the International Activities Office and programs of the International Agricultural Office.

Plans are now complete for the remaining year of the 211(d) grant. Emphasis will continue to be placed upon graduate student training in food grain utilization in India and other developing nations. Two students will complete their work in the very near future and the third student will initiate his research. Current plans are to request a one-year extension of the grant without additional funding to allow the third student to complete his research and the requirements for his Ph.D. degree. This emphasis is considered to be of maximum importance and benefit, yielding the greatest return from the current 211(d) program and increasing the competency of Kansas State University to render assistance to India and other developing nations in food grain utilization.

II. GRANT OBJECTIVES

The basic objectives, as stated in the contract, are as follows: "The basic objectives are to train graduate students in food grain utilization in India and other developing countries and to further develop the competency of Kansas State University in these areas. The University considers international activities of this nature a legitimate concern and function. Training and research activities in this area are under way but assistance, as requested

in this grant, will enable the University to engage in new endeavors and expand its research and graduate instruction program so as:

- A. To increase the capability of Kansas State University to render assistance to India and other developing nations in food grain utilization.
- B. To enlarge the pool of scientists trained in grain handling, processing, storage and marketing interested in and capable of assisting India and other developing nations.
- C. To increase professional awareness of the increasing importance of grain storage, handling, processing and marketing in developing countries.
- D. To encourage college students to seek careers in international service in the broad area of grain utilization.
- E. To provide an opportunity for graduate students to obtain research experience on problems of particular relevance to India and other developing countries by assisting with research activities carried out fully or in part in India.
- F. To stimulate and encourage faculty and other professional staff to consider careers in international service and to increase faculty interest in and university commitment to agricultural problems of India and other developing countries by drawing upon their special relevant competencies in training and research."

III. MAJOR ACCOMPLISHMENTS

The work plan outlined in annual Technical Report No. 3 was followed and realized. Dr. H. A. B. Parpia, Director, Central Food Technological Research

Institute (C.F.T.R.I.) came to Kansas State University, May 20-24, 1972, under the provisions of the 211(d) Grant. During this period he presented one formal seminar, "Some Aspects of Food Research at C.F.T.R.I.", and consulted with students and faculty from several departments of the university. He had discussions with several staff members from the Department of Grain Science and Industry concerning the 211(d) program and interests generated by it. Arrangements for the cooperative program between C.F.T.R.I. and Kansas State University were made through Dr. Parpia. He has been most interested in the program, its implications and effects, and has spent considerable time with the students studying at C.F.T.R.I. One of the most significant accomplishments of the 211(d) grant has been the relationship which has developed between Kansas State University (Department of Grain Science and Industry) and C.F.T.R.I. This relationship would not have developed without the 211(d) Grant. Discussions during Dr. Parpia's visit to Kansas State encompassed such areas as mutual research interests, staffing problems at C.F.T.R.I. concerning which personnel at Kansas State could advise, grain utilization and food production problems in India, the possible implications and effects of international politics on reciprocal scientific relations, and mutual areas for cooperation between the two institutions. This relationship has grown stronger each year and considerable exchange of correspondence and information now occurs. If programs such as the current 211(d) Grant were maintained, relationships such as these could be greatly strengthened at a minimal expense with mutual benefit to both countries.

Plans for the graduate students involved in the program progressed as expected, with the exception of Mr. Siegel, and are summarized below.

1. Mr. L. Merrick Lockwood continued his Ph.D. dissertation research under the supervision of Dr. S. K. Majumder in the Infestation Control and Pesticide Discipline at C.F.T.R.I. Samples of wheat and rice were obtained

and, together with the sorghum sample obtain previously, were treated with three to four different concentrations of malathion, gardona or sumithion. A bioassay involving confused flour beetles and a lepidopterous grain pest was used to determine the lowest effective concentration of each chemical. Each grain was then treated with the lowest effective concentration of each chemical and with multiples of this concentration. Samples of the grain were removed after varying periods of storage and milled by procedures commonly used in India. Commonly used food products were prepared from each milled grain by methods normally used in India. The milled grains and food products prepared from them were analyzed for chemical residues.

The laboratory research portion of the investigation was completed in June, 1972. Mr. Lockwood and his family are returning to the U.S. in July, 1972. Following his return, he will complete the writing of his dissertation and complete the requirements for his Ph.D. degree. A paper covering the results of his work in India has been submitted for presentation at the National Meeting of the American Association of Cereal Chemists, October 29-November 2, 1972 at Miami Beach, Florida.

