C O N T E N T S

Page

SECTION III

SECTION IV

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PREFACE

General Statement Of Agricultural Policy For British Guiana 1959.

The Policy of the Department of Agriculture is:-

Firstly - To expand exports of crops, livestock and fishery products which are being exported at present with due regard being taken of external market possibilities and trade and price agreements; for example Sugar, Rice and Coffee;

Secondly - To produce other crops, fishery and livestock products for export; for example, Cacao, Beef, Shrimps;

Thirdly - To replace imports of certain crop, fishery and livestock products. Ultimately, it might be possible to produce a surplus for export, having regard both to future patterns of external trade and to local efficiency. Examples are Coconuts, Dairy Products, Poultry, Fish, Pulses, Citrus, Condiments and Vegetables; and

Fourthly - To encourage, for reasons of nutrition and of self-sufficiency, local production of foods which do not normally enter, to any large extent, into international trade, but which, nevertheless tend to reduce imports of food in addition to providing farmers with a source of income. For example plantains and ground provisions (root crops).

The Methods employed to achieve these objectives are:-

(1) Making available for productive use, after comprehensive soil surveys, increasing areas of land from the large undeveloped land resources of the country;

(2) Undertaking research to improve the productivity of existing crops and livestock and to discover new crops, new varieties and strains of existing crops and new breeds of livestock adaptable to the territory. To search for new fishing grounds, to conserve fishery resources, and to adopt techniques to increase the production of inland and marine fishes;

(3) Providing educational and Extension facilities for all members of the farm family to enable the farmer and his family to avail themselves of research findings and to secure the adoption of improved techniques and practices on the farm and in the home. To adopt these measures also as they apply to the fishing industry;

(4) Organising and rationalising economic production, marketing and processing so as to ensure that the producer obtains the maximum return for his labour, skill and capital;

(5) Providing a climate for prosperity in agriculture and fishing by introducing appropriate legislation and administrative measures and by providing necessary amenities, services and materials for efficient production, marketing and processing;

(6) Collaborating with all agencies and interests, especially credit agencies and cooperatives, concerned with the development of resources of the country.

AGRICULTURE IN THE COLONY

WEATHER CONDITIONS

The total rainfall for the year at the Georgetown Meteorological Station was 78.45 inches as compared with 61.83 inches in 1958. The average annual precipitation was 92.49 inches over the past 79 years (1880 - 1958).

2. The rainfall was below average during the first five months of the year. During this period, the rainfall, month by month, commencing from January was 4.47, 2.20, .70, 2.75, and 3.83 inches. These 'dry' conditions affected crop production very seriously. In addition, the mid-year 'wet' season was late, and delayed the sowing of the rice crop in most areas. The 'second' wet season commenced earlier than usual and this affected reaping conditions both for rice and sugar cane.

3. Rain fell on 221 days of the year as compared with 179 days in 1958, the highest fall for any one day was 4.29 inches on the 19th June which was well below the record of 7.65 inches on the 1st December, 1936.

4. In the riverain areas, dry weather which continued until the end of May was broken by heavy rains during the month of June. Following this, rainfall for the latter half of the year was fairly heavy but evenly distributed. On the ranching areas of the Rupununi savannahs, precipitation was much better than in the previous year, and this was reflected in improved grazing and better water supply.

CROPS

SUGAR

Organisation of the Industry

5. Sugar Production is pursued mainly on plantations owned by two large companies. These companies also operate eleven (11) factories which produce raw sugar. One factory (at Ogle) ceased operation at the end of 1958. The closure followed the completion of an improved larger factory in the vicinity (at La Bonne Intention). This new factory has a capacity of 33,000 tons of raw sugar, and will process sugar cane produced by three plantations, namely, La Bonne Intention, Ogle and Houston. Peasant cane farmers produce a limited quantity of cane for sale to the large factories.

6. The Sugar plantations have increased their use of mechanical equipment in the field, including the use of aircraft for applying insecticides, weedicides, etc. Their aim also is to stabilise their labour requirements, thereby reducing seasonal underemployment.

7. The plantations employ a staff of qualified agricultural scientists and are virtually independent of Government for technical assistance.

Output

8. The total production of sugar was 284,425 tons, of which 278,702 tons were produced from canes grown by estates and 5,723 tons by farmers. Comparative figures for 1958 were 300,419 and 5,942 tons respectively. The Estates harvested 86,927 acres of cane as compared with 84,547 acres the previous year. The average yield of cane per acre was 36.1 tons which gave an average of 3.19 tons of raw sugar per acre as compared with 3.52 tons per acre for the previous year. This decline in yield was

TABLE I

Sugar and Rum Statistics, British Guiana 1958-1959.

	Area reaped (including farmers' canes) - English acres			Sugar produced including farmers' canes - Tons			Yields per acre Tons			Rum Produced Proof Gallons		
	Berbice	Demerara	Colony	Berbice	Demerara	Colony	Berbice	Demerara	Colony	Berbice	Demerara	Colony
1958	35,746	51,242	86,988	124,335	182,026	306,361	3.48	3.55	3.52	1,003,956	2,434,238	3,438,194
1959	36,047	53,087	89,134	115,522	168,903	284,425	3.20	3.18	3.19	700,121	2,195,775	2,895,896

due primarily to the prolonged dry weather during the first five months of the year which adversely affected yield of cane and to the wet weather during the autumn crop which also had a similar effect on juice quality.

9. Table I gives details of production for the year.

Varieties

10. B41227 and B37161 continued to be the major commercial varieties. The acreage planted to B47258 was extended but this variety proved very susceptible to attack by rats and by the Yellow Cane Aphid - (Siphia flava). While this latter variety is as satisfactory as the two major varieties with respect to yield, its susceptibility to attack by these two pests, tended to preclude its extension. D141/46 was recommended for extension on a limited scale and only for reaping during the autumn crop.

11. Table II shows the distribution of varieties grown on Sugar plantations and reaped in 1959:

Distribution of Sugar Cane Varieties

TABLE II

Variety	Acres 1958	Acres 1959	Percentage distribution in the Colony 1958	1959
B37161	36,156.9	33,823.1	42.8	38.9
B41227	28,395.0	32,643.4	33.6	37.6
B47258	4,739.6	6,347.6	5.6	7.3
Pindar	2,160.4	2,109.1	2.5	2.4
B4362	2,178.9	1,924.7	2.6	2.2
B4098	2,868.7	1,866.4	3.4	2.2
Co 419	606.6	634.2	.7	.7
B47379	435.5	464.6	.5	.5
B45137	-	343.6	-	.4
B47419	-	312.6	-	.4
B46378	471.2	290.1	.6	.3
D37/45	132.2	226.3	.1	.3
B 4373	176.7	178.5	.2	.2
B49119	-	165.7	-	.2
D62/43	155.1	-	.2	-
Other Varieties	1,934.1	1,855.6	2.3	2.1
Total	84,546.8	86,927.9	100.00	100.0

The Sugar Experiment Station at Sophia, which is financed wholly by the Sugar Producers tested a number of new seedlings bred at the Central Sugar Cane Breeding Station in Barbados. In addition some crosses were made at this Station, and the resulting seedlings tested. A successful attempt at keeping Sugar Cane Arrows in preservative solution, as practised in Hawaii and other territories, was made and this line of work will be continued.

Fertilisers

12. The Sugar industry is the most important (and until recently the only) user of fertilisers. The value and quantities of fertilisers used on Sugar Estates for the years 1957, 1958 and 1959, are shown in Table III. Total expenditure for 1959 was $3,174,272 as compared with $3,400,000 for 1958.

TABLE III

Value and Quantities of Fertilisers used on Sugar Estates 1959

	Amonium Sulphate			Superphosphate			Hyperphosphate			Muriate of Potash		
	1957	1958	1959	1957	1958	1959	1957	1958	1959	1957	1958	1959
Quantity- tons	19,458	19,459	19,800	2,738	1,685	1,171	3,700	1,668	1,538	1,930	2,838	3,541
Value - $	2,196,724	1,962,735	1,801,103	448,709	274,123	184,690	321,835	128,800	114,585	215,209	297,858	331,977
Cost per ton $	112.90	100.87	90.96	163.88	162.88	157.72	86.98	77.22	74.50	111.51	104.95	93.75
% of total quantity.	48.5	50.0	48.4	6.8	4.3	2.9	9.2	4.3	3.8	4.8	7.3	8.6
% of total value.	56.4	57.4	56.7	11.5	8.0	5.8	8.3	3.8	3.6	5.5	8.7	10.5
	Limestone			Urea			Diammonium Phosphate			Mixed		
Quantity- tons	11,700	11,369	13,085	488	1,004	1,022	.110	.858	.737	-	19	-
Value - $	295,607	281,197	318,954	114,582	236,542	229,132	301,763	234,749	193,831	-	2,121	-
Cost per ton $	25.27	24.73	24.38	234.80	235.60	224.20	274.33	273.60	263.00	-	111.63	-
% of total quantity	29.2	29.2	32.0	1.2	2.6	2.5	0.3	2.2	1.8	-	0.1	-
% of total value	7.6	8.2	10.1	2.9	6.9	7.2	7.8	6.9	6.1	-	0.1	-

13. Sulphate of Ammonia continued to be the main fertiliser, but there was a slight increase in the use of potash and a marked increase of limestone and Urea. The high acidity of most of the sugar-cane soils indicate the need for still greater applications of limestone. This material is imported and its high cost is a deterrent. A local source of calcium - in the form of deposits of sea shells - is being developed.

Marketing

14. Total exports of sugar amounted to 255,153 tons as compared with 300,318 tons in 1958. The bulk of the export went to the United Kingdom under the Commonwealth sugar agreement, the quota for the year being 159,630 tons at the negotiated price of $216.48 (£45.2s.0d)per ton. In 1958, the export under this agreement was 154,567 tons at a negotiated price of $210.40 (£43.16s.8d). Local sales of sugar amounted to 18,956 tons as compared with 18,415 tons in 1958. The free market in the United Kingdom and Canada absorbed the rest of the output. Low prices were of much concern to the industry.

15. The production of rum was estimated at 2.9 million proof gallons which was less than the estimate of 3.4 million proof gallons for 1958. Export of rum was 2,191,372 proof gallons valued at $3,511,771.00 (£731,618.19s.2d.) as compared with 2,454591 gallons valued at $3,451,852.00 (£719,135.16s.8d) for 1958.

16. The estimated production of molasses was 14.5 million gallons and the export was 12,353,904 gallons valued at $2,341,450.00 (£487,802.1s.8d) as compared with 12,531,128 gallons valued at $2,549,486.00 (£531,142.18s.4d) exported during 1958.

The summary of the export trade in sugar, rum and molasses is shown in Table IV.

RICE

Organisation of the industry

17. Rice is grown chiefly on the heavy clay soils of the coastal belt and is principally a peasant crop, cultivated mainly by farmers whose individual holdings cover an average of about 7 acres though some cultivate as much as 400 acres by mechanical methods. The British Guiana Rice Development Company under Government sponsorship cultivated approximately 2,600 acres on its mechanised farm. Rice is milled both by privately owned mills, and by two large mills operated by the Rice Development Company. The Marketing of rice is controlled by a Rice Marketing Board which is the sole exporter.

Developments in the industry during 1959

18. The most important event in the industry during the year was the negotiation between the Government and The Federation of the West Indies of an agreement under which the Federation will take its full requirements of rice from British Guiana for a period of 3 years and 3 months, as from 1st October 1959 to 31st December 1963. Prices, under this contract, will be subject to annual review. This guaranteed market should help to give farmers confidence to expand the industry.

