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211 (d) ANNUAL REPORT

June 30, 1975



SCHOOL OF APPLIED SCIENCES

Department of Agricultural Sciences

TUSKEGEE INSTITUTE

Tuskegee Institute, Alabama

TUSKEGEE INSTITUTE 211-d ANNUAL REPORT

July 1, 1974 — June 30, 1975

To

**United States Agency for International Development
Washington, D.C.**

**Department of Agricultural Sciences
Tuskegee Institute
Tuskegee Institute, Alabama 36088**

211-d Annual Report
June 1975

Title: Expansion of Competency in the Design and Execution of Ruminant Livestock Development Programs for the Tropics: With Emphasis on Design and Organization of Systems to Intergrate Technological Information and Disseminate it along with needed physical inputs. (AID/csd - 3676)

Grantee: Tuskegee Institute
Department of Agricultural Sciences
Tuskegee Institute, Alabama 36088

Director: Dr. Maurice A. Maloney, Jr.

**Campus
Coordinator:** Dr. G.E. Cooper

A. Statistical Summary:

Period of Grant: July 1, 1972 - June 30, 1977

Amount of Grant: \$500,000.00

Expenditures: (note tables I and II)

For current year 1974-75 \$117,540.00

Accumulated: 229,547.00

Anticipated for next year, 1975-76 \$145,000

B. Narrative Summary:

Following organization meetings with 211-d member universities with the AID technical officer, and correspondence with the ministry of National Development and Agriculture in Guyana, the plan of work was implemented during the course of several visits to Guyana which began in May 1974.

Other consortium meetings have been held to discuss the general concept of the "Systems Model" and to initiate contact with a second country in order to formulate plans for future involvement as a consortium team. Tentative discussions have also been made to interact with people within the Guyana ministry of Agriculture in discussions concerning the model and studies conducted by the consortium in Guyana when the reports have been finalized. These discussions are planned to be held in the form of a workshop in Guyana.

Table I
Distribution of 211-d Grant Funds and Contributions from Other Sources of Funding
Review Period July 1, 1974 to June 30, 1975

(List all grant related activities)					Non 211-d Funding Amount
	Period Under *Review	Cumulative Total	Projected Next year	Projected to end of Grant	
e.g. Research	37,587	60,059	38,000	39,600	34,230
Teaching	56,380	108,819	77,000	59,400	51,345
Libraries	514	2,514	2,000	1,000	840
Consultation	488	3,488	8,000	3,000	1,050
Publication	205	1,705	3,000	2,000	2,310
Other	22,366	59,962	17,000	20,453	19,950
TOTAL	117,540	229,547	145,000	125,453	109,725

* These Figures are estimated for review period July 1, 1974 - June 30, 1975

TABLE II
EXPENDITURE REPORT
 (ACTUAL AND Projected)
 Under Institutional Grant #AID/csd - 3676

Review Period July 1, 1974 - June 30, 1975

Expenditures to Date		Projected Expenditures Year			
Line Items	Period Under Review	Cumulative Total	4	5	Total
Salaries	93,967	168,878	115,000	99,000	382,878
Travel	10,528	27,516	12,000	12,000	51,516
Equipment	4,985	9,245	2,000	1,000	12,245
Other	8,060	13,614	16,000	13,453	53,361

Relevant materials have been acquired as additions to the Tuskegee Institute Library.

A series of seminars on tropical agriculture were initiated during this year with participants sharing a wide array of experiences with the Tuskegee Institute faculty, staff and students.

Visitors and special students have been received from LDC countries to discuss and be involved in programs which develop concepts useful to development in their countries. This has proven to be of considerable benefits to both parties involved.

Several students have received support from 211-d grant funds.

C. Detailed Report

I. General Background and Purpose of Grant

As the world population continues to grow, the demand for livestock and livestock products will increase. In order that world production can be increased, the developing countries of the world, must develop and reach potentials for becoming self-sufficient - to produce agricultural products to meet their own needs. It has been estimated that the annual rise in production per capita in the developing countries of the world is 3% while nearly 11% in others.

To be certain that agriculture productivity is increased in the developing countries of the world, technical assistance is being provided through various agencies from the developed countries. Despite these efforts, many problems are still left unsolved.

The primary purpose of the 211-d livestock grant(s) is to strengthen the capability of four U.S. universities in identifying and analyzing the constraints associated with ruminant livestock production in the tropics. This capability will be developed and strengthened through an integrated, multiplinary team approach, encompassing the scope of ruminant livestock production. Several critical areas are considered in this livestock system and involve the following areas: sociology, extension, breeding, veterinary medicine, nutrition, economics and forage production.

Tuskegee Institute will specifically be able to strengthen its capability-'to assist in designing and executing livestock development programs for the tropics where social and physical environments are important'. It is important to evaluate methods by which relevant information can be disseminated to livestock producers, when and as required.

II. Objectives of the Grant:

1. Objective Restated:

The objective of the grant is to strengthen the capability of Tuskegee Institute, in total analysis of tropical ruminant livestock production systems, through involvement with other consortium member universities. This capacity will be strengthened by involvement within the livestock industry of selected developing countries through activities which: 1. Identify existing constraints to production; 2. Develop appropriate analytical procedures to evaluate these constraints and 3. Identify opportunities for significant livestock improvement.

The 211-d grant will allow Tuskegee Institute to work in coordination with Texas A&M University, Purdue University and the University of Florida, in selecting problem settings in LDC's and identifying those forces which influence livestock production. Grant funds will also be utilized to increase Tuskegee Institute's expertise in overcoming constraints associated with livestock production, particularly where they involve aspects of sociology, extension and information delivery. The 211-d grant also allows a strengthening of the expertise in an integrated livestock systems approach to research, and technical assistance programs.

2. Review of Objectives:

After general consortium objectives were established, a LDC Country identified, and clearance received from AID/Washington, AID/Guyana and the Ministry of National Development and Agriculture/Guyana, a plan of work was established in order for Tuskegee Institute to initiate work in Guyana, South America.

As a result of interaction with consortium members, and specific comments from Purdue and Texas A&M, a producer survey was developed in order

to evaluate producer objectives and goals, herd characteristics, and socio-economic profiles of producers. Other mechanisms and discussions were developed to evaluate overall objectives for livestock extension programs as developed by the Government of Guyana.

The survey is essentially completed and summarized. The ability of Tuskegee Institute to respond to this aspect of development has been significantly strengthened.

III. Accomplishments:

I. Guyana Livestock Producer and Extension Survey's

The major emphasis during this fiscal year was in the design, implementation and summary of the Guyana livestock producers survey (Appendix I) and Guyana Extension Survey (Appendix II).

The implementation of this survey, has allowed the Tuskegee Institute faculty to make a significant contribution to the overall "Systems Model" for the ruminant livestock industry of Guyana by studying:

1. The Socio-economic profile of livestock producers.
2. Characteristics of land used by producers.
3. Characteristics and Composition of livestock herds.
4. Livestock Management Programs used by producers (i.e. breeding, nutrition, health and marketing).
5. Involvement with and attitudes toward the livestock extension programs from both the government and producer viewpoint.

Information generated by this study has not only allowed the Tuskegee 211-d staff an opportunity to develop procedures for critically evaluating extension and sociological constraints to livestock production but has strengthened the overall university consortium concept for the "Systems Model". As an indirect accomplishment of the grant activities, the Ministry of Agriculture of Guyana will have a summary of these findings which may perhaps be utilized as a tool for future development planning.

II. Involvement of Ministry of Agriculture Personnel and Guyanese students in Evaluating Tuskegee Institute's 211-d study in Guyana.

During the implementation of the livestock Producer Survey in Guyana, two Guyanese students (Duke Bourne and Wilbur Weever) were utilized while in Guyana. Bourne worked for the Extension Service before attending Tuskegee Institute and Weever served as an instructor involved with youth corp agriculture training. Both of these students plan to return to Guyana and be involved in programs supported by the Ministry of Agriculture.

The implementation of this survey provided a mechanism whereby these students could be involved in a critical evaluation of extension programs and understand inputs necessary in the design of such a survey, how the information is evaluated and its role as a possible tool in development planning.

The students were requested to summarize their observations while in Guyana. It is a personal view and in no way reflects the commitment of the Ministry of Agriculture or Extension programs. This merely served as an exercise in developing an overview of their experiences. (Appendix III-A) and (Appendix III-B).

On July 30, 1974, Mr. John Browman, Ministry of Agriculture, Georgetown, Guyana visited Tuskegee Institute in order to interact with faculty involved in 211-d activities in Guyana and other faculty and staff at Tuskegee Institute. This visit served also allowed an opportunity for Tuskegee's 211-d staff to discuss findings relevant to the Guyana livestock producers survey which was implemented in May, 1974 (Appendix IV).

III. Interactions with other consortium member universities to make inputs in and develop a "Systems Model" for the Guyana ruminant livestock sector.

Dr. G. E. Cooper met with other consortium members at the University of Florida, Gainesville during a pasture and forage modeling seminar. (Aug. 22, 1974). This served as an opportunity to determine the types of forage inputs that one could be put into the overall ruminant model in Guyana.

Drs. G. E. Cooper, and Mr. Henry VanBlake met with other consortium participants in Atlanta, Georgia (October 24, 1975). The purpose of the meeting was: to discuss progress associated with developing the Guyana model; to discuss overall plans for the consortium; to evaluate the need for additional information on Guyana and consider the selection of a second country for consortium involvement.

Another 211-d consortium was scheduled April 14, 1975 in Atlanta, Georgia to discuss: procedure(s) for the fourth year 211-d grant review (comprehensive review); action plan for second county involvement in Kenya; and model workshop scheduling (in the U. S. and Guyana); and progress on the herd level model (Cartwright) and overall consortium model (White).

A progress report (summary) was also presented in order to describe the overall inputs into the model (Appendix V).

The final consortium for 1974-75 was held at Purdue University June 30-July 1, 1975. This meeting was designed to summarize the model and allow interaction among consortium members, and invited guests to suggest inputs which would modify and strengthen the overall model. The overall model and herd models were presented, discussed and modified. It

was decided at this meeting that more time would be required in Guyana to complete the model before becoming involved in a second country. Contact with Kenya is still open pending consortium progress thru April, 1976.

For future activities, beyond the 211-d Grants, it was suggested that an agreement be reached between the four universities to form a mechanism to bid on contracts and/or provide services based on capabilities developed as a result of 211-d grants at the consortium and university levels (July 1, 1975).

IV. Faculty Development

Dr. C. L. Padmore attended the Carribean Veterinary Conference (August 11-17, 1975) and served as a participant to present the following papers:

1. Some common forelimb lameness in the Equine (Appendix VI).
2. Diagnosis and Treatment of Equine cholera (Appendix VII).

Dr. G. E. Cooper and Mr. Henry VanBlake traveled to Washington, D. C. to meet with AID officials to discuss future plans for involving Tuskegee Institute and other 211(d) consortium universities in aspects of program design and review and project implementation based on experiences in Guyana. This visit also allowed a meeting with a representative of the International Livestock Center for Africa (ILCA) at Addis Ababa, Ethiopia. (Appendix VIII).

The development and implementation of a producer-extension survey has definite advantages since it strengthens the ability of Tuskegee Institute to respond to specific development needs, and reflects the ability to respond as a member of a consortium of universities in LDC development needs.

Additional reference books have been acquired in order to strengthen library reserves at the Tuskegee Institute Hollis Burke Frissell Library. These books are made available to faculty, staff and students interested in topics pertaining to livestock production, economics, disease, sociology and general development.

V. Utilization of Institutional Resources In Development

The faculty has maintained continued involvement with visitors from developing countries of the world to interact with on various topics. These visitors have interacted with the 211-d staff and other faculty representing many areas of interest in development.

VI. Other Resources For Grant Related Activities

Tuskegee Institute is providing physical facilities as well as its computer staff and facilities for the handling and storage of information collected during the survey's in Guyana, South America. Other faculty have been helpful in reviewing and planning sessions useful for 211-d activities. The activities have been provided without cost to 211-d grant funds.

APPENDIX

APPENDIX I

211-d Livestock Project
Carver Research Foundation
Tuskegee Institute

Department of Agricultural Sciences

SURVEY OF LIVESTOCK PRODUCERS IN GUYANA

Conducted in Cooperation with
The Guyana Ministry of Agriculture and National Development
and
The United States Agency for International Development

by

George E. Cooper
Assistant Professor of Animal Science
and

Glenn Howze
Professor of Sociology

June 29, 1975

Purpose of Study

The purpose of the present study is to provide the Tuskegee Institute faculty who are responsible for extension planning, specifically associated with livestock development in the tropics, with a description of livestock attitudes of the Government and producers in Guyana, South America. Such information would not only be useful to the Government of Guyana, but would strengthen the faculty of Tuskegee Institute in evaluating past and present programs in the tropics, especially where extension and sociological implications are major constraints to development. This expertise would hopefully be used in development planning by governments of tropical countries, USAID and other donor agencies. This is especially true when the systems approach to development is considered. Tuskegee Institute is conducting this study as a part of the 211-d institutional grants (USAID) which involve four U. S. universities. This consortium of universities considers extension, sociology, economics, breeding, nutrition, forage production and animal health. Constraints within the total livestock systems are identified and methods to reduce or eliminate these constraints are considered.

INTRODUCTION

Since gaining its political independence on May 26, 1975, Guyana has been seeking ways to strengthen its economy through the development and support of agricultural enterprises. This is an attempt by Guyanese to attain economic independence.

Before independence, Guyana was essentially an economic monoculture with sugar cane being the principle earner of foreign exchange. Also according to recent statistics, bauxite, rice, and shrimp are other exports which are significant earners of foreign exchange. The major aim of the present government is to continue to strengthen these enterprises and become self-sufficient in agriculture. This will require a great deal of expansion and diversification in the many areas of agricultural production.

Livestock production is one of the agricultural areas which has been selected by the Government of Guyana to receive increased developmental support. The Ministry of National Development and Agriculture, through the use of various financial programs, is attempting to increase the quantity and quality of livestock and livestock products. This increase in production will be assisted through research activities, and implemented by extension efforts. Major emphasis is being placed on beef and dairy cattle production, however swine and poultry production is receiving a great deal of attention. Livestock production activities will attempt to improve methods for production of beef cattle owned by individual farmers as well as large private cattle producers (i.e. the Rupununi Development Company). Other activities will include the following:

- I. Establishment of cooperatives for small livestock producers
- II. Developing new corporately owned ranches between the private sector of the economy and the government (i.e. the Livestock Development Company).
- III. Establishing Government Owned Herds

Major funds to support such developments in beef cattle production are being provided by the Livestock Development Project (LDP). These funds are provided by the World Bank and are presently limited only to supporting the development of beef cattle projects.

Through its livestock veterinary extension activities, the Ministry of Agriculture is initiating activities to improve livestock management, marketing, breeding, herd health and nutrition.

The Ministry has a professional staff composed of veterinarians, livestock officers, veterinary assistants and livestock assistants in order to provide assistance to livestock producers throughout the country. Despite the experience of this staff, the government is short of professional help and continues to provide financial support for qualified individuals to receive advanced animal science and veterinary training at foreign institutions. This is evidence that the government is committed to the development of a viable livestock industry. In addition to this advanced training, the Guyana School of Agriculture continues to train students in a two year program in agriculture. A recent innovation was the training of para-professionals in livestock management. This two-year activity was conducted at Tuskegee Institute with financing from USAID. Because of the diversity of this type of training, trainees are now employed in many aspects of the livestock industry (i.e. ranch managers, extension livestock and veterinary assistants and individual farmers).

Likewise, in the marketing areas the Government has fostered livestock development by operating government owned abattoirs, establishing a government owned marketing operation (Guyana Marketing Corporation), and by various ways encouraging the development and growth of Meat Marketing Ltd. (a privately owned marketing company). These efforts are extremely important because for most of Guyana, the traditional marketing system is geared to small local markets and there is certainly a need to shift to a national market. The Government of Guyana, through its Ministry of National Development and Agriculture, has made a firm commitment to the development of agriculture and is moving forward with its efforts.

Scope of Study

The Tuskegee Institute Project Staff, in consultation with personnel from the Ministry of National Development and Agriculture, decided that the study would focus primarily on beef and dairy cattle production in Guyana. However, data on swine, poultry, sheep and goat producers would be collected during the study. Specific aspects to be studied during the random survey of producers would be their socio-economic characteristics of land use, herd characteristics, herd health, nutrition, marketing practices and producers' involvement with an attitude toward the extension efforts of the Ministry of Agriculture. Specifically, the study was to provide the following types of information:

1. Socio-economic profile of livestock producers. The profile contains such variables as age, sex, marital status, educational attainment, occupation, ethnic identity, and income.
2. Characteristics of land use. The principal focus of this section is size of acreage owned and/or rented, length of tenure, and present usage of land.
3. Breeding Program. This portion of the survey reports data which

describes the use of improved breeds, type of breeding (natural vs. A. I.), calving percentages, age of breeding, season of breeding and weaning program.

4. Herd health data. These data describe the methods used to prevent and control diseases and parasites.
5. Nutritional information. These data should describe the management programs involved in feeding livestock and will include pasture programs and the use of supplemental feeds, vitamins and minerals.
6. Marketing practices. These data should answer questions related to the number of livestock units sold, the marketing procedures used, and evaluate the general attitude of producers on the price received for their product.
7. Involvement with and attitudes toward livestock extension programs. This aspect of the study evaluates the producer's knowledge of livestock extension programs, his involvement in these extension programs and knowledge of other government programs which relate to his current and anticipated needs, and his attitude toward these programs.

The Tuskegee Institute 211-d project staff had limited personnel, time and financial resources. Furthermore, it lacked a sampling base necessary to conduct a geographically comprehensive and statistically significant study of all livestock producers in the country. Therefore, in consultation with Ministry personnel, it was decided to survey only those geographical areas that had significant numbers of livestock producers. Thus the Rupununi District and large portions of the coastal areas were selected.

Because of the historical, current and future importance of the Rupununi District to Guyana's beef cattle industry a major effort was made to do a complete enumeration of beef cattle producers in certain areas of this district. Unfortunately, this was not possible. A scarcity of vehicles, gasoline and support personnel limited this effort. Despite this situation, interviewers were able to talk with a significant number of producers and it is reasonable to assume that the findings of the survey are representative of the Rupununi District as a whole. The staff was able to cover most of the villages from

Karasibai and Annai in the North to Aishalton in the South. With minor variations the life style of the people and the characteristics of the herds were quite similar throughout the district.

The Coastal area presented a different problem. While the Rupununi is sparsely settled and livestock producers were known and fairly easy to locate, most of the Coast is densely settled and livestock production is found throughout. Due to certain limitations a complete enumeration study was not possible. As a sampling technique, it was decided to interview each livestock producer in every tenth half mile of the Coastal highway. Using a random start the interviewer marked off a half mile distance along the highway and would attempt to interview every livestock producer within this area. Once this was completed the interviewer would travel four and one-half miles further along the highway and repeat the process. This was facilitated by using the mileage posts existing along the highway. The Coastal areas surveyed were East Bank Demerara, West Coast Demerara, West Coast Berbice, East Bank Berbice, Canje and Upper Corentyne, Lower Corentyne and Black Bush Polder. As expected some of the half mile sample areas did not contain producers. The procedure used should have provided a statistically valid sample of the areas studied.

The samples from the Rupununi and Coast should therefore provide a fairly comprehensive view of livestock producers and livestock production in Guyana.

One final point about the sample should be made. The interviewers reported that they were having some difficulty in obtaining truthful data from some respondents along the Coast. The Rupununi posed no difficulty along these lines; respondents were most cooperative. Apparently, some respondents believed that the interviewers were from the government and were gathering information for tax and other purposes. Thus some of the questions on marketing, income, etc.

were underreported. It is reasonable to assume that the number of livestock producers in the sample areas along the Coast is underestimated. The interviewers felt certain that a number of persons whom they encountered met the study's definition of livestock producers, but because of fear did not want to be interviewed.

Results

One hundred twelve (112) livestock producers were interviewed during the survey. Table I presents the number of interviews from each of the two major geographical areas and each of the sub-areas. Forty-two (38 percent) of the respondents were from the Rupununi District and seventy (63 percent) were from the Coastal area. With regard to the sub-areas, a substantial portion of the interviews in the Rupununi were from each of the sub-areas. On the Coast there was more of a concentration of producers; twenty-five (35.7 percent) of Coastal respondents were from East Coast Demerara.

TABLE I
NUMBER AND PERCENT OF RESPONDENTS FROM EACH OF THE
MAJOR GEOGRAPHICAL AREAS AND SUB-AREAS

	F	%
Geographical Area		
Rupununi District	42	38
Coastal Region	70	63
Total	<u>112</u>	<u>101</u>
Geographical Sub-Area		
North Rupununi	24	21
South Rupununi	18	16
East Bank Demerara	10	9
West Bank Demerara	3	3
East Coast Demerara	25	22
West Coast Berbice	9	8
East Bank Berbice, Canje and Upper Corentyne	10	9
Lower Corentyne	9	8
Black Bush Polder	4	4

Table II reports livestock producers by the type of livestock produced for each of the areas and sub-areas. Only cattle producers were reported in the Rupununi. In the Coastal area one-half of the producers were cattle producers, one-third were swine producers, sixteen percent were poultry producers and about one-fourth had sheep and goats.

Also reported in Table II is a distribution of producers of each of the types of livestock for each of the geographical sub-areas. Over half of the cattle producers were found in the two Rupununi sub-areas. This is not to say that farmers in the Rupununi do not have livestock other than cattle. Sheep, goats, chickens, and swine are seen in the Rupununi, but they are not raised commercially; they are for domestic use.

On the Coast, East Coast Demerara, West Coast Berbice and East Bank Berbice (including Canje and Upper Corentyne) contained the largest number of cattle producers. East Bank Demerara and West Bank Demerara contained the smallest number of cattle producers, each having only one percent.

Swine production was concentrated in East Coast Demerara (38 percent) East Bank Demerara (29 percent) and Lower Corentyne (13 percent). All other sub-areas had less than ten percent of the producers. No swine producers were interviewed in the Black Bush Polder area.

East Coast Demerara and East Bank Demerara were also the areas where the largest number of poultry producers were interviewed; thirty-six percent of the producers were found in East Bank Demerara and twenty-seven percent in East Coast Demerara. East Bank Berbice and Lower Corentyne each contained eighteen percent of the poultry producers. There were no poultry producers interviewed in three Coastal sub-areas: West Bank Demerara, West Coast Berbice and Black Bush Polder.

Half of the sheep and goat production was concentrated in Lower Corentyne

TABLE II
GEOGRAPHICAL DISTRIBUTION OF PRODUCERS BY TYPE
OF LIVESTOCK PRODUCED

	Type of Livestock			
	Cattle ¹ (78)	Swine ² (24)	Poultry ³ (11)	Sheep/Goats ⁴ (17)
Geographical Area				
Rupununi District ⁵	54	0	0	0
Coastal Area	46	100	100	100
Geographical Sub-Area				
North Rupununi	23	0	0	0
South Rupununi	31	0	0	0
East Bank Demerara	1	29	36	0
West Bank Demerara	1	8	0	6
East Coast Demerara	14	38	27	21
West Coast Berbice	10	8	0	18
East Bank Berbice, Canje and Upper Corentyne	10	4	18	18
Lower Corentyne	4	13	18	19
Black Bush Polder	5	0	0	6

¹A respondent was classified as a cattle producer if he owned five or more head of cattle.

²A respondent was classified as a swine producer if he owned five or more swine.

³A respondent was classified as a poultry producer if he had a flock of 1,000 birds.

⁴A respondent was classified as a sheep/goat producer if he had a herd of ten or more sheep and/or goats.

(29 percent) and East Coast Demerara (21 percent). The rest of the sheep and goat producers were scattered in the other coastal areas. The only coastal sub-area where no sheep and goat producers were interviewed was West Bank Demerara.

The Coastal area which had the most diverse mixture of livestock producers was East Coast Demerara. Black Bush Polder had both the least number of producers and the least amount of diversity in livestock production enterprises.

Socio-economic Characteristics of Livestock Producers

Selected socio-economic characteristics of the producers were examined controlling for geographical area and type of livestock produced. The findings are reported in Tables III-V.

Table III reports the selected social characteristics of the total sample of livestock producers and for each of the major geographical areas. Table IV presents the same social characteristics controlling for major type of livestock produced.

Ninety (90) percent of the producers interviewed were male and there was no variation from this finding for each of the geographical areas. However, there was substantial variation of sex of respondent by type of livestock produced. Female respondents represented only five percent of the cattle producers and there were no females among the poultry producers. On the other hand, twenty-one percent of the swine producers were female and forty-three percent of the sheep/goat producers were female. Using a chi-square test, the level of significance was .003.

Ninety-two percent of the total sample reported that they were married. While the variation is not significant, a slightly higher proportion of the Coastal respondents reported they were married than the Rupununi respondents. The only significant variation of this when controlling for type of livestock produced was for sheep/goat producers. Only seventy-one percent of this group was married.