2. Mr. Patrick L. Finney completed his research investigation at C.F.T.R.I. and returned to the U.S. with his family in April, 1972. Since his return, he has been writing his Ph.D. dissertation. Work on this is nearly complete. A paper covering the results of his investigation in India has been submitted for presentation at the National Meeting of the American Association of Cereal Chemists, October 29-November 2, 1972, at Miami Beach Florida. Upon completion of his Ph.D., Mr. Finney plans to do postdoctoral work under Dr. R. Carl Hoseney, Department of Grain Science and Industry, Kansas State University, in the area of baking quality evaluation. This postdoctoral fellowship is a direct out-growth of Mr. Finney's experiences and

training in India on the 211(d) program and will increase his competence and experience in this area.

While at C.F.T.R.I., Mr. Finney conducted quality evaluation studies on 35 varieties of Indian wheats (54 samples in all) from two different crop years. These samples were obtained from the major wheat-growing areas of India through cooperation of Indian plant breeders and experiment stations. The wheats were milled by Mr. Finney on a Buhler mill in the Discipline of Flour Milling and Baking Technology at C.F.T.R.I. Milling data were obtained for each of the wheats milled. Wheat samples ranged from hard through soft wheats. The flours obtained from these wheats were used to bake leavened bread. Three different baking formulae were used in evaluating the breadmaking potential of each wheat flour. The flours were characterized by appropriate standard tests and the doughs derived from these flours were also adequately characterized by accepted rheological tests. Coupled with the baking tests, this investigation resulted in a complete set of data for each wheat sample for each stage of the grain processing and utilization (breadmaking) sequence. This information will be made available to the breeders cooperating in the study as well as being published in suitable scientific journals. It was found that certain Indian wheats, particularly Kalyan Sona (developed at CIMMYT, Mexico and now grown as the major wheat variety in India) was equal to or superior to a regional baking standard flour from the U.S. used as a standard in the investigation. This latter flour is a composite flour from medium-strong to strong wheats grown in the Southern and Central Great Plains region of the U.S. in 1969. The information obtained from this investigation should be very useful in determining the suitability of various varieties of Indian wheats for production of bread. The use of bread is increasing at a rapid pace throughout India.

3. Mr. Alvin Siegel completed the course requirements for his Ph.D. program and took his preliminary examinations. Arrangements had been completed for him to study in the Discipline of Protein Technology at C.F.T.R.I. on a problem involving studies on the preparation, acceptability and nutritional evaluation of cereal-based foods for children. These final arrangements had been made during a visit to Mysore in January, 1972 by the 211(d) professor. Dr. H. A. B. Parpia had indicated the willingness and desire of the Institute to have another student under the collaborative arrangement between the two institutions and had signified his pleasure with the first two students and the progress of the relationship between C.F.T.R.I. and Kansas State University.

Shortly before the time planned for his departure to India, while waiting issue of the necessary visa, a cable was received by AID/Washington indicating that no new 211(d) personnel would be assigned to India. This necessitated a change in plans for Mr. Siegel. Talks with personnel at Kansas State University and with Dr. Irwin Hornstein of the nutrition area of AID/Washington resulted in a recommendation that Mr. Siegel do his Ph.D. dissertation research with Mr. Amara Bhumaratana at the Institute for Food Research and Product Development, Kasetsart University, Bangkok, Thailand. It so happened that Mr. Bhumaratana was in Washington at the time attending meetings and telephone conversations were held with him and Dr. Hornstein. Dr. Hornstein strongly recommended that Mr. Siegel work with Mr. Bhumaratana and the latter indicated his willingness to direct Mr. Siegel in research work. A tentative project was agreed upon, to be finalized in later meetings in Bangkok, which was nearly identical to that which Mr. Siegel had planned to do in India. This was a major reason for selection of Thailand as the location for Mr. Siegel's research. This would enable experiences in India to be capitalized on and would further enhance the competency of Kansas State University to render assistance to

developing nations in food grain utilization.

Mr. Siegel plans to proceed to Bangkok as soon as the necessary approval has been obtained from ATD/Washington and the necessary visa has been issued. He will spend about 18 months there doing the research and will then return to the U.S. to complete the writing of his dissertation. A one year extension of the present grant without additional funding will be requested to enable him to complete his Ph.D. degree under these arrangements.