19. British Guiana made its first sale of paddy to Venezuela. About 10,000 tons were shipped at a favourable price. This quantity was equal to the surplus remaining on hand over and above the requirements of the West Indies. A delegation from the Board, including the Director of

TABLE IV

Exports of Sugar and By Products; British Guiana 1958 - 1959

Year	Sugar			Rum			Molasses		
	Tons	Value	Value per ton F.o.b.	Proof Gallons	Value	Value per gallon F.o.b.	Gallons	Value	Value per gallon F.o.b.
1958	300,314	$54,72[illegible]	$182,23	2,454,591	$3,451,852	$1.41	12,531,128	$2,549,486	$0.20
		£11,401,[illegible]	£37. 19.3½		£719,135.16.8	£0.29		£531,142.18.4	£0.04
1959	255,153	$46,360,527	$181.70	2,191,372	$3,511,771	$1.60	12,353,904	$2,341,450	$0.19
		£ 9,658,443	£37.17.1		£731,618.19.2	£0.33		£487,802.1.8	£0.04

Agriculture visited Venezuela to investigate the market.

20. Great interest was displayed by farmers in improved methods at all levels of the industry. The demand for tractors and combines was sustained and a number of small multi stage mills were installed in substitution of hullers. There was a sharp rise also in the use by the industry of Insecticides, weedicides, fertilisers and fungi - cides.

21. The Rice Marketing Board began to expand its facilities for storage and packaging of rice. A delegation from the Board, with the Director of Agriculture, visited Jamaica and secured the consent of the authorities there to reserve the entire market for packaged white rice (4,000 tons) for supplies from British Guiana.

22. Assessment Committees which deal with problems of land tenure affecting landlords and tenants functioned throughout the Colony fixing rents and generally improving tenurial arrangements.

23. The demand for land for rice cultivation continued to increase and many new areas were issued to landless persons by Government. This work is described fully in the appropriate Departmental reports. The Department of Agriculture helped by conducting soil surveys, to determine the suitability of lands and its officers served on committees which select settlers.

24. The efficiency of paddy production leaves much room for improvement. Farmers have been paying more attention to increasing production by cultivating new lands than to securing higher yields per acre and a better quality of the crop. Greater emphasis will have to be given to quality in future to satisfy the demand of export markets. This will involve the more general use of pure line seed, the eradication of red rice, and better cultivation, drying, storage and processing of the crop.

25. Production exceeded the record attained in 1958. It would have been higher had it not been for unfavourable weather which practically destroyed the spring crop and affected the autumn crop. The acreage under cultivation continued to expand and for the Autumn Crop was estimated at 179,200 acres, and for the Spring Crop 16,595 acres. The estimated total production in terms of milled rice was 104,075 tons as compared with 100,519 tons for 1958. Weather conditions were less favourable than in 1958 and the wet conditions obtaining at time of reaping of the Autumn crop, apart from reducing the output, had a particularly adverse effect on the quality of grain.

26. Table V summarises the production of rice for the year.

Marketing

27. With the exception of rice retained by producers for their personal needs, the British Guiana Rice Marketing Board continued to be the sole agent handling the internal and export marketing of all rice produced in the Colony.

28. During the financial year 1st October 1958 to 30th September, 1959, millers delivered to the Board 707,572 bagsof rice (180 lbs. gross weight), equivalent to 56,859 tons. This represented an increase of 4,896 tons over the previous year.

29. Exports for the year were 49,906 tons valued at

$12,529,919.00 as compared with 17,651 tons valued at $4,785,346.00 for 1958. The average price received was $251.07 per ton compared with $270.74 per ton for 1958. In addition to the export of milled rice 9,821 tons of paddy valued at $1,300,140.00 were exported to Venezuela. Local sales and 'retentions' by growers amounted to 30,396 as compared with 29,599 tons for 1958.

Prices

30. The price structure for paddy and rice was as follows:-

Paddy:- The minimum price for paddy was $6.80 per bag of 140 lbs. nett for dry, cleaned, well - winnowed padi.

Rice:-

Local Buying Prices for rice, 1959, effective 1st October, 1959

Grade	Price per 180 lbs.
Extra Super	$20.70
Super	19.70
Extra No. 1	18.55
No. 1	17.60
Extra No. 2	16.45
No. 2	15.35
No. 3	13.20
Super Broken	9.85
Broken	8.20
Unclassified	7.00
White A	19.70
White B	17.60
White C	15.35
White Broken	10.00

TABLE V

Rice acreage and yields, British Guiana, 1958/59

YEAR	Total Estimated Acres Spring and Autumn Crops				Estimated Yield
	Berbice	Demerara	Essequibo	Total	Tons of Rice
1958	78,807	78,872	31,647	183,326	100,519
1959	83,521	75,835	36,420	195,776	104,075

31. The selling prices of rice for export to The West Indies under contracts with the Board, were the same as for 1958, viz:

Grade	Price per bag of 180 lbs.
Super	$21.30
First Quality	19.20
Second quality	16.95

32. Local selling prices were also practically the same as last year, viz:-

Local Selling Prices

Super	$22.15 per bag of 100 lbs.
Brown A	18.80 " " " " "
Brown B	14.45 " " " " "
White A	21.30 " " " " "
White B	18.80 " " " " "
White C	17.00 " " " " "
Brewers Broken	12.00 " " " " "
Mixed Broken	10.45 " " " " "
Stock Feed	7.20 " " " " "
"Pearl Brand"	10.00 per 60 lb. Carton
"Indian Maid"	7.73 per paper sack of 50 lbs.

Milling

33. In addition to the two large mills operated at the Mahaicony/Abary Rice Scheme and at Anna Regina by the British Guiana Rice Development Company, there were also in operation 217 mills of different sizes and all privately owned. These mills are mainly of the single stage huller type, and therefore less efficient than the multi-stage mills which apart from giving a superior out-turn, recover Bran and Brokens. The mill at the Vergenoegen Land Settlement Estate and formerly operated by Government Land Development Department was taken over by a Co-operative Society of small farmers.

34. The in-efficiency of a large number of single-stage mills was fully recognised by the Rice Committee under the Chairmanship of His Excellency the Governor, and in the report published in December, 1958, it recommended inter alia:

(a) The definition of operational zones for the two large mills operated by the British Guiana Rice Development Company at Anna Regina and Mahaicony/Abary, and the compulsory closing down with compensation of all privately owned mills within those zones.

(b) The rationalization of milling outside these Central zones was to be undertaken by private enterprise. Single stage huller type mills were to be replaced by modern multi-stage mills within a specified period.

Draft legislation was being prepared during 1959 to give effect to some of these recommendations of the Rice Committee.

35. The two central mills of the British Guiana Rice Development Company purchased a total of 608,007 bags of padi which represented an increase of 128,477 bags on last year's purchase of 479,530 bags. Details of purchase are as follows:-

Centre	No. of Bags of 140 lbs. purchased from	
	Company's Cultivation	Farmers
Mahaicony/ Abary	30,879	450,391
Anna Regina	-	126,737

Machinery

36. The mechanisation of the industry continued to contribute to the expansion of the area under rice cultivation. 390 tractors valued at $1,393,945.00 and 21 combines valued at $348,141.00 were imported during 1959 as compared with 421 tractors valued at $2,060,143.00 and 11 combines valued at $168,225.00 during 1958.

37. Mechanisation was further stimulated by the continued issue of duty free gasolene for cultivation and harvesting. In this respect, a total of 531,580 gallons was issued compared with 513,940 gallons in 1958. Hire service of various types of machinery was continued by the Rice Producers' Association, the Government's Machinery Pool and private operators.

Pests and Diseases

38. Blast disease (Piricularia Oryzae) continued to cause damage to rice on the riverain lands, but its economic control using an organo-mercuric fungicide was effectively accomplished by the Department of Agriculture which sprayed all affected areas free of charge in order to demonstrate the technique to farmers and prevent the spread of the disease. In these areas, farmers have been advised to use this type of fungicide as a routine cultivation practice until it may be possible to develop a resistant variety.

39. There were instances of padi bug (Mormidia Poecila) damage in some areas, but these were controlled by dusting with B.H.C. under a scheme worked out by the Department of Agriculture with financial assistance from the Rice Marketing Board and with the cooperation of the Rice Producers' Association.

40. Rice water weevil (Lissorhoptrus) was reported in several areas and did serious damage in some districts. Effective control was brought about by improving the movement of the water, and it was demonstrated experimentally that treating seeds with an insecticide (Dieldrin or Aldrin) was effective. Farmers have been advised to adopt this seed treatment as a control measure for future plantings in view of the difficulty of controlling the pest by the traditional method of draining affected fields.

41. There was widespread evidence of leaf spot (Helminthosporium spp) damage especially on the grain which resulted in discoloured milled grains. Consequently, it was decided to introduce the treatment of seed with an appropriate fungicide in order to control the disease. The danger involved in using this fungicide, will necessitate strict supervision by the Department of Agriculture.

Supply of Pure Line Seed

42. The Production of Pure Line seed was continued under the supervision of the Department of Agriculture at the Land Settlement Schemes of Cane Grove and Anna Regina, where a total of 16,045 bags (140 lbs. nett) were produced. The main varieties produced were No. 79 and D110. Storage conditions at these centres were greatly improved by the use of the newly constructed concreted prefabricated storage bonds.

43. Storage space, nevertheless, continued to be a problem, and additional storage will have to be provided. A limited quantity of pure line seed (353 bags) was again

produced by private growers selected in consultation with the Rice Producers' Association. Such seed was purchased by the Department of Agriculture at $8.55 per bag and resold to farmers at $9.55 per bag.

44. The sale of pure line seed to farmers through Co-operative Thrift and Credit Societies helped to increase the demand for such seed. This arrangement should contribute to the more general use of pure line seed, linked as it is with the availability of loans to finance purchases. The acreage planted to accredited seed at present still forms only a small portion (about 16%) of the total area, and every effort is being made to encourage farmers to use better seed in order to improve the quality of marketed rice and to increase yields per acre. With this object in view, settlers on all new Government Land Settlement areas are restricted to the use of only pure line seed.

Fertilisers

45. In order to stimulate farmers to use fertilisers, a large number of demonstration plots were laid down on farms. The provision of credit for the purchase of fertilisers should help to increase usage, especially if associated with marketing arrangements for rice. This aspect is being examined. The estimated quantity of fertilisers used by rice farmers is of the order of 300 tons only.

COCONUTS

Organisation of the Industry

46. Coconuts are the third most important crop in the Colony with an estimated 34,000 acres grown on estates and in scattered plantings mainly around houses in villages. Production is less than domestic requirements for edible oil. The Development programme provides for the establishment of 2,000 acres of new land under coconuts annually. During 1959, some 70,000 seedlings were distributed to farmers from nurseries of the Department. This amount should plant 1,400 acres.

Output

47. Relatively dry conditions during the past 3 years have had a most striking effect on the coconut industry. During 1959 production of copra reached the very low level of 3,432 tons as compared with 4,830 tons for 1958 and 5,370 in 1957. The industry suffers from gross neglect. Government introduced a programme to encourage the resuscitation and development of the industry. The aim is to rehabilitate old estates by making loans available. Moreover, it is planned to increase planting of new areas by 2000acres annually; Nurseries have been established by the Department of Agriculture to supply selected seedlings at a subsidised price; a bonus of $20.00 per acre is offered for new plantings; loans are available; and there is increased technical assistance to control pests and diseases, and to increase yields by better field practices.