There was substantial age variation for geographical area and type of livestock producer. For the total sample, the modal age category (38 percent) was 36-50 years of age. The oldest category (over 50 years of age) was a close second with thirty-six percent and only about one quarter (26 percent) of the respondents were in the 35 and under category. When geographical area

TABLE III*
 SELECTED SOCIAL CHARACTERISTICS OF LIVESTOCK
 PRODUCERS BY GEOGRAPHICAL AREA

Characteristic	Rupununi (%)	Coast (%)	Total (%)	X ² /P
Sex of Producer (110)				
Male	90	90	90	.06
Female	10	10	10	NS
Marital Status (110)				
Married	88	94	92	.67
Non-married	12	6	8	NS
Age (104)				
35 and under	41	18	26	7.85
36-50	38	39	38	.02
51 and over	22	43	36	
Education (110)				
None	37	0	13	29.44
Primary	50	86	70	
Secondary & College	13	14	16	.001
Occupation (108)				
Farmer	85	88	87	.01
Non-farmer	15	12	13	NS
Ethnic Identity (110)				
East Indian	2	46	30	81.06
African	7	42	29	
Amerindian	78	0	29	.001
Other	12	12	12	

*Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

TABLE IV*
 SELECTED SOCIAL CHARACTERISTICS OF LIVESTOCK PRODUCERS
 BY TYPE OF LIVESTOCK PRODUCED

	Type of Producer				X ² /P
	Cattle	Swine	Poultry	Sheep/Goats	
Sex					
Male	95	79	100	57	13.86
Female	5	21	0	43	.003
Marital Status					
Married	92	95	100	71	5.06
Non-married	8	5	0	29	NS
Age (years)					
35 and under	33	0	30	29	9.91
36-50	35	47	40	43	NS
51 and over	32	53	30	29	
Education					
None	20	0	0	0	22.52
Primary	71	89	50	100	
Secondary	9	11	50	0	.001
Ethnic Identity					
East Indian	30	5	55	57	74.41
African	15	95	0	43	
Amerindian	44	0	0	0	.001
Other	11	0	45	0	
Occupation					
Farmer	89	84	80	86	.80
Non-farmer	11	16	20	14	NS

*Sample size varies due to non-responses and non-applicability of questions. Except where noted, reported figures are percentages.

controlled, the data indicated that the Rupununi sample was a much younger group than the Coastal sample. While forty-one percent of the Rupununi respondents were in the youngest category and only twenty-two percent in the oldest category, almost the reverse was true for the Coastal sample: Only eighteen percent of the Coastal producers were in the youngest group and forty-three percent were in the oldest category. The level of significance based on Chi-Square is .02.

Likewise, there was age variation by major type of livestock produced. Cattle producers were almost equally divided between the age groups. Poultry and sheep/goat producers were very similar with regard to age; about two-fifths of each group was in the 36-50 age category and the remainders were equally split. Swine producers were quite different from the other producers with regard to age. There were none in the youngest category and over half were in the above 50 category.

Seventy percent of the respondents indicated that their highest educational attainment was the primary school level, thirteen percent reported no formal education and sixteen percent said they had attended secondary school or college.

Controlling for geographical area and type of animals produced, resulted in substantial variation for level of education. The Rupununi producers had a lower educational attainment when compared to the Coastal producers. Thirty-seven percent of the producers in the Rupununi indicated that they had no formal education. No Coastal producers were in this category. Eighty-six percent of the Coastal sample were in the primary category, and each geographical area had a similar proportion (13 and 14 percent) in the highest educational category. The Chi-square test yielded a value that was significant at the .001 level.

East Indians (30 percent), Africans (29 percent), and Amerindians (29 percent)

were almost equally represented in the total sample. Twelve percent were in the "Other" category (European, Chinese, etc.). As would be expected, the two geographical areas differed radically with regard to ethnic identity. The Rupununi sample was primarily Amerindian; only two percent were in the "Other" category. On the Coast there were no Amerindian producers and there were slightly more East Indians (46 percent) than Africans (42 percent); twelve percent were in the "Other" category. The Chi-square value was significant at the .001 level.

There was significant variation in ethnic identity by producer type. The cattle producer sample was the only one with respondents from each of the ethnic groups. In that livestock category Amerindians (44 percent) and East Indians (30 percent) had substantially larger numbers than the other ethnic groups. Swine producers were either East Indian (55 percent) or "Other" (45 percent). Sheep/goat producers were East Indian (57 percent) or African (43 percent).

There was very little variation for occupation. Eighty percent or more of each group were farmers.

Table V presents data on the economic level of producers. Over two-thirds (68 percent) of the total sample reported incomes below \$4,000 (G\$) and only nine percent had incomes above \$5,000 (G\$). The variation in income between geographical area was only slight.

Sheep/goat producers were the group with the lowest incomes and poultry producers had the highest; fifty-seven percent were in the over \$5,000 (G\$) class. Swine producers had substantially lower incomes than cattle producers with eighty-one percent in the lowest category compared with sixty-eight percent. The Chi-square for these data was significant at the .04 level.

TABLE V*
 INCOME OF LIVESTOCK PRODUCERS BY GEOGRAPHICAL AREA,
 PRINCIPAL TYPE OF LIVESTOCK PRODUCED
 OCCUPATION AND ETHNIC IDENTITY

	Income			χ ² /P
	Below 2,000 (G\$)	2,000 5,000 (G\$)	Above 5,000 (G\$)	
Total Sample (92)	68	23	9	
Geographical Area				
Rupununi (39)	67	23	10	6.25
Coast (53)	70	23	8	.04
Type of Livestock Produced				
Cattle (65)	68	26	6	25.28
Swine (7)	81	19	0	
Poultry (16)	29	14	57	
Sheep/Goats (4)	100	0	0	.001
Occupation				
Farmer (78)	71	21	9	2.03
Non-Farmer (13)	54	38	8	NS
Ethnic Identity				
East Indian (24)	63	29	8	23.65
African (27)	78	19	4	
Amerindian (30)	73	27	0	.001
Other (11)	45	9	45	
Age				
35 and under	75	25	0	3.76
36-50	60	27	13	NS
51 and over	68	21	12	
Education				
None	93	7	0	
Primary	22	23	5	13.47
Secondary and above	36	36	27	.01

*Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

Occupational data indicated that farmers had lower incomes than non-farmer producers. Chi-square was not significant. Seventy-one percent of the farmers were in the lowest income class compared with only fifty-four percent of the non-farmers.

Controlling for ethnic identity yielded substantial variation in income. The ethnic group with the highest income was the "Other" category: forty-five percent had incomes over \$5,000 (G\$). Africans (78 percent) and Amerindians (73 percent) had the largest proportions in the lowest category.

The variation in income levels between the three age groups was not statistically significant. However, the youngest group had the lowest income level and the middle age group the highest.

There was a positive linear relationship between income and level of education. For the lowest education level 93 percent were in the low income group. Only 36 percent of the highest educational group were in this category. The Chi-square was significant at the .01 level.

Chief Agricultural Activity

Table VI present data which summarizes the principal agricultural activity of livestock producers. Two-thirds (67 percent) of the respondents were engaged in combined livestock and food crop operations. Only 27 percent of the respondents considered themselves livestock producers. These findings probably reflect the fact that the majority of producers are involved in subsistence agriculture and specialization is not yet feasible. This demonstrates a trend towards diversification, especially for those persons who consider themselves agricultural producers (farmers). Ninety-three (93) persons out of the one hundred seven responding or eighty-seven percent considered themselves

TABLE VI*
**PRINCIPAL AGRICULTURAL ACTIVITY BY GEOGRAPHICAL AREA, AGE,
 EDUCATION, ETHNIC IDENTITY, OCCUPATION, INCOME
 AND PRINCIPAL TYPE OF LIVESTOCK PRODUCED**

	<u>Principal Agriculture Activity</u>			χ^2/P
	Livestock	Food Crop	Both	
Total Sample (112)	27	5	67	
Geographical Area				
Rupununi (42)	29	10	62	2.50
Coast (69)	26	3	70	NS
Age (years)				
35 and under (27)	26	11	63	2.35
36-50 (40)	30	3	68	
51 and over (36)	25	6	69	NS
Education				
No formal education (14)	14	7	79	7.50
Primary (77)	22	5	73	
Secondary and college (17)	53	6	41	.10
Ethnic Identity				
East Indian (33)	33	0	67	16.69
African (32)	25	0	75	
Amerindian (32)	16	9	75	.01
Other (12)	33	25	42	
Occupation				
Farmer (93)	24	5	71	2.57
Non-farmer (14)	43	7	50	.28
Income (G\$)				
Less than 2,000 (62)	18	8	74	15.71
2000-5,000 (21)	24	0	76	
Over 5,000 (8)	75	13	13	.003
Most Important Livestock				
Cattle (73)	21	7	72	8.94
Swine (20)	30	0	70	
Poultry (11)	55	9	36	N.S.
Sheep/Goats (7)	43	0	57	

*Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

as farmers. Diversification appears to be important to those persons without secondary and college level education.

While there was no important variation when age was controlled, important differences appeared when education categories were compared. While the differences were not statistically significant, the data nevertheless indicates that the higher the education levels, the most likely the respondent was to be involved primarily in the production of livestock.

The relationship for ethnic identity and principal livestock activity is significant. African and Amerindian respondents were more likely to report that crop and livestock production activities were of equal importance in generating income. Respondents in the East Indian and "Other" categories were more likely to indicate that some aspect of livestock production was their major agricultural activity.

While the difference was not significant, it is interesting to note that non-farmers were more likely to indicate that livestock production is the major activity when compared to farmers.

There was a statistically significant relationship between income and principal agricultural activity. The higher the income level, the more likely the respondent reported specialization in some livestock production enterprise. This further differentiates between subsistence agriculture (diversification) and specialization. The higher income levels are more likely to be engaged in commercialized agriculture and therefore be better able to become specialized.

Although the differences were not statistically significant, when the data were controlled for type of livestock produced, it appeared that poultry and sheep and goat producers were more likely to respond that livestock production was their most important agricultural activity. Cattle producers were least likely to describe this as their most important agricultural activity.

Land Use Characteristics

Table VII presents data concerning land use patterns and tenure for livestock and poultry producers on the Coast. It is interesting to note that only one-half of the livestock and/or poultry producers actually owned or rented the land which they used.

This would indicate that some other legal or informal agreement is arranged with the owner or the government or that the producer uses this land illegally (i.e., grazing on areas of estates and along the right-of-way near the highway).

The percentage of those persons either owning or renting land was greatest for cattle (56 percent) and swine (70 percent) producers. The responses for poultry and sheep/goat producers were small in comparison to cattle and swine producers and valid inferences may not be justifiable. However, it is evident from traveling along the Coast that there are many sheep and goats grazing unoccupied lands.

Herd Characteristics

Several characteristics associated with cattle production are summarized in Table VIII. From these data it is evident that the Rupununi area contains the largest cattle population in Guyana. The largest herd, though based on gross estimates, is owned by the Rupununi Development Company (RDC), and is believed to represent 26,000 head. The average herd in the Rupununi consists of 40 head of cattle.

Since the cattle numbers in the Rupununi, especially those in the RDC, were uncertain estimates, special attention should be devoted to the numbers contained in the column headed "Rupununi minus RDC." These figures are believed to represent more accurate data by small producers since they would be in closer contact with their herds. Considering these producers, herd size is still larger

TABLE VII*
 SELECTED CHARACTERISTICS OF LAND USE FOR COASTAL AREA
 BY PRINCIPAL TYPE OF LIVESTOCK PRODUCED

	% Owning Land	% Renting Land	% Owning and/or Renting Land
Geographical Area Coast (70)	31	30	50
Type of Livestock			
Cattle (32)	22	44	56
Swine (20)	55	20	70
Poultry (11)	18	18	18
Sheep/Goats (7)	14	0	14

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

TABLE VIII*
SELECTED HERD CHARACTERISTICS FOR CATTLE PRODUCERS(1973)

Characteristic	Rupununi	Rupununi minus RDC**	Coast	Total
Total Number of Cattle (78)	30,846	4,846	1,688	32,534
Smallest Herd Size	10	10	8	8
Largest Herd Size	26,000	1,200	250	26,000
Median Herd Size	41	40	23	30
Total Number of Breeding Age Cows (78)	10,453	2,453	534	10,987
Smallest No. of Cows	4	4	3	3
Largest No. of Cows	8,000	600	120	8,000
Median No. of Cows	21	20	11	14
Total Number of Breeding Age Bulls (75)	581	181	20	601
Smallest No. of Bulls	0	0	0	0
Largest No. of Bulls	400	89	4	400
Median No. of Bulls	2	2	0	1
Total Number of Calves (69)	851	851	273	1,124
Smallest No. of Calves	1	1	2	1
Largest No. of Calves	198	198	55	198
Median No. of Calves	13	13	6	6
Total Number of Unbred Heifers (69)	1,085	585	238	1,323
Smallest No. of Heifers	0	0	0	0
Largest No. of Heifers	500	157	60	500
Median No. of Heifers	6	6	4	5
Total Number of Steers (69)	6,414	414	44	6,458
Smallest No. of Steers	0	0	0	0
Largest No. of Steers	6,000	156	20	6,000
Median No. of Steers	4	4	0	0
% with Improved Stock (78)	45	45	53	49

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

** Rupununi Development Company.

than those which are developed along the Coast. The largest herd identified during the survey was 1,200 in the Rupununi (excluding the RDC) vs. 250 along the Coast. It would appear from these data that there is an optimum ratio of bulls to cows being 1:14 in the Rupununi and 1:27 along the Coast. As far as culling practices are concerned, the data would suggest that steers are culled heavily along the Coast. In the entire survey along the Coast only forty-four steers were estimated to be distributed among the 36 cattle producers interviewed.

Table IX presents data which compares herd size by geographical area and selected socio-economic characteristics. When these data are compared the differences between herd size are significantly different (P .02). Herd size along the Coast is more likely to be 20 or less whereas in the Rupununi herd size is most likely to be 100 or above. Differences are significant (P .005) when income and herd size are compared. Producers with specialized herds of 100 or above were more likely to be in the upper income category while those in the lower income category are almost always in the lowest income category.

When the other data are compared differences are not significant. In comparing age and herd size, most of the producers in each category operate herds of between 21 and 99 head. All ethnic groups, except Africans followed this same trend and were therefore more likely to have herds of 21 to 99 cattle.

According to herd size there were no significant difference between occupational classification (farmers vs. non-farmers). On the other hand, when the number of unbred heifers is expressed as a ratio with the total number of cattle in both geographical areas, the ratios are similar. It is evident

TABLE IX
SIZE OF HERD BY GEOGRAPHICAL AREA AND
SELECTED SOCIO-ECONOMIC CHARACTERISTICS

	Size of Herd			X ² /P
	20 or less	21-99	100+	
Total	.38	44	18	
Geographical Area				
Rupunununi District	29	46	24	7.71
Coast	47	42	11	.02
Age				
35 and under	52	80	17	4.00
36-50	28	56	16	NS
51 and over	32	50	18	
Education				
None	29	64	7	4.83
Primary	44	40	16	NS
Secondary & College	14	57	29	
Income (G\$)				
Less than 2,000	52	41	7	
2,000-5,000	11	67	22	21.64
over 5,000	0	25	75	.005
Ethnic				
East Indian	36	50	14	
African	58	33	8	4.24
Amerindian	31	47	22	NS
Other	30	40	30	
Occupation				
Farmer	37	44	19	.23
Non-farmer	38	50	13	NS

that most of the cattle producers are concerned with the improvement of their herds, since forty-nine percent of the producers indicated that they were utilizing improved stock. Improved stock would no doubt include imported stock and improved local stock.

Due to a lack of adequate records, there is no available means of evaluating the reproductive efficiency of cows in the herd, to include calving percentages, weaning percentages, percent of cows bred or the length of the breeding season.

Nutrition

Table X presents data concerning the use of supplemental feed and supplements by cattle producers. In general, very few supplements are utilized. The only supplements utilized in the Rupununi, in limited amounts are salt and minerals. Minerals are used to a greater extent in the Coastal areas; however, the number of producers using this practice would not be significant. Molasses and rice bran are utilized along the Coast due to the location near sugar estates and rice producers. Hay and green chop are also utilized due to the lack of adequate grazing areas. Animals are usually confined to small areas with these feeds being harvested and hand fed to them. The failure of producers to utilize supplemental feed and supplements is probably due to simple economics and based on productive and financial returns above the cost of such additions.

Table XI reports the percent of cattle producers using any type of feed supplements by geographical area. Only 15 percent of the cattle producers responding indicated that they used feed supplements.

Coastal producers were more likely to have feed supplements than Rupununi producers. This is associated with the availability and cost of feed supple-

TABLE X
PERCENT OF CATTLE PRODUCERS USING SELECTED FEED
SUPPLEMENTS BY GEOGRAPHICAL AREA

Supplement	Geographical Area		
	Rupununi (42)	Coast (36)	Total (78)
Salt	5	0	3
Minerals	2	14	8
Green Chop	0	6	3
Hay	0	6	0
Rice Bran	0	6	3
Molasses	0	11	5
Other	0	6	3

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

TABLE XI*
 PERCENT OF CATTLE PRODUCERS USING ONE OR MORE OF THE
 FEED SUPPLEMENTS BY GEOGRAPHICAL AREA, SELECTED
 SOCIO-ECONOMIC CHARACTERISTICS AND SIZE OF HERD

Characteristic	%	X ² /p
Total (78)	15	
Geographical Area		
Rupununi (42)	7	3.48
Coast (36)	25	.06
Age of Respondent		
35 and under (23)	9	1.26
36-50 (25)	20	
51 and over (22)	14	NS
Education		
None (14)	0	4.59
Primary (50)	20	
Secondary and College (11)	18	.10
Ethnic Identity		
East Indian (22)	32	
African (12)	8	
Amerindian (32)	3	.02
Other (10)	10	
Occupation		
Farmer (68)	12	2.03
Non-farmer (8)	38	NS
Income (G\$)		
Less than 2,000 (44)	7	3.51
2,000-5,000 (18)	22	
Over 5,000 (4)	25	NS
Size of Herd (number of cattle)		
20 or less (29)	14	.01
21-99 (34)	15	
100+ (14)	14	NS

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

ments. Rupununi producers would not be likely to use these supplements due to the transportation cost associated with getting them from the Coast to this interior area of Guyana.

Controlling by age did not produce a significant difference with regards to supplement users. The younger producers were least likely to utilize supplements.

The data also indicates that the use of supplements varies with educational attainment. Respondents without any formal education did not use feed supplements. Approximately 20 percent of the respondents in the other two educational categories reported the use of food supplements.

There was substantial variation in the use of supplements when ethnicity was controlled. East Indians were most likely to use feed supplements. Approximately one-third of the East Indian respondents reported using supplements. Only three percent of the Amerindians utilized supplemental feeding.

Although the differences were not statistically significant, non-farmers were more likely to utilize feed supplements than farmers. There was no relationship between herd size and use of feed supplements.

Table XII summarizes the use of various feeds and supplements by swine, poultry and sheep/goat producers. In comparing the producers' use of the three feed sources, swine and poultry are the greatest users of commercial feeds and supplements. Sheep/goat producers rely almost entirely on pastures with very little use of commercial feeds and supplements.

Health Practices

Table XIII reports selected health practices of cattle producers. A majority of producers (64 percent) in both areas indicated that some type of health problem was noted within their herds. With regard to routine vaccination

TABLE XII*
**SELECTED NUTRITIONAL PRACTICES OF SWINE, POULTRY
 AND SHEEP/GOAT PRODUCERS**

Nutritional Practices	Type of Producer		
	Swine (24)	Poultry (11)	Sheep/Goats (17)
Pasture Anima...	29	not applicable	94
Commercial Feeds	88	100	6
Additional Supplements	71	45	18

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

TABLE XIII
SELECTED HEALTH PRACTICES OF CATTLE PRODUCERS
BY GEOGRAPHICAL AREA

Health Practices	Rupununi (42)	Coast (36)	Total (78)
Drenching	24	58	40
Dipping	0	0	0
Spraying	5	25	14
Blackleg Vaccination	0	0	0
Foot and Mouth Vaccination	48	0	26
Rabies Vaccination	43	19	32
Antibiotics Used	0	3	1
Footbaths	0	3	1
De-worming	21	56	37
Clamps Used for Castration	5	23	13
Health Problems Noted	64	51	58

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

programs, it appears that routine vaccination programs are used to the greatest extent in the Rupununi area when compared to the Coast. Of the producers interviewed in the Rupununi, forty-eight and forty-three percent utilize foot-and-mouth and rabies vaccines respectively. Rabies vaccine is utilized to a limited extent by producers along the Coast. Currently no foot-and-mouth problem is reported to exist along the Coast. Programs to control internal and external parasites are being utilized, however, drenching and possibly other methods of de-worming are used to a greater extent along the Coast.

Table XIV reports data on cattle producers which implement one or more of selected health practices. Foot and mouth vaccination was utilized in special case during the survey period. Data are therefore reported to include and exclude the use of the foot and mouth vaccine. Seventy-three percent of the respondents indicated that they utilized one or more of the selected health practices. However, when foot and mouth vaccination is excluded, the figure is 62 percent.

The difference between use of selected health practices between Coastal and Rupununi producers was not statistically significant. However, when foot and mouth vaccination is excluded, the Rupununi producers implemented a greater number of the selected health practices than Coastal producers.

When age is compared, analysis of the data indicates that the oldest age group is least likely to implement health practices. When foot and mouth vaccination is excluded, only 50 percent of this group of producers reported the use of any health practice. The middle age group reported the greatest use of the selected health practices.

The data indicate that there is a positive relationship between the use of health practices and education. Although the relationship was not statistically significant, the higher the income, the more likely producers were to implement

TABLE XIV*

PERCENT OF CATTLE PRODUCERS IMPLEMENTING ONE OR MORE OF THE
SELECTED HEALTH PRACTICES (INCLUDING AND EXCLUDING FOOT
AND MOUTH VACCINATION) BY GEOGRAPHICAL AREA, SELECTED
SOCIO-ECONOMIC CHARACTERISTICS AND SIZE OF HERD

Characteristic	% Including Foot & Mouth Vaccination	χ^2/P	% Including Foot & Mouth Vaccination	χ^2/P
Total Sample (78)	73		62	
Geographical Area				
Rupununi (42)	76	.17	57	.78
Coast (36)	69	N.S.	69	N.S.
Age				
35 and under (23)	78	4.08	70	3.74
35-50 (25)	84	.13	76	N.S.
51 and over (22)	59		50	
Education				
None (14)	64	.77	43	2.78
Primary (50)	76	N.S.	66	N.S.
Secondary & College (11)	72		71	
Income (G\$)				
Less than 2,000 (44)	64	2.67	52	5.36
2,000-5,000 (18)	89	N.S.	83	N.S.
Over 5,000 (4)	75		50	
Ethnic Identity				
East Indian (22)	82	5.28	82	6.74
African (12)	50	N.S.	50	N.S.
Amerindian (32)	78		59	
Other (10)	60		40	
Occupation				
Farmer (68)	71	1.85	62	.12
Non-farmer (8)	100	.67	75	N.S.
Size of Herd				
Less than 20 (29)	62	3.09	55	1.07
21-99 (34)	76	N.S.	67	N.S.
Over 100 (14)	86		64	

*Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

one or more of the reported health practices.

Differences between ethnic groups and their use of these health practices were also not significant. East Indians did, however, show a substantially higher incidence of implementing health practices than the other groups. Excluding foot and mouth vaccinations, 82 percent of the East Indian producers reported that they employed one or more health practices. The figure was 50 percent for Africans, 59 percent for Amerindians and 40 percent for "Others".

The selected health practices used in the production of swine, poultry and sheep/goats are presented in Table XV. It is apparent from the responses that all of the above producers noted various health problems. In response to these health problems, sheep/goat producers use primarily those methods for controlling parasites. Swine and poultry producers utilize where applicable measures for parasite control and vaccines and antibiotics to control diseases.

Record - Keeping

Table XVI provides data concerning record-keeping by cattle producers. The basic finding is that record-keeping is not very common. In the Rupununi area there are essentially no records kept, and even on the Coast there is very little record-keeping. Apparently there are very few producers who see any benefit in keeping complete records. Producers were most likely to keep records on breed type and births. Cattle producers are not actively involved in maintaining production records on their herds.

Table XVII reports the percent cattle producers implementing one or more record keeping activities. Only 12 percent of the respondents reported a record keeping activity. There was a significant difference in the incidence of record keeping when geographical areas were compared. Twenty-two percent of the Coastal producers reported some record keeping activity compared to only two percent for the Rupununi.