A. Development of Teaching Competence

Kansas State University has a long history of active international involvement. The Department of Grain Science and Industry has an excellent international reputation for its research and training functions in the field of grain science. The graduate student body of this department currently is about 50-60% international students. The staff and faculty of this department are in almost daily contact with foreign students and visitors.

The 211(d) program has been used to enrich the teaching program of this department and the services of those involved in the 211(d) program have been made available to other departments of Kansas State University for use in their teaching programs. It is strongly believed that this approach is of more value to the University and its students than the creation of new courses specifically dealing with international agriculture. As the experiences of students and staff involved in the 211(d) program are incorporated into their various teaching assignments, many more students will benefit from these experiences than would the few enrolling in any one new course. The 211(d) professor has incorporated experiences from the 211(d) program into the two courses he teaches related to food science and into his involvement in the food science interdepartmental program at Kansas State University. Graduate students returning from their work in India will be used during the next academic year in a series of technical and

social seminars relating to their work and experiences in India. Development and improvement of teaching competence occurs as the experiences and competence of teaching faculty are increased. This is being done through the 211(d) program by exposing more personnel to the problems of grain utilization and production in developing nations.

B. Development of Research Competence

The relationship between Central Food Technological Research Institute and Kansas State University was further strengthened and developed during the year. Considerable exchange of technical information and experience is occurring between individuals in both institutions via the 211(d) program. New areas of mutual research interests are becoming apparent which are increasing the research competency of scientists at Kansas State University by opening new or expanded areas of research. During the course of Mr. Finney's work on wheat quality evaluation, several Indian wheats were found to give unusual responses in their breadmaking performance based on what would have been expected from some of the quality parameters measured. Several of these wheats have been imported for further investigation at K.S.U. to determine why these unusual responses, compared to American varieties and their behavior, occurred. Using standard baking tests, Mr. Finney was able to achieve loaf volumes comparable to but slightly less than those obtained at Kansas State under similar conditions. This was further investigated at Kansas State University and the lower loaf volume was found to be due to the use of buffalo milk solids in India rather than the normal nonfat dry milk solids used in the U.S.

Scientists from Kansas State University and C.F.T.R.I. have exchanged information and ideas on potential areas for collaborative research, for information exchange and for consultation. If the relationship between these two institutions and their staff is allowed to continue to develop, significant

areas of mutual cooperation are bound to emerge. Many of these may be incorporated into existing research programs at K.S.U., such as the development of protein-enriched cereal-based foods, and others will require initiation of new research programs. All of these will increase the research competency of the scientists involved, particularly in the areas of food grain production and utilization in developing nations.

C. Development of Competency for Consultation and Service

As indicated in the third annual technical report, experiences gained in India by students and staff participating in the 211(d) program increase their competence for consultation and service in the following ways:

1. Information and knowledge gained from these experiences constitute a pool of knowledge and information concerning international agriculture, particularly grain utilization in developing nations, and food problems which can be made available to the university community.
2. The most unique concept of the 211(d) program is the ability to formulate a research project in an area of mutual interests through direct cooperation with Indian colleagues or colleagues in other developing countries. This observation was also voiced on several occasions by Dr. Parpia and cannot be stressed enough. The experiences gained through such a venture are not available in the University other than through the 211(d) program. It is probable that the 211(d) concept will, in the long run, prove to be the most viable, least expensive vehicle to foster establishment of significant long term relationships between institutions and scientists in developing nations and their counterparts in the U.S. without the political implications of technical assistance teams.
3. Experiences of those involved in the 211(d) program are daily utilized through lectures, seminars, contact with international students and discussions

with other faculty members having interests in India and other developing nations. Again for the second year, the 211(d) professor was interviewed concerning the 211(d) program following his visit to India. The interview was used for the "Agriculture Today" program of the University radio station (KSAC) and was distributed for use throughout the state to inform Kansas area farmers and ranchers of the program and the implications for Kansas agriculture.

4. Participants involved in the 211(d) program cooperate with the University's International Activities Office, the South Asian Institute, and the International Agricultural Programs Office.

5. Conferences with staff members who have returned from assignments abroad or about to leave for foreign duty are common.