48. Table VI shows the production of various coconut products in 1959 as compared with the preceding three years.

TABLE VI

Year	Copra (tons)	Copra Meal (lbs)	Edible Oil (Glns.)	Crude Oil (Glns.)	Soap lb.	Margarine Compound Lard
1956	5,468	3,901,694	696,440	230,567	4,454,762	636,818
1957	5,370	3,814,412	676,731	147,339	4,777,727	1,642,230
1958	4,832	3,432,358	623,835	109,729	4,012,976	1,920,978
1959	3,432	2,440,165	445,350	86,282	3,748,514	1,778,550

48. Local production of margarine increased to 1,547,691 lbs. from 1,533,754 lbs in 1958. Imported oil was used to a great extent in its manufacture. Soap Production was 4,012,976 lbs. compared with 3,748,514 lbs in 1958, while compound lard produced amounted to 373,287 lbs compared with 244,796 lbs in 1958.

Grading

49. Copra grading continued to be supervised by Government. Prices paid remained the same as in 1958 viz:

Grade I	-	$282.80 per ton
Grade II	-	271.60 " "
Grade III	-	260.40 " "

Insect pest and diseases

50. The most serious insect pests were the Large moth borer (Castnia daedalus) and coconut caterpillar (Brassolis Sophorae) respectively. Farmers were advised to improve sanitation on their estates, and spray with 1% Dieldrin as control measures. Bronze leaf wilt - the result of poor drainage and irrigation continued to be a symptom of neglect on many properties.

General

51. The Colony continued to participate with the West Indies in the Oils and Fats Agreement. The new agreement ratified from 1st January, 1957, continued in force. The area export price was increased to £66.13s.4d per ton f.o.b.

COFFEE

52. Liberica coffee is produced by farmers mainly on the banks of rivers in the North West District and Pomeroon. Greater attention was paid to improvingthe quality of beans. The Co-operative Marketing Societies in both districts were consequently striving to improve quality by central and better methods of processing, and by the introduction of grading. Exports totalled 536,144 lbs. valued at $311,943.00 as compared with 417,200 lbs. valued at $273,548.00 in 1958.

53. Weather conditions favoured sclerotium disease, and it was particularly severe in the deep pegasse areas of the North West District. Spraying with fungicides proved in-effective, but plants which received fertiliser treatment showed considerable resistance to the disease.

CITRUS

54. Approximately 28,000 budded citrus plants were distributed by the Department to farmers. New plantings continued especially in the North West District. Fruits

were more readily available but tended to be small and of indifferent quality. With the increased local production, imports from Suriname and Trinidad were on a smaller scale.

55. Exports of Lime oil and lime juice were as follows:-

TABLE VII

Year	LIME JUICE Quantity (Glns.)	LIME JUICE Value $	LIME OIL Quantity (Lbs.)	LIME OIL Value $
1958	10,836	20,893	139	$19,422
1959	15,153	20,023	92	9,173

FOOD CROPS

Roots and Plantains

56. Supplies of local food crops, notably plantain and cassava were adequate. The serious glut conditions experienced in 1958 were greatly reduced. Exports of plantain to Trinidad rose from 810,243 lbs valued $35,632 in 1958 to 1,639,779 lbs. valued $73,391 in 1959. This striking increase helped to sustain local prices and avoided the creation of large unmarketable surpluses. Surplus cassava was processed into starch and exports of this commodity increased from 211,732 lbs. valued $19,531 in 1958 to 370,792 lbs. valued $39,658.

57. Purchases of food crops by the Government Marketing Division at Georgetown for the years 1958 and 1959 were as follows:

TABLE VIII

Item	1958 lbs.	1959 lbs.
Plantains	5,487,324	1,858,684
Cassava	5,208,705	2,029,889
Sweet Potatoes	83,290	108,496
Yams	25,855	50,424
Tannias	4,642	6,363
Eddoes	136,715	71,368

Export of cassava starch and plantain for 1958 and 1959 was as follows:

TABLE IX

Item	1958 Quantity (lbs)	1958 Value $	1959 Quantity (lbs)	1959 Value $
Plantain	810,243	35,632.00	1,639,779	73,391
Starch	211,722	19,531.00	370,792	39,658

Corn

58. With the proposal to establish locally a large Feed Manufacturing Plant, efforts were made to stimulate corn production. However unfavourable weather conditions reduced production below the level of 1958. As a result, the Government purchase price of 4.5 cents per pound ex far-

had to be increased to 5.75 cents per pound delivered Georgetown. Purchases by the Government Marketing Division for 1959 amounted to 1,234,374 lbs. Exports amounted to 160,380 lbs valued $8,019 compared with 540,736 lbs. valued $43,240 in 1958.

Cacao

59. Efforts to encourage planting of this crop on the riverain areas were continued. The production of clonal planting material on Government Stations was being expanded to meet the proposed development programme of 2,000 acres of new plantings annually for the next five years. Bookers, a large commercial firm, continued with its programme to establish 5,000 acres of cacao during the next five years. 43,177 clonal plants were distributed from Departmental nurseries.

60. Many abandoned cultivations were reclaimed and rehabilitated. The Marketing Division guaranteed to purchase beans from farmers. Exports amounted to 38,640 lbs. valued $12,972 compared to 22,400 lbs. valued $7,969 in 1958.

Other Crops

61. There was a good supply of local fruits such as mangoes, guavas, pineapples, sapodillas, papaw and starapples. Avacadoes were in short supply. Green leafy vegetables were abundant. Tomatoes and exotic vegetables such as beet and carrots were scarce. There was a fair production of tomatoes on old coral sites in the Rupununi.

.. The Department of Agriculture distributed seed of most vegetables and made special efforts to foster the use of pulses e.g. mung and urid (Phaseolous) and Black eye peas (Vigna) in rotation with rice.

LIVESTOCK

Milk

62. Milk production continued to expand and reflected the efforts being made by the Department of Agriculture and by private interests towards realising the Government's policy of eventual self-sufficiency in milk. Dairying is being encouraged particularly in areas within reasonable proximity of urban centres e.g. Georgetown and New Amsterdam. The expansion of the output of milk helped to reduce the high level of imports of processed milk. These imports fell by 649,000 lbs valued $300,000. Details are given in the following table.

TABLE X

IMPORTS OF MILK PRODUCTS

	1958		1959	
	Imports (lbs.)	Value $	Imports (lbs.)	Value $
Condensed Milk	4,218,322	1,150,903	3,459,238	883,627
Evaporated	6,129,289	1,425,875	5,998,769	1,419,730
Milk Powder	1,831,794	923,554	2,072,230	896,988
Total	12,179,405	3,500,332	11,530,237	3,200,345

63. The Milk Pasteurisation Plant operated by the Department in Georgetown purchased 498,876 gallons of milk valued $369,168, an increase of 19,430 gallons valued $14,378 over the 1958 purchases. The output of milk for

the colony (including purchases by the Plant) is estimated at 1,400,000 gallons. The quantity of fresh milk delivered to the Pasteurisation Plant rose in January, but remained at a fairly constant level for the remainder of the year, but rising again in December. The average daily intake was 1,366 gallons compared to 1,100 gallons for the previous year.

64. Paradoxical as it appears, not all the milk purchased by the Plant was sold because of problems of distribution and the acquired preference of consumers for processed milk. This unsold "surplus" of 29,000 gallons valued at $21,460.00 was distributed free of charge to Government Institutions and charitable organizations. The introduction of a sweetened chocolate milk product proved to be very popular and helped to reduce the surplus which in 1958 had amounted to 77,422 gallons valued $61,042.37.

65. The Milk Pasteurisation Plant purchases milk from the farmer at the following prices:-

	Price per gallon
Leguan and West Coast Demerara	$ .72
Cane Grove	.86
West Coast (Berbice)	.60
East Coast (Demerara)	.70
Georgetown (Delivered)	.80
Grade A - t.b. tested - (Delivered) Georgetown	.96

66. Milk is sold after pasteurisation and bottling at $1.08 per gallon wholesale and 16¢ per pint retail.

67. The dairy cow on which the industry is being built is a cross between the unimproved animal and the Friesian Holstein breed. Where possible, the Zebu animal is used in the breeding programme to give heat tolerance. The most suitable crosses for local conditions are between 50% and 75% of Friesian blood. The higher grade animals need very careful management. The Artificial Insemination Service recorded 3,147 services on this programme during the year as compared with 2,447 in 1958.

68. The Dairy Expansion Scheme was expanded during the year. A total of 425 cows and heifers are now being used on the Scheme, under which a deserving farmer who undertakes to discharge certain technical requirements is given a suitable heifer in calf. The farmer is required to return the first heifer calf to the Scheme for rearing and later for breeding until it is ready for issue to another farmer. Proper breeding and feeding under this Scheme will give the farmer much improved animals.

Beef

69. Beef production is concentrated on the savannahs of the Rupununi and on coastal ranches operated by four limited liability companies. In addition, a large number of small farmers and land owners keep cattle to provide their households with milk, to produce oxen, and to sell for beef those animals which are in excess of or unsuitable for these purposes.

70. The output of beef was well maintained in the Rupununi where pastures were in somewhat better condition than in the previous year. The appearance of Foot and Mouth disease in Brazil led to the enforcement of precautionary measures on the border but these arrangements did not affect the activities of ranchers.

71. Government decided to close the cattle trail which connects the Rupununi district to the Berbice river and on which cattle were traditionally driven to the Georgetown and New Amsterdam markets. This action was not favoured by the Rupununi ranchers. However, no difficulty was experienced in slaughtering cattle at Lethem and transporting carcases by aircraft to the coast,

72. Dry conditions affected pasturage and production on coastal ranches. In these areas, there is a growing demand for land for rice cultivation which would be difficult to resist unless ranchers are prepared to intensify their methods and to secure higher returns to capital and land than at present.

73. Small producers contribute at least a half of the total number of cattle marketed for slaughter. The mechanisation of the rice industry has resulted in a larger number of cattle being sold for beef rather than as oxen. Not only are cattle sold for slaughter because the demand for oxen is declining but producers who keep cattle as a means of capital accumulation or savings, draw on these reserves so as to obtain funds for the purchase of tractors and other equipment.

74. The total number of cattle slaughtered for the year was 20,894 head of which 6,363 were slaughtered in Georgetown, this represented a decrease of 1,339 and 390 respectively over the 1958 figures.

75. Beef slaughtered in the Rupununi and flown by aircraft to Georgetown was 1,392,286 lbs. compared with 1,334,498 lbs. in 1958.

76. Exports of beef amounted to 37,280 lbs. valued $11,889 compared with 53,114 lbs. valued $30,681 in 1958. All exports were made by aircraft to French territories in the Caribbean. 212 head of cattle valued $36,859 were exported to Suriname compared with 477 head valued $92,620 in the previous year.

Hides

77. Local and Export prices for wet salted hides remained at about the 1958 level and exports amounted to 369,881 lbs valued $38,227 compared to 399,651 lbs. valued $32,005 in 1958.

78. A trial shipment of dried hides prepared by the Department was made to the United Kingdom and the results indicated that it was financially more favourable to ship hides in this form than in the wet salted condition. This information was transmitted to the Meat Marketing Ltd. through which most hides from the Rupununi district are marketed.

Pigs

79. A committee headed by Mr. R.E. Davis, a member of the Legislative Council was appointed to enquire into the reasons for the decline in pig production and to make recommendations. The Committee received much technical advice from the Department and its report is awaited.

80. The shortage of cheap grain - the most important factor which contributed to the reduction of the pig supply, ended towards year end with the availability of large quantities of rice by-products and paddy damaged by unfavourable weather at harvest. However, there is still

scope for a larger supply of maize and of copra meal.