TABLE XV
 SELECTED HEALTH ITEMS OF SWINE, POULTRY AND
 SHEEP/GOAT PRODUCERS

Health Item	Type of Producer		
	Swine (24)	Poultry (11)	Sheep/Goats (17)
Parasite Control	88	**	29
Vaccination	25	91	0
Antibiotics	**	100	**
Iron Injections	71	**	**
Health Problems Noted	75	100	71

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

** Not applicable.

TABLE XVI
SELECTED ANIMAL RECORD-KEEPING ACTIVITY OF CATTLE
PRODUCERS BY GEOGRAPHICAL AREA

Type of Record	Rupununi (42)	Coast (36)	Total (78)
Breed Type	2	6	4
Birth Date	2	14	8
Date First Bred	0	9	4
Number of Calf Births	0	17	6
Number of Calf Deaths	0	9	3
Cull Date	0	3	1
Reason for Culling	0	3	1
Gallons of Milk Produced (dairy cattle only 17)	0	6	6

* Sample size various due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

TABLE XVII^{*}

PERCENT OF CATTLE PRODUCERS REPORTING THAT LIVESTOCK
RECORDS WERE KEPT BY GEOGRAPHICAL AREA,
SELECTED SOCIO-ECONOMIC CHARACTERISTICS AND SIZE OF HERD

Characteristic	%	χ^2/P
Total Sample (78)		
Geographical Area		
Rupununi (42)	2	5.66
Coast (36)	22	.02
Age		
35 and under (23)	4	1.13
35-50 (25)	8	N.S.
51 and over (22)	9	
Education		
None (14)	0	2.26
Primary (50)	10	N.S.
Secondary & College (11)	0	
Income (G\$)		
Less than 2,000 (44)	5	.23
2,000-5,000 (18)	6	N.S.
Over 5,000 (4)	0	
Ethnic Identity		
East Indian (22)	14	7.35
African (12)	25	.06
Amerindian (32)	0	
Other (10)	10	
Occupation		
Farmer (68)	9	.09
Non-farmer (8)	13	N.S.
Size of Herd		
Less than 20 (29)	17	2.36
21-99 (34)	6	N.S.
Over 100 (14)	7	

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

There was also a significant difference between ethnic groups in implementing record keeping activities. Africans were most likely to engage in record keeping (25 percent).

Marketing Data

Table XVIII presents data which attempts to identify channels used to market cattle. In both geographical areas it is apparent that producers sell animals by the most competitive method in order to obtain the best price. Few cattle are sold to friends and neighbors. This would tend to indicate that livestock producers are developing confidence in the market system. Despite the previous statement, there are still persons who are not satisfied with the price received from the sale of their cattle. The disparity appears greatest for the producers marketing their animals in the Rupununi. Only thirty-seven percent of the Rupununi livestock producers responding were satisfied with the price which they received, compared to sixty-eight percent along the Coast. The most preferred way of selling cattle is on the hoof.

Marketing information for the other types of livestock producers is presented in Table XIX. Swine producers were most likely to sell their livestock to the Guyana Marketing Corporation (74 percent) and were least satisfied with the price received (30 percent were satisfied). Poultry producers marketed their products to wholesalers (66 percent). Over half of the sheep/goat producers sold their animals directly to neighbors and relatives; this group was most likely to be satisfied with the price received.

Extension Program

One of the major functions of this survey was to collect data concerning livestock producers' knowledge of, participation in and attitudes toward government programs designed to aid them. Findings for this section are

TABLE XVIII
 SELECTED MARKETING CHARACTERISTICS OF CATTLE
 PRODUCERS BY GEOGRAPHICAL AREA

Characteristic	Rupununi	Coast	Total
Number of Producers			
Selling Cattle to:			
Abattoir	2	4	6
Meat Marketing Ltd.	9	3	12
Guyana Marketing Corp.	1	3	4
Cattle Dealer	7	4	11
Wholesale Butcher	0	15	15
Super Market	1	3	4
Other (neighbors, friends, etc)	7	3	4
Usually Sell Cattle: (66)			
On the Hoff	67	92	76
Carcus	17	4	12
Other	17	4	12
Form of Price Determination: (66)			
Per Head	24	75	42
Per lb. Live Weight	10	0	6
Per lb. Carcass Weight	67	25	52
Satisfied with Price (66)	37	68	42

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

TABLE XIX*
 SELECIED MARKETING CHARACTERISTICS FOR SWINE,
 POULTRY AND SHEEP/GOAT PRODUCERS

	Swine (23)	Poultry/Eggs (11)	Sheep/Goats (11)
Usual Buyer			
Neighbors/Relatives	4	0	45
Wholesalers	0	66	0
Guyana Marketing Corp.	74	0	
Other	22	33	55
Satisfied with Price	30	36	82

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

presented in Tables XX - XXVI.

Livestock producers were asked if they were aware of the government extension program. For the total sample eighty-three percent of the respondents indicated their awareness of a program. The percentage was significantly higher for the Coast (91 percent) than the Rupununi (69 percent), and while all swine and poultry producers had knowledge of the program only seventy-seven percent of the cattle producers and seventy-one percent of the sheep/goat producers had knowledge. Producers in the 35-50 age category were more knowledgeable about the extension program than the other two age groups; the youngest group was least knowledgeable. East Indians (94 percent) had the most knowledge of extension knowledge and Amerindians (69 percent) had the least. There was not a significant variation by education, income or herd size.

Of those having knowledge of the program seventy-one percent had requested assistance. Coastal producers (76 percent) were more likely to have requested assistance than Rupununi producers and sheep/goat producers (100 percent) who knew about the problem were the type of livestock producers most likely to request assistance and cattle producers (55 percent) the least likely. This relationship was not statistically significant. The only variable that showed substantial variation was ethnic identity. Eighty-eight percent of the East Indians and "Others" were more likely than Africans (65 percent) and Amerindians (55 percent) to have requested assistance from the extension service.

Seventy-five percent of the producers requesting assistance received it. The only important variation to this over-all finding was that smaller proportions of sheep/goat (60 percent) and poultry (63 percent) producers were likely to have received the assistance.

Eighty-eight percent of the respondents receiving assistance reported that they were satisfied with the assistance received. Rupununi producers (77 percent)

TABLE XX^{*}RESPONSES TO SELECTED EXTENSION AND RELATED ITEMS
BY GEOGRAPHICAL AREA

	Rupununi %	Coast %	Total %	X ²	P
Knowledge of Extension Program (111)	69	91	83	7.61	N.S.
Requested Assistance from Extension Program (91)	62	76	71	7.22	N.S.
Received Assistance from Extension Service (65)	72	77	75	.002	N.S.
Satisfied with Assistance (49)	77	92	88	.80	N.S.
Extension Agent Visited Farm (108)	54	79	69	6.61	N.S.
Govt. Vets Vaccinate Animals (74)	74	22	51	17.59	N.S.
Attended Livestock Demonstration (109)	2	10	7	1.43	N.S.
Attended Livestock Seminar (108)	0	27	17	11.85	N.S.
Attended Field Day (108)	0	6	4	1.18	N.S.
Attended Field Tour (109)	0	4	3	.62	N.S.
Heard of Livestock Development Project (69)	51	64	57	.69	N.S.
Considered Getting Loan from LDP (39)	71	17	46	9.60	N.S.
Knowledge of Agricultural Bank (111)	45	80	67	12.45	N.S.
Tried to Get Loan from Agricultural Bank (74)	0	18	14	14.21	N.S.
Think Agricultural Cooperatives are Good (98)	86	84	85	0	N.S.
Interested in Participating in Agricultural Cooperative (100)	81	81	81	.05	N.S.

^{*}Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

TABLE XXI*

RESPONSES TO SELECTED EXTENSION AND RELATED ITEMS
BY TYPE OF LIVESTOCK PRODUCER

	Cattle (72) %	Swine (24) %	Poultry (11) %	Sheep/Goats (17) %	X ²	P
Knowledge of Extension Program	77	100	100	71	9.01	.03
Requested Assistance from Extension Program	55	80	80	100	3.32	N.S.
Received Assistance from Extension Service	75	88	63	60	2.62	N.S.
Satisfied with Assistance	85	93	80	100	1.20	N.S.
Extension Agent Visited Farm	61	100	91	33	17.51	N.S.
Govt. Vets Vaccinate Animals	53	0	50	0		
Knowledge of Agricultural Bank	68	95	55	86	11.07	N.S.
Tried to Get Loan from Agricultural Bank	12	26	0	0	4.58	N.S.
Think Agricultural Cooperatives are Good	89	84	56	86	6.75	N.S.
Interested in Participating in Agricultural Cooperative	81	88	57	83	3.19	N.S.

*Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

TABLE XXII[†]RESPONSES TO SELECTED EXTENSION AND RELATED ITEMS
BY SIZE OF HERD

	-20 or Less	21-99	100+	χ^2	P
Knowledge of Extension Program (76)	71	82	79	1.06	N.S.
Requested Assistance from Extension Program (59)	62	71	60	.69	N.S.
Received Assistance from Extension Service (39)	69	90	33	8.04	.02
Satisfied with Assistance	100	78	100	**	
Extension Agent Visited Farm (74)	56	68	62	.93	N.S.
Govt. Vets Vaccinate Animals (72)	42	59	50	1.69	N.S.
Attended Livestock Demonstration (75)	85	94	86	**	
Attended Livestock Seminar (75)	81	97	93	**	
Attended Field Day (75)	93	100	93	**	
Attended Field Tour (75)	100	100	100	**	
Heard of Livestock Development (68)	45	58	69	1.95	N.S.
Considered Getting Loan from LDP (38)	40	37	67	2.32	N.S.
Knowledge of Agricultural Bank (76)	61	62	57	.08	N.S.
Tried to Get Loan from Agricultural Bank (46)	18	14	13	**	
Think Agricultural Cooperatives are Good (66)	96	81	100	**	
Interested in Participating in Agricultural Cooperative (57)	86	83	73	.96	N.S.

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

** Expected cell values are too small to compute χ^2 .

TABLE XXIII*

RESPONSES TO SELECTED EXTENSION AND RELATED ITEMS
BY AGE OF PRODUCER (Age in Years)

	35 And Under	35-50	51 And Under	X ²	P
Knowledge of Extension Program (104)	70	93	84	5.77	.05
Requested Assistance from Extension Program (86)	68	75	68	.05	N.S.
Received Assistance from Extension Service (61)	77	78	71	.27	N.S.
Satisfied with Assistance (46)	100	90	80	**	**
Extension Agent Visited Farm (101)	52	80	67	5.64	.10
Govt. Vets Vaccinate Animals (68)	54	60	32	3.75	N.S.
Knowledge of Agricultural Bank (104)	56	70	73	2.37	N.S.
Tried to Get Loan from Agricultural Bank (70)	7	21	7	**	**
Think Agricultural Cooperatives are Good (89)	91	89	76	3.20	N.S.
Interested in Participating in Agricultural Cooperative	90	87	73	2.89	N.S.
Heard of Livestock Development Project (63)	52	58	61	.32	N.S.
Considered Seeking Loan from LDP (33)	45	57	36	1.09	N.S.

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

** Expected cell values are too small to compute X².

TABLE XXIV^{*}RESPONSES TO SELECTED EXTENSION AND RELATED ITEMS
BY EDUCATION OF PRODUCER

	None	Primary	Secondary & College	X ²	P
Knowledge of Extension Program (105)	71	85	77	1.64	N.S.
Requested Assistance from Extension Program (85)	70	70	78	.25	N.S.
Received Assistance from Extension Program (60)	86	80	57	2.20	N.S.
Satisfied with Assistance (47)	67	92	75	**	**
Extension Agent Visited Farm (102)	57	72	69	1.23	N.S.
Govt. Vets Vaccinate Animals (69)	71	46	57	**	**
Knowledge of Agricultural Bank (105)	29	72	62	9.78	.01
Tried to Get Loan from Agricultural Bank (68)	0	14	13	**	**
Think Agricultural Cooperatives are Good (92)	67	87	83	3.02	N.S.
Interested in Participating in Agricultural Cooperative (78)	67	88	73	3.57	N.S.
Heard of Livestock Development Project (64)	36	57	83	4.10	N.S.
Considered Seeking Loan from LDP (35)	40	36	80	3.31	N.S.

*Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

**Expected cell values are too small to compute X².

TABLE XXV^{*}
 RESPONSES TO SELECTED EXTENSION AND RELATED ITEMS
 BY INCOME OF PRODUCER

	Less Than G\$ 2,000	G\$ 2,000- 5,000	Over G\$ 5,000	X ²	P
Knowledge of Extension Program (92)	78	86	88	.91	**
Requested Assistance from Extension Program (74)	70	65	71	.18	N.S.
Received Assistance from Extension Service (51)	77	91	60	2.05	**
Satisfied with Assistance (40)	89	90	33	**	**
Extension Agent Visited Farm (91)	66	76	38	3.86	N.S.
Govt. Vets Vaccinate Animals (75)	48	65	25	.07	**
Knowledge of Agricultural Bank (92)	62	76	75	1.74	**
Tried to Get Loan from Agricultural Bank (61)	8	19	0	**	**
Think Agricultural Cooperatives are Good (82)	82	89	57	3.47	**
Interested in Participating in Agricultural Cooperative (68)	85	81	33	8.64	.01
Heard of Livestock Development Project (64)	44	81	100	9.74	.01
Considered Seeking Loan from LDP (35)	33	46	100	**	**

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

** Expected cell values are too small to compute X².

TABLE XXVI**

RESPONSES TO SELECTED EXTENSION AND RELATED ITEMS
BY ETHNIC IDENTITY OF PRODUCER

	East Indian	African	Amerindian	Other	χ^2	P
Knowledge of Extension Program (109)	94	81	69	92	7.92	.05
Requested Assistance from Extension Program (89)	83	65	55	83	6.00	N.S.
Received Assistance from Extension Service (63)	71	82	75	70	.83	N.S.
Satisfied with Assistance (47)	88	93	89	71	**	**
Extension Agent Visited Farm (106)	84	66	61	58	4.86	N.S.
Govt. Vets Vaccinate Animals (73)	33	9	81	33	23.19	.001
Knowledge of Agricultural Bank (109)	63	88	41	85	18.0	.001
Tried to Get Loan from Agricultural Bank (72)	20	14	0	9	**	**
Think Agricultural Cooperatives are Good (96)	76	90	93	70	5.26	N.S.
Interested in Participating in Agricultural Cooperative (82)	85	79	92	50	7.67	.05
Heard of Livestock Development Project (68)	74	50	39	80	8.62	N.S.
Considered Seeking Loan from LDP (38)	21	50	67	50	5.55	N.S.

* Sample size varies due to non-responses and non-applicability of questions. Sample size is contained in parentheses. Except where noted, reported figures are percentages.

** Expected cell values are too small to calculate χ^2 .

were less likely than those on the Coast (92 percent) to have been satisfied with the assistance. Comparing different types of livestock producers, sheep/goat (100 percent) and swine (93 percent) were most likely to be satisfied and poultry (80 percent) and cattle (85 percent) the least likely. When essentially all cattle producers with herds of 20 or less and 100 or more were satisfied with the extension service received, only 78 percent of these producers with herds of 21-99 were satisfied. The younger producers were more satisfied with services than were older producers.

Sixty-nine percent of the respondents reported that they had been visited by an extension agent. The rate was higher for the Coast (79 percent) than for the Rupununi (54 percent), swine (100 percent) and poultry (91 percent) producers were the most likely to be visited and sheep/goat producers the least likely. Respondents within the middle age group were more likely to have been visited than those in either of the other two groups. Only 38 percent of those with incomes greater than G\$ 5,000 reported that they were visited by extension personnel, compared to 66 percent and 76% for the other groups.

A little over half (51 percent) of the respondents indicated that a government veterinarian had vaccinated their animals. The percentage is much higher for the Rupununi (74 percent) than the Coast (22 percent). The explanation for this finding is that the Ministry had just completed a campaign against foot-and-mouth disease in the Rupununi at the time of the survey and the government veterinarians had vaccinated all cattle that could be located in South Rupununi.

Rates of participation in extension activities— demonstrations, seminars, field days and field tours — were very low. Participation was particularly low in Rupununi. Fifty-three percent of the swine producers did report that

they had attended livestock seminars.

An important effort to develop the national cattle herd is being undertaken by the Livestock Development Project. Fifty-seven percent of the cattle producers indicated that they had heard of the project. The rate was higher for the Coast (64 percent) than for the Rupununi (51 percent). An interesting finding is that of those who had heard of the project the Rupununi producers (71 percent) were much more likely to have considered obtaining a loan than the cattle producers on the Coast (17 percent). Although the relationship is not statistically significant the data indicates that producers with larger cattle herds were more knowledgeable of the livestock development project (LDP) and were also more interested in obtaining a LDP loan. The data also indicates that the higher the level of education, the more likely was the producer to know about the LDP. Controlling for ethnicity also yielded significant results. Producers in the "Other" category (80%) and East Indians (74%) were most likely to have heard of the LDP and Amerindians (39%) were least likely. An interesting finding is that while East Indians had a high level of awareness about the LDP, they were least likely to be interested in a LDP loan. Only 21 percent reported interest.

A standard source of funding for producers is the Agricultural Bank. Two-thirds (67 percent) of the total indicated knowledge of the bank. Once again, Coastal producers (80 percent) were most likely to know about it than Rupununi producers (45 percent). Swine producers (95 percent) were most likely to know about the Agricultural Bank and poultry producers (55 percent) the least likely. Of those with knowledge of the Bank only fourteen percent, all on the Coast, had tried to get a loan. Comparing different types of producers, only swine (26 percent) and cattle (12 percent) producers had attempted to get a loan from the Agricultural Bank. Respondents in the lowest educational category (29%)

were much less likely to know about the Agricultural Bank than were those in the other two educational groups. None of the respondents in the lowest educational group tried to get a loan. Amerindians were least likely to know about the Agricultural Bank and none had tried to get a loan.

A final subject examined was the attitudes of livestock producers to cooperatives. This is important because Guyana is a cooperative republic and the government is attempting to encourage the development of cooperative efforts. Eighty-five percent of the total sample indicated that they felt that cooperatives are good. The only significant deviation from this was with poultry producers; only fifty-seven percent thought that cooperatives were good. Of those supporting cooperatives eighty-one percent said they were interested in participating in one. The only significant variation from this was for poultry producers; only fifty-seven percent said they were interested in participating in a cooperative.

Analysis of the data, while not statistically significant, indicates that producer support for cooperatives decreases with age. Support for cooperatives was highest for the youngest age group (90%). The respondent with no formal education was also less likely to approve of cooperatives.

While the results were not statistically significant, only 57 percent of the respondents in the higher income group approved of cooperatives; this compares with 82 percent for the other two groups. Income groups did differ significantly with regards to interest in joining producer cooperatives. Only 33 percent of the high income group expressed an interest; this compares to 85 percent for the lowest income group and 81 percent for the middle income group.

Ethnic groups differed in their approval of the African and Amerindian producers voiced approval of cooperatives. Only 76 percent of the "Other"

producers responding indicated approval. The difference between groups was significant with regards to producer willingness to join cooperatives.

211-d Livestock Project

CARVER RESEARCH FOUNDATION OF TUSKEGEE INSTITUTE
Tuskegee Institute, Alabama 36088
U.S.A.

In Cooperation With

THE GUYANA MINISTRY OF AGRICULTURE AND NATIONAL
DEVELOPMENT AND THE UNITED STATES AGENCY

FOR INTERNATIONAL DEVELOPMENT

SURVEY OF LIVESTOCK PRODUCERS

Hello! I'm _____ . We are cooperating with the Ministry of Agriculture and National Development in conducting a survey to find out how the extension program might be of greater service to livestock producers in Guyana. You were selected in the sample to be included in this survey.

I would like to ask you some questions about your land, your herd, Government extension programs and related matters. The interview should take about one-half hour of your time.

The information which you supply will be treated confidentially. Your comments will be combined with those of other persons and used only for statistical purposes.

Respondent's Name _____

Respondent's Location _____

Interview: Date _____, 1974

Time Started _____

Time Completed _____

Interview's Name _____

FOR OFFICE USE ONLY

Study No. ---- 790

ID _____

District _____

Sample area _____

Supervisor's Name _____

SURVEY OF LIVESTOCK PRODUCERS

A. Which of the following types of livestock do you have?

1. Dairy or Beef Cattle? Yes _____, No _____

(a) If yes, How Many? _____

(If five head or more ask dairy or beef questions).

2. Poultry? Yes _____, No _____

(a) If yes, How Many? _____

(If flock if 1,000 or more, ask poultry questions)

3. Swine? Yes _____, No _____

(a) If yes, How Many? _____

(If five or more sows, ask swine questions).

4. Sheep and goats? Yes _____ No _____

(a) If yes, How Many? _____

(If ten or more, ask sheep and goat questions).

If RESPONDENT DOES NOT QUALIFY AS A LIVESTOCK PRODUCER IN ANY OF THE CATEGORIES,
INDICATE THIS TO THE RESPONDENT AND THANK HIM FOR HIS COOPERATION.

B. Questions Concerning Land Use

1. How many acres of land do you own? _____. Cost per acre? \$ _____

How long have you owned this land? _____ years.

2. How many acres of land do you rent or lease? _____

(a) Tenure of lease (years) _____

(b) Annual amount of rent \$/acre _____.

3. Regarding your agricultural activities, how do you classify yourself?

Livestock producer _____; Food crop farmer _____; Both _____.

Other _____

4. Commercially, which type of livestock is most important to you?

Beef cattle _____; Dairy cattle _____; Swine _____;

Poultry _____; Sheep and goats _____

C. Herd Characteristics: Management and Marketing Practices

1. Beef and Dairy Cattle

I would like to ask several questions about cattle number and performance.

Type	No. on Hand	Age	Average in Past Weight	No. Died in Past Year	Number Sold (1973)	Value	Number Stolen in Past Year
Breeding Bulls							
Brood Cows							
Unbred Heifers Over 2 yrs. old							
Calves Less than 1 yr.							
Calves 1-2 yrs. old							
Steers (2-3 yrs. old)							
Steers (3-4 yrs. old)							
Steers (4-5 yrs. old)							
Steers (5-6 yrs. old)							
Steers (6 & over)							
What breeds of beef and dairy cattle do you have?							

2. Breeding Program.

- (a) What method do you use? A.I. _____; Natural _____; Both _____.
- (b) Cost of A. I. _____
- (c) How many cows did you have in 1973, at least 3 years of age? _____.
- (d) How many cows failed to produce a calf in 1973? _____.
- (e) How many calves were born in 1973? Live births _____ Dead _____.
- (f) At what age do heifers usually breed the first time? _____ years.
- (g) How many calves died in 1973? _____
- (h) How many cows aborted in 1973? _____

3. Dairy Herd.

- (a) Do you use milking machines? _____yes; _____No.
- (b) Do you usually wash the udder before milking? yes _____; No _____.
- (c) How many cows are you currently milking? _____
- (d) Is your herd primarily dairy _____; Beef _____; or both _____.

4. Information on Cattle feeding.

- (a) How many acres of pasture do your cattle use? _____ Native _____ and improved _____.

(b) Pasture use

Acres	Proportion fed to Cattle (%)	Yields	Fertilizer - lbs. / acre and analysis or lbs. n, P, or K per acre
-------	------------------------------	--------	---

Pasture _____

Other _____

(Specify, i.e. hay, green chop, etc.) _____

(c) How much supplemental feeding do you use?

<u>SUPPLEMENT</u>	<u>No. of Months fed per year</u>	<u>Types of Animals Receiving feed</u>	<u>lbs. / day per head</u>	<u>Cost/ lb.</u>	<u>Where Purchased</u>
<u>Salt</u>					
<u>Minerals</u>					
<u>Mixed feeds</u>					
<u>Protein Supplement</u>					
<u>Green Chop</u>					
<u>Hay</u>					
<u>Corn</u>					
<u>Bone Meal</u>					
<u>Rice Bran</u>					
<u>Wheat Middlings</u>					
<u>Urea</u>					
<u>Molasses</u>					
<u>Copra Meal</u>					
<u>Others (Specify)</u>					

5. Herd Health

(a) Which of the following animal health practices are used?

Practice	Frequency	Cost per head/ Treatment	or Total COST	Number Treated
Drenching	_____	_____	_____	_____
Dipping	_____	_____	_____	_____
Spraying	_____	_____	_____	_____
Vaccinate: Anthrax	_____	_____	_____	_____
Blackleg	_____	_____	_____	_____
Leptospirosis	_____	_____	_____	_____
Brucellosis	_____	_____	_____	_____
Foot & Mouth	_____	_____	_____	_____
Rabies	_____	_____	_____	_____
(Other	_____	_____	_____	_____
Antibiotics Used _____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Foot Baths (control foot rot _____)	_____	_____	_____	_____
Worming (specify method) _____	_____	_____	_____	_____

(b) What method of castration do you use: _____
(If males are not castrated, enter None)

(c) What health problems do your cattle have? _____

6. Marketing Dairy Products

(a) How many gallons of milk produced daily? _____

(b) To whom do you usually sell your milk? What price do you receive?

Buyer	Price Received	Percent Sold to	Proportion of Total Sales
____ Processing Plant	_____	_____	_____
____ Collecting Station	_____	_____	_____
____ Neighbors & Relatives	_____	_____	_____
____ Local Market	_____	_____	_____
____ Other	_____	_____	_____

(c) How many gallons are sold daily? _____

(d) Are you satisfied with the price? Yes _____ No _____

7. Marketing Beef Cattle

(a) Do you usually sell your beef - on the hoof _____, carcass, _____, or both _____?

(b) On what basis do you sell live cattle? Per head _____. Per pound _____ live weight _____, or per pound carcass weight _____.

(c) Number of live cattle sold to: Abattoir _____; Meat Marketing Ltd. _____; Guyana Marketing Corp. _____; Cattle dealer _____; wholesale Butcher _____; Meat Market _____; Supermarket _____; or Other (specify) _____;

(d) Where do you sell your carcass beef? _____

(e) To whom do you sell carcass beef? _____

(f) What price are you paid for culled cows _____; steers _____; calves _____; and breeding bulls _____?