Dr. Lineback made his second visit to India during December, 1971-January, 1972, to coordinate and evaluate the research of the two graduate students studying at C.F.T.R.I., to consult with Indian scientists and to complete arrangements for a third student to study at C.F.T.R.I. under the 211(d) program. He was accompanied by Dr. R. Carl Hosenev, Associate Professor, Department of Grain Science and Industry whose trip was made under the provisions of the 211(d) grant. Dr. Hosenev is a nationally and internationally recognized expert in cereal chemistry and wheat quality evaluation. However, he had not been exposed to many of the problems and experiences of grain utilization in developing nations, even though many of these would have direct implications for his research. He also was admirably qualified to evaluate and assist with the research of Mr. Finney. This is one of the finest examples of the use of the 211(d) program to increase the teaching, research and consulting competence of K.S.U. by increasing these capabilities of a faculty member. Dr. Hosenev derived great benefits from the trip, his discussion with scientists at the institutions visited, and the experiences he had involving cereal grain production and utilization in a

developing nation with the food problems attendant to such an area. This has increased the competency of Kansas State University to assist with food grain utilization in developing nations by more effectively equipping one of its younger faculty members to work in this area. This is one aspect of the 211(d) program which should be encouraged and used for it truly achieves the objectives of the grant and will have a lasting impact. The itinerary for the trip included:

- December 29 Flour Milling and Baking Research Association,
Chorleywood, England
- December 30 Station of Biochemistry and Physicochemistry
of Cereals, National Institute of Agronomic
Research, Massy, France
- January 1-10 Central Food Technological Research Institute,
Mysore, India
- January 12 Bread Research Institute of Australia and
C.S.I.R.O. Wheat Research Unit, North Ryde

Visits to the Flour Milling and Baking Research Association, Chorleywood, and the Station of Biochemistry and Physicochemistry of Cereals, Massy, enabled Drs. Hosney and Lineback to consult with scientists active in the fields of cereal chemistry and baking. Scientific areas of mutual interests were thoroughly discussed, information shared and areas pertinent to the 211(d) program reviewed. Previous correspondence had enabled appointments to be scheduled with Dr. C. T. Greenwood and his staff at Chorleywood and with Drs. Mercier, Cerning and Charbonniere at Massy.

The majority of the time at C.F.T.R.I., Mysore, was spent in consultation with the two students there and with the Indian scientists co-directing their work. By virtue of his research interests, Dr. Hosney spent the major portion of his time in consultation with Mr. Finney and Mr. G. S. Bains (Head, Discipline of Flour Milling and Baking Technology) evaluating the data collected during the course of Mr. Finney's investigation and discussing problems pertinent to quality

evaluation of wheat. Dr. Hosney presented a formal seminar to personnel at C.F.T.R.I. Dr. Lineback spent the major portion of his time in consultation with Mr. Lockwood and Dr. S. K. Majumder (Head, Infestation Control and Pesticide Discipline) evaluating Mr. Lockwood's preliminary data and completing plans for collection of the remainder of the data. A field trip was made to witness the rice harvest in an area near Mysore City. This enabled both Dr. Lineback and Dr. Hosney to become more familiar with some of the problems of a labor-intensive set of cultivation and harvest practices and the implications this has for grain utilization. Discussions were held with other staff members of C.F.T.R.I. particularly Dr. H. A. B. Parpia, concerning research at the Institute, possible areas for mutual collaboration and support, and future plans for the 211(d) program (including final arrangements for the third student in the program to study there).

One of the most informative and worthwhile aspects of this trip was the visit to the Bread Research Institute of Australia at North Ryde. This Institute has had extensive experience with the establishment of modern breadmaking facilities in India and is also doing excellent, extensive research in cereal chemistry. A number of areas of mutual interest relating to the 211(d) program were thoroughly discussed. Problems relating to grain utilization in developing nations and the implications that current cereal chemistry research and food science research have for these problems was discussed.

D. Undergirding of Other Indian Programs of CUSURDI Universities

Arrangements have been made for a student being trained at Ohio State University to complete a portion of his training in the Department of Grain Science and Industry. Mr. V. K. Chaudhary, Lecturer in Cereal Technology in the Department of Food Science and Technology, Punjab Agricultural University, Ludhiana, India, is enrolled at Ohio State University for a Ph.D. degree. The

main purpose of his program is to prepare him for cereal and baking technology so that he can continue the program initiated at his home university by Dr. Donald C. Abbott of Oklahoma State University, who is serving a one-year assignment at Punjab Agricultural University on the Ohio State University/USAID contract. It was desired for Mr. Chaudhary to receive a portion of his training at Kansas State University. Arrangements have been completed for him to spend two semesters studying in the Department of Grain Science and Industry, utilizing the unique capabilities of this department to train personnel in the area of baking science and technology. Dr. Abbott also visited with Mr. Finney in Mysore where they discussed the work Mr. Finney was doing, particularly that involving wheat samples from Ludhiana.