81. Production of bacon, ham, sausages and lard continued at the Marketing Division where pigs are purchased from farmers at prices based on carcase quality.

82. Export of pigs on a restricted scale was again permitted and 298 valued at $16,770 were sent almost entirely to Suriname.

Sheep and Goats

83. These animals are reared wherever farms and ranches are found in the colony. Most of the meat is consumed in situ, particularly during periods of festivity. The Department has tried in the past to improve the quality of sheep by introducing Black-headed Persian, Barbados Black belly, Wiltshire horned, and Border Leicester rams. The results are hardly noticeable except on the few large properties where owners take some care in improving husbandry. Most sheep are nondescript being left by their owners to fend for themselves on roadsides and wasteland. Goats are kept mainly for meat under the same conditions as for sheep. A few persons rear goats for milk and the Department maintains a number of British Alpines to provide rams for grading up the local herd.

Poultry

84. The production of broilers has risen steadily over the past five years and reached its highest level in 1959. The output reported by the larger producers, was 850,000 lbs. compared with 600,000 lbs. in 1958. This rise was reflected in a further decline in imports which fell from 147,033 lbs valued $110,049 in 1958 to 40,790 lbs valued $33,186. These imports were confined almost entirely to turkeys, capons and other special types.

85. In addition to organised broiler production which is heavily capitalised and well managed, chickens are reared on practically every farm both to supply the farm family with eggs and meat as well as for cash sale. There is need for increased production of eggs (some 232,000 valued $28,531 were imported) to satisfy the growing demand.

86. The Department of Agriculture, in collaboration with certain specialised producers was able, for the first time in many years, to fill all orders for chicks.

87. Poultry meat is, undoubtedly, the most popular meat on the market - a popularity which is growing daily because of advertisements by producers and restuarant operators. In quantity consumed, it ranks second to beef.

Meat products - imports

88. It is customary to record the quantity and value of meat products of all kinds imported in order to indicate the extent to which the local market remains to be fully satisfied. The quantity imported was 3,245,862 lbs valued $1,727,640 compared to 3,329,275 lbs valued $1,824,725 in 1958. It is possible that this decline was due to increased local production.

ANIMAL HEALTH

Foot and Mouth Disease

89. An outbreak of Foot and Mouth disease in the Rio Branco Territory of Brazil, adjacent to the Northern

Rupununi Savannahs was reported in August. The 5 mile wide buffer zone was re-established with all animals placed east of the fence and strict control measures introduced. The disease did not enter British Guiana and all measures were relaxed by December 31st.

Paralytic Rabies

90. A limited outbreak occurred around Bartica 60 miles up the Essequibo river and another around Atkinson Field, Demerara River, but the disease was much less in evidence on the Coastal belt. There were reports of many deaths in the Rupununi District particularly in the Southern Savannahs. Vaccinations for the year numbered approximately 4,000 compared to 25,000 in the previous year.

91. A survey of bat vectors in the colony was carried out by Dr. A.M. Greenhall, Zoologist, Ministry of Agriculture, Trinidad.

Equine Encephalomyelitis

92. Both Eastern and Western strains were identified in an outbreak occurring in the Rupununi at Dadanawa Ranch. The Venezuelan type was previously identified on the Coast.

93. Diagnostic work was carried out by the Regional Virus Laboratory in Trinidad.

94. Vaccination has been carried out using bivalent Eastern-Western vaccine and monovalent Venezuelan vaccine.

Swine Fever

95. A suspected outbreak occurred at the Livestock Farm, Central Agricultural Station, vaccination using Crystal Violet vaccine was carried out.

Anthrax

96. One outbreak occurred in Essequibo and was controlled by vaccination. Routine Vaccination is carried out on all Government owned and Sugar Estate livestock.

Poultry Diseases

97. Prophylactic innoculation against Newcastle disease and Fowl Pox is carried out through the Colony. Salmonellosis, Coccidiosis, Leucosis complex, Chronic Respiratory Disease were among other diseases diagnosed.

BEEKEEPING

98. The production of honey and bees' wax remained at about the same level as 1958. The total number of colonies in operation was 2,055 - an increase of 29 over 1958. Local Market prices continued at 20 - 30 cents per pound for honey and $1.50 per pound for wax.

99. Local production and demand for honey and wax appear to be in balance and the export market price of about 12 cents per pound f.o.b. is regarded by beekeepers as too low to attract increased production.

FISHERIES

Shrimps

100. The most important - and indeed, spectacular - development in Fisheries during the year was the catching

of shrimps by American owned trawlers based at Georgetown and operating off the Guianas. During 1957, an American financed company, locally registered as B.G. Fisheries and Trading Company began a survey of the waters off the Guianas for shrimp. Their efforts were unsuccessful although they found evidence of the occurrence of shrimp in the area. However, like the Departmental survey vessel "The Cape St. Mary", they located very productive grounds of fish. Towards the end of 1958, the U.S. Fish and Wildlife survey vessel "the Oregon" located shrimp in good quantity off the Guianas and shortly thereafter trawlers confirmed these findings and based their operations from British Guiana.

101. Twenty two trawlers, all American owned, were in operation and produced 1,140,567 lbs of shrimp valued $746,511 for export. The shrimp are graded, frozen, packed and exported to the United States. Small quantities were sent to Trinidad, while the local market is fully supplied. These operations afford employment to some 200 persons. Within a year, shrimps have become third in importance - next to sugar products and rice - on the list of exports of products derived from Agriculture, Livestock and Fisheries: A truly remarkable achievement.

Marine fish

102. There are several areas from which fish is captured by many methods. Deep sea fishing, using hand lines from schooners operating 60 to 100 miles from the coast provide snapper and grouper for the local market. During the year, the number of the schooners increased from 12 to 15.

103. Fishermen using pin seines and to a lesser extent cadell and hand lines fish the shallow coastal mud flats for queriman, bashaw, snook and other types. While Chinese seines are the main type of gear used for fishing in the rivers and estuaries for the smaller species of fish and shrimp.

104. With the completion of the survey by the Department of coastal fishing grounds between the 10 to 20 fathom lines, a local entrepreneur launched two trawlers to exploit areas which were found to be productive. The survey vessel "The Cape St. Mary" left the Colony for Hong Kong, after having made a most valuable contribution to our knowledge of the fishing resources of the country and demonstrating the use of the trawler for fish capture. The fishing industry has been greatly encouraged by the establishment of a central fish Market in Georgetown, managed by the Marketing Division of the Department of Agriculture. In addition to providing fishermen with facilities for disposing of their catches, the market maintains a fishermen's lodge and canteen, repair ramp, net preservation facilities, a dock, cold stores, fish boxes for rent, and produces ice. The market is used also at night for fishermen's meeting and for the showing of educational films.

105. Further financial assistance to the industry is given through the refund of duty on imported gear and equipment. The sum of $26,242.92 was disbursed in 1959.

106. A Fisheries Ordinance was promulgated in 1956. However, following objections by fishermen to some of its provisions, it was suspended during 1957 and 1958. However, it was brought into force from the 1st of November. The aims and objectives of the Ordinance are to conserve fisheries resources and to ensure orderly production and marketing of fish.

Inland Fisheries

107. Inland fisheries make a considerable contribution to local food supply. It is difficult to estimate the output but in many areas it is more important than fish from marine sources. The principal areas which constitute inland fisheries' are the drainage and irrigation systems of coastal agricultural lands, inland water ways, rivers, creeks, reservoirs, swamps and flood fallows. Additionally, there are many fish ponds in which fish culture is practised. Most of the fish captured from these sources are for subsistence purposes. The majority of rural people fish by castnets, hooks and lines and similar simple devices. Fish poisoning is practised in remote areas by Amerindians.

108. With the increasing reclamation of coastal land for agriculture, the supply of inland fish has declined in many districts. Consequently, the Department has placed emphasis on fish culture. However, there is need for considerable research before this enterprise can find a significant place in the economy. Accordingly a large research station has been established at Onverwagt to work out techniques of brackish water fish culture. Should these efforts succeed, several thousand acres of land could be made available for production and consequently contribute prominently to the economy.

Aquarium fish

109. There were four (4) major exporters of aquarium fish. The weather has adversely affected this industry but supplies have still continued to be sent to various parts of the world, particularly the United States and United Kingdom.

Production Statistics

110. The compilation of statistics of fish production is difficult under local conditions and this is aggravated by the lack of staff to undertake collection and processing. The following table gives only information, the accuracy of which can be attested. It indicates the progress of the industry.

TABLE XI

Exports

Shrimp	1,140,567 lbs.	valued $746,511

Purchases by Wholesale Fish Market Georgetown

1958	589,580 lbs.	(excludes 356,340 lbs. landed by survey ship Cape St. Mary)
1959	665,380 lbs.	

Landings by trawlers on private wharves:- 458,500 lbs.

Imports of fish and fish preparations

1958	5,933,422 lbs.	valued $1,984,496
1959	5,705,264 lbs.	valued $1,999,181

Analysis of Exports of Agricultural, Livestock and Fisheries Products.

111. Table XII gives a general analysis of exports of Agricultural Livestock and Fisheries products over the five year period 1955 to 1959.

112. The total value of these exports was $67,691,127 compared to $57,260,019 in 1955 and the record of $69,695,977 in 1957. These exports, in 1959, represented 66.4% of the total value of all exports compared to 64.3% in 1955 and 68.9% in 1958.

113. The position occupied by exports of Agricultural, Livestock and fisheries products would have been even more favourable in 1959 had it not been for adverse weather which affected exports of sugar products to the extent of some $10 million - i.e. an additional 10% of total exports.

SECTION II

DEPARTMENT OF AGRICULTURE

Organisation

114. The Department of Agriculture falls within the portfolio of the Minister for Natural Resources who is charged with the responsibility for the development of Agriculture and Fisheries. The Department is administered by a Director with a Deputy Director of Agriculture and is divided into three main functional sections, each headed by an Assistant Director. There are (1) Research, (2) Veterinary and Animal Husbandry, and (3) Extension and Field Services. In addition the following major divisions report separately to the Directorate:-

Marketing Division
Botanical Gardens
Fisheries Division
Meteorological Division
Agricultural Economics Division.

The work of these sections and divisions of the Department is described in this report. A list of staff is given in the Appendix. Table XIII gives the Organisational Chart of the Department.

115. Close contact is maintained with Institutions and Departments concerned with Agriculture and Fisheries and the Department of Agriculture occupies an important position in their administration and work. Thus, the Director of Agriculture serves as Chairman of the Sugar Experiment Station (which is financed by the Sugar Producers' Association) and Chairman of the Sugar Industry Rehabilitation and Price Stabilisation Funds Committee, as a Director of the Rice Development Company, a member of the Rice Marketing Board, Chairman of the Marketing Committee and of the Fishery Advisory Committee and as a member of the Industrial Development Advisory Committee.

116. The following four events will affect the organisation and work of the Department of Agriculture:-

(a) Government decided to create a Marketing Department within the Ministry of Trade which will absorb the Marketing Division and other Government Organisations engaged in trade.

TABLE XII

Value of Exports of Agricultural Produce - (F.O.B.) Excluding Ships' Stores/Bunkers.