(g) Is the price satisfactory? Yes _____ No _____

D. For which of the following do you keep records? Breed _____; birth date _____; date first breed _____; calf brrths _____; calf deaths _____; abortions _____; cull date _____; reasons for culling _____; gallons of milk produced _____.

E. The following set of questions relate to the availability of and requirements for labor on your farm.

1. Have you had any difficulty getting hired farm labor? Yes ____ No ____
2. Total farm labor required per year (full-time men) _____?
3. Percent of farm labor use for livestock production _____%.
4. Percent of livestock labor used for the following jobs:
 - (a) Pasture maintenance _____%
 - (b) Cattle handling _____%
 - (c) Milking labor _____%
5. How much labor would be required to establish one acre of improved pasture? _____(hours)

IF LABOR IS HIRED, ANSWER 6, 7, and 8:

6. Wage rates paid cattle handlers _____
7. Wage rate for farm labor _____
8. Wage rate for milking crew laborers _____

F. The following questions are pertinent only if improved pasture is used in producing cattle.

1. What kind of grass is used for improved pasture? _____
2. What kind of legume is used for improved pasture? _____
3. Cost and amount of fertilizer (dollars per acre) \$ _____
4. Costs (\$/acre) of pasture establishment \$ _____

G. Other costs and requirements associated with livestock production:

1. Cost of fence construction (\$/mile) \$ _____
2. Hours of labor required to construct a mile of fence _____

8. Swine

A. I have a few questions about your swine operation. First of all, I would like to know the number, ages and approximate weights of the boars, sows, and pigs.

(1)

	Number	Ages	Weights
Boars			
Sows:			
Pigs			

(2) What type of operation do you have? feeder pig
 farrowing finishing Mixed

B. Questions about breeding.

(1) What breeds do you have? _____

(2) At what age do you usually breed gilts? _____

(3) Do you usually do a semen evaluation before you use a bore for breeding purposes? yes no

(4) What method of farrowing do you use? crates pens
 pasture

(5) Are you usually with the sow during delivery? yes no

C. Questions about feeding.

(1) Do you pasture your swine? yes no

(2) Do you use commercial feeds? yes NO

(3) What supplements do you feed your swine? _____

D. Health questions.

(1) Do you spray your swine for parasites? yes no

(2) Do you vaccinate? yes; for what? _____ no

(3) Do you give your pigs iron injections? yes no

(4) What health problems do you have with your swine? _____

F. Questions about marketing.

- (1) About how many swine did you sell in 1973? _____
- (2) Were they sold on the hoof or as carcass pork?
_____ Hoof _____ Carcass _____ Both
- (3) What price did you receive _____
- (4) Were you satisfied with the price? _____ yes _____ no
- (5) To whom did you sell the swine _____ abattoir _____ neighbors
and/or relatives _____ market _____ other _____

Poultry

A. Questions about the characteristics of your poultry.

- (1) How many layers do you have? _____
- (2) How many broilers do you have? _____
- (3) What breeds do you have? _____
- (4) Where do you get your chicks? _____ hatchery _____ produced on
farm _____ Other _____
- (5) How would you characterize your operations? _____ broiler
_____ layer _____ broiler/layer

B. Questions about feeding.

- (1) Do you use commercial feed? _____ yes _____ no
- (2) (If yes) Is it a complete feed or a supplement?
_____ complete _____ supplement
- (3) What supplements do you use in your feed? _____
- (4) Do you use artificial light? _____ yes _____ no
If yes is light automatically controlled _____ yes _____ no
- (5) Do you have a cage or floor operation? _____ cage _____ floor
_____ both

C. A few health related questions.

- (1) Do you vaccinate your birds? _____ yes _____ no

(2) Do you feed your birds antibiotics? _____ yes _____ no

(3) What health problems have you noticed in your flock?

D. (If layer operation) Now a few questions about the marketing of your eggs.

(1) About how many eggs do you collect daily? _____

(2) About how many eggs do you sell daily? _____

(3) To whom do you sell most of your eggs? _____ Neighbors and/or
relatives _____ Wholesaler _____ Market _____ Other _____

(4) What price do you get for your eggs? What is the average price
per dozen? _____

(5) Are you satisfied with the price? _____ yes _____ no

(6) Do you candle eggs? _____ yes _____ no

F. (If broilers) I have some questions about how you sell your
broilers.

(1) About how many birds do you sell daily? _____

(2) Do you sell them live or dressed? _____ live _____ dressed
_____ both

(3) To whom do you sell them? _____ Neighbors and/or relatives
market _____ Other _____

(4) What price do you get for your chickens? live _____
dressed _____

(5) Are you satisfied with the price you receive? _____ yes _____ no

10. Sheep and Goats

A. How many sheep and goats do you have? Sheep _____ Goats _____

B. I would like to get some information about how you feed your sheep
and goats.

(1) Do you pasture your sheep and goats? _____ yes _____ no

(2) Do you feed them commercial feed? yes no

(3) What supplement do you feed them? _____

C. I would like to ask you some questions about herd health.

(1) What procedures do you use to control parasites among your sheep and goats? _____

(2) Do you vaccinate your sheep and goats? _____

(3) What other health practices do you follow with your sheep and goats? _____

(4) What health problems do you have with your sheep and goats?

D. I would like to ask you some questions about how you market your sheep and goats.

(1) How many sheep and goats did you sell in 1973?

_____ Sheep _____ Goats

(2) Did you sell the animals on the hoof or as carcass?

_____ Hoof _____ Carcass _____ Both

(3) To whom did you sell the animals? Neighbors and/or relatives

_____ Market _____ abattoir _____ other _____

(4) What price do you usually get for your animals?

_____ Goats _____ Sheep _____

(5) Are you satisfied with the price? yes no

11. Now I have a few questions about government programs for livestock produce

A. Did you know that the government has a program designed to provide technical assistance, information and advice to livestock producers?

_____ yes _____ no

B. (If yes) Where did you learn about the extension program?

C. (1) Have you ever requested technical assistance or information from the extension service? yes no

(2) (If yes) Did you receive the assistance requested? _____ yes
_____ no

(3) (If yes) Were you satisfied with the assistance received?
_____ yes _____ no

(4) (If never requested assistance) Why haven't you requested
technical assistance from the government? _____

D. (1) Has an extension agen ever visited your farm? _____ Yes _____ no

(2) (If yes) How many times in the last five years? _____ (ca.)

E. What sorts of information, services or assistance would you find useful
for your livestock operation? _____

F. (Cattle producers) Do the government vets vaccinate your cattle?
_____ yes _____ no

(2) Are there any problems associated with this service? yes;
what? _____ no

G. (1) (If dairy) Did you know that the government has an A.I. breeding
program? _____ yes _____ no

(2) Have you ever used this service? Yes _____ No; why not? _____

H. (1) (Beef Producers) Have you heard of the Livestock (beef)
Development Project, a program which provides loans for the
development of beef cattle operations? _____ yes _____ no

(2) (If yes) Have you ever considered seeking one of those loans?
_____ yes _____ no

(3) (If heard of LDP) Why or why not? _____

12. One final set of questions. They have to do with background characteristics

of livestock producers, things such as family characteristics, age, etc.

A. Sex of producer (DONOT ASK) ____ male ____ female

B. Are you married? ____ yes ____ no

C. (If married) How many children do you have? _____

D. How old are you? _____ years

E. How far did you go in school? _____

F. What is your major occupation? _____

G. Income

1. What was your 1973 income? _____ dollars

2. How much of your 1973 income was due to livestock? _____ dollars

3. How much of your 1973 income was due to agriculture? _____ dollars

H. Ethnic identity (ASK ONLY IF NECESSARY) ____ East Indian

____ African ____ Chinese ____ Protuguese ____ Other Europeans

____ Amerindians ____ Mixed ____ Other _____

INTRODUCTION

In the design and implementation of development policies for livestock production and extension, several functions need to be identified. These functions include the following: 1) A definition of a National Policy framework; 2) A description of production inputs; 3) The establishment of minimum standards of performance; 4) The creation of a local problem solving system; 5) The provision of the necessary leadership directives; and 6) The provision of the necessary research infrastructure to generate production information to support extension activities. Despite the existence of inadequate research infrastructures in many developing countries, technology has advanced enough, such that with careful planning, satisfactory decisions can be made on the likeness of success in proposing changes for livestock production.

PURPOSE OF EXTENSION SURVEY

The real purpose of this 211(d) extension survey is to provide those persons involved with extension planning at Tuskegee Institute, an opportunity to evaluate the total extension program in a developing tropical country. This is in context with the overall "systems approach" to development. The objectives would be summarized as follows:

1. To define the objectives of the livestock extension program for Guyana, South America (Ministry of Agriculture Objectives).
2. To evaluate the administrative organization of the livestock and veterinary components of extension.
3. To determine areas of livestock extension involvement.
4. To determine government program plans for livestock producers.

5. TO identify the source(s) of information available to livestock producers.
6. To identify problems encountered by those persons implementing extension program plans.
7. To evaluate incentives which may be used to maintain qualified livestock extension personnel.
8. To evaluate livestock extension training programs.

In an attempt to evaluate the above objectives, the 211(d) staff from Tuskegee Institute, arranged meetings with key personnel within the Ministry of Agriculture (February 13, 1975) in order to get an overview of the extension program plans for Guyana. Travel along areas of the coast was also arranged in order that those persons responsible for implementing livestock extension programs could be interviewed. This was facilitated by utilizing a prepared questionnaire (Appendix I). The schedule also allowed informal visits with livestock producers located within the coastal areas of Guyana. In designing discussions and interviews in this manner, it was hoped that the detailed program plans proposed by the Ministry of Agriculture could be defined, and program plans could be evaluated as they were being implemented by livestock and veterinary assistants.

The overall survey objectives would thus be to define the extension services' plans for implementing production changes relevant to the livestock production enterprises in Guyana.

RESULTS

During the discussions which were held with Ministry personnel, several objectives were described which, in unspecific terms, describe overall extension objectives. These objectives are described as follows:

- I. To diversify agricultural production.

APPENDIX II

211-d Livestock Project

Carver Research Foundation
Tuskegee Institute

Department of Agricultural Sciences

SURVEY OF LIVESTOCK EXTENSION PROGRAMS IN GUYANA

Conducted in Cooperation With

The Guyana Ministry of Agriculture and National Development

and

The United States Agency for International Development

by

Edward T. Braye
Professor of Veterinary Medicine

Phillip W. Brown
Director, Cooperative Extension Program

George E. Cooper
Assistant Professor of Animal Science

July 31, 1975

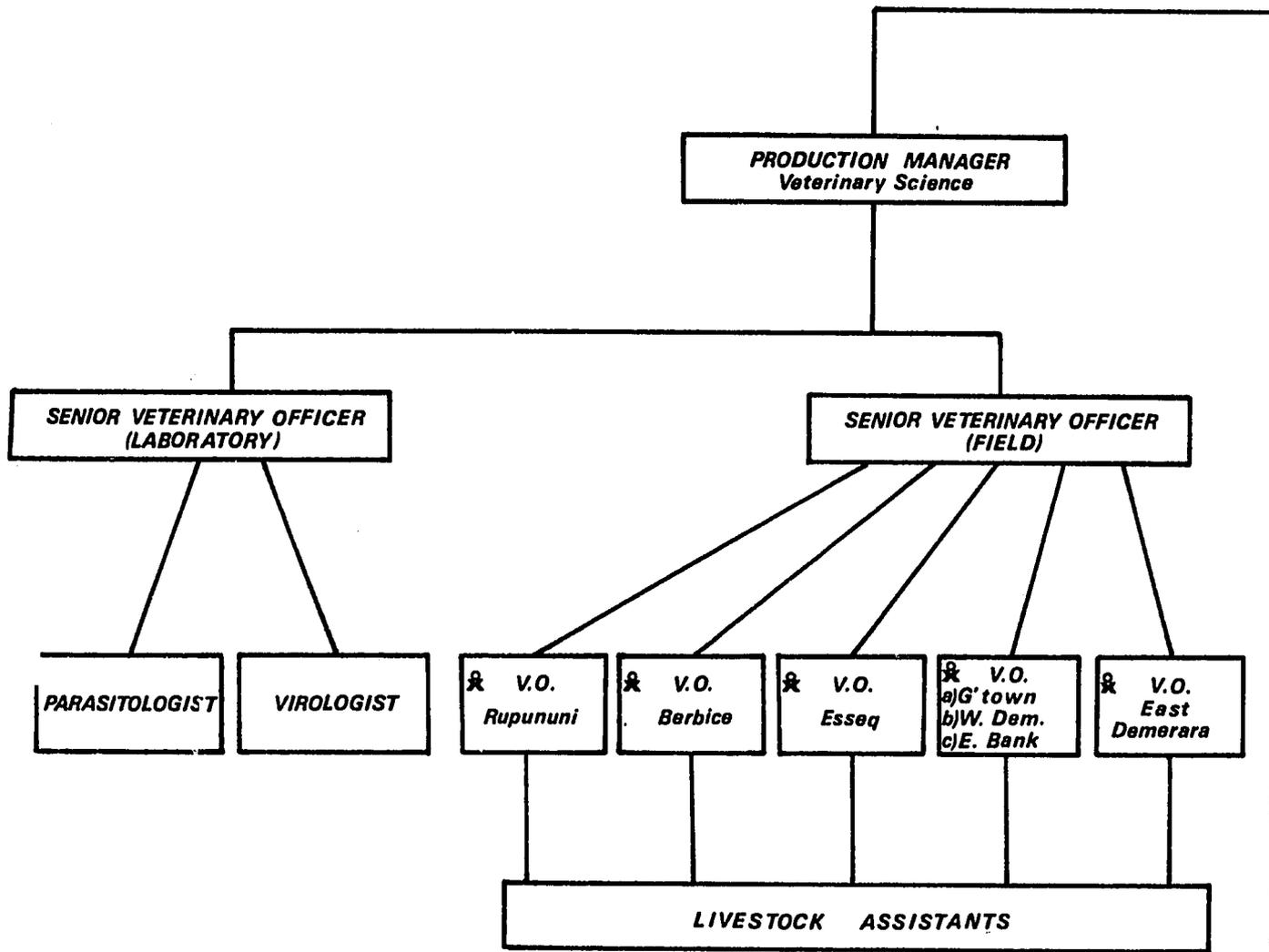
- II. To develop ranching systems (cooperatives, corporations and small production systems) for beef cattle production in order that the income derived from such systems might be increased.
- III. To develop livestock programs based on regional priorities.
- IV. To develop programs for income distribution between the small and large livestock sectors.
- V. To increase export promotion.

An organizational chart for personnel associated with the livestock sector of the Ministry of Agriculture is presented in Figure I. This chart presents positions by job title, however it is not supplemented with a description of job responsibility. It is apparent from this chart that many important positions within the Veterinary and Livestock section are unfilled (As of February 13, 1975).

The organizational chart further indicates how severely the Ministry is limited in professionally trained persons. The following list of names presents those individuals who fill professional and administrative positions within the Veterinary and Livestock sector of the Ministry:

- Dr. P. Fernandes, Principle Veterinary Officer [PAO (V & LS)]
- Dr. L. Applewhaite, Vet. Officer, Rupununi
- Dr. R. Raja, Vet. Officer, Berbice
- Dr. G. Smart, Vet. Officer, Essequibo
- Dr. S. Ramudit, Vet. Officer, Georgetown
- Dr. A. Fox, Vet. Officer, Georgetown
- Dr. E. Sanford, Vet. Officer, East Demarara (On Study Leave)
- Mr. M. Persuad, Livestock Officer, Artificial Insemination
- Mr. J. Jaigoo, Livestock Assistant, Poultry and Swine
- Mr. G. Nurse, Livestock Assistant, Dairy and Grassland
- Mr. D. Fung-On, Livestock Officer, Swine and Poultry
- Mr. C. Edwards, Livestock Officer, Matthew's Ridge
- Mr. C. Shaw, Livestock Assistant, Swine Credit Scheme
- Mr. V. McPherson, Livestock Officer, Ebini
- Mr. N. Holder, Livestock Officer, Ebini

There are seven (7) Veterinarians employed by the Ministry, however, there are eight (8) Veterinarians in the country of Guyana, when Dr. P. L. McKenzie (LDP) is included.



* Positions filled as of 2/13/75

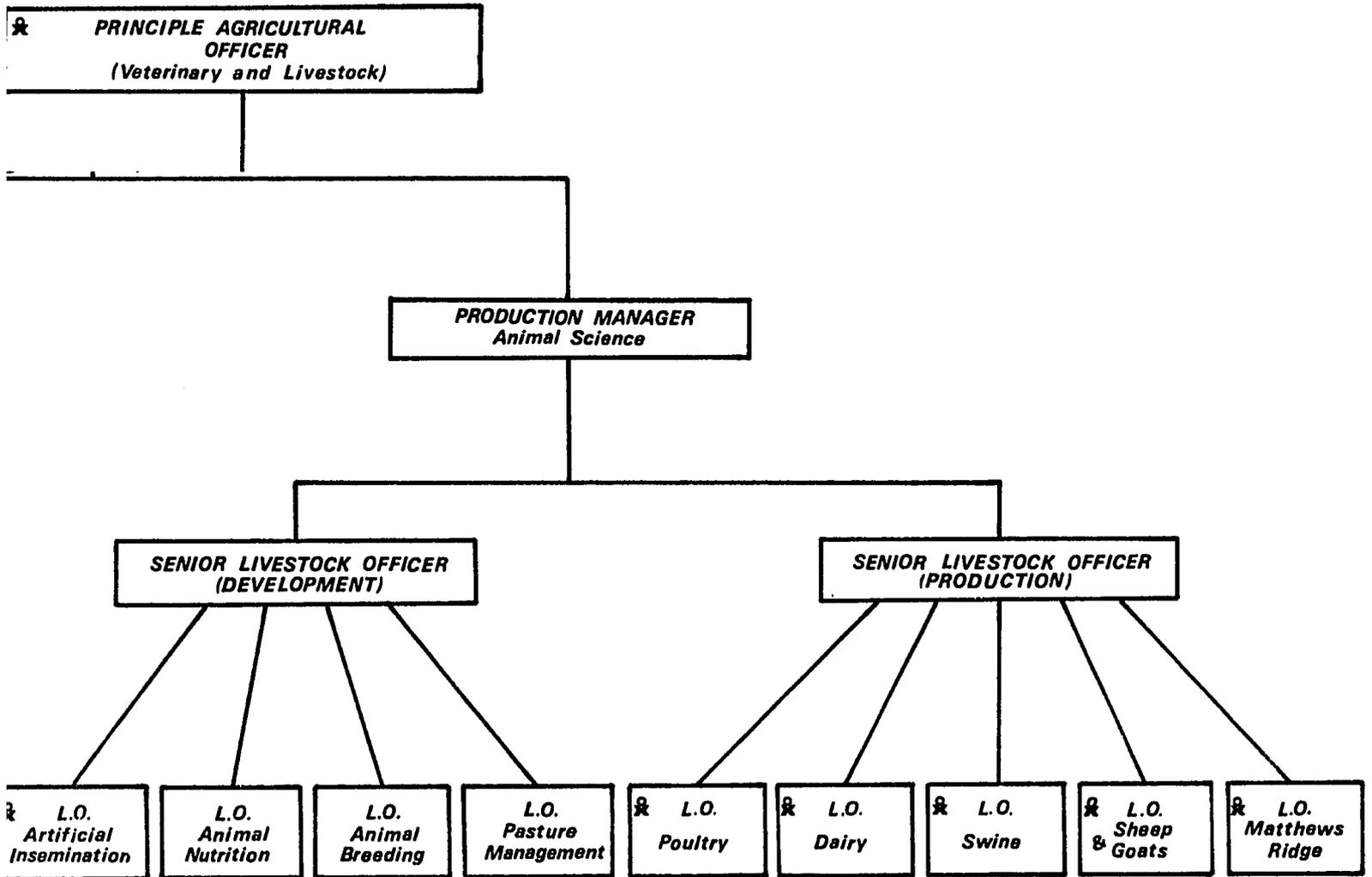


Figure 1

The Ministry of Agriculture demonstrates an interest in the development of livestock industries in the principal geographical areas of Guyana (Coastal, Intermediate Savannah, Rupununi Savannah, and Northwest Region). At present, a majority of all extension efforts are carried out within the coastal area. This is where a majority of the 714,233 population lives. Extension efforts in other geographical areas are meager at best. Essentially all of those persons employed by the Ministry of Agriculture, and assigned to work with livestock in areas other than the coast, are associated primarily with the support of Government research facilities. (i.e. Ebini and Matthew's Ridge). Of the sixty-one (61) persons employed in the Veterinary and Livestock Sector as administrators, professional staff, and extension staff, only ten (10) or 16.4% work outside of the coastal area of Guyana (Appendix II).

In program plans developed by the Ministry of Agriculture, there are plans for future involvement in all major livestock production areas (Beef, Dairy and Swine). There is also major interest in the production of poultry and only limited interest in the production of small ruminants (sheep and goats).

In implementing these plans, it is apparent from our discussions that initial development efforts and immediate projections for improvement will only involve a small number of the already established producers. Development plans do not describe an attempt to involve a significant number of the small livestock producers. Except for the Rupununi, and especially along the coast, a significant number of the livestock producers interviewed were small and only earned an income of less than G\$ 5,000 annually. This is a difficult problem when development in the livestock sector is being planned, however it is a problem that must be dealt with.

LIVESTOCK PROJECTS

DAIRY: The Ministry of Agriculture has proposed the development of commercial dairies in several locations throughout the country of Guyana (Mon Repos, Moblissa, Ebini and Matthew's Ridge). However, due to several problems (i.e. a high water table, high cost of drainage infrastructure, etc.), the Ministry has decided to cancel its efforts to initiate a large scale dairy at Mon Repos. Most of the efforts associated with milk production on a large scale commercial basis will be carried out at the other locations.

Initial efforts at Moblissa will be associated with the development of a national dairy herd and involve the establishment of improved grasses and legumes and the construction of various physical facilities for staff support. Imported heifers will serve as the nucleus of this herd. In addition to this activity, there will also be a program initiated where twenty-one (21) dairy farmers will be resettled in the Moblissa area. These dairy farmers will be divided into two groups based on the initial size of their operation. Group one will be composed on sixteen producers with 26 animal units each. Group two will be composed of sixteen producers with ten animal units each. The dairy producers scheduled to participate in this program already own their cattle.

The dairy herds at Ebini and Matthew's Ridge will continue to be supported with Government funds and operated commercially.

BEEF: The Ministry of Agriculture, in an attempt to establish a beef corporation, will re-organize the Ebini beef cattle ranch under the direction of the Livestock Development Company. The Government feels that this change will aid the development of an organization similar to that of the rice marketing corporation, where aspects of research, financing,

commercial production, marketing and by-product utilization will be handled. Once established, the government will function solely in the role of policy making, regulation and extension.

The commercial beef herd at Matthew's ridge will continue to be operated with government support. Its primary purpose will be to conduct research on by-product utilization in livestock rations, and to supply a limited number of good quality bulls to beef cattle producers.

The livestock Project Division (LPD), utilizing funds from a World Bank Loan, will continue to make loans to beef cattle producers. In 1975, it anticipates that sixteen beef producers will qualify for loans. There will be three loans in the Rupununi involving 1,000 cattle; seven loans in the Corentyne, involving 2,400 cattle; and six loans in the Mahaica, Mahaicony and Abary areas involving 1,500 cattle. These loans are based on evidence that the enterprise will be economical and allow producers who qualify to meet the loan charges and repayments. These loans are limited to current producers and require the ownership of cattle.

SWINE: In expanding programs in swine production, the Ministry plans to provide interest free credit (G\$ 1 Million) to swine producers. In an attempt to expand its extension efforts, there is also a planned breeding unit in the Hopetown/Belair area. This unit will provide a source of breeding stock to some producers, and serve to demonstrate breeding, farrowing and weaning techniques. Research will also be conducted in order to evaluate the use of local feed ingredients in swine rations and include other aspects of management and production.

POULTRY: The government is proposing that a feed subsidy (G\$ 3.5 Million) be made to commercial poultry producers. This will also include duty free concessions on poultry equipment. This subsidy is expected to increase egg

and broiler production by ten percent.

SMALL RUMINANTS: Like many developing countries, Guyana underestimates the importance of small ruminants in food production. Despite this oversight, the Ministry is planning to increase the number of sheep and goats at the Matthew's Ridge unit and initiate programs in sheep and goat production in the Intermediate savannahs. Plans are also being made to establish demonstration centers along the coast in an attempt to evaluate production and management schemes for small ruminants. Research will also be conducted in order to evaluate the use of crop by-products in the feeding of sheep and goats.

SOURCES OF LIVESTOCK EXTENSION INFORMATION TO PRODUCERS

The most utilized method of disseminating information to producers is through personal contact with extension specialist on their routine visits. Agricultural information, not specific to livestock production, is also available through the use of the following methods: 1) Radio - this method is only utilized for about thirty minutes per week; 2) Newspaper supplements - there are presently six such supplements per month; and 3) Seminars - although not widely utilized, they were re-initiated last year.