E. Involvement of Other University Resources

Many divisions of Kansas State University provide either direct or indirect support to the 211(d) program. Administrative services and advice are provided by the various international programs offices that have extensive overseas projects. In addition, the overall staff of the Department of Grain Science and Industry contributes in innumerable ways to the support of the 211(d) project, by providing office space, secretarial services, library facilities, as well as giving advice and encouragement to the 211(d) students.

IV. INTERNATIONAL PROGRAMS OF THE UNIVERSITY

Kansas State University is committed to the concept that international activities are a legitimate concern and function of the university. It has a long history of involvement in international agriculture and continues its

high degree of interest and involvement in international programs of this nature. These programs are diverse in nature and only the most relevant will be cited in this discussion. It must be realized that a commitment to teaching and training foreign graduate students represents a major commitment of the resources of a university. Kansas State has been a center for such activity and it has only recently become necessary to place limitations upon the number of foreign graduate students enrolled in the graduate programs of this University. This was necessitated by current economic conditions in the United States as reflected by decreasing financial support for graduate education and research. The first international assignment of a KSU faculty member was to Egypt in 1927 and involvement in international technical assistance programs has continued since then.

The University has been involved in India on a university-wide basis since 1956 when it finalized a contract with the International Cooperation Administration (now USAID). The university has staffed and operated a program to aid in the development of Andhra Pradesh Agricultural University at Hyderabad. A large number of KSU faculty have served abroad under the provisions of this program. This program is currently being concluded with the last KSU faculty member scheduled to leave Hyderabad in September, 1972. Dr. Charles Deyoe of this department spent about six weeks in November-December, 1971 as a consultant concerning the establishing of a Feed Technology curriculum at Andhra Pradesh Agricultural University (A.P.A.U.). This was a direct consequence of training a student from A.P.A.U. for a Ph.D. in Grain Science. This student returned to the faculty at A.P.A.U. and initiated consideration of such a curriculum, similar to that he had studied here at KSU. During his visit to Hyderabad in April, 1971, Dr. Lineback gave a seminar emphasizing the Feed Science and Management curriculum in the Department of Grain Science and Industry, KSU.

In 1963 Kansas State University signed a contract with AID for aid in developing Ahmadu Bello University in Nigeria. This program involves assistance in broad areas of agriculture and veterinary medicine. The program has been in operation since that time with numerous KSU faculty members having served there on two-year or short-time assignments. Five faculty members departed from KSU for assignments in Nigeria during the current year.

The Department of Grain Science and Industry has continued its broad involvement in areas related to grain processing utilization. Training and research programs in grain handling and processing have been continued on an international basis under contracts with AID. For the third consecutive year a short course in Grain Storage and Marketing is being held in this department during June-July, 1972 under the provisions of Contract AID/csd-1588. Participants from Central and South America, Nepal, Indonesia and Liberia are attending the short course. Under this same contract, programs involving grain storage, transportation and processing were continued and staff members from this department and the Department of Economics travelled to Viet Nam, Indonesia, Honduras, Guatemala, Panama, Senegal, Mali and Mauritania to consult on problems pertinent to these areas. During this same period, the Department of Grain Science and Industry has continued its extensive research program concerning nutritional improvement of cereal-based foods under the provisions of Contract AID/csd-1586. Staff members went to Lyallpur, Pakistan to conduct acceptability studies with Pakistani colleagues involving protein-enriched cereal-based food products developed from this research.

The South Asia Center of the university has continued its extensive involvement in matters pertaining to cultural, social, geographical, political, economic and historical aspects of this area of the world. This Center has become the center for international instruction in the University in the areas outlined

above. Courses, such as the two in Introduction to the Civilization of South Asia, are extensively utilized by undergraduate and graduate students desiring training in this area. Courses are co-listed among several departments.