Commodity	1955	1956	1957	1958	1959
Live animals chiefly for food	-	-	9,504	94,620	54,587
Meat and meat preparations	-	3,829	40,703	33,032	18,361
Dairy products, eggs and honey	522	84	23	82	373
Fish and fish preparations	1,568	1,583	5,348	1,558	744,687
Cereals and cereal preparations	12,518,684	9,852,092	9,165,531	4,822,170	13,838,088
Fruits and Vegetables	6,284	17,618	23,173	64,223	110,073
Sugar and sugar Preparations	40,018,639	42,615,047	55,763,576	57,276,288	48,702,237
Coffee, tea, cocoa, spices and manufactures thereof	309,646	382,944	316,588	281,754	324,922
Feeding stuff for animals (not including unmilled cereals)	114,820	122,794	163,445	118,416	119,791
Miscellaneous food preparations	3,419	4,873	11,589	20,022	19,836
Beverages	3,243,589	3,879,597	4,125,772	3,568,941	3,625,548
Hides, skins and fur skins, undressed	20,721	29,731	31,521	32,005	38,266
Textile fibres not manufactured into yarn, thread or fabrics and waste*	7,257	2,877	6,772	7,257	3,805
Animal and vegetable crude materials, n.e.s.	326	462	673	2,063	3,545
Animal and vegetable oils (not essential oils) fats, greases, and derivates	2,458	19,300	-	-	-
Essential Oil - Lime Oil and other essential vegetable oils (excluding turpentine) Soaps - soft, resin, hard in bars, etc. principally for laundry washing	10,060	12,428	27,048	44,274	45,293
Miscellaneous chemical materials & products - starches etc., glue and size and dressings, casein, albumen, gelatin, etc.	2,026	3,343	4,711	21,567	40,815
Total Value of Agricultural Produce	$57,260,019	56,948,602	69,695,977	66,388,272	$67,691,127
As a percent of Total Domestic Exports	64.3%	61.0%	65.1%	68.9%	66.4%
Total Value of all Domestic Exports-Excluding Ships' Stores/Bunkers	89,059,183	93,351,449	107,022,177	96,346,689	$101,997,382

*Wool and other animal hair, jute, vegetable fibres (except cotton).

TABLE XIII

ORGANISATIONAL CHART

DEPARTMENT OF AGRICULTURE - BRITISH GUIANA

DIRECTOR
DEPUTY DIRECTOR

CLERICAL STAFF - Executive Officer
Accountant
Central Accounting Staff
District Accounting Staff

- BOTANICAL GARDENS
- ECONOMICS DIVISION (SECTION (a) Production; SECTION (b) Marketing
- MARKETING DIVISION (Fish Market; Processing Factory; Bacon and Ham Factory; Produce Depots; Pasteurisation Plant)/
- ANIMAL & PLANT PROTECTION SERVICE
- AGRICULTURAL OFFICER (Land Settlement & Development)
- EBINI LIVESTOCK STATION //
- ST. IGNATIUS LIVESTOCK STATION //
- FISHERIES DIVISION (Marine, Inland & Research)

AGRICULTURAL OFFICER
- FARM YOUTH TRAINING
- INFORMATION & EDUCATION
- LIBRARY & PUBLICATIONS

ASSISTANT DIRECTOR (Extension)
- DISTRICT STAFF AGRIC. ENGINEER
- AGRICULTURAL OFFICERS (11)
- AGRICULTURAL ASSISTANTS (5)
- FIELD ASSISTANTS (39)
- (District Demonstration Stations & Nurseries)

ASSISTANT DIRECTOR (Research)
- A.O. (Perennial Crops)
- A.O. (Annual Crops)
- A.O. (Rice)
- A.O. (Fibre & Pasture)
- Plant Pathologist
- Entomologist
- Entomologist (Rice Storage Investigations)
- Agricultural Chemists (3)
- Soil Surveyors (2)
- Soil Scientist (1)
- Agronomists (Soil Surveys)(2)
- CENTRAL AGRICULTURAL STATION∅

ASSISTANT DIRECTOR (Veterinary & Animal Husbandry)
- Veterinary Officer (Research)(1)
- Veterinary Officers (General)(4)
- Livestock Officer

N.B:- / Advisory Marketing Committee with D. of A. as Chairman
// There is an Administrative Committee comprising D.D. of A. Chairman, A.D.(V) & A.D.(R)
∅ There are a Central Research Committee with D. of A. as Chairman, A Rice Research Committee and a Consultative Committee for C.A.S.

(b) The decision of Government to withdraw from the manufacture of stockfeed as soon as a modern stock feed Factory was established by private enterprise. The Company which intends to erect such a Factory has agreed, with the approval of Government, to appoint the Director of Agriculture as a nominal Director and his duty will be to protect the interests of Government and the farming community.

(c) The integration of the 4 H and Young Farmers' Club movement into the normal Extension service, and

(d) the take over by the Department of the mechanised experiment station of the Rice Development Company.

117. Funds voted to the Department by the Legislative Council in 1959 were $1,840,368 on the Recurrent Estimates and $606,741 on the Development Estimates.

Policy

118. There was no major change of policy during the year. The preparation of the Development programme for the period 1960 - 64 occupied a good deal of the time of the Administration.

119. The main features of the programme as approved by Government, are:-

(a) Establishment of a cacao industry ($800,000);
(b) Research at St. Ignatius Livestock Station ($370,000)
(c) Research at Ebini Livestock Station ($450,000);
(d) Staff Training ($225,000);
(e) Soil and Land use surveys ($368,000);
(f) Rice Development (production of additional pure line seed)($200,000);
(g) Expansion of coconut industry ($140,000)
(h) Dairy Farming ($100,000) - mainly for new stock;
(i) Beef industry ($132,000) - mainly for new stock;
(j) Fisheries development ($235,000)
(k) Establishment of Agricultural Training Centre ($180,000)
(l) Additional staff ($400,000).

In addition there will be an expenditure of $34.5 million on new Drainage and Irrigation Schemes, $7.1 million on new Land Development projects and $11 million for agricultural and related credit.

Staffing

(a) Vacancies

120. The expansion of the work of the Department during the past five years and the new obligations imposed by the Development Programme will require all the energy and ingenuity that the staff can muster. It is regrettable that at the present time, there is a serious shortage of experienced qualified staff to fill the large number of vacancies which exist. At time of writing there were 22 senior staff vacancies, representing 35.7% of the senior establishment. This position is of serious concern and has been reported to Government. It seems that improvement of salaries and conditions of service in conjunction with a greatly enlarged training programme are the only permanent long term solutions.

121. I wish to record, at this stage, my deep appreication of the dedication and zeal with which the senior staff, in particular, have been loyally performing their ever increasing duties despite difficulties and the attraction of lucrative opportunities in commerce and other Government services in the area.

122. The supply of trained junior staff is better as a result of the cadetship Scheme under which eight suitable young men have been sent annually since 1955 to the Eastern Caribbean Farm Institute in Trinidad. However, it is important that these young men should mature into useful officers with the proper attitudes, by service under competent senior personnel.

(b) Training

123. The following numbers of persons were in training on scholarships with a view to taking up appointments with the Department:

As Agricultural Officers - Five

As Agricultural Assistants - Two

As Field Assistants - 8 at Eastern Caribbean Farm Institute

124. The following numbers of Officers underwent short training courses while on vacation during the year:

United Kingdom

Diploma in Tropical Veterinary Medicine	- 1
Milk Processing	- 1
Marketing Agricultural products	- 1

United States of America - under auspices of the International Cooperation Administration.

Beekeeping	- 1
Agricultural Visual Aids	- 1
Plant Quarantine	- 1

In addition four (4) Officers are persuing 2 year courses in vocational agriculture at the College of Agriculture, Puerto Rico under sponsorship of the International Cooperation Administration.

Trinidad - Ministry of Agriculture

Rabies control and eradication of bats - 2

Technical Assistance

(a)(a) United Kingdom

125. The Department received advice on a wide range of matters from the Offices of the Agricultural Adviser, the Annual Health Adviser and the Fisheries Adviser to the Secretary of State for the Colonies and from the Federal Agricultural Adviser.

Financial Assistance was provided under the Colonial Development and Welfare Act for the undermentioned Schemes.

Scheme	D 2900 & A	- Staff Training
	D 1931 & A	- Central Agricultural Station
	D 2319	- Hosororo Experiment Scheme
	D 2779	- Employment of a Soil Scientist
	R 892 and D 3286	- Soil Surveys
	R 764	- Livestock Station, Ebini
	D 2172 & A	- Livestock Station, St. Ignatius
	D 3344	- Fisheries Development - Operation of "Cape St. Mary"
	D 3141	- Cocoa Development
	D 2976	- Jute Investigations
	R 898	- Botanical Survey of Intermediate and Interior Savannahs.

126. The Department was also kept informed of technical developments on a wide range of subjects by the several Institutes and Bureaux maintained by the Government of the United Kingdom to assist colonial territories.

127. Several academic biologists visited the country from the United Kingdom.

128. Through the instrumentality of the Colonial Office, the following experts visited the Colony:

Mr. I. Callan	To investigate the incidence of Blast disease of rice (Piricularia oryzae) and to advise on control;
Mr. G.W. Twigg	To study the damage to sugar cane caused by field rats, and to initiate control measures.

Mr. G. Herford, Director of the Pest Infestation Laboratory visited the Colony to examine measures being adopted to control pests of stored products.

(b) United States of America

129. The International Cooperation Administration agreed to assist with the Agricultural programme and assigned to the Department the following technicians for a period of two years:

Mr. M.E. Knickerbocker	- Livestock Specialist ;
Mr. D.H. Lee	- Marketing Specialist;
Mr. J. Wheat	- Horticultural Specialist (working particularly on cacao, citrus and coconut);
Mr. R.B. Gregg	- Rural Credit Specialist;
Mr. A.C. Hale	- Vocational Agriculture Specialist:
Mr. D. Carter	- Rural Youth Sepcialist.

I.C.A. arranged and financed a number of training courses for staff members in the U.S.A. and Peurto Rico (previously described); and supplied literature and information on a wide range of subjects.

130. The Department was visited by Dr. Adair, expert on the diseases of rice, who made a survey to determine whether Hoja Blanca disease of rice occurred in the colony. Subsequently, he tested some of the local varieties in the United States to determine their resistance to the disease. Fortunately, there was no evidence of the disease locally, Moreover, the main varieties showed resistance.

131. Mr. Paul Holden, I.C.A. Farm Management Adviser in Suriname, visited on request, to advise the Department with respect to the setting up of a supervised credit scheme for settlers on Land Development Schemes.

(c) United Nations Organisation

132. Mr. Y.T. Mac, Genetic Stock Officer for Rice of the Food and Agriculture Organisation visited to survey the varieties of rice in production. He gave advice on the breeding of rice and on seed production.

133. Mr. Charles Gamo, F.A.O. expert on cooperatives gave useful advice on agricultural cooperatives.

(d) The West Indies

134. British Guiana shares with The West Indies in regional schemes of common value to the area.

135. The Minister for Natural Resources and the Director of Agriculture attended the first meeting of the Natural Resources Council (Council of Regional Ministers of Natural Resources) held in Trinidad under the Chairmanship of the Federal Minister of Natural Resources.

136. The Advisory Body to this Council, comprised of heads of the Agricultural Departments, under the Chairmanship of the Federal Agricultural Adviser met in British Guiana in November.

137. Post graduate students from the Imperial College of Tropical Agriculture paid their annual visit to the Colony and an appropriate educational tour was arranged for them by the Department.

138. The Department received help from the Virus Research Laboratory in Trinidad on investigations into equine encephalomyelitis; from the Ministry of Agriculture, Trinidad, on a survey of vectors of rabies; and from the University College of the West Indies on Cirrhosis of livers of cattle in the intermediate savannahs.