The Extension Ministry is scheduled to be revitalized in order that a regular a regular extension paper might be prepared and circulated. One Individual has been trained in communications in order to initiate this activity. The Ministry anticipates to utilize World Bank Funds to support this project.

PROBLEM AREAS ASSOCIATED WITH EXTENSION PROGRAMS

The livestock extension assistants were classified by the Ministry

of Agriculture according to the producers which they served. They served as production specialist and were therefore classified as either: 1) Swine and poultry; 2) general livestock (beef, dairy, sheep and goats); 3) Veterinary assistants (all health problems associated with livestock and poultry); 3) Veterinary assistants; or 4) Artificial insemination technicians. Eleven basic questions were asked in order that the efforts of these livestock extension assistants might be evaluated (the questionnaire was described earlier in Appendix I).

In general, the programs involving the swine and poultry producers appeared to be better organized. This is proportional to the assistance which has been provided to those producers involved in these two production activities. A great deal more has been provided in assisting these producers with production, management and marketing than has been done for beef, dairy, sheep and goat producers. Extension specialist associated with poultry and swine programs were also more knowledgeable of program plans and projections within their program area. Veterinary assistants also seemed to be knowledgeable of their basic program plans and appeared to be following closely some outlined program. During the interviews, it was very apparent that many of the general livestock assistants were providing services to livestock producers, however in many instances they were unable to adequately define program plans specific to their program area.

Many problems are confronted by all assistants associated with the implementation of livestock programs. These are a combination of extension problems compounded with problems of individual producers. Through limited contact with livestock and Veterinary assistants the following problems were identified:

- I. Transportation. The most utilized method of transportation by extension workers in the livestock sector was public transportation

(i.e. bus and taxi). This limits the ability of the assistant's to travel at will in serving livestock producers. There is also a fixed mileage allowance for extension assistants. If travel expenses exceed this limit there is usually no reimbursement.

II. Availability of Livestock Feeds. This seems to be a very common problem of concern to most livestock assistants we visited.

It appears that program implementation for swine and poultry producers involves subsidies or other assistance in acquiring feed. In many instances producers complain to them about the quantity and quality of feed that they receive. Feed cost also appears to be a problem for the small poultry producer. This problem is more critical in areas which are distant from Georgetown.

III. Availability of breeding stock. The Ministry of Agriculture has interest in supplying breeding stock for swine and sheep producers. However many of the extension assistants feel that the lack of new breeding stock hampers the promotion of extension programs in management and breeding.

IV. Producer management. Despite the materials and advice made available to various producers, there is some resentment on the part of the producer to introduce new techniques into his present system of management. Sanitation is one of the major problems, and includes a high incidence of foot rot, pneumonia, scours and parasites.

V. Social Problems: These problems exist primarily with the development of cooperatives, and are generally associated with personal conflicts between individuals and groups involved within the cooperatives.

- VI. Lack of Adequate Grazing Areas. This is a major problem of dairy producers. In several instances animals must be walked two to five miles each day to find adequate grazing areas.
- VII. Cattle pound fees. This is a major deterrent to beef and dairy producers along several areas of the coast, especially between Abary and Crabwood Creek. This pound fee was designed to keep livestock off of the right-of-way along highways and out of areas which produce crops. Persons may catch animals (legally or illegally) and turn it in at assigned stations and receive half of the pound fee which the producer must pay to have his animal returned. This has frustrated many producers, especially those who have had their animals removed several times illegally, and is causing some producers to sell their entire herds.
- VIII. Lack of published or other materials pertaining to livestock production and management.
- IX. Inadequate supervision and coordination from area headquarters to the field staff and lack of communication among the field staff. Many extension assistants receive very few directives which might reflect new administrative policies
- X. Maintaining qualified personnel in the extension service. This is a problem since there is a difference between Ministries in implementing salary scales. A person who works in another Ministry may receive a higher pay scale. Therefore it is always possible for an experienced extension assistant to transfer to another Ministry and receive a higher salary and other benefits.

SUMMARY

In evaluating this study, it is clear that the Ministry of Agriculture, Veterinary and Livestock Section, has attempted to develop appropriate objectives for immediate and future programs within the livestock sector (research, production and extension). Research and production appear to be established priorities. The Ministry through its extension programs have not seriously addressed the problem of producer education, nor has it appeared to involve producer inputs into the design of these livestock objectives. This appears to be quite apparent in that new programs involve the few commercial producers. Government programs and loans are geared to provide additional capital for these producers, therefore the extension efforts will be concerned with supplying technology to these producers, at the expense of lowering the production output of limited resource producers. Major emphasis is also being placed on current producer involvement. However, there are persons with the desire to become livestock producers, who if properly motivated will contribute significantly to the livestock industry.

The objectives of the Veterinary and Livestock section, especially where extension efforts are concerned, should develop a set of detailed objectives such that they address and describe the following: 1) The type of programs to be supported based on established priorities within the livestock sector; 2) Provide estimates, utilizing current costs and reasonable projections, the amount of capital which will be invested in support of priority programs (grants, subsidy's, loans, etc.); 3) Establish guidelines which clearly indicate the types of producers which the program will serve; 4) Interact with the producers (in 3 above)

in an attempt to understand their problems and production objectives. Only then can proper technology be provided; 5) Evaluate the overall contribution of limited resource producers in supplying domestic and export market needs with livestock products; and 6) Support specific research programs which generate a valid technology base for the majority of the livestock producers and provide this technology through a dynamic extension program. The government must be prepared to provide a high input of services in order to increase farm output within the livestock sector..

In addition to developing the objectives mentioned above, the total organization should be structured with positions and individuals which are accountable. This means that within the overall structure of the Veterinary and Livestock section, that there must be specific job descriptions with well defined responsibilities. At present the existing organization is inadequately staffed at all levels (administration and staff). At the administrative level, certain individuals are saddled with too many responsibilities outside of extension. At best, many of their efforts are diffuse. It is also apparent that there are a limited number of persons in the field with extension responsibilities. This further magnifies the problem of accountability.

Many of the extension personnel interviewed during the study appeared for work each day and actually made daily rounds, by physically covering a specific geographical area. Within this area, producers with problems specific to their assigned job (i.e. veterinary assistant, swine and poultry, general livestock, etc.) were contacted. If there were no problems or no producers stopped them during their travel for advice or assistance, the extension assistant passed them by. It would seem that the extension assistant should contact producers and establish

producer confidence during this apparently unutilized time. A relative account of how the extension assistant's time is presented in yearly reports to The Ministry of Agriculture. Since this is the case, it is impossible to accurately determine the type of services needed by livestock producers and if these services were actually provided by the extension assistant.

There must be more frequent and more effective methods utilized by the extension personnel in order to inform producers of more efficient technology for livestock production. In most instances, small livestock producers are already obtaining from their animals about as much as can be expected. This is the point where an innovative extension worker would attempt to make an input of a new service in order to improve producer efficiency. This does however require an understanding of the producer, his objectives, capabilities, and resources. At present, most of the information which is available to producers is presented through personal contact with extension assistants. There are few published reports or information leaflets available to producers, nor is there frequent use made of public radio. Currently there are six newspaper supplements per month which address various agricultural topics. This however is not specific to the needs of livestock producers. The Ministry is conscious of this weakness, and is attempting to initiate livestock seminars and to re-vitalize its efforts to publish an extension newspaper. One person has been trained in communications in order to facilitate this change. To supplement these efforts, there must also be other techniques used to educate current and young livestock producers (i.e. demonstration farms, inservice training, agricultural field days and on the farm demonstrations). This would serve as a supplement to the implementation of new management techniques and procedures.

Some consideration should be given to more efficient methods of transportation for extension assistants, since they are assigned to areas which are relatively large for one individual to thoroughly serve. This may be compensated for though by having livestock assistants function as generalists and serve a small geographical area to support all livestock and poultry. Specialized assistance could be provided as requested. Workers could be kept current in management, production, health, etc. through the use of quarterly seminars. Information from these seminars could then be provided on a limited scale to livestock producers in mini-seminars scheduled in selected areas along the coast.

Veterinary Officers should schedule weekly staff meetings to plan and discuss plans for the week. There should also be individual meetings between the Veterinary officers and individual staff to evaluate activities implemented and provide assistance in problem solving when necessary. This would allow the Veterinary Officer to take a closer look at job assignments and make recommendations for additional specialized training as appropriate.

APPENDIX

Appendix I

Interview Date _____

By _____

211-d Livestock Project

TUSKEGEE INSTITUTE
CARVER RESEARCH FOUNDATION

Extension/Producer Survey
For
Areas of Guyana, South America

Extension Specialist

Name _____

Title _____

Area(s) Served _____

Extension Experience _____

1. Livestock Extension Plans for the Area(s) Served.

2. Approximate Number of people served? _____

Percent (%) involved in livestock production _____

Are they cattle producers, sheep and goat producers _____

Swine Producers, poultry producers, diversified producers _____

3. Major livestock extension problems?

A.

B.

C.

D.

4. Recommended solutions to problems (in No. 3)
 - A.
 - B.
 - C.
 - D.
5. What type follow-up is used for producers having problems?
6. How is your time spent (schedule/day or/week).
7. What is the extent of supervision and directives received from Georgetown?
8. Is new information presented to livestock producers (i.e. extension leaflets, radio announcements, field days, personal contact, etc)?

9. Do you keep written records of your extension duties to livestock producers (i.e. person visited, date, problem, recommendation, letters, etc).
10. Do you have a budget to support your extension activities (travel, drugs, etc)? _____: How is the budget spent?
- A.
 - B.
 - C.
 - D.
11. Are you satisfied with the program support from Georgetown? Why or Why not?

Appendix II

STAFF LIST

VETERINARY AND ANIMAL HUSBANDRY DIVISION

Dr. P. Fernandes	- Principal Veterinary Officer
Dr. R. Raja	- Veterinary Officer (Berbice)
Dr. P. McKenzie	- Veterinary Officer (on Secondment to Livestock Proj.)
Dr. S. Ramudit	- Veterinary Officer (Georgetown from 1st March)
Dr. E. Sanford	- Veterinary Officer (East Demerara)
Dr. L. Applewhaite	- Veterinary Officer (Rupununi from 1st March, 1974)
Dr. J. Smart	- Veterinary Officer (Essequibo)
Dr. A. Fox	- Veterinary Officer (Georgetown)
Mr. C. Edwards	- Livestock Officer (Matthew's Ridge)
Mr. P. D. Persaud	- Livestock Officer (A.I.)
Mr. G. Nurse	- Livestock Officer (Dairy and Grassland)
Mr. V. McPherson	- Livestock Officer (Ebini)
Mr. D. Fung-On	- Livestock Officer (Swine and Poultry)
Mr. N. Holder	- Livestock Officer (Ebini)
Mr. D. Juigoo	- Livestock Assistant (Poultry Special)
Mr. C. Shaw	- Livestock Assistant (Swine - Credit Scheme)
<u>Waini Region:</u>	
Mr. C. Percival	- Livestock Assistant (Nosororo/ Maharuma)
<u>North West Region:</u>	
Mr. C. Edwards	- Livestock Officer (Matthew's Ridge)
Mr. L. A. Amsterdam	- Farm Manager (Matthew's Ridge)
Mr. Carmichael	- Livestock Assistant (Kaituma)
Mr. J. Smith	- Livestock Assistant (Grasslands - Matthew's Ridge)
<u>Coastal Plain Region - Berbice:</u>	
Mr. E. Mandat	- Artificial Inseminator (No. 51 to Crabwood Creek)
Mr. L. Dropaul	- Livestock Assistant (Nos 42 Crabwood Creek Villages)
Mr. K. Meyers	- Livestock Assistant (No. 11- 48)
Mr. C. James	- Livestock Assistant (New- Amsterdam - East Bank Berbice)
Mr. L. Williams	- Livestock Assistant (Poultry Swine, Corentyne)

- Mr. Keece - Livestock Assistant (Rosignol/Dush Lot)
- Mr. S. Bacchus - Livestock Assistant (Dush Lot/Abary)
- Miss C. Bachai - Livestock Assistant (New Amsterdam - No. 11 - Canje)
- Mr. S. Johnson - Livestock Assistant - Swine & Poultry (Rosignol - Abary)

East Demerara:

- Dr. E. Sanford - Veterinary Officer (Non Repos)
- Mr. W. Lynch - Livestock Assistant - Swine (Plaisance - Abary)
- Mr. G. Rasul - Artificial Inseminator (Abary/Mahaicony Bridge)
- Mr. H. Khan - Livestock Assistant (Mahaicony-Abary and Creeks)
- Mr. J. Dottin - Livestock Assistant (Swine) - (Non Repos)
- Mr. F. Richmond - Livestock Assistant (Mahaicony/Mahaicony and Public Creeks)
- Mr. K. Cumberbatch - Livestock Assistant (Non Repos - Selkir)
- Mr. J. Sexton - Livestock Assistant (East Demerara Mahaicony Non Repos)
- Mr. P. Persaud - Agricultural Officer (A.I., Non Repos)
- Mr. C. Hinds - Artificial Inseminator (Non Repos)
- Mr. S. Mohabir - Livestock Assistant (Dairy Extension)
- Mr. L. Ramsarraj - Livestock Assistant (Dairy Farm) (on study course)
- Mr. A. Clarke - Livestock Assistant (Dairy Farm)
- Mrs. Bynes - Livestock Assistant - Poultry (Upper East Demerara)

East Bank Demerara:

- Dr. S. Mamudith - Veterinary Officer (East Bank)
- Mr. M. Assad - Artificial Inseminator
- Mr. R. Sivari - Livestock Assistant
- Mr. C. Johnson - Livestock Assistant (Swine)
- Mr. J. Burnett - Livestock Assistant (Moblissa Dairy)
- Mr. B. Luke - Livestock Assistant (Moblissa Dairy) on study course.

West Demerara:

- Dr. S. Mamudith - Veterinary Officer
- Miss W. Vossanah - Livestock Assistant (Swine)
- Mr. W. Daniels - Livestock Assistant (West Bank and Polders)
- Mr. D. Jagdeo - Livestock Assistant (West Coast)
- Mrs. H. Roberts - Livestock Assistant (Poultry)

Essequibo Coast and Islands:

Dr. G. Smart - Veterinary Officer
Mr. M. Nichols - Livestock Assistant (Swine)
Mr. I. Simpson - Livestock Assistant
Mr. H. Singh - Livestock Assistant (Anna Regina/
Charity)
Mr. G. James - Livestock Assistant (Essequibo Islands)
Mr. P. Randoen - Artificial Inseminator (Laguana/Wakenaia)
Mr. B. Batson - Livestock Assistant (Poultry)
Mr. P. Lakose - Artificial Inseminator (Coast)

Upper Mazaruni Region:

Dr. G. Smart - Veterinary Officer
Mr. I. Simpson - Livestock Assistant

Central Mazaruni Region:

Dr. G. Smart - Veterinary Officer
Mr. I. Simpson - Livestock Assistant
Mr. C. Adams - Livestock Assistant (Bartica)

Essequibo Islands:

Mr. G. James - Livestock Assistant

Geosdyke/Linden Region:

Dr. S. Ramdutt - Veterinary Officer
Mr. C. Johnson - Livestock Assistant (Swine)
Mr. M. Assad - Artificial Inseminator
Mr. A. Tiwari - Livestock Assistant

Banin/Para/Mahaicony Region:

Dr. E. Sanford - Veterinary Officer

Intermediate Savannahs Region:

Dr. H. Raja - Veterinary Officer
Mr. W. Holder - Livestock Officer
Mr. V. McPherson - Livestock Officer

Upper Berbice River:

Dr. H. Raja - Veterinary Officer
Mr. C. James - Livestock Assistant
Mr. W. Holder - Livestock Officer (Ebini)
Mr. V. McPherson - Livestock Officer (Ebini)
Mrs. L. McPherson - Agricultural Assistant (Ebini)
Animal Nutrition Laboratory

Pakaraima Region -

South Muanuni Savannahs

- Dr. L. Applewhite - Veterinary Officer (Moritzoro)
- Mr. M. Dorn - Livestock Assistant (Abattoir)

Kanuki/Kawuni Region -

South Muanuni Savannahs:

- Dr. L. Applewhite - Veterinary Officer
- Mr. Pedro - Livestock Assistant

New River/Upper Essequibo Region:

- Dr. N. Raja - Veterinary Officer

Riverain Region -

Mara:

- Dr. N. Raja - Veterinary Officer
- Mr. L. Williams - Livestock Assistant (Swine)
- Mr. E. Randatt - Artificial Inseminator
- Mr. C. James - Livestock Assistant

Canjeia:

- Dr. N. Raja - Veterinary Officer
- Mr. L. Williams - Livestock Assistant (Swine)
- Mr. E. Randatt - Artificial Inseminator
- Miss Scheel - Livestock Assistant

Libary/Mahicany Creeks:

- Dr. E. Sanford - Veterinary Officer
- Mr. W. Lynch - Livestock Assistant (Swine)
- Mr. M. Khan - Livestock Assistant

Mahicany River:

- Dr. E. Sanford - Veterinary Officer
- Mr. W. Lynch - Livestock Assistant (Swine)
- Mr. T. Richmond - Livestock Assistant

Essequibo Islands:

- Dr. G. Smart - Veterinary Officer
- Mr. G. James - Livestock Assistant

Veterinary Laboratory:

- Mr. N. Sawh - Agricultural Assistant (Lab.)

APPENDIX III-A

REPORT

ON

LIVESTOCK SURVEY OF GUYANA

BY

Duke Bourne

May 8, 1974

Report on Livestock Survey of Guyana

By

Duke Bourne

May 8, 1974

During the period in which the survey was conducted, the greatest problem was the response to certain questions which were not responded to or for which were not responded to or for which responses were questionable are listed:

1. Size and description of
2. Income
3. Land Tenure i. e. acres owned and or rented.

Cattle producers were the most reluctant to answer these three questions however, sheep and goats, poultry and swine producers were most responsive and are ranked according to their willingness to respond more difficult to less difficult.

The difficulty encountered was due in part to the fact that the survey was not well publicized before hand. As a result, most farmers thought that its purpose was for taxation. The employment of a person intimate with the area being surveyed would have reduced the problems encountered on the coast. In the Rupununi, such a person was employed and was able to identify farmers who met the requirements of the survey. He was most useful in communicating with some of the Amerindian producers because he spoke their language.

The problems encountered by livestock producers varied greatly within the regions interviewed. These problems are dealt with by areas:

I. Rupununi

- A. There is free movement of cattle and people across the border between Guyana and Brazil. Farmers are claiming that their cattle are stolen and driven over the Brazilian border. This free movement needs to be considered whenever controlled measures for animal diseases are implemented.
- B. With the Amerindian producers, improved management practices with cattle do not exist. The large ranchers differ from the Amerindians in that they use somewhat better management, but the overall management in the Rupununi is low.
- C. The presence of the extension agent is not felt in most villages and in some villages he has never been seen. Villages in the Rupununi are very far apart and in order for the extension agent to perform efficiently, he must have motor transportation.
- D. The animals suffer from nutritional problems due to poor pasturage caused by overgrazing and also because little or no mineral supplements are used.
- E. The small rancher - Amerindians - are conscious of the fact that their stock lack improvement, but do not seem to know the procedure to use in obtaining improved breeding stock.

II. E. B Demerara

Unlike the Rupununi which concentrates on beef cattle, this area concentrates on the production of poultry and swine.

A. Swine Production

1. Most of the swine producers are involved in co-ops. The remainder of the producers can be said to be knowledgeable of the workings

of the swine co-op. Most of the co-op members have their own pens and prefer this system to the alternative in which there is one large pen owned and managed by the co-op.

2. Swine co-ops are contracted to sell all the finished swine to the Guyana Marketing Corporation (G.M.C.). Most of the producers seem to be satisfied with the present price paid to them by G.M.C.
3. Swine producers complain of low quality feed sold by the feed factory on E.E. Demerara. This has affected some producers to such an extent that they are considering closing their farms.
4. Management of swine appears good and seems to be improving. This can be credited to the Extension agents and personnel at the G.M.C. some swine producers seem to be aware of the latest information on swine production and management.
5. Specialization is rare. Most producers breed the sows and fatten the offsprings. No producer sells at the weaning stage or buys weaners and sells them as fatteners.

B. Poultry Production

1. Generally production is done on a large scale. Producers are composed of individuals or small companies which have access to the necessary capital to invest.
2. Most producers have a very good system of management and own their marketing outlets.
3. The large concentration of producers in this area makes it necessary to use large amounts of drugs to decrease the incidence of disease.

III. E. C. Demerara

A. Cattle Production

1. Cattle production is dual, but its main purpose seems to be for

milk production.

2. A. I. is frequently used by producers. This service is provided by the Government Extension Service. Complaints have been made that the offspring from A. I. are not as good as expected. However, there are more complaints in regards to percent conception.
3. Not much use is made of the factory mixed feeds. Basically, home mixed feeds using rice by products are used. The main reason for not using commercial feeds seems to be the comparative cost of these feeds.
4. Pasture is the main source of feed and normally there is village land set aside for grazing cattle. This land does not have improved grasses and in order to supplement these unimproved pastures some producers cut excess grass from other lands to feed their cattle.

B. Sheep and Goats Production

1. Very little management is being utilized and has resulted in a great amount of inbreeding and eventual reduction in body size of animals. No land is set aside for pasturage so the herd is allowed free grazing. This increases the incidence of stealing. Herd expansion rests greatly on the availability of pasture.

C. Swine Production

Same as E. B.

D. Poultry Production

Same as E. B.

Demerara, however the system of management is lower.

IV. E. B. Berbice

This area is predominantly used in cattle production. With some of the cattlemen also being rice farmers.

A. Cattle Production

1. Transportation in this area is a big problem. The E. B. Berbice road is passable only during the dry season and even during this time the the flow of traffic is not heavy.
2. Very few cattlemen have less than 30 head of cattle and they are usually single producers. In some areas, although the cattlemen are related to each other mutual distrust prevents them from combining as a group and forming co-ops.
3. There does not seem to be much pressure on pastures by rice cultivation and measures to improve pasture would be beneficial to the cattlemen.

V. Corentyne

A. Cattle Production

1. Shortage of land for pasture does not seem to be a problem for cattle producers.
2. Cattlemen are very critical of the law which prohibits the slaughter of female cattle. While they all know and understand the reason for the law, its enforcement is creating financial problems for them.
3. The pound fee is a source of great concern to cattlemen they claim that their cattle is deliberately removed and carried to the pound.
4. Rustling from big cattlemen is reduced to some extent because some of them employ a stockhand to keep watch over the herd.

B. Sheep and Goat Production

Same as E. B. Demerara

C. Poultry Production

1. The main market is New Amsterdam with the important sources being the hotels and restaurants.
2. Georgetown is the main source of supply for purchasing baby chicks by producers.
3. A good system of management is being utilized.
4. Although serviced by a livestock assistant, most poultry producers are talking about a specialized poultry officer, because they realize that there is need for more specialized information.

D. Swine Production

Same as for E. B. Demerara

APPENDIX III-B

Livestock Survey Report

by

Wilbur Weever

May 8, 1974

Livestock Survey Report

By:

Wilbur Weever

May 8, 1974

Tuskegee Institute in conjunction with Ministry of National Development and Agriculture conducted a survey with livestock producers in Guyana, South America during the period May 13 and July 9, 1974.

The survey dealt with livestock population, land utilization, government related programs and related sociological problems. The producers surveyed, should have been selected from the recent agricultural census, but since the information was not available random sampling was done in various areas surveyed.

In the areas of East Bank Demerara, West Bank Demerara, West Coast Demerara, East Coast Demerara, West Coast Berbice, Corentyne Coast and East Bank Berbice random sampling was done with farmers within a half mile distance every four and one half miles from a specified area (starting point). In Rupununi and Black Polder all farmers who had the required number of livestock were interviewed.

In conducting the survey in Guyana local interviewers were to be utilized however, it was difficult to find persons, knowledgeable of livestock production in these areas which could have been utilized. Therefore, the interviews were done by the Tuskegee Team with limited assistance from the extension service.

In most of the villages south of Lethem and in two villages north of Lethem Rupununi eighteen producers were interviewed. The names of farmers, who

were unavailable for the interview, were also collected, and the number of animals which they had was tabulated.

In the Rupununi we were guided by an Amerindian who knew the area and the farmers. Since he knew the producers, they were not very suspicious about us with regards to our reason for collecting the information. Most of them felt that it was for income tax purposes, but with the help of the guide the feeling was reduced considerably.

In the Rupununi there were also some producers who could not speak in English, so the guide was used to translate the questions into the appropriate language. However, he at sometimes misinterpreted the questions and the farmers either answered wrongly or not at all.

Questions that dealt with livestock numbers, land utilization and marketing products were at most times, being guessed by farmers for fear of income tax purposes and also due to the fact that no records were kept. The other questions were fairly well answered in the Rupununi District.

On the coastlands we worked in several areas on East Bank Demerara, East Coast Demerara and West Coast Berbice and some problems with the farmers were encountered. At this time the Ministry of Agriculture provided extension agents to assist us in conducting the survey. With their assistance fewer problems were encountered.

Most of the people were still hesitant in answering our survey questions. In some cases inaccurate information was given in regards to livestock numbers, especially when classes of livestock were confused with total number. Since most producers thought that we were taking tax information they gave misleading answers on the number of animals marketed and the income received.