V. EXPENDITURES

	Original	Actual Expenditures				Estimated Expenditures	
	Budget 1968-73	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74 ¹
Faculty Salaries	\$ 98,000	\$16,887	\$20,277	-0-	\$14,605	\$18,500	\$19,500
Graduate Stipends	54,000	700	8,400	\$13,792	17,280 ²	8,000	7,000
Exchange Professor	7,000	-0-	-0-	648	420	799	500
Travel (Mission Payments)	25,000	713	606	3,164	1,436 ³ 10,864	6,000	5,500
Equipment, Supplies & Other	16,000	73	780	12,586	5,970 ⁴	3,000	2,000
	<u>\$200,000</u>	<u>\$18,373</u>	<u>\$30,063</u>	<u>\$30,190</u>	<u>\$50,575</u>	<u>\$36,299</u>	<u>\$34,500</u>

1. One-year extension of grant being requested without additional funds. Budget is predicated upon this being granted.
2. Graduate stipends include the following:

L. Merrick Lockwood	\$6540
Patrick L. Finney	\$6540
Alvin Siegel	<u>\$4200</u>
	\$17,280
3. 1971-72 Travel includes expenses of 211(d) professor to annual 211(d) review in Washington, Dr. Lineback's and Dr. Hosoney's trip to India, and the return of Mr. Finney with his wife and child from Mysore. The Mission payments reflect the official costs received from AID for the above trips and those in previous years (estimated in previous annual reports).
4. All major items were purchased from U.S. Manufacturers. The items costing above \$100 are listed below. The first (laboratory sifter) was purchased for the research laboratories at Central

Food Technical Research Institute, Mysore, India for use in experiments being conducted in connection with the research program of a 211(d) student. The second item (microscope) was purchased for the research laboratories of the Department of Grain Science and Industry, Kansas State University for use in research generated by the 211(d) work in India.

Laboratory sifter	\$490.00	Great Western Mfg. Co.
Microscope	702.00	Scientific Products

Other costs included a portion of the equipment itemized in the third annual technical report which was paid with funds during this fiscal year.

VI. PLAN FOR SUBSEQUENT YEARS

During 1972-73, the last year of the original grant, Mr. Lockwood will complete the requirements for his Ph.D. degree and be terminated from the program. Mr. Siegel will initiate the research for his Ph.D. at the Institute for Food Research and Product Development, Kasetsart University, Bangkok, Thailand. The 211(d) professor will travel to Thailand to complete arrangements for the research problem and to consult with Thai scientists.

A one year extension to the present grant is being requested without additional funding. This will allow Mr. Siegel to complete his research work in Bangkok, return to Kansas State University to write his dissertation, and complete the requirements for his Ph.D. degree. Current plans are for his research to be completed by January, 1974, allowing six months to write his dissertation and complete his degree requirements. The 211(d) professor would make one trip to Bangkok during 1973-74 to supervise and evaluate the data acquisition of the research program and to consult with Thai scientists co-directing the work.

Supplementary material - KSU Project (p. 35)

C. II. The basic objectives "to train graduate students in food grain utilization in India and other developing countries and to further develop the competency of Kansas State University in these areas" have received about equal emphasis during the period of the grant and have not been significantly modified. One of the major means for increasing the competence of a university is through the training of graduate students in the designated area. These two mutually compatible objectives form the heart of the present grant and will continue to do so.

III. Table I is appended.

TABLE I

DISTRIBUTION OF 211(d) GRANT FUNDS AND CONTRIBUTIONS
FROM OTHER SOURCES OF FUNDING

Review Period: July 1, 1971 to June 30, 1972

Activity	211(d) Expenditures				Non 211(d) Funding Amount
	Period Under Review	Cumulative Total	Projected Next Year	Projected to End of Grant	
Research	\$32,270	\$83,000	\$23,500	\$128,000	There is no way to estimate in any reasonable accurate- ness the contribution of non-211(d) funding.
Teaching	6,025	16,201	4,500	24,000	
Consultation	12,280	30,000	8,299	48,000	

TABLE II

EXPENDITURE REPORT
(Actual and Projected)

UNDER INSTITUTIONAL GRANT AID/csu-1931

Review Period: July 1, 1971 to June 30, 1972

	Expenditures to Date		Projected Expenditures Year		Total
	Period Under Review	Cumulative Total	5	6*	
Faculty salaries	\$14,605	\$51,769	\$18,500	\$19,500	\$89,769
Graduate stipends	17,280	40,172	8,000	7,000	55,172
Exchange professor	420	1,068	799	500	2,367
Travel	12,300	16,783	6,000	5,500	28,283
Equipment, supplies, & other	5,970	19,409	3,000	2,000	24,409

*Predicated on a one-year extension to the present grant without additional funding beyond that of the original grant.