139. Trinidad continued to supply hybrid and clonal cacao. Sour orange seed was obtained from Jamaica, Trinidad and Suriname.

140. The Administration wishes to express its gratitude for this help and cooperation.

(e) Other Countries

141. Seed of several crops were received from many countries. Venezuela supplied hybrid corn and sesame, and Suriname a number of pulses. Other countries which assisted in our work by supplying seed include Malaya, Nigeria and India. We are grateful to them for their kindness.

142. Officers of the Department visited Venezuela to study the fishing Industry; Honduras to examine Agricultural Extension Services; Suriname to learn about agricultural development, rice milling and storage; Grenada, St. Vincent

and Dominica to lecture on Agricultural Extension Methods, and Brazil in connection with the control of Foot and Mouth Disease of Cattle.

Attendance at Meetings outside the Colony

143. During the year, the Director of Agriculture participated in the following activities outside the Colony;-

(1) Meeting of Ministers of Natural Resources, W.I. (Regional Natural Resources Council) as Adviser, Trinidad;

(2) The Rice Conference with W.I. to negotiate a new trade agreement and new prices; Trinidad;

(3) Trade Mission to Venezuela; and

(4) Rice Mission to Jamaica;

(5) The Fisheries Officer (Research) represented the Director at meetings of the Caribbean Fisheries Conference, sponsored by the Caribbean Commission and of the sub-committee on Fisheries to the Regional Standing Committee on Agriculture, Livestock, Forestry and Fisheries.

144. The importance of local representation at external conferences of interest to the colony and of official visits to other countries cannot be overemphasized. Not only do such conferences and visits add to knowledge and experience but they serve to provide useful contact with influential persons and afford opportunities for securing assistance in many ways. The meetings attended during the year have yielded substantial benefits for British Guiana. For example, at the Natural Resources Council a number of research projects were approved .. from which the Colony would benefit directly; the Rice Conference resulted in the establishment of a guaranteed market for 3 years and 3 months for the colony's rice exports to the West Indies. The Trade Mission to Venezuela laid the foundation for future trade in agricultural products with Venezuela and for technical cooperation between the two coun - tries; the Trade Mission to Jamaica secured a market for 4000 tons of packaged white rice annually; the Fisheries Conference enabled the Department to secure expert advice from an F.O.A. expert on designs for fishing craft.

General

145. The Department maintained a satisfactory relationship with all agencies concerned with the development of agriculture and fisheries. An Agricultural Officer performed liaison duties with the Land Development Department; and another was similarly concerned with respect to the International Cooperation Administration. Departmental representatives served on committees to select settlers for Land Development projects, Rice Assessment Committees, Regional Development Committees and Drainage and Irrigation Committees.

146. Close cooperation was maintained by the Directorate with the Credit Corporation, Statutory Boards and Producers' Organisation. Relations with the Press were most satisfactory.

147. Staff relations were good and several meetings were held between the Administration and the Departmental Staff Association to examine those issues affecting the staff which the Departmental Administration is competent and authorised to resolve.

RESEARCH AND EXPERIMENTATION

Organisation of the Research Service

148. The Research Division consists of the Assistant Director (Research) whose function is to co-ordinate the work of a team of specialist officers consisting of an Economic Botanist, two Entomologists, a Plant Pathologist, three Agricultural Chemists, one Soil Scientist, two Soil Surveyors, three Agricultural Officers who deal with (a) Annual Crops (b) Perennial Crops and (c) Grassland and Fibre Crops. With the exception of the Chemistry Division, Speicalist officers of the various Divisions have temporary laboratories at the Central Agricultural Station where they are provided with quarters so as to be within easy access to their laboratories and field experiments. Funds have been provided for the new Agricultural Research Laboratory at the Central Agricultural Station and the erection of the building will commence in 1960.

149. In addition to the Central Agricultural Station which serves as the main centre of research, there are four other Stations of the Department primarily engaged in research work on the crops of the areas and at the same time the officers stationed carry out advisory work among the farmers. The Hosororo Agricultural Station in the North West District deals with the main crops of the area such as Citrus, Cacao, Coffee, Maize and root crops generally and in addition with the fertility problems associated with the deep pegasse (peat) soils. The Ebini Livestock Station on the right bank of the Berbice River and about seventy miles inland is situated on an area of poor sandy soils representative of the district. This Station is investi - gating the possibilities and economics of beef production under the conditions of low soil fertility and extremely poor natural pastures. The St. Ignatius Livestock Station in the interior Rupununi Savannahs is also engaged with the problems of livestock production, animal health, pastures and breeding for the beef trade in the area. The Cacao Research Station at Atkinson on the right bank of the Demerara River and about 25 miles from Georgetown deals primarily with the introduction and trial of cacao clones in addition to plant propagation.

150. There is a Central Research Committee with the Director of Agriculture as Chairman, the Deputy, three Assistant Directors and the Sugar Agronomist as members. This Committee approves the general programme of Research to be pursued in the Department in relation to the policy of Government. In addition, there is the Rice Research Committee with the Assistant Director (Research) as Chairman, and other specialist officers as members. This Committee discusses the technical problems related to the rice industry and submits programmes of investigations to the Central Research Committee for approval. There is also the Sugar Research Committee consisting of the Director of Agriculture as Chairman and research officers of the Department and allied organisations review the progress on sugar research undertaken by Companies, the Sugar Producers Association and Departmental organisations. There is a Livestock Committee with the Director of Agriculture as Chairman and specialist officers of the Department, including Scientists of the International Cooperation Administration of the United States, as members. This Committee studies and approves the programme of work relating to the Livestock industry in the Country.

Other Research Organisations

151. The Sugar Experiment Station which is maintained by the Sugar Producers' Association serves the sugar industry and is engaged primarily in varietal, fertilizer and cultivation investigations. Bookers Sugar Estates, Ltd., maintained a well-equipped research laboratory and a team of technical staff that investigate in greater detail the problems of Sugar cane cultivation on their plantations. In addition, other sugar plantations carry out limited research for their cultivation and processing of sugar and its by-products.

152. The British Guiana Rice Development Company Ltd., continued to work on problems in connection with all aspects of the mechanisation of rice cultivation. The Company operates two Central Rice Mills and cultivate about 3,000 acres in rice. However the Department of Agriculture has assumed responsibility for experimental work on 100 acres of land in this area. The Berbice Fibre Research Company Ltd., which was engaged in the experimental growing and processing of jute went into liquidation. The yield of fibre obtained was uneconomical and the crop as a whole does not thrive well. Soil toxicity was considered a contributory factor in the poor performance of this crop. The Company handed over its equipment gratis to the Department.

The Finance of Research

153. The research work on sugar cane is financed by the Sugar Producers' Association which includes all sugar manufacturers in the Country. Rice Research is financed from local funds with some assistance for fertilizer investigations from Colonial Development and Welfare grants. The Ebini and St. Ignatius Livestock Stations, Soil Surveys, Botanical Surveys and the Hosororo Agricultural Station are partly financed by Colonial Development and Welfare grants which c come to an end in 1960. All other agricultural research investigations are met from funds provided by the local Government.

Sugar Cane

Variety Testing

154. Variety testing of seedlings continued to be the main line of investigation. A wider range of seedlings crosses are being made at the British West Indian Central Cane Breeding Station than formerly and fuzz from these crosses are germinated at the Sugar Experiment Station. In addition, first selections from Barbados are tested in British Guiana and seedlings are raised from crosses made at the Station.

155. The industry is overwhelmingly dependent on the varieties B41227 and B37161 which between them account for over 80 per cent of the cultivation; there has been a marked tendency for B41227 to increase in view of its slightly higher yield of sugar per acre compared with B37161. B47258 is being extended, mostly at the expense of B37161. This new variety is drought- resistant but is somewhat too susceptible to damage by rats and borers and to aphid infestation. The excellent control of aphids by the new organophosphorus insecticide Dimethoate, has been responsible for the extension of B47258. Other promising varieties which are undergoing further testing and extension are D.37/45, B45137 and D.141/46.

Cultivation Practices

156. The results from a number of field trials have shown

that equally good results may be obtained from simpler cultivation techniques compared with those used at the present time; and further, that flood-fallowing has more lasting effects on tilth than mechanical cultivation operations. It has also been demonstrated that the influence of cultivation, which over and above flood-fallowing alone, gives a response of about 10 per cent in the plant crop, has little or no residual effect after this first crop. In other words, a condition of dynamic equilibrium with respect to soil structure, dominantly dependent on the interaction of soil and climate is reached, which after one, or at the most two crops, obliterates the effect of presently used cultivation practices.

157. Evidence is accumulating that the dominant limiting factor to yield at present is the supply of adequate water and adequate soil aeration at all times. During periods of drought soil moisture deficit and, in many areas, accompanying salinity, is limiting growth whereas in excessively wet periods soil aeration is limiting growth.

Irrigation Trials

158. Several irrigation trials have been harvested during the year in which comparisons of irrigation after varying degrees of water deficit have been made. Certain definite conclusions have emerged from these trials and they may be summarised as follows:-

(1) On the typical frontland clays the optimum deficit at which to irrigate is 2½ inches; being slightly lower on saline soils;

(2) Where the water table during drought is fairly low as in the non-saline Demerara soils only a limited number of irrigations at 2½ inches deficit are required. With suitably timed irrigation in the initial stages the root system appears capable of following the receding water table;

(3) On the heavy Berbice clays and to a lesser degree on the Demerara soils, cane growth rates under conditions of drought but where irrigation by the flood-irrigation method was applied, were only about one-third of growth rates during periods of adequate natural rainfall, and this irrespective of the water-deficit at which irrigation was carried out.

Manurial Requirements and Studies of Mineral Nutrition.

159. Manurial trials were laid down primarily to test the efficacy of various carriers, in particular urea as a nitrogen carrier as compared to sulphate of ammonia. Twenty-five factorial trials in which urea and sulphate of ammonia were compared at two application times showed a small but economic advantage in favour of sulphate of ammonia as compared to urea.

160. Similar experiments compared diammonium phosphate with triple superphosphate as phosphorus carriers. No difference existed in the efficacy of these materials as phosphate carriers, although, as expected, in areas of low calcium status superphosphate gave better returns in virtue of its calcium content.

161. Foliar diagnostic methods were also used in an effort to obtain more precise information connected with responses to fertilizers applied.

Pests and Diseases

162. The climatic conditions to which the 1959 crop was subjected, fostered an unprecedented invasion of rats into the cane cultivation and provided exceptionally favourable conditions for localised build-up of insect pests, particularly of aphids, mites, mealy bugs, giant borer and army-worm caterpillars. The natural food supplies of the rat inhabiting the savannah hinterlands died off in the drought, large areas of savannah were burnt and rat invasion of the cane cultivation on some estates was such that the normal baiting of a sanitary cordon on dam beds and the perimeter of the vulnerable areas was completely inadequate. Moreover, re-infestation of treated areas occurred with disturbing frequency, particularly following the harvesting of adjacent rice lands and as a result of change of habits by the rat in response to the drought conditions e.g. in-field nesting in fissures caused by soil contraction in place of the usual dam-bed nesting sites.

163. In addition to greatly increased anticoagulant baiting, thallium and strychnine torpedoes were made in enormous numbers. The services of the Colonial office Rodentologist, Mr. G.I. Twigg, were secured for a period of four months in order to advise on investigations on the biology of our chief rat species, Holochilus on immediate control measures and on long term preventive measures. The rat infestation was brought under control with pellets of endrin and zinc phosphide. Over ten million pellets were distributed in the fields in a few weeks, by hand in young cane, and by catapult in tall cane. Excellent results were obtained by this method of control.