On the East Bank Demerara, West Bank Demerara and West Coast Demerara no

livestock assistants assisted us. The farmers in those areas were known to me because of my employment in those areas several years ago. In these areas the questionnaires were well answered.

In Black Bush Polder Farmers were interviewed in two areas, Yokusar and Mibikuri with the assistance of the field of foreman. Questionnaires in these areas were answered, because of the fact that it is a settlement scheme and the field foreman knew what the farmers had.

In some areas where the livestock assistants assisted, the questions that pertained to their activities were not well answered by the farmers, because of the presence of the livestock assistants who at most times influenced the farmers to answer the questions for their benefit.

Observations

Questions on number and performance and marketing of products with regards to cattle, pigs, poultry, sheep and goats were to a great point inaccurate for fear of income tax purposes. The answers can give us an idea of what they have and how many they market and also to whom they sell and what price they receive. But, for accuracy the figures should not be used.

It was my observation also that question G. 4a. should not be considered seriously in the Rupununi and the coastlands. I was made to understand that extension agents do visit the farmers, but the farmers would know them by names and not as "extension agents", or field assistants.

The questions on income received from sale of livestock was to a great point inaccurate too, for fear of income tax purposes.

However, from this survey a lot of information was gathered and from it one can understand greatly what the problems of the farmers are and also what information services and assistance they need to make their agricultural ventures viable ones.

APPENDIX IV

OUTLINE OF DISCUSSIONS AT TUSKEGEE INSTITUTE

Between

Mr. John Browman

Ministry of Agriculture, Guyana, South America

and

Drs. Glenn Howze & George Cooper

Tuskegee Institute

August 2, 1974

TENTATIVE OUTLINE

SURVEY OF LIVESTOCK PRODUCERS IN GUYANA

I. INTRODUCTION

- A. General statement about nature of project
- B. The purpose of 211-D
- C. Tuskegee's role in 211-D
- D. The selection of Guyana as a study site
- E. Statement of research objective

II. REVIEW OF LITERATURE CONCERNING LIVESTOCK PRODUCTION IN GUYANA

- A. History of livestock production in Guyana
- B. Census data on livestock and livestock producers
- C. Research and technical reports concerning livestock and livestock producers in Guyana

III. METHODOLOGY

- A. Selection of geographic area to be studied
- B. Sampling procedures
- C. Methods of data analysis

IV. REPORT OF FINDINGS IN THE CATTLE PRODUCTION IN THE RUPUNUNI DISTRICT

- A. Cattle production in the Rupununi District
 1. Land tenure in the Rupununi
 2. Herd characteristics--size, breeds, mobility, number sold, etc.
by age-sex groupings
 3. Reproduction--breeding program, calving rates, etc.
 4. Nutrition
 5. Health practices and problems
 6. Marketing data
 7. Record keeping
 8. Socio-economic characteristics of producer
 9. Involvement with and attitudes toward extension & other government programs

B. Beef and Dairy Production in the Coastal Area

1. Land tenure
2. Herd characteristics--size, breeds, mortality, number wold,
etc. by age-sex groupings
3. Reproduction
4. Nutrition
5. Health practices and problems
6. Marketing data
7. Record keeping
8. Socio-economic characteristics of producers
9. Involvement with and attitudes toward extension and other
government programs

C. Swine Production in the Coastal Area

1. Land tenure
2. Litter characteristics
3. Breeding program
4. Health practices and problems
5. Nutrition
6. Marketing data
7. Socio-economic characteristics of swine producers
8. Involvement with and attitudes toward extension and other
government programs

D. Poultry Production in the Coastal Area

1. Herd characteristics
2. Feeding and management practices
3. Health data
4. Marketing data
5. Socio-economic characteristics of poultry producers

E. Sheep and Goat Production in the Coastal Area

- 1. Hard characteristics**
- 2. Nutrition and management**
- 3. Health data**
- 4. Marketing data**
- 5. Socio-economic characteristics of producers**
- 6. Involvement with and attitudes toward extension and other
government programs**

V. RECOMMENDATIONS

VI. Summary and Conclusions

APPENDIX V

REPORT OF PROGRESS ON COOPERATIVE GUYANA AGREEMENT
USAID 211(d) GRANT ON TROPICAL RUMINANT LIVESTOCK PRODUCTION
July 1, 1974 - December 31, 1974

A major data collection activity in Guyana was undertaken by the various members of the 211(d) Consortium in Guyana during the first six months of 1974. Therefore, there was no in-country activity during the six month period covered by this report. Work was focused on the tabulation and analysis of data obtained during the first half of 1974, on the integration of this additional information into the modelling activities of Texas A&M and Purdue University, and on further development of the herd model by Texas A&M and the industry model by Purdue. As data tabulation, analysis, and modelling efforts progressed additional information needs were identified, and plans were made for additional field work in early 1975. Communication among Consortium members has been maintained through exchange of reports, direct communication for exchange of ideas and through Consortium meetings. Specific activities and progress of individual Consortium members will be discussed below.

Texas A&M University

Data collected on beef cattle production by J.M. Davis at Ebini, Matthews Ridge, and the Rupanuni supplemented by data from the World Bank Project have been organized. Data has been punched on computer cards. These data will be used to establish a basis for simulating alternative beef cattle production systems in the Texas A&M model. Data

were also made available to Purdue for use in development of production alternatives for initial runs with the industry model.

The Texas A&M herd model was completed to an initial stage and subjected to validation. Although the model performed well in the validation test, further consideration of actual production conditions in Guyana led to the conclusion to modify the nutritional component rather intensively and to make minor modifications in the reproduction component. The herd composition component did not require alteration.

Modifications to the model will be completed during the first half of 1975 and testing and validation of the model will be initiated. As soon as this step is completed alternative production systems will be evaluated. These simulations will be chosen to be feasible for Guyana and with parameters appropriate with the various regions of Guyana.

The veterinary personnel at Texas A&M concentrated on analysis of data obtained in their livestock disease survey in Guyana. Preliminary findings were organized into a report which was made available to other members of the Consortium and to Guyana. Work has continued on analysis of sample results and a final report will be forthcoming during the first half of 1975.

Tuskegee Institute

Data was punched on computer cards and tabulations made and organized into a preliminary report of findings from the livestock producer survey conducted in the summer of 1974. The questionnaire used in this survey had input from all members of the Consortium and was especially designed to provide data needed by Tuskegee in their work on sociology and extension, and by Purdue and Texas A&M in definition of production

systems. A preliminary summary of findings was made available to consortium members and to Guyana. In addition, the raw data pertaining to production practices were made available to Purdue University for further analysis and incorporation into the industry model. Plans were made for a survey of livestock extension workers. This survey will be conducted during the first half of 1975.

University of Florida

A workshop was organized and conducted at Gainesville in August of 1974. The purpose of this workshop was to discuss the approach to modeling of forage production systems. Representatives from the four member institutions participated in the workshop. Tentative agreement was reached on the critical aspects of forage production and nutrient inputs necessary to represent livestock nutrition in the production systems for both the Texas A&M and Purdue models. Mott and Conrad, drawing upon Florida's prior experience in Guyana and in the tropics in general, have served as resource persons for Texas A&M and Purdue in their modelling of livestock production systems.

Purdue University

Emphasis has been on development of the industry model for Guyana. Data obtained during the summer of 1974 by Purdue, Texas A&M and Tuskegee as a result of field work conducted in Guyana were organized and used as a basis for structuring both production and marketing aspects of the model. Additional data needs were identified and plans made for more field work to be conducted in the first half of 1975. A conceptual framework for the industry model was developed and programming of the computer model was initiated. A sub project for economic analysis of alternative sizes for slaughter facilities has been initiated. Preliminary discussion were carried on with Mr. Dukhia of the University of Guyana with respect to the conduct of a study of beef demand in Guyana. The initial version of the Texas A&M model was converted from DYNAMO to FORTRAN to facilitate utilization on the Purdue computer and linkage with the Purdue model. The FORTRAN version was made available to Texas A&M and subsequent work will be done in FORTRAN.

The plans for the first half of 1975 include additional field work to obtain necessary information to complete modeling, initiation of the

beef demand study, completion of the economics to size study for slaughter facilities, and completion of the industry model in a preliminary form. The industry model will be used in a workshop framework with Consortium members in the U.S. to identify major problems and deficiencies. A workshop in Georgetown will then be organized for evaluation of the model in cooperation with the Guyanese. This will provide a basis for further modification and improvement of the model as a policy analysis tool.

APPENDIX VI

**SOME COMMON FORELIMB DISEASES
IN THE EQUINE**

Paper Presented by

Dr. C. L. Padmore

August 11-17, 1975

at the

Caribbean Veterinary Conference

Port of Spain, Trinidad

APPENDIX VI

Some Common Forelimb Lamenesses in the Equine

For the full time equine practitioner, as well as for the veterinarian who sees only an occasional pleasure horse, lameness presents one of the most frequent problem condition.

Forelimb lameness are much more common than hindlimb lameness. This is due to the fact that the forelimbs of the horse bears 60-65% of the body weight. Some work on telemetry on the equine foot disclosed that a 1000 lbs. horse running 3/8 of a mile in 34 secs., with a 110 lbs. jockey on his back expends about 1,850,000 foot pounds of energy most of which is transmitted to the forelimbs. Because of their weight bearing factor the forelimb of the equine is subjected to more injuries from trauma and concussion. Another important factor regarding forelimb lameness which is often overlooked is that the forelimb also aid in the propulsion of the animal's body and many injuries are known to occur at that particular phase of the stride.

What I propose to do this afternoon is to discuss with you some of the more common forelimb lameness that we see in the equine. I will not spend too much time on the symptoms, but will discuss them very briefly, as we go along I will try to point out some of the more salient features.

In our clinic we try to impress on our students the development of a sequence in the examination and diagnosing of lameness. First we try to determine which leg is affected; second we try to locate the area involved; third we always try to determine what the lesion is. Because 80% of all equine lamenesses can be traced directly or indirectly to the feet this area is often times the first area examined and as such this is an excellent area to begin.

Slide 1 - Puncture Wounds of the Sole and Subsolar Abscess is the result of the horse stepping on a sharp object, such as this nail, or on a three cornered rock which could break a dry sole.

Lameness is the most consistent finding with a puncture wound of the sole. The lameness may not develop immediately after the puncture has occurred, but when the accumulation of exudate is sufficient to cause pressure the horse will exhibit an obvious lameness. As the exudate accumulates the horny sole is undermined from the corium and the exudate will drain at the heel.

Treatment - The original puncture site in the sole should be pared out in a conical fashion at least 2 cm in diameter. The entire undermined area should be removed. If

the subsolar abscess is small or the related structures of the foot are not involved the horse will go sound as soon as the abscess is opened.

Medical treatment of puncture wounds and subsolar abscess varies widely. Soaking the foot in a super-saturated solution of magnesium sulfate, or applying a poultice are beneficial procedures until the acute inflammation has subsided. In our clinic simple puncture wounds have been successfully treated by packing the pared out area of the sole with iodine crystals and placing a few drops of turpentine on the crystals - this produces a cauterizing effect. As soon as the wound is dry and there is no evidence of exudation around the edges of the pared sole, a shoe with a full leather pad (Slide 2) may be applied. Before the pad and shoe are applied, the sole should be packed with pine tar and oakum. Warm pine tar should be poured under the pad twice weekly until the shoe is reset in 4 to 6 weeks. In all cases of puncture wound or subsolar abscess the administration of tetanus antitoxin or a tetanus toxoid booster (if the horse is permanently immunized) and antibiotics are indicated. In cases where the leg is swollen a support bandage and phenylbutazone are beneficial.

Laminitis

Laminitis is a very common cause of lameness in our area. All four feet may be affected but the front feet are primarily involved.

Laminitis is thought to be caused by multiple conditions, but the most common form encountered is due to an enterotoxemia. This can be due to overeating of grain or a post-parturient infection. Two forms of laminitis are observed. These are the acute and chronic forms. Acute laminitis is characterized by rapid development. If all four feet are involved the horse will refuse to stand, and if forced to walk the gait will be a shuffle with an occasional stumble. There is increased heat in the feet and a bounding digital pulse. Other signs of toxemia such as an elevated temperature, infected mucous membranes, diarrhea or constipation, and muscular tremors may be evident. In chronic laminitis, the acute phase has passed and the horse has recovered from the initial laminitis. This form is manifested by:

1. Increased hoof production (Slide)
2. Rotation of the third phalanx (Slide)
3. Convexity of the sole (Slide)
4. Disruption of the white line (Slide)

Treatment - Laminitis, no doubt, has been treated with as many different preparations as any condition and the results have been quite variable.

In view of recent findings, however, the method of treatment now being used by practitioners is that proposed by Dr. James Coffman at the University of Missouri who has done extensive work in this area.

Cases of acute laminitis should be treated as emergencies to prevent severe damage to the laminae of the feet. Therapy is centered around:

1. Evacuation of the gastrointestinal tract - Mineral oil
2. Anesthesia of the palmar nerves - this decreases peripheral resistance and allows exercise on a soft surface. This in turn provides compression of the digital cushion, which enhances venous return. Anesthesia of the digit is best accomplished by depositing 3 to 5 ml. of 2% xylocaine over the palmar nerves as they cross the abaxial surface of the proximal sesamoid bones.
3. Administration of glucocorticoid steroid - (Dexamethasone 20mg/100 lbs B.W. I.V and 200 mg/200 lbs B.W. I.M.) this decreases platelet aggregation, maintains RBC elasticity, enhances capillary perfusion, and protects capillary integrity. However, glucocorticoid steroids predispose to secondary infection and inhibit protein synthesis. Therefore the use of steroids beyond the second day is contraindicated.
4. Administration of Phenylbutazone - this drug has properties similar to the glucocorticoid steroids but has the added advantage of producing analgesia and even more important is the fact that it does not predispose to secondary infection and does not seriously inhibit protein synthesis (dosage 200 mg/100 lbs I.V., or 1 gm/250 lbs orally up to 5 days)
5. Provision of a methionine substrate - this is an important part of the therapy since cell maturation in keratin synthesis has been described as a methionine-dependent system. (Dose 10 gm daily for 4 days followed by 5 gm daily for 10 days is satisfactory for a 1000 lb horse).
6. Administration of parental antibiotic - to prevent secondary infection.

In chronic laminitis therapeutic shoeing is very helpful in prolonging the usefulness of these animals.

The basic concepts for therapeutic laminitis shoeing:

1. Remove the excess hoof
2. Relieve the wall to ground pressure in the toe region
3. Lower the heel
4. Provide constant and diffuse sole pressure

Slide - this shows the excess hoof to be removed

Slide - this compares trimmed and untrimmed hoofs

Slide - relief of wall to ground pressure in the toe region by removing a section of toe. Another method of doing this is to remove the section from the toe of the shoe - so-called "floating toe shoe".

Slide - the heel should also be lowered in an effort to correct the rotation of the third phalanx.

Slide - Acrylic powder and fluid (distbd. by H.D. Justi and Sons, 32 and Spring Garden Streets, Phila. Penn.), mixing cups and wooden stirrers, along with aluminum foil which is used to keep the acrylic on the foot until it hardens.

The acrylic powder which is supplied as a polymer, is mixed with the fluid which is a monomer in a 2:1, or 3:1 mixture which hardens in 6 to 10 minutes.

Slide - the foot is prepared for shoeing and the shoe is nailed in place. Although regular shoes can be used satisfactorily, I find that a shoe with a two inch bar will hold the acrylic in place better. A piece of adhesive tape around the wall and onto the shoe will prohibit escape of liquid acrylic out the toe space and will facilitate its filling with acrylic.

Slide - the sole is being moistened with the fluid, this increases the adhesion of the acrylic to the sole.

Slide - the acrylic mixture is prepared before the sole is moistened and is poured onto the sole immediately after it is moistened.

Slide - the sole is filled to overflowing so that an excess of acrylic will be present to be forced under the shoe.

Slide - Aluminum foil is placed over the acrylic filled sole and around the hoof to confine the semifluid.

Slide - This is the finished product

Navicular Disease

This condition may be related to heredity, concussion, conformation or trauma.

Navicular disease invariably involves only the forefeet - this is probably due to the fact that the forefeet is subjected to more weight and receive more concussion during work.

The animal often has a history of intermittent lameness that improves upon rest and warms out. Unilateral involvement results in pointing of the affected foot while bilateral involvement may produce alternate pointing or an extended stance of the forelegs. If the animal is observed in motion it will be noted that there is a tendency to land on the toe of the foot to avoid concussion. Because of this the anterior phase of the stride is shortened, the toe worn, and the heels are contracted in long standing cases. Because of the choppy, shuffling gait, a common complaint by the owner is that the horse is lame in the shoulders.

Slide - The hoof testers are very effective in diagnosing cases of navicular disease as the animal will exhibit signs of pain over the central third of the frog and over the ends of the navicular bone.

Slide - Posterior digital nerve block is also commonly used to differentiate this condition from other involvements of the foot. The horse with navicular disease will show as much as a 90% improvement in the gait following this procedure.

Slide - This shows the radiograph of a normal navicular bone.

Slide - In cases of navicular disease there may be osteoporosis enlarged vascular channels, exostosis, narrowing of the articular space, osteolysis and sclerosis.

Treatment - There is no really effective treatment for navicular disease. Injection of steroids into the navicular bursa has been advocated but the relief it produces is only temporary.

The only treatment that will give any lasting result for active use of the horse is posterior digital neurectomy.

However, in the U.S. there are numerous racetracks that do not permit denerved horses to race. Another common sequela to this condition is neuroma formation.

Corrective shoeing has been shown to be very effective in prolonging the usefulness of horses with navicular disease. In preparation for the shoe the foot should be properly trimmed and balanced. The heels should be raised by the use of heel calks or by thickening the heels of the shoe. A bar or leather pad should be used to protect the frog from pressure, and the toe of the shoe should be rolled to provide easier breakover. The branches should be slightly beveled to the outside and the nails placed more forward, these two factors allow the heels to spread thus preventing contracted heels

In animals manifesting signs of severe pain the administration of Butazolidin is indicated.

Fracture of the Third Phalanx

This condition is usually accompanied by acute onset of lameness (the animal may pull up lame, however, in the majority of cases the lameness is observed after the animal cools out). The foot is hot, there is pounding of the digital pulse, and there is pain on application of the hoof testers. This pain may occur all over the foot, but there is usually one area which is more sensitive.

In cases of fracture of the third phalanx the lameness will improve with tubing, steroids, Butazolidin and rest, but will usually reoccur when the animal is put back in training.

In many cases the fracture may not be observed radiographically for the first 3 days or so following its occurrence and as such re-examination is indicated in about 10 to 12 days later.

Slide - Most fractures of the third phalanx also involve the pedal joint and as such there is usually some degree of degenerative joint disease.

Treatment - Most fractures of the third phalanx will heal with time (6-12 months) if properly handled. In these cases the foot may be used as a cast by applying a standard bar shoe with side clips near the heel - this prevents the heel from spreading and contracting. The nails should also be placed well back and the animal confined to a box stall or small paddock for about 30 to 60 days. At the end of three months the side clips may be removed, but the bar shoe should be continued. At this time the animal may be placed in a larger paddock. At the end of six months continue to

use the bar shoe, but place the nails farther forward. Progressive radiographs should be taken every 3 to 4 months to evaluate healing.

Fracture of the First and Second Phalanges

This is a common finding in the racing Thoroughbred. This type of fracture is due to twisting and compression of the phalanges at the time the foot lands.

Treatment consists of placing a plaster paris cast on the affected area with the limb in normal flexion. The cast should be left on for a minimum of 5 weeks during which time it may require two or more changes to keep it snug enough to limit movements of the bones. In recent years the use of compression screws utilizing the lag principle has been shown to be very effective in treating spiral fractures of the phalanges. The horse should not be worked for at least six months. Once healing has occurred, the foot should be kept properly trimmed and shod with a full roller motion shoe. The horse should not be worked heavily in this type of shoe, which aids in the breakover of the foot and eliminates the need for as much movement in the pastern region.

Ringbone

This is an exostosis of the first, second or third phalanges. Ringbone is a form of degenerative joint disease (a disease process of a joint where there is both osteoclastic and osteoblastic activity occurring at the same time).

Depending upon its location ringbone is classified as high or low. High ringbone involves the distal end of the first phalanx and the proximal end of the second phalanx. Low ringbone involves the distal end of the second phalanx and the proximal end of the third phalanx. Conformation also predispose to ringbone.

Ringbone is also classified as articular or periarticular, depending on whether or not the joint is involved.

Ringbone may be due to trauma, wire cuts, tearing of the collateral ligaments of the pastern joint, tearing of the attachment of the common extensor tendon from the first, second and third phalanx and displacement of the attachment of the joint capsule of the pastern joint.

In cases of ringbone radiographic examination should be obtained to determine the extent and location of the lesion which in turn will determine the type of management. Though not a common finding the extensor process of the third phalanx may actually be fractured and in the early stages this may be misdiagnosed for ringbone. However, as more and more bone

s laid down there is swelling of the anterior portion of the coronary band and a bulging of the hoof wall below the coronary band resulting in the so-called "Buttress Foot."

As far as management is concerned periarticular ring-bond respond extremely well to the use of counterirritants and rest for four to six months. Cases of articular ring-bone do not respond to counterirritants, and as such management should be different. Here the axis of the foot should be observed and corrected if necessary. The aim in these cases is to promote ankylosis. This may be done surgically by destroying the articular cartilage of the joint. Working the horse will help to promote ankylosis and this is the approach used by the majority of equine practitioners. If the animal shows signs of pain on exercise this can be controlled by the administration of Butazolidin. Once ankylosis is complete these animals will usually go sound.

Traumatic Arthritis of the Fetlock Joint

This is a common cause of lameness particularly in young horses that are in training.

With bony proliferation the condition is referred to as "Osselets" and without bony proliferation it is termed "Green Osselets."

Traumatic arthritis is usually bilateral in young horses that are in early training, or have been trained too hard, or raced too frequently.

Osselets are due to a straining or partial tearing of the collateral ligaments of the fetlock joint or dislodging of the joint capsule.

The horse should be removed from training for at least 3 weeks and the joints cooled off. After one week injections of steroids may be started. One to three injections may be required to control the synovitis. I would like to impress upon you the fact that these are anti-inflammatory only and do not substitute for proper rest - if these horses are put back to work too early the condition may recur. Results are judged by how well the swelling remains reduced following aspiration of the excess joint fluid and injection of the steroid. All injections must be made under strict aseptic technique, and counterpressure by the use of elastic bandages should be used following the injection.

Fractures of the Fetlock Joint

These fractures are fairly common in horses, and occur towards the end of a race where as a result of fatigue there is overextension of the fetlock joint which may result in tendo-synovitis, tearing of the suspensory ligament, chip fractures from the articular margin of the first phalanx and fracture of the proximal sesamoid.

There is usually swelling in the area of the fetlock, reluctance to bear weight on the affected limb, heat, pain on palpation, and reluctance to the fetlock flexion. X-rays are essential in making a diagnosis and oblique views should be taken to determine the exact site of the fracture.

Fractures of the Margin of the First Phalanx

These fractures are best handled surgically.

Slide - Most fractures of the articular margin of the phalanx occur on the medial aspect which allows better exposure of the joint than the lateral aspect.

Slides - The incision should be made as close to the fracture as possible, care being taken not to cut the tendon sheath. The incision should include the skin, subcutaneous tissue, dorsal annular ligament, the fibrous layer of the joint capsule, and the synovial layer. Following opening of the joint self-retaining rake retractors are useful in exposure and location of the fragment. The chip is then removed following which the area from which it broke is curretted smooth, and any ragged edges of cartilage removed. Following curretage, the joint is then flushed with sterile physiological saline to remove pieces of bone and cartilage which were broken off during the process of curretted the bone. This I feel is an important step which should be judiciously performed. The fibrous capsule and the annular ligament is sutured together as one layer with 00 medium chronic catgut on a swaged or needle which should not penetrate the synovial layer of the joint capsule. After the joint is closed 1 million units of crystalline penicillin dissolved in sterile physiological saline is infused into the joint. To infuse the penicillin a 20 gauge one inch needle is inserted on one side of the suture line. The subcutaneous tissue is then closed with 00 medium chronic catgut, and the skin with a non-absorbable type suture. The leg is supported by use of a cotton gauze combine and elastic bandage. Sutures are removed 8 to 10 days following surgery.

Sesamoid Fractures

There are 3 types of Sesamoid fractures, these are (1) Apical which are the most common, (2) Basal which are next in frequency and (3) Abaxial.

Apical fractures, especially those with separation should be removed since proper healing is extremely rare. Best results are obtained in those cases where the fracture is recent and there is no secondary exostosis.

The operative site for the removal of apical fractures is the dorsal volar pouch of the fetlock. The skin and subcutaneous tissue are incised immediately in front of and parallel to the suspensory ligament, and extend into the volar pouch. The fragment is located and excised from its ligamentous attachment, the bone curretted, and the joint flushed and closed in routine manner.

Basal Fractures - If these are left alone exostosis and degenerative changes usually occur in the area. The prognosis in these cases is very poor and only 25 to 30% of these cases return to the track.