Leaf Scale Disease.

164. This disease which was a hazard a few years ago continued to be on the decline by planting resistant varieties. All new varieties before they are recommended for commercial planting undergo resistance tests by the Department of Agriculture. The disease has now been effectively controlled on all sugar cane plantations.

Rice

Introduction, Breeding and Genetics

165. The rice breeding programme continued at the Central Agricultural Station for the Spring and Autumn Crops. The aim of the programme is to produce a variety with the following characteristics:-

(a) Be at least equal in yield to that of the standard variety No. 79;

(b) Be non-lodging;

(c) Be non-shattering;

(d) Possessing a medium-long grain type and must cook without becoming sticky;

(e) Be vigorous, adapted to all the main soil types and resistant to Piricularia and Helminthosporium;

(f) Maturing at suitable times both for the Autumn and Spring harvests;

(g) Be high yielding with minimum amount of fertilizers.

166. Eleven lines which were tested during the year showed one or more of the following defects:-

(i) Difficult to thresh with Combine;

(ii) Too sticky when cooked;

(iii) Susceptible to Piricularia and Helminthosporium

(iv) Not adapted to the main soil types. Yields were unsatisfactory over large areas;

(v) Too highly photosensitive.

167. At the end of 1959 a careful selection was made from the whole range of homozygous lines at the Station by discarding in the first place on the basis of field characters, then on cooking quality. Seventy-four of these lines and two promising foreign types were immediately put into varietal trials on Frontland clay of coastal aluminium. Sixty-nine other lines which have not undergone cooking tests as yet are under close observation in a series of large plots containing a system of check plots. These 143 lines are also undergoing a test for adaptability in four different environments.

168. 348 pure lines which were being maintained in quadruplicate plots were discarded on the basis of extreme susceptibility to disease, difficulty of shattering, lodging and stickiness in cooking. In the generations F_5 to F_9, 913 out of 2635 were retained at the end of 1959. In the F_4 populations it was clear that little progress was being made by the method of mass selection which was tried previously and the method of pedigree selection was resumed.

169. 126 varieties including 76 foreign varieties and 50 local lines were tested for resistance to Blast (Piricularia oryzae) in a blast infected area at Land of Canaan about 18 miles up the East Bank of the Demerara River. Only one variety, Dima from Suriname gave some indications of resistance to the disease. Among the 143 types planted on the same site late in 1959, there are some which have not been affected by the disease so far. Others are affected more or less severely. These varieties will be harvested for the 1960 Spring Crop.

170. The main disease which occurs at the Central Agricultural Station is Helminthosporium (leaf spot). Hybrids which are susceptible to it are discarded.

171. During the year some of the more promising new varieties (about five in all) were put into farmers' trials for both the Spring and Autumn crops, but unfortunately their performance had not been satisfactory particularly as regards to yield of grain. On account of the abnormal dry weather in the early part of the year, shortage of irrigation water was one of the principal contributory factors. For the 1960 Autumn crop, new varieties which have shown promise will again be put into farmers' trials scattered throughout the country.

Weed Control in Rice Fields

172. Trials conducted during the past years have confirmed that the weedicide 2:4-D (amine salt) could be used effectively against the weed Fimbristylis miliacea in rice when applied at the rate of one pint and a half per acre. Application could be made about five weeks after the germination of the rice or when the rice is two weeks old as it has been observed

that there are no apparent adverse effect on the young plants.

It has been found that 4-chloro-2 methylphenoxy butyric acid (M.C.P.B.) previously used with satisfactory results against weeds in the rice field at the rate of 1½ pints per acre at the age of 4-5 weeks could be used at the rate of one pound per acre when the rice is three weeks old.

173. Dinoseb which was found to be effective against the weed Sphenochlea zeylanica occuring in rice fields in Trinidad gave good results in this country also at the rate of half of one pound active ingredient per acre three weeks after germination of the rice.

Control of "Drop-Seed"

174. It has been confirmed that the weedicide 2:4-D is effective in preventing the germination of "drop-seed". When it was applied at the rates of 1, 3, 6 and 9 lbs. per acre before germination of the seed, it produced mortalities of 70%, 80%, 94% and 100% respectively. It has been observed that an application of about 4 lb. per acre gave reasonably good control.

175. Eptam was tried against "drop-seed" rice at the rates of 1, 2, 4 and 8 lb. active ingredient per acre. The herbicide when harrowed in at the highest rate produced only 50% mortality when the seed was also harrowed in. The method does not appear of practical value in the control of drop-seed.

Fertilizer Investigations on Rice

176. A number of fertilizer trials was carried out at the Cane Grove, Mara and Vergenoegen Land Settlement Schemes and on the Central Agricultural Station. These results have further confirmed those of previous experiments that on toxic soils which are high in exchangeable aluminium and sulphuric acid, phosphates in the presence of nitrogen in the form of a 10:20 mixture have given significant responses in yield of grain. However, in some of the trials where limestone was also used, the yield of grain was higher than when the 10:20 mixture was used alone. One trial at Vergenoegen Land Settlement in the form of a randomised block design was carried out to test the significance of ammonium chloride and sulphate of ammonia in the presence and absence of phosphatic fertilizers. In addition a higher rate of application of the 10:20 mixture was used so as to compare it with the recommended application of 1 cwt. per acre. The results have shown that phosphate in the presence of nitrogen, whether in the form of ammonium chloride or sulphate of ammonia, gave a significant increase of over 500 lb. of paddy per acre over the non-fertilised plots which recorded an average yield of about 1,800 lb. per acre. Nitrogen "per se" whether in the form of sulphate or chloride did not give any increase in yield, but on the other hand, tended to depress yield. The soil type was high in exchangeable aluminium and the results indicated that on such soils better response in yield of grain was obtained from 2 cwt. of the 10:20 mixture (2,400 lb. per acre) when compared with 1 cwt. of the same mixture per acre (2,000 lb/acre).

177. The results of several long term fertilizer trials extending from three to eight years at the Mahaicony/Abary Rice Development Scheme were statistically examined. The results indicated that over a period of years, the application of lime had significantly increased the pH of the soil from 5.4 to 5.8. It was found that in the majority

of experiments there were small but consistent responses in yield of grain to applications of nitrogen, phosphate and lime. Lime in the presence of nitrogen and phosphate gave the best response. The soil type was a pegassy clay and this soil type responds to the application of lime. There was no response to potassium.

178. At the Mahaicony/Abary Rice Development Scheme an experiment was conducted using plastic waste as a source of nitrogen and comparing it with sulphate of ammonia in split applications. The results indicated that the application of 2 cwt/acre of plastic waste was better than sulphate of ammonia applied at 1 cwt/acre, that is half of it applied at sowing and the remainder ten weeks after germination. The results are shown in the table below:-

TABLE XIV

Summary of Results (bags/acre) 1 bag - 140 lbs. paddy.

	Control	1cwt/acre Sulphate of Ammonia in split application	1 cwt/acre plastic waste	2 cwt/acre plastic waste
Yield	9.0	9.8	10.3	11.5
Effects	-	+ .8	+ 1.3	+ 2.5
	P. .05	= 1.52		
	P .01	= 2.18		

Mean Yield - 10.15 bags.

179. Further field experiments were carried out to investigate the responses to the micro-nutrients, manganese, iron, boron, copper, zinc and molybdenum. The soil type at both sites, Cane Grove and Central Agricultural Station, was pegassy clay. Although there was a small response to most of the micro-nutrients used, none of the results reached the level of significance. At Cane Grove, application of 25 lb/acre of ferrous sulphate gave the highest increase of (1.98 cwt/acre) of clean, dry paddy. The response to macro and micro-nutrients was of the same order of magnitude and it should be pointed out that the season was particularly unfavourable to fertilizer responses on account of the abnormal dry weather making irrigation water scarce. In the absence of lime the largest increase was obtained with complete mixture of the micro-nutrients (3.2 cwt/acre) while on the limed plots iron gave the best results (2.2 cwt/acre). Without NPK the increases due to micro-nutrients were low, the highest was recorded for copper (1.6 cwt/acre). With NPK fertilisers applied, iron gave the best results, producing an extra 3.6 cwt/acre of grain.

180. Responses to lime were highest in presence of Manganese (3.8 cwt/acre) and iron (2.7 cwt/acre). NPK acted best in the presence of iron and manganese (2.4 and 2.3 cwt/acre respectively).

181. Further demonstration trials on farmers' holdings were carried out during the year in order to investigate whether the present recommendation of 1 cwt. per acre of a 10:20 mixture needed revision. Thirty trials were laid down but only twenty were harvested as some of them were

affected by blast disease, poor water control, etc. The results of the trials varied considerably from place to place and in areas where the yield for check plots was over 3,500 lb/acre, there was no significant response to any of the treatments. Where, however, the yield was below 2,000 lb/acre of grain, significant increases in yield in the order of 500 to 800 lb/acre of paddy were obtained. The increases were higher for transplanted rice than they were for broad-cast. On soils which were high in exchangeable aluminium and sulphuric acid, the indications were that an increase over the 1 cwt/acre of the 10:20 mixture recommended might be justified. In addition it would seem that the best results might be obtained in conjunction with a basic application of lime in the order of one ton of limestone per acre once in two or three years. On the more fertile soils, the results did not confirm a change in the present recommendation. These demonstration trials on farmers' holdings will be continued in 1960.

Fractionation of Soil Phosphate.

182. Fractionation of soil phosphorus by approved methods, indicated that use of phosphatic fertilizers on pegassy clay tended to cause phosphate to accumulate as aluminium phosphate in the plough layer (0-6") and moved iron phosphate below 8 inches. In the Frontland clay soils there was a predominance of iron phosphate over aluminium phosphate. These two forms of soil phosphorus appeared to be more equally distributed in pegassy clay, while in the deep pegasse (peat) soil, aluminium phosphates were exceedingly higher than iron phosphate. Calcium phosphate was low in all three types of soils.

Red Rice and its Control

183. A survey was carried out by the Extension Staff of this Department in all the main rice producing areas of the Country in order to assess the incidence of red rice. The figures disclosed that in areas where dry cultivation has been practised using agricultural machines the incidence of red rice had reached the enormous figure of up to 90 per cent. In areas where wet cultivation was practised and particularly with transplanted rice, red rice was below two per cent. This steep increase in the proportion of red rice is attributed to the abnormal dry weather experienced for the last three years.

184. The value of wet cultivation as a suppressor of red rice has been observed from experiments conducted at the Mahaicony/Abary Rice Development Scheme. The incidence for the wet cultivated areas of the Scheme was less than 7 per cent compared with over 30 per cent for all other forms of dry cultivation. Eight wet cultivated fields with adequate control of water had a red rice index of less than one per cent, compared with an index of slightly less than 15 per cent from wet cultivation where water control was not satisfactory. These results further emphasise the need for efficient control of water in the suppression of red rice. Deep ploughing has also given some reduction in the incidence of red rice but again unless there is adequate inversion of the soil, this method does not give satisfactory control.

185. During 1959 it has been demonstrated at the Central Agricultural Station that a light wet harrowing following dry cultivation and the subsequent retention of the water in the field for a period of a few days enabled practically complete suppression of red rice and creates a surface upon which germinated seed grows successfully especially in showery weather.

186. It has been confirmed that 2:4-D when applied before germination takes place at rates higher than four pounds per acre reduces the stand of red rice considerably. Investigations are proceeding to test the duration of residual effect of the weedicide upon the germination of seed sown subsequently.