To remove a basal fragment, the skin incision is made about 3 cm distal to the location described for removal of an apical fracture. The structures attaching the distal end of the third metatarsal or metacarpal bone to the abaxial border of the sesamoid are severed at the joint space. The branch of the suspensory ligament which passes downward and forward to join the extensor tendon should not be transected. The joint is then flexed, and the bone fragment excised. To close the incision 0 chromic catgut is used in the deepest layers for added tensile strength.

A method of internal fixation of basal fractures involving the proximal sesamoid bone was described a few years ago. This procedure does show some merit.

Tendosynovitis - Tendosynovitis or so-called "Bowed Tendons" usually result from an injury to the deep, and or superficial flexor tendon and their associated tendon sheath. This condition is very common in the forelimbs and in general the superficial flexor tendon is more commonly involved.

There are a number of predisposing factors including long weak pasterns, fatigue, toes which are too long, low heels and muddy racetracks.

The time at which injury to the tendon is most likely to occur is when the lead limb has all the weight on it when it is landing and again just as it pushes off.

According to location tendosynovitis are classified
as:

- (a) High - just below the carpus - these do not respond well to treatment and involve the tendon sheath.
- (b) Middle - these occur in the middle third of the cannon bone. In this area the tendon lacks a definite tendon sheath, and as such the condition is primarily a tendinitis. With this type there are usually adhesions between the tendon and subcutaneous tissues.
- (c) Low - these occur in the lower one third of the cannon bone and include the volar annular ligament.

Tendosynovitis may occur in the high or low areas alone, but it usually does not occur in the middle alone, and in severe cases all areas may be involved.

Symptoms observed in bowed tendons may either be acute or chronic. The acute form is manifested by severe lameness which will cause the horse to stand with the heel raised and the carpus flexed. The affected area is usually swollen and heat and pain are evident. In the chronic form there is usually some fibrosis in the area of the original injury. Heat, pain and lameness vary according to the degree of healing. Palpation of the affected tendon will usually reveal a firm, prominent swelling. With chronic tendosynovitis some animals will be sound at the walk and at the trot, but they will go lame with hard work.

As far as treatment is concerned the application of cold water to the affected area is always indicated in acute tendosynovitis. A more recent procedure used in treating these acute cases is to inject a steroid subcutaneously, and into the tendon and tendon sheath. Multiple injections of 1/4 to 1/2 ml of the steroid are made with a 23 gauge, half inch needle throughout the length of the injured tendon in a symmetrical pattern with injections about half inch apart. Following injection of the tendon the leg should be placed in a light plaster-of-paris cast extending from just below the carpus to the coronary band. Parental steroids may be used in conjunction with the initial local injections for up to 10 days. The cast should be removed in two weeks and in most cases the leg will appear normal. If necessary, however, another cast may be applied for an additional 10 to 14 days. Following removal of the cast the limb should be placed in supporting bandages for another 30 days. These horses should not be put in training for at least 6 months.

Dr. R.C. Robinson in Victoria, Australia has reported excellent results with the injection of the sclerosing agent ethamoline (5% monoethanolamine maleate-Glaxo-Allenbury) into the tendon after the inflammation has subsided, together with raising the heel.

In those cases where the tendon is swollen and the fetlock sore and distended with fluid, cutting the volar annular ligament give good results.

The treatment of chronic tendosynovitis is still very discouraging. The latest figures disclose that even with new methods of treatment only 35 to 40% of the horses treated returned to their former racing form.

Surgical treatment of chronic tendon injuries by radical longitudinal incision has been used by many practitioners and so far appears to give the best results. The procedure most commonly used is Ascheim's tendon splitting technique. With the horse under general anesthesia the tendon is exposed by a longitudinal incision; the affected portion of the tendon is then split longitudinally with a single incision extending 2 cm into normal tissue following which the peritendineum is sutured and the incision closed. Another method is the percutaneous splitting of the tendon. This operation may be performed on the standing animal following local nerve blocks (Ulnar, musculocutaneous, medial and lateral volar). In this procedure the skin is punctured with a double edged knife and a fan shaped incision is made alternately on the medial and lateral aspects of the tendon along its entire length. The surgical area is then dressed with an antibiotic powder and the leg may either be wrapped with cotton gauze combine and an elastic bandage, or it may be placed in a plaster-of-paris cast.

Periostitis of the Third Metacarpal

This condition is also referred to as "bucked shins", or "sore shins". It is commonly seen in young animals and is usually bilateral.

Concussion in an immature animal is the factor that is primarily responsible for this condition which is rare in horses over three years of age unless it occurs as a result of direct trauma.

In buck shins the periosteum is usually torn away from the anterior distal two thirds of the metacarpus with hematoma formation between the periosteum and the cortex of the bone.

In these cases there is heat, swelling and pain on the anterior surface of the cannon bone. Since both legs are involved the horse travels with a short choppy gait, with the lameness increasing with exercise. We have begun to take radiographs to rule out the possibility of compression micro-fractures (March) which may produce similar symptoms. In long standing cases radiographs will reveal marked thickening of the cortex of the bone.

Rest is the most important consideration for a complete recovery. The use of poultices and cold packs during the first 24 to 48 hours after the onset of symptoms is indicated to decrease the acute inflammation. This is followed in 10 to 12 days by the application of a medium or strong paint or blister and the results are very good. In long standing cases thermal cautery in the form of pin-firing give good results. The animal should be rested for at least 3 weeks before being put back into training.

A more modern method of therapy is the subcutaneous administration of a corticosteroid along the injured metacarpal, following which the leg is wrapped with cotton gauze combine and an elastic bandage. Animals treated in this manner respond dramatically but they should not be put back into training until 30 days following the injections.

We feel that those cases that reoccur during training are due to insufficient rest and as such we try to stress the importance of this to the trainer.

Splints

Splints or periostitis of the second or fourth metacarpal bones with inflammation of the interosseous ligament is a disease of young horses up to 5 years of age.

In the forelimb, the medial splint bone is more frequently affected, while in the hindleg the lateral is more commonly involved.

There are a number of factors which predispose to splints, one of the most common being conformation. Horses that toe out, as well as, horses with bench knees place more stress on the medial splint thereby predisposing to injury. Other factors include age and nutrition (def. of Vit. A, D or Ca:P imbalances).

Most splints appear near the middle third of the bone. Knee splints occur in the proximal portion of the bone near the carpus. Usually when the distal third is involved one should suspect a fracture.

Typical splints are located on the lateral aspect of the bone. Blind splints, however, are located on the inside of the splint bone. As such in order to palpate a blind splint you must palpate behind the suspensory ligament.

In general, splints are easy to diagnose. In our clinic however, we take radiographs to rule out possible fracture, as well as, to determine whether or not the lesion is active. In cases where we suspect blind splints we inject a local anesthetic over the area to determine whether or not the gait will improve.

The injection of a steroid in the splint area along with bandaging will result in temporary improvement, but the condition will recur if the animal is not given adequate rest. A very common treatment which is still used today consists of cooling the leg off for 10 to 14 days and either blistering or firing the area.

We recommend a minimum of 4 to 8 weeks rest following blistering or firing and at least 8 weeks following the administration of steroids.

Fracture of the Splint Bone

Fracture of the splint bone usually involve the second metacarpal bone and is due to the opposite foot striking the bone.

Some sequelae to fracture of the splint bones include

- a. Sequestration - due to necrosis of a piece of bone that has separated from the main shaft.
- b. Non-union
- c. Excessive callus formation
- d. Desmitis of the suspensory ligament

If the splint bone is healing as shown by radiographic examination, usually we do not disturb the condition, providing no lameness, swelling, or pain are present. If the fracture has been present for some time and shows no signs of healing it should be removed since healing often occurs more rapidly following surgical removal. Most trainers and owners usually request removal of a fractured splint as soon as possible after the fracture has occurred rather than waiting for healing to occur.

(Slides on surgical procedure)

Carpitis

Carpitis refers to an acute or chronic inflammation of the carpal joint which often involve the joint capsule, the associated ligaments of the carpus and the carpal bones. Initially the condition is a serous arthritis which later progresses to an osteoarthritis involving the margin of the carpal bones or the joint space.

Acute carpitis is characterized by heat, swelling, pain and distension of the joint capsule which may involve the radial carpal and or intercarpal joints.

In subacute or chronic cases there is only swelling or filling of the joint. In these cases, however, pain can be accentuated by carpal flexion.

Diagnosis is based on carpal flexion, palpation of the carpal bones, intra-articular injections and radiographs. Proliferative changes are not observed radiographically until about 3 weeks after the injury has occurred.

Treatment: the acute serous form of arthritis responds extremely well to the injection of corticosteroids into the joint. Three injections of steroids, approximately one week apart give excellent results. Following steroid injection the carpus should either be bandaged with a many tailed bandage or immobilized with a plaster-of-paris cast or fiber glass cast which should be left in place for two weeks and the horse rested for a period of at least 4 months.

The greatest difficulty in treating carpitis with steroid injection is that the relief produced by the drug allows the owner to use the horse too soon resulting in re-injury.

In those cases where there is new bone growth that is not encroaching on the articular surface of the bone point firing along with application of a good leg pain and rest for about 6 months usually give favorable results. In severe cases where new bone growth is encroaching on the articular surfaces of the bones the prognoses is very unfavorable and the results of firing is not as good.

Fractures of the Carpal Bones

This is a very common cause of lameness in racing thoroughbreds.

These fractures are due to trauma, and from the location of the fracture overextension of the joint appears

to be the most common cause as it places great stress on the anterior face of the carpal bones and radius and as a result, portions of these bones may break off. Depending on the size these may be classified as "chip" fractures or "slab" fractures.

Conformation is also an important feature which may predispose to carpal fractures. Horses with "calf knees" are more likely to be affected.

Fractures of the distal end of the radio-carpal bone is the most common and comprises 2/3 of all fractures of the carpus, and is followed in frequency by fractures of the 3rd carpal bone. Other bones which may be involved include the distal end of the radius and the intermediate.

Radiographs are necessary to confirm a diagnosis of carpal fracture as well as to determine the exact location of the lesion.

Surgery is now the method of handling carpal fractures. The intra-articular injection of corticosteroids into the affected joint should be avoided. Horses which have been subjected to intra-articular injections of corticosteroids should not be operated on until 4 to 6 weeks following the last injection.

(Slides on surgical procedure)

APPENDIX VII

DIAGNOSIS AND TREATMENT
OF
EQUINE CHOLIC

Paper Presented by

Dr. C. L. Padmore

August 11-17, 1975

at the

Carribean Veterinary Conference

Port of Spain, Trinidad

DIAGNOSIS AND TREATMENT OF EQUINE COLIC

Disturbances of the digestive tract is a common finding in the equine species. Poor physical condition, improper management, abnormal exercise, bacterial and viral infections and parasitism are more likely to precipitate abdominal distress in the horse than in any other species of domestic animal.

The stomach and large intestine of the equine are the two areas where most of the digestive problems tend to occur and because of this I will like to take a few minutes to review the anatomy, as well as, the pathology of these areas which may produce symptoms of colic.

(Fig. 1) The stomach is relatively small, having a capacity of 2 to 4 gallons. It is shaped like the letter "J" and is situated in the dorsal part of the abdominal cavity behind the diaphragm and liver, mainly to the left of the median. The most common pathology of the equine stomach is dilatation which may be either primary or secondary.

Large Intestine: The large intestine of the equine is very large in proportion to that of other species and consists of the cecum, large colon, small colon and the rectum.

(Fig. 2) The cecum is about 4 feet long, comma shaped and has a capacity of 7 to 8 gallons. It is located to the right of the median plane, the base is in the right sublumbar space and the apex is on the abdominal floor near the xyphoid.

The most common pathology of the cecum is impaction due to obstruction of the ceco-colic orifice.

(Fig. 4) The large colon is about 10 to 12 feet long and about 8 to 10 inches in diameter. The large colon is folded so that it consists of four parts and three flexures.

<u>Parts</u>	<u>Flexures</u>
Right Ventral Colon	Sternal Flexure
Left Ventral Colon	Pelvic Flexure
Left Dorsal Colon	Diaphragmatic Flexure
Right Dorsal Colon	

Pathology:

A. Impaction

1. The pelvic flexure due to the acute bend, and considerable decrease in size is the most common site of impaction in the equine.
2. The terminal right dorsal colon due to a sudden narrowing at the junction with the small colon is another site of impaction.

B. Torsion

The left dorsal and left ventral parts of the large colon, and the diaphragmatic and sternal flexures are movable; while the right ventral and right dorsal colon, because of the short mesentery, are relatively fixed. In torsion the left dorsal part may turn laterally or medially around the left ventral part and this will also involve the sternal and diaphragmatic flexures. As a result of this ingesta will collect in the lumen in front of the sternal flexure while gas and bloody transudate will collect between the sternal and diaphragmatic flexures.

Torsion is thought to be due to mechanical influence such as rolling - in these cases death usually occurs in 6 to 10 hours if the condition is not corrected.

C. Circulatory Disturbances (Fig. 5)

The main supply to the small and large intestine of the equine is the anterior or cranial mesenteric artery which arises from the aorta under the lumbar vertebra. Aneurysms and thrombosis of the anterior mesenteric artery due to the larvae of *Strongylus vulgaris* are very common (Figs. 6 & 7).

The Effects are:

1. Ischemia which may lead to infarction and/or gangrene
2. Diminished peristalsis resulting in impaction
3. Embolus formation which may cause severe damage depending on the location and the degree of involvement.

When one speaks of colic in the equine one is referring to abdominal pain which may be due to acute gastric dilatation, intestinal indigestion with stasis or intestinal hypermotility.

Because of the various causes of colic and the numerous areas which may be involved an accurate diagnosis is essential if adequate therapy is to be instituted.

The history should give some idea as to the feeding program, work habits, signs and onset of symptoms, type of pain, treatment if the animal was treated and the response to treatment. One should also include in the history when the horse was last wormed, or if the owner uses a regular worming program.

A thorough physical examination should be performed and should include:

- A. An evaluation of the degree of pain. All intestinal obstructions cause pain but the lower the segment of intestine, the lesser the pain. Impaction causes horses to lie down more than usual, but it seldom causes the intense pain manifested by involvement of the small intestine.

Degree of Pain

- (a) Sudden, intense, intermittent pain - associated with spasmodic type colic.
 - (b) Sudden, mild, transient pain - manifested by animals with small ischemic areas.
 - (c) Sudden, intense, continuous pain - observed in cases of gastric distension, as well as, animals with irreversible morphologic changes.
 - (d) Sudden, variable, continuous pain - associated with torsion, gut tie and herniation
 - (e) Gradual, dull, intermittent - chronic impaction (cecum)
 - (f) Sudden, moderate, intermittent pain - cases of acute impaction with gas formation.
- B. Abdominal Distension: Involvement of the stomach and/or small intestine does not produce visible distension of the abdomen, whereas involvement of the cecum and/or colon produces tympany and visible abdominal distension.
- C. The temperature, pulse and respiration should be examined immediately after the patient is presented and frequently thereafter.

- (a) An increase in temperature above 101°F is significant and a continuous rise in temperature should warrant a poor prognosis.
 - (b) A rising pulse is unfavorable - pulse rates between 40 to 50/min are not bad, whereas rates 60 and above are not favorable and suggests compartmental fluid shift, decreased circulating blood volume or an increase in blood viscosity.
 - (c) Shallow, rapid respiration of increasing intensity suggests a state of acidosis, the inadequate removal of CO₂ is responsible for the increased respiratory rate. However, the increased rate is not enough to maintain acid base balance resulting in metabolic acidosis, as well as, respiratory acidosis.
- D. Mucous Membranes - the mucous membranes mirrors the status of the peritoneum. The color and rate of capillary refill are good indicators of the quality of tissue perfusion. The more shocky and toxic the horse the more cyanotic the mucous membranes become. Although the heart rate is increased in shock, the cardiac output has decreased which results in a slower capillary refill. One can measure the refill time by blanching the gum with thumb pressure and then noting how rapidly the color returns (2-3 secs in the normal animal).
- E. Auscultation of the abdomen - The stethoscope offers the best means of assessing peristalsis. The examiner should listen long enough for peristaltic rushes to occur. By auscultating the left flank and left mid abdomen he can determine the peristalsis of the left dorsal and central large colon. One can determine if the viscus is distended with gas by snapping the finger against the belly wall while auscultating the area, if there is an accumulation of gas in the large colon this will produce a high pitch sound. The cecum can be ausculted high along the right flank. A gas cap in the cecum can be outlined in a manner similar to that described for the large colon. One should bear in mind, however, that a small gas cap is normal in this structure. The activity of the small intestine is best determined by listening along the lower right flank. Although borborygmus can be heard when auscultating the chest it does not indicate diaphragmatic hernia. On auscultation areas that are quiescent warrant a poor prognosis whereas hypermotility though serious is not as alarming.

- F. **Rectal Examination** - this should be performed in an orderly manner to determine areas of impaction, areas distended with gas, painful areas and the presence of new growths. At the same time the presence or absence of feces, as well as, the consistency and content of the feces may be significant. One should always be aware of the fact that feces may be present in the intestine posterior to an obstruction for up to 12 hours after the obstruction has occurred. Also in cases of impaction of the cecum, the passage of small amounts of feces is a common finding. Continuing with the rectal examination, the root of the mesentery, the anterior mesenteric artery, the iliac arteries, the urogenital tract and the inguinal ring in colts and stallions should be examined. Negative findings are not always significant as the pathology may be so far cranial that it may not be palpable and this may be an indication for an exploratory laparotomy.
- G. **Pass the Stomach Tube** - This is a very useful therapeutic instrument which is often overlooked in the diagnosis of equine colic. There are only three major valves in the approximately one hundred feet of the digestive tract of the horse. These are the cardiac sphincter of the stomach, the ileo - cecal valve and ceco-colic valve. If the obstruction is within the small intestine one can expect to get a reflux of fluid and gas when a tube is passed into the stomach. On the other hand if the obstruction is in the large intestine or from the cecum to the small colon fluid should not accumulate in the upper digestive tract - stomach and duodenum because of the ileo-cecal. However, there will be more fluid and gas distension in the cecum or large colon.
- H. **Paracentesis** - this procedure is not proposed as a routine measure in every case of colic. It is, however, useful in determining the condition of the peritoneal cavity.

Procedure (Fig. 6-9) - The equipment necessary are a small scalpel and blade, a 1½" - 2" teat cannula, an 18 or 20 gauge 1 inch hypodermic needle and a 5 ml syringe.

The site is on the midline about 5 to 6 inches caudad to the xiphoid. The area is clipped and surgically prepared. A wheal of anesthetic is deposited in this area following which a small nick is made in the skin and linea alba; the cannula is then passed into the peritoneal cavity and a sample of the fluid obtained for examination.

Peritoneal Fluid Chart - Nelson

<u>Color</u>	<u>Contents</u>	<u>Indications</u>
Straw-amber Turbid	WBC	Normal Infections Lymphosarcoma
Pink to red	RBC	Traumatic Paracentesis
Brownish-Yellow	Bacteria WBC Pigment from damaged intestinal wall	Early gut necrosis
Muddy-brick	Bacteria WBC RBC Increased pigment	Necrotic intestine
Brown	Fecal WBC Debris	Ruptured intestine or accidental gut penetration

Fig. 10

I. Laboratory Tests - there are a number of laboratory tests which may be used as guidelines in the diagnosis, treatment and prognosis of equine colic. Those which I find to be extremely valuable are:

1. Packed cell volume (PCV) - this to me is the most informative of all the blood studies. This simple procedure helps one to determine if the animal needs I.V. fluids. If the PCV is over 50%, one knows that the horse is losing fluid into the lumen of the intestine and from there into the peritoneal cavity.
2. Other tests which I use less frequently are the HB (Normal 11-19 Gms%), and the Total Protein (Normal 5.3-7.6 Gms%). The value of these two tests also mount rapidly in severe intestinal obstruction particularly in cases of necrosis and incarceration.

In recent years I have also begun to measure the blood glucose levels as an aid in the diagnosis of colic. In these cases the blood glucose level increases from a normal of 54-111 Mg% to as high as 200 Mg% and there have been reports of this value being as high as 360 Mg%.

Death in cases of abdominal crises in the equine is ultimately the result of shock brought about by the vasoactive properties of bacterial toxins, as well as, by pain, fear and anxiety.

(Fig. 11) Any gastrointestinal lesion that involves stasis or degenerative changes of the gut wall leads to increased absorption of bacterial toxins (primarily gram negative endotoxin). Increased levels of endotoxin are associated with an increase in the level of circulating catecholamines (epinephrine and norepinephrine derivatives), the net effect being vasoconstriction with capillary pooling - particularly in the splanchnic circulation. Due to the increased size of the intravascular compartment and loss of water into the interstitial space a circulating blood deficit occurs resulting in decreased venous return, decreased ventricular filling, decreased cardiac output, decreased capillary perfusions, diffuse intravascular clotting and irreversible cellular changes terminating in shock.

Treatment

Control Pain - Pain is a major factor in shock. In many instances, examination and further treatment cannot be accomplished until pain has been controlled. Numerous analgesics have been used to control pain -- Jenotone and Dipyrone are commonly used but these drugs decrease intestinal motility and are contraindicated in stasis, Rompun (xylazine) is a relatively new analgesic-tranquilizer that has been used with good results.

Sedatives - Promazine (400Mg) together with 30 ML of a mixture of pentobarbital/magnesium sulfate and chloral hydrate give excellent results, but are contraindicated in cases where shock is already present.

Relief of Obstruction - Medical treatment for obstructive conditions primarily involves the treatment of impaction. This is best accomplished by the administration of mineral oil, which besides lubricating the intestinal surface and softening the mass, also impedes the absorption of toxins.

Smooth muscle stimulants may be indicated in impaction and depressed peristalsis. Antispasmodics are indicated when there is hyperistalsis or when intermittent sharp pain persists after analgesics have been administered. The injudicious use of antispasmodics should be avoided since intestinal stasis is a fundamental problem in colic.

Decrease the Production of Toxins - Since shock and death are due to large amounts of toxins. Steps should be taken to deplete the source. To accomplish this the addition of Neomycin Sulfate (1 to 2 fluid ounces Biosol) to the mineral oil is recommended. However, regardless of if Neomycin Sulfate or some other oral antibiotic is given it should be administered while the reticuloendothelial system is capable of catabolizing the resultant increase in endotoxin.

Prevention or Treatment of Vasconstriction - Vasodilation may be induced either with the administration of alpha blocking agents or by massive doses corticosteroids. Phenothiazine derivatives, phenoxybenzamine and phentolamine are effective alpha adrenergic blocking agents. These are indicated to prevent vasoconstriction in cases where the heart and peripheral pulse rates are equal and within normal limits. These drugs, as well as, adrenolytic compounds are contraindicated in the presence of hemoconcentration or a circulatory blood deficit.

In cases where shock already exists the administration of massive doses of corticosteroids (200 Mg Solu Delta Cortef^R or 250 Mg 9-Fluro-Prednisolone) intravenously have given good results. Steroids have been shown to stabilize lysosomes, counteract the effects of endotoxins and in pharmacological doses they have an alpha blocking effect thus promoting vasodilation. In addition they are anti-inflammatory, protect the elasticity of RBS, decrease platelet adhesiveness and have an inotropic effect on the myocardium, thus augmenting cardiac output and capillary perfusion.

Correction of Volume Deficit - In the field the need for fluid therapy is evidenced clinically by rapid heart rate, dry mucous membranes and delayed capillary filling time. A more direct assessment may be obtained by packed cell volume, hemoglobin or total protein determination. The primary requirement is replacement of volume with the right kinds of fluid. The question of how much fluid to give is one that often plagues individuals that are uneasy about their fluid therapy. A rule of thumb for initial volume replacement is 1 liter of Ringer's solution for each 1 per cent increase of packed cell volume above 40%.

Most horses with obstructive colic are also in a state of acidosis. The administration of 100 to 150 grams of sodium bicarbonate intravenously is usually effective in buffering the existing acidosis.

Surgical Cases

There are certain colic cases which can only be treated surgically (Figs. 13 & 14). The veterinarian, however, must be able to diagnose these cases and perform surgery while the animal is a good surgical risk. In general surgery is contra-indicated in cases of frank, diffuse peritonitis, perforation or rupture of the gut with contamination of the peritoneal cavity that has existed for sometime and in terminal shock.

Some attention should be given to the type of anesthesia to be used. In general the administration of barbituates intravenously is contraindicated in cases of colic. Gas anesthesia is undoubtedly the safest approach as the level of anesthesia can be adequately controlled thus allowing the anesthesiologist to keep the animal in as light a plane as possible. In cases of impending shock the administration of a tranquilizer and regional anesthesia may be sufficient to perform surgery.

The characteristics of the equine abdominal wall differs from that of other large animals. The fascia is thin and insecure thus making closure of the incision line difficult. This is especially true in those cases where the muscle has been incised. Because of this the abdominal muscles in the equine should be separated along their fibers rather than being cut. The perfect example of an abdominal incision is the McBurney incision for acute appendicitis in man. The incision is made in the direction of muscle pull at all layers, this results in the muscle fibers being separated rather than being cut, major nerve and blood vessels are not disturbed and the incision allows adequate access to the operative field. The counterpart to the McBurney incision in veterinary medicine is the "Grid Incision" which is used in paralumbar and low flank approaches to the abdominal cavity.

There are various surgical approaches to the equine abdomen, however, the site chosen should allow adequate exposure of the area involved. Some of the more common approaches to the abdomen of the equine included:

1. Paralumbar fossa
2. Vertical or transverse flank (Fig. 15)

If minimal exposure is all that is required the paralumbar and vertical flank incisions can be used. The principal

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advantage of these approaches is that they can be employed on the recumbent or standing patient (Fig. 16 - Fig. 18).

3. Oblique low flank, cranioventral or paracostal approach (Fig. 19).

4. Oblique low flank, caudoventral or Marcenac approach - used by European workers for caesarean section, as well as, for cecotomy in cases of impaction (Fig. 20).

5. Ventral Abdominal Approach (Fig. 21-22). The horse is placed in dorsal recumbency. The midline approach is preferable to the paramedian because the linea alba is extremely strong and fibrous and is devoid of nerves and blood vessels. This approach also allows greater latitude of access and should be the site of choice if one is not sure of the exact location of the lesion. Many individuals are somewhat leary to use the ventral approach for fear of herniation. However, the problems associated with herniation can be avoided by using a strong overlapping Modified Mayo suture pattern in the closure of the abdomen (Fig. 23) with #2 to #4 medium chromic gut.

6. The Inguinal Approach - Fig. 24) - The inguinal laparotomy is classically used in cryptorchidectomy and inguinal herniorrhaphy. One real argument for the use of the inguinal canal approach in cryptorchidectomy over the alternative paramedian or flank approaches is that so many of the cases presented as cryptorchids are found to be either "high flankers" with the testicle located just outside the external inguinal ring or inguinal cryptorchids with the testicle located in the canal. In either case, these testicles cannot be retrieved from their positions of partial descent by either of the alternative routes. Also, in many cases where the testicle is abdominal, the processus vaginalis will have evaginated into the canal, usually with a loop of the epididymis therein. These structures are easily identified and, with very little dissection and retraction, lead directly to the retained testicle.

In equine colic, the correction of the existing condition will depend largely on what is found on opening the abdomen.

1. In paralytic ileus the intestine is usually distended with gas and will often balloon out of the incision when the abdomen is opened. Decompression is indicated in these cases and is best accomplished by placing a purse string suture in the intestinal wall and using a decompression set with a 12 or 14 guage needle to remove the gas slowly from the lumen of the intestine.

2. Impactions may be broken down by massage alone or in some cases they may have to be injected to facilitate breakdown - glycerine and mineral oil are commonly used in these cases.

3. Removal of large hard masses such as enteroliths and fecaliths which cannot be broken down may be accomplished by enterostomy.

4. Some conditions such as volvulus, displaced or strangulated intestine may be corrected by manipulation.

5. In any case where there is necrosis of the intestine, resection of the necrotic portion and anastomosis of viable intestine is indicated.

Healing of abdominal incisions take longer in the equine than in other species. This may be due to the increased tension on the suture line - to eliminate dehiscence sutures should be left in for 12 to 14 days following surgery.

But, the surgeon's knife is not enough. All too frequently the condition is corrected with great surgical skill with little attention being paid to the animal's need. Simultaneous therapy to correct acidosis, hemoconcentration, and dehydration and to prevent infection should be started prior to surgery and continued throughout the operation and into the postoperative period.

APPENDIX VIII

January 8, 1975

Trip Report

Report on trip to Washington, D. C. (December 9-11, 1974)

By: Dr. G. E. Cooper
Mr. Henry VanBlake

Purpose

1. To evaluate USAID attitude for sponsoring a sub-grant in order that Tuskegee Institute's 211-d faculty might become competent in conversational French (see attached discussion draft proposal).
2. To determine other ways in which the resources of the 211-d faculty might become involved in AID's long term plans (i.e. program planning and design, as well as program implementation).
3. To evaluate AID's long range interests in livestock projects in LDC's in order that a second country might be selected for future activities of the 211-d livestock consortium.
4. To contact other organizations to evaluate possibilities of further consortium activities, especially in model development and program implementation. (Dr. Hodgson, Chairman, Board of Trustees of the International Livestock Center for Africa was contacted and discussions held.

Narrative Summary:

Monday (December 9, 1974)

- 8:30 a.m. A meeting was scheduled with Mr. Sheldon W. Cole, Assistant Director of the Development Branch (West Africa). The purpose was to obtain opinions on the discussion draft for French training which was submitted to AID. Mr. Cole felt that the development of this capability was logical and seemed within the future needs of USAID. He stressed the importance of developing this capability considering the long term effect which it would have at Tuskegee Institute. This program might also assist in strengthening the capability of the language department at Tuskegee Institute. Mr. Cole suggested documents that would help us know AID's planned emphasis.
- 9:05 a.m. Meeting with Mr. Frank Madden, Acting on-site project manager, Bahama Livestock Project. A recent grant was awarded to the government of the Bahamas to strengthen their livestock industry. This presently involves two contractors (Penn. State Univ. and Western Institute of Science and Technology). Even though, these two contractors are involved, there are aspects of the project which call for the training of local livestock producers. This immediate capability is not available at the two participating universities.

However, Tuskegee Institute, because of its involvement with similar international programs has the capability of supplying the required expertise (Most recent training involvement was with the Government of Guyana, South America). These topics were addressed with Mr. Madden and a later meeting was arranged with Dr. Madden and Mr. John Halpin, Bahama Project Director.

- 9:20 a.m. A brief discussion was held with Dr. Paul Saenz, Liberian Desk Officer, to obtain comments about long range plans for Liberia, especially in terms of livestock projects. The purpose of the 211-d Livestock Consortium was emphasized. Dr. Saenz seemed to feel that AID was not putting much emphasis in Liberia for the next fiscal year.
- 9:25 a.m. Discussions with Mr. Bob Shoemaker, Development Officer, Project Design for his comments on the French proposal and opportunities which might exist for the 211-d livestock consortium to be involved in livestock project design. This would strengthen our capability for future use by AID. He suggested that we might also develop a capability in the Hauso language. This is the language of the people who handle cattle and would be important in executing some of the proposed projects in Senegal and Mali.
- 10:40 a.m. Dr. F. T. McQueen, Federal Relations Officer for Tuskegee Institute, Washington, D.C. met us and visited with various AID persons for the rest of the day. We discussed the French proposal and long term plans to involve the language department at Tuskegee Institute.
- 2:00 p.m. Meeting with Mr. Princeton Lymon, Director of Development Services. The following topics were discussed:
1. Proposal for French training. Mr. Lymon felt that this was a capability which will be needed by AID in the future, however he felt that the Africa bureau should be contacted because the capability would be used primarily by them in development projects. Mr. Lymon would be interested in the progress of future discussions concerning this proposal and stated that if TAB would not support the proposal he would.
 2. Selection of a country for future 211-d consortium activities
Mr. Lymon did not have any specific countries to become involved with, he recommended that we read AID's Development Assistant Program (DAP). This document would identify the countries in which there will be some interest in for the next 2-3 years. This may give some opinion of countries that may be considered by the consortium.
- 3:30 p.m. Mr. John Halpin and Dr. Frank Madden, AID, project managers for the Bahama Livestock Project. Both men informed us that a contract had been signed with W.I.S.T. (The Texas Contractor) for a Training Officer. This officer has not been hired, but his duties are to

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December 9, 1974

arrange and supervise all the training necessary for this project. This would include in-country, out-of-country and short and long term education projects for livestock producers. We suggested that Tuskegee Institute be the "training officer" and provide the necessary services. It was suggested that a letter be written to I.I.S.T. and Dr. Madden making this proposal.

Tuesday (December 10, 1974)

- 10:00 a.m. Mr. Nathaniel Farris, Educational Program Officer. This meeting was used to discuss a proposed training project and to receive guidelines to be used in other training programs.
- 10:45 a.m. Drs. Frank Abercrombie and Donald Ferguson. Dr. Abercrombie discussed in general "procedures for planning intergrated range and livestock programs." He also gave some insight into countries in West Africa which might be considered for 211-d consortium involvement included are Northern Cameroon and Chad. Cameroon will have a land capability survey on animal, land and human resources. After this a project design team will design specific projects for contracts. Pending the outcome of future relationships, Chad might be considered to: 1) Place range management in the structure of the university at the graduate level; (2) establish Farm Training Centers for formal training of herders; and (3) Third Country Training of government officials.
- 1:30 p.m. Foreign Service Institute (F.S.I.) was contacted to evaluate the language courses taught and determine the type of assistance they might provide in language training. A direct relationship cannot be developed between F.S.I. and Tuskegee since they train government personnel only. However, the software used in their training programs is available for purchase.

Wednesday (December 11, 1974)

- 9:00 a.m. Attended the seminar on "Hemoprotozoal Diseases" presented by Drs. Maurer and Kattler, Texas A & M University.
- 12:00 a.m. Mr. Ted Britton, U. S. American Ambassador elect to Barbados and other Carribean Islands. We had lunch and made known our purpose in Washington.
- 1:30 p.m. Travel to College Park, Maryland to meet Dr. R. E. Hodgson, Chairman of the Board, International Livestock Center for Africa (ILCA), Addis Ababa, Ethiopia. We were accompanied by Drs. Maurer and Kattler from Texas A & M and Dr. Neil Kanropp, Veterinary Officer, AID/TAB.

Dr. Hodgson stated that he or ILCA would be interested in knowing

the capabilities of the consortium as he felt some of the projects of ILCA would need capabilities in disciplines in Social Anthropology, Nutrition, Physiology, Genetics and Veterinary Medicine. He revealed that one project had been requested by Nigeria on the Nigeria-Chad-Cameroon border. Outside of this project and probably one more, the greater part of this year's money and efforts will be spent in staffing and erecting buildings for ILCA. He did not emphasize the need for technicians in the above fields that were bilingual but stated that the personnel of the organization would be completely international.

Dr. Maurer expressed the regret that Texas A & M had trained many graduate students in international programs, but had been unable to place any in any of the ongoing projects. Texas A & M has the contracts and money for experiments in International Development and uses a number of graduate students in this work, thus expanding the expertise of the university in these fields. Tuskegee would be well advised to try to get some Foreign Aid projects in its various disciplines and use them to train its graduate students. The approach to this would be to place a manuscript, describing Tuskegee's past foreign aid experiences and its capabilities, in the hands of the various USAID branch chiefs, desk officers, contractors, World Bank and other concerned agencies.

Tuskegee should bid on contracts involving livestock and veterinary medicine as well as sociology, extension, education and community development. There probably should be a meeting of all the department heads of each of these disciplines prior to the bidding so a competent bid may be presented.

The 211-d Grant campus coordinator has subscribed to the Commerce Business Daily, the official publication in which all contracts are published. In addition, the USAID contracting office has been notified of Tuskegee's intention to bid on contracts. A paper presenting Tuskegee's capabilities is being prepared to be presented to the USAID branch chiefs, desk officers, World Bank, contractors and other concerned agencies in the business of Foreign AID.

VII. Impact of Grant Related Activities in Developing Institutional Capabilities:

The most important impact which the 211-d grant has had, is to strengthen faculty in animal science, extension, sociology and veterinary medicine, in overall concepts of development. Faculty members have been provided a first hand opportunity to visit tropical countries and observe livestock production systems, evaluate components of extension programs and better define the sociological implications important to development.

Another important impact of the grant is that a unified concept of development has become more apparent through an active involvement of faculty from different academic areas of Tuskegee Institute. This interaction has allowed an appreciation for all the specific disciplines involved. Moreover, this has allowed a total awareness for the multidisciplinary "Systems Analysis" concept which the 211-d livestock consortium is developing.

The grant has also allowed faculty an opportunity to become involved in program design and review on a short-term basis. Dr. Glenn Howze served as consultant on a team which reviewed AID range management programs in Nigeria. This activity strengthens the Institute's ability to respond to development needs of USAID and other agencies concerned with LDC development. Additional benefits have come from the short-term assignment of Mr. Henry VanBlake, USAID, Livestock officer to Tuskegee Institute. His experiences in the areas of livestock production in the tropics have added dimension to our concepts of development and have proved rewarding to the students enrolled at our institution.

A series of seminars of Tropical Agriculture was initiated this year. These seminars have allowed interested faculty, staff, and students an opportunity to hear and interact with many people who have worked with agriculture programs in the tropics. Seminars were presented by consortium member universities (Dr. G.O. Mott, University of Florida; Dr. T.K. White, Purdue and Dr. Fred Maurer, Texas A&M), active and retired USAID personnel, and personnel from the Ministry of National Development and Agriculture, Guyana, South America. (Appendix IX)

APPENDIX IX

APPENDIX IX

Tuskegee Institute

TUSKEGEE INSTITUTE
ALABAMA, 36088

SCHOOL OF APPLIED SCIENCES
DEPARTMENT OF AGRICULTURAL SCIENCES
M. A. MALONEY, JR., HEAD OF THE DEPARTMENT
P. K. BISWAS, COORDINATOR, PLANT & SOIL SCIENCE
C. L. MANNINGS, COORDINATOR, ANIMAL SCIENCE

Nov. 1974 thru Feb. 1975

Seminars on Tropical Agriculture
Sponsored in Part by USAID 211-d Funds

Time: Monday and Wednesday Nights
7:00 p.m.

Place: Milbank Hall Room 204

Nov. 11, 1974 (Mon.)	Dr. Sandy McCorvey USAID - Retired 20 yrs. experience in Tropical Agriculture extension	"Rubber and/or Cocoa" Production I
Nov. 18, 1974 (Mon.)	Dr. Sandy McCorvey	"Rubber and/or Cocoa" Production II
Nov. 27, 1974 (Mon.)	Mr. R. Shoemaker USAID - Project Design Washington, D.C.	"Project Design - I"
Nov. 25, 1974 (Wed.)	Mr. James Smith Special Student Guyana, South America	"Livestock and Forage inputs in the Development of Guyana, South America
Dec. 2, 1974 (Mon.)	Mr. J. Manley, USAID Proj. Review & Evaluation Washington, D.C.	"Program Evaluation and Review Technique I&II
Jan. 13, 1975 (Mon.)	Mr. John Bulls USAID-Retired 20 yrs. experience in Tropical Agriculture extension	"Rice Production in the Tropics"
Jan. 15, 1975 (Wed.)	Dr. Fred Maurer, Director Center for Tropical Veterinary Medicine Texas A&M University College Station, Texas	"Disease Problems in the tropics"

Jan. 20, 1975 (Mon.)	Dr. J. H. M. Henderson, Director Carver Research Foundation Tuskegee Institute Tuskegee Inst., Alabama	"Sugar Cane Production in Hawaii"
Jan. 22, 1975 (Wed.)	Mr. John Bulls	"Extension Training for the Tropics"
Jan. 27, 1975 (Mon.)	Dr. G. O. Mott, Professor Department of Agronomy University of Florida Gainesville, Florida	"Tropical Forage Pro- duction"
Feb. 3, 1975 (Mon.)	Mr. Abercrombie, USAID Washington, D. C. 20 yrs. experience in Tropical Horticulture	"Range Management"
Feb. 5, 1975 (Mon.)	Mr. R. Dirks, USAID Washington, D. C. 20 yrs. experience in Tropical Horticulture	"Veg. Production in the Tropics"
Feb. 10, 1975 (Mon.)	Dr. J. Craig USDA-Texas A&M Univ. College Station, Texas 15 yrs. experience in Trop- ical plant pathology	"Grain Production in the Tropics"
Feb. 12, 1975 (Mon.)	Dr. Eugene Adams, Assoc. Dean School, Veterinary Medicine Tuskegee Institute - 2 years in Nigeria (Pathology)	"Disease in the Tropics"
Feb. 17, 1975 (Mon.)	Dr. T. K. White Department of Agr. Ec. Purdue University Lafayette, Indiana	"Economic Consideration in the Tropics"
Feb. 19, 1975 (Wed.)	Mr. R. King	AID Funding & Obligation Concepts.

For additional information contact:

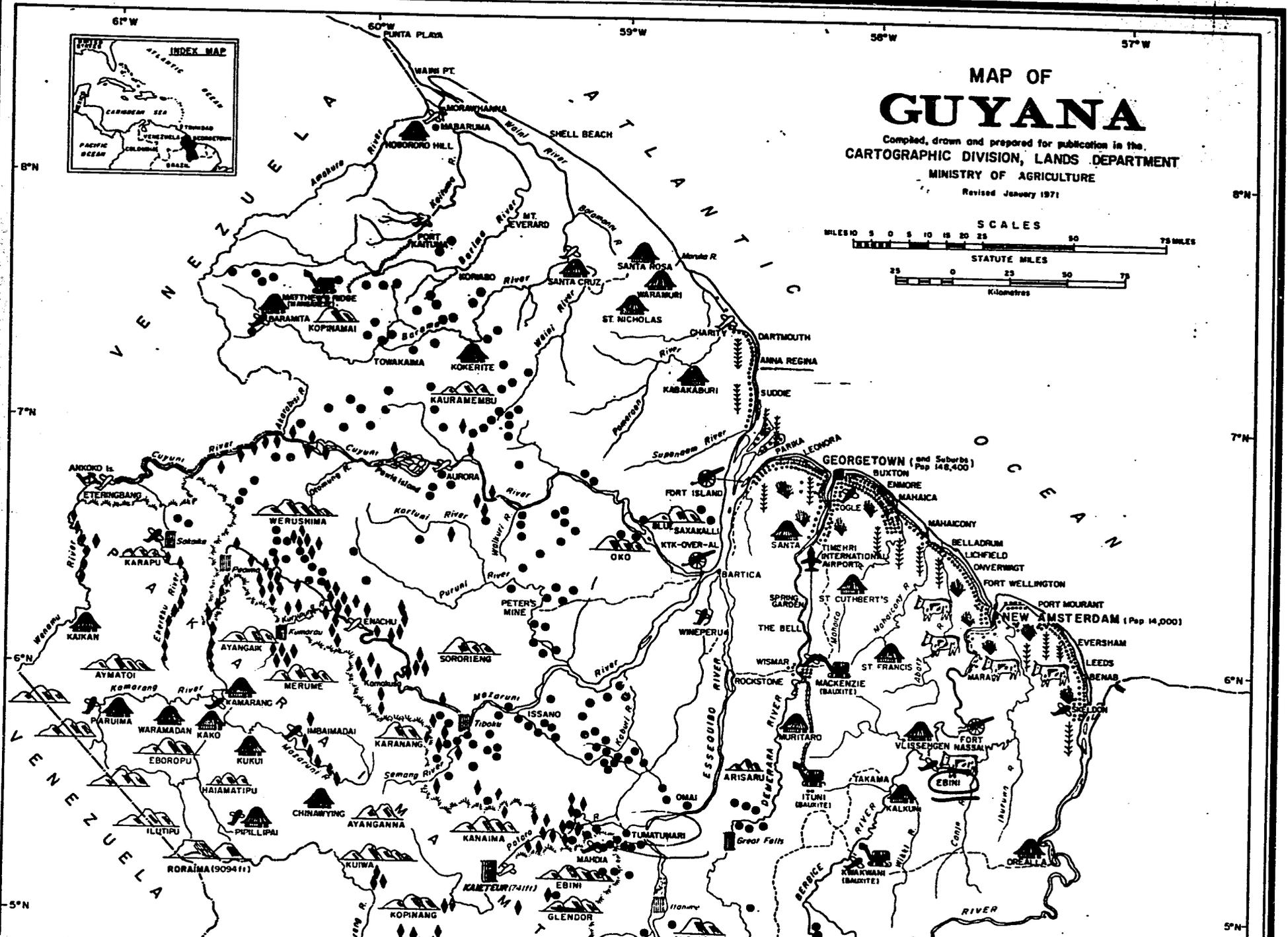
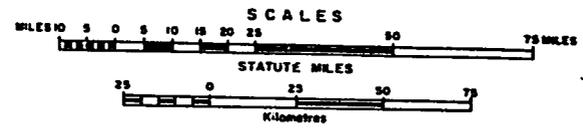
(1) Mr. Henry VanBlake
Assoc. Prof. on leave from USAID
School of Veterinary Medicine
Tuskegee, Institute, Al. 36088

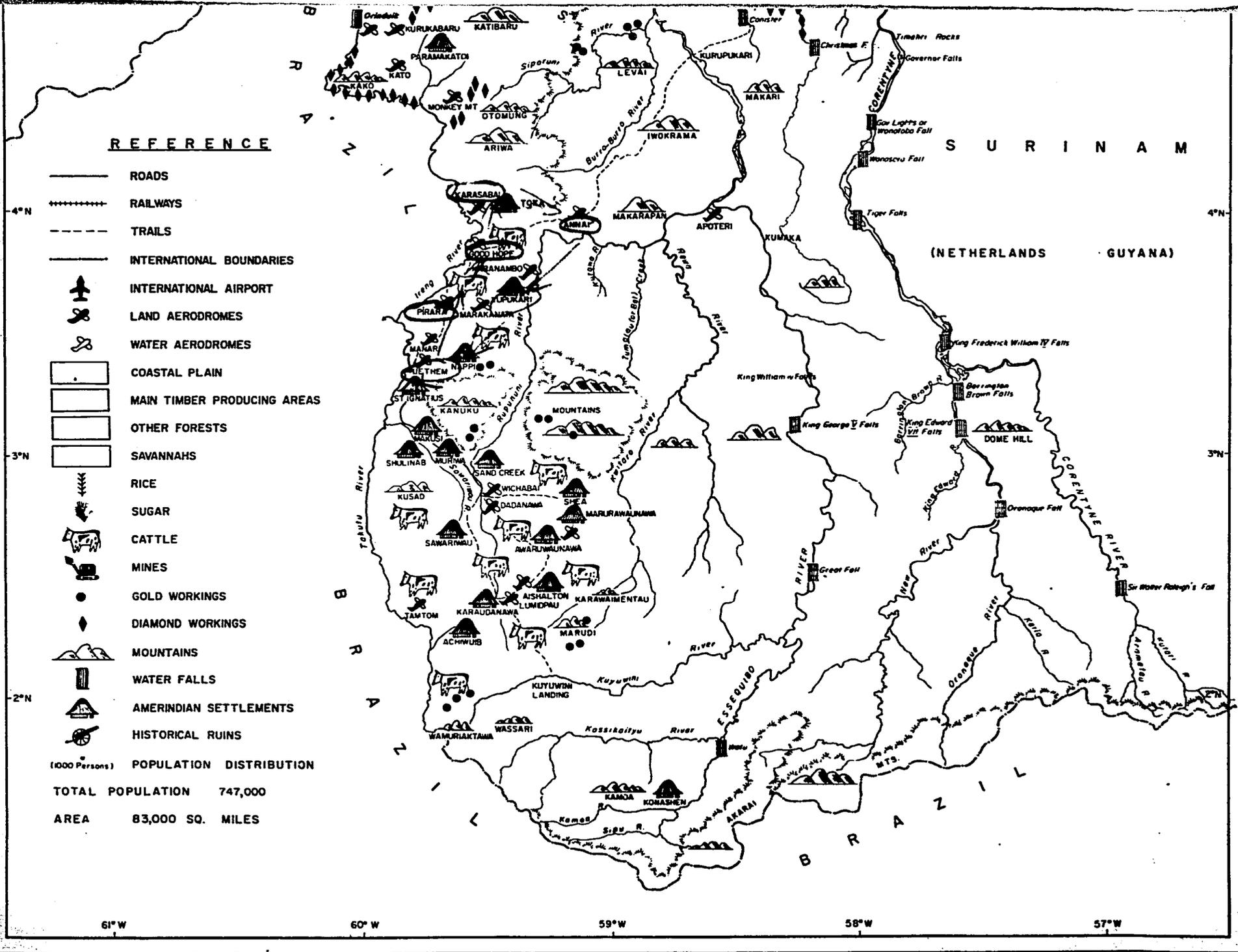
(2) Dr. George E. Cooper, Asst. Prof.
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Tuskegee Institute
Tuskegee Institute, Al. 36088



MAP OF GUYANA

Compiled, drawn and prepared for publication in the
CARTOGRAPHIC DIVISION, LANDS DEPARTMENT
MINISTRY OF AGRICULTURE
Revised January 1971





REFERENCE

- ROADS
- ++++ RAILWAYS
- - - TRAILS
- INTERNATIONAL BOUNDARIES
- ✈ INTERNATIONAL AIRPORT
- ✈ LAND AERODROMES
- ✈ WATER AERODROMES
- COASTAL PLAIN
- MAIN TIMBER PRODUCING AREAS
- OTHER FORESTS
- SAVANNAHS
- 🌾 RICE
- 🍬 SUGAR
- 🐄 CATTLE
- ⚒ MINES
- GOLD WORKINGS
- ◆ DIAMOND WORKINGS
- ⛰ MOUNTAINS
- 🏞 WATER FALLS
- 🏠 AMERINDIAN SETTLEMENTS
- 🗑 HISTORICAL RUINS

(1000 Persons) POPULATION DISTRIBUTION
 TOTAL POPULATION 747,000
 AREA 83,000 SQ. MILES

61°W 60°W 59°W 58°W 57°W

MAP FOR THE GOVERNMENT OF GUYANA BY THE GUYANA LITHOGRAPHIC CO. LTD. COPIES ARE AVAILABLE AT THE SURVEY DEPARTMENT OF GUYANA, GEORGETOWN.