Insect Pests and Diseases

187. Approximately 1,500 acres of rice on the banks of the Demerara, Berbice and Essequibo rivers were attacked by Blast (Piricularia oryzae), but the loss of grain caused by the disease was not as serious as in 1958. The disease was controlled by two and three applications of Verdasan, an organo-mercuric fungicide, at the rate of two pounds in 20 gallons applied with a mist blower at 8-10 gallons per acre. At the Mara Land Settlement, on the right bank of the Berbice river, where the attack of the disease was most serious, about 900 acres of farmers' rice were sprayed with Verdasan at the expense of Government. The farmers were satisfied with the yields obtained by the treatment.

188. Widespread outbreaks of Brown Spot disease (Helminthosporium oryzae) were observed in various parts of the rice areas. The disease was particularly serious in the Mahaicony creek. The control measures recommended for the disease were:

(a) seed treatment with organic mercury compound;

(b) burning of the straw and stubble after harvesting, and

(c) sparying with Verdasan; Sclerotium disease (Sclerotium oryzae) also occurred in some areas, but it did not cause any serious damage.

189. Severe outbreaks of the rice caterpillar (Laphygma frugiperda) occurred on the East and West Coast of Demerara, East Bank, Berbice and on the Essequibo Coast. Generally the caterpillars attack young rice in the nursery and in the field, but in 1959 the attack was observed on reasonably matured plants. In some cases, the crop was completely destroyed and had to be resown. Dusting with Agrocide 3 (0.65% gamma B.H.C.) was not very effective against the pest. However, the application of dieldrin and chlordane as a spray gave effective control.

190. Widespread reports of damages caused by the rice water weevil (Lissorhoptrus simplex) were received from many of the rice areas. The attacks were observed to be more severe on broadcast paddy sown late, and approximately 10,000 acres of rice suffered. The normal measure of control recommended was that of draining the land and allowing the field to dry out for a few days before adding fresh irrigation water. However, because of the shortage of irrigation water due to the abnormal dry weather in 1959 this method of control could not be generally adopted. The paddy bug (Solubea poecila) also caused some damage, but the pest was kept in control by dusting with Agrocide 7 (2.6% gamma B.H.C.) using Motoblos and rotary dusters.

191. During the year reports from the neighbouring country of Suriname reached this Department that there was serious outbreak of Hoja Blanca disease on rice. Steps were immediately taken to investigate whether the disease was actually in the country, and an expert on this disease (Dr. Adair) from the United States Department of Agriculture visited British Guiana and after a Survey reported that he was unable to find Hoja Blanca disease in the main rice producing areas of the country. Several varieties of rice

including the two commercial ones No. 79 and D.110 were tested by Dr. Adair for resistance to the disease. It was encouraging to report that No. 79, the principal variety of rice grown in the Country was resistant to Hoja Blanca. On the other hand, D.110 and a few others not grown on any large scale, were proved to be susceptible to the disease. A search was made for the leaf-hopper (Sogata oryzicola) the vector of Hoja Blanca but none of the species was discovered in population obtained in the preliminary investigations.

Rice Storage Investigations

192. Under local conditions the most important insects attacking both paddy and rice are Calandra oryzae (l), Rhizopertha dominica (Fabr.) and Sititroga cerealella (Oliv.) The greatest damage to paddy and rice is caused by Calandra and Rhizopertha and the financial loss could be very high.

193. Under the research programme, financed by Government, the Rice Marketing Board and the Rice Development Company, special attention was paid to the pests Sitotroga cerealella (Oliv.) and Rhizopertha dominica (Rabr.) which are the most important ones attacking paddy in storage. In the early months of storage Sitotroga caused the greater damage but as the paddy remained longer Rhizopertha became more important and was the principal pest responsible for damage of paddy in storage.

194. From field examinations during the 1959 Autumn Crop, it would appear that only a very small percentage of the Sitotroga infestation occurred in the field and most of the early infestation in storage was the result of the latent population of this insect present in old crop paddy and sweepings in the mill bonds. This insect breeds readily in paddy of high moisture content and this condition generally exists in freshly reaped paddy.

195. When the moisture in the paddy is decreased and portions of damaged grains and rice dust are available, Rhizopertha attacks the grain. After a few weeks the damage increases and in the course of two or three months may become appreciable.

196. Work was undertaken also on the storage bins suitable for small cultivators, and locally manufactured "Pliboard" was used in construction. In this connection supplementary heating equipment was examined, and trials were made in the construction of small inexpensive units suitable for small cultivators, These investigations will continue in 1960.

GRASSES

197. At the Central Agricultural Station, the grasses Pangola (Digitaria decumbens), Locuntu (Ischaemum timorense) Para (Brachiaria mutica), Nadi Blue (Dicanthium caricosum) and Coastal Bermuda (Cynodon dactylon) were tried out. The indications are that Nadi Blue and Locuntu are not suitable for the soil conditions existing at the Station and these grasses have been abandoned. Pangola, Para and Coastal Bermuda have given satisfactory growth and yield under semi-drought conditions experienced in the early part of 1959 and as their overall performance has been satisfactory they are extended at the Station. Pangola grass is recommended to farmers for the establishment of pastures and the response has been most encouraging. Grazing and fertilizer trials are being carried out. Preliminary indication is that

Pangola pastures could carry about 3 heads of cattle on 2 acres.

198. Observations on weed control in the establishment of pastures over a two-year period have shown that in general the use of herbicides is inadvisable on account of its high cost. Frequent topping with a mower and carefree grazing with young stock has produced excellent pastures at the Station in the shortest possible time.

199. In the North West District on the worn-out deep pegasse (peat) soils which no longer would support root crops, Para grass (Brachiaria mutica) and Locuntu grass (Ischaemum timorense) have continued to give excellent yield of herbage with normal fertilizer application of nitrogen and phosphate. There is every indication that the rearing of cattle on the riverain lands can be based on these two grasses. The policy of the Government is to encourage the expansion of the dairy and beef industry.

Botanical Survey

200. The primary object of the survey had been to collect plants on the Intermediate Savannahs at Waranama and Ebini, Berbice River, as a contribution towards investigations into the problem of cirrhosis of liver in cattle at Waranama particularly and in adjacent areas. Over 1,000 specimens were collected at Waranama and about 1,400 at Ebini. A Botanist from Kew Gardens was made available by the Colonial Office to undertake the survey. His assignment came to an end in February 1959 and he returned to Kew. A complete report by the Botanist is now available.

201. Three species of Crotalaria (C. maypurensis), (C. retusa) and (C. stipularia) were found at Waranama and it was suspected that plant poisoning might be the contributory factor to Cirrhosis of liver. (C. maypurensis) growing sporadically and in small amounts is a possible suspect. Seeds were obtained from Waranama and were sown at the Central Agricultural Station but the growth was not satisfactory. Feeding trials have commenced by the injection of alcoholic extracts of the different species of Crotalaria into calves. Liver biopsies from time to time are being examined at the University College of the West Indies.

Land Use Planning and Soil Surveys

202. The development of the Black Bush Polder (formerly Blocks I and II) on the Corentyne coast, county of Berbice, made satisfactory progress and it is expected that in 1960 settlers will move into the area to occupy the lands. The drainage and irrigation system put in will open up approximately 30,000 acres of new land which from reports of detailed soil surveys and field observations is proved suitable for rice and other truck-garden crops. The area is being divided into 17½ acre holdings for homesteads and farmsteads.

203. The completion of the drainage and irrigation works for the western section of the Boerasirie Development Scheme has made available about 25,000 acres of new land for agricultural development. The drainage of adjacent properties has also been improved and the production of ground provision crops such as cassava and plantains from the area increased considerably. Unfortunately, a good proportion of the land is not very productive as some of the soils of the area contain toxic amounts of sulphuric acid and aluminium. Distribution of the land to farmers has commenced. On the better silty clay soils, cacao and citrus are recommended but the bulk of the area will not be immediately suitable for rice because of the deep pegasse (peat) with

toxic properties. The toxic soils can grow suitable grasses and cattle rearing is being recommended for such areas. Further investigations are being carried out with a variety of crops some of which should prove suitable for the soils high in sulphuric acid and aluminium.

204. Detailed soil surveys totalling about 6,000 acres were completed for Cane Grove and Vergenoegen, Land Settlement Schemes of the Government. In the past many settlers had complained of poor yields of rice. The surveys showed that nearly 50 per cent of the area contain soils which are high in exchangeable aluminium and sulphuric acid. The purpose of the surveys was to demarcate the toxic soils from the more fertile soils. The soil map will assist in fixing the rentals for the less productive soils under the Rice Farmers' Security of Tenure (Ordinance of 1956), and the settlers will be advised of the treatment with fertilizers in order to enhance the productivity of the area.

205. A soil survey of the Tapacuma area on the Essequibo coast was commenced during the year. The drainage and irrigation works of this area when completed will make available about 30,000 acres of new land for crops mainly rice. The survey of the Moruka Amerindian reservation of the North West District was completed and coconut nurseries started so as to provide quality seedlings for planting on the land by the Amerindian population.

206. A reconnaissance survey of approximately 6,000 acres of Crown Land aback of Plantation Port Mourant, Corentyne, was carried out in order to assess the suitability of the area for rice and other food crops. At present, parts of the area are cultivated to rice with moderate success. The pressure of population on the land in this area is very great. A more detailed survey of the area is planned so that the comparatively low productivity of the land could be enhanced.

207. Soil survey reports on the Rupununi and Intermediate Savannahs, the Mahdia valley, the Bartica Triangle, the Kamarang and Kukui valleys and a part of the Upper Mazaruni Valley were received from the Regional Research Centre, Imperial College of Tropical Agriculture, Trinidad.

JUTE

208. The jute cultivation at the Central Agricultural Station which at one time occupied the greatest acreage (200 acres) of any crop under cultivation was discontinued during the year on account of the disappointing results obtained. Yield of fibre was low and the plants did not reach a satisfactory height. Both capsularis and clitorius varieties were tried out and they appeared to be very susceptible to high exchangeable aluminium in the soil. The Berbice Fibre Research Company which was responsible for the investigations went into liquidation during the early part of 1959. Seed of Segama variety from Malaya was planted for the 1960 Spring Crop, but the plants are very sensitive to photoperiodism and the height was not considered satisfactory. Further small plot trials of this variety will be continued for the 1960 Autumn Crop.

209. Small scale trials at the Central Agricultural Station with Kenaf have given promising results and this crop is being extended.

COTTON

210. Trials with Cotton have been discontinued mainly as a result of the problem of pest control and irregularity

of the weather. The annual rainfall of about 85 inches is considered too high and places too much risk at the time of harvesting. From the varieties tested, BLR.14/25 and BAR XL_1 were the most promising ones.

Crop Production Trials and New Crops

211. Introduction of varieties of Tomatoes, French beans, Pole beans, Mung, Black-eye peas, Urid, Cucumber, Egg plant, Musk melon, Water melon, Ochro, Cauliflower, Onions, Sweet potatoes and Field corn were made for quality and disease resistance. The main emphasis was placed on Tomatoes in a search for varieties resistant to Bacterial Wilt, Spotted wilt virus, Mosaic, Phoma fruit rot and Collar rot. Twenty varieties from the United States were tested but natural incidence was low. Bacterial Wilt virus, Mosaic and Blossom End rot were recorded. On account of the very favourable weather conditions an excellent crop was obtained, many trees giving as much as twenty pounds each of good quality fruit. Seed selections were made. From the trials at the Central Agricultural Station good quality seeds of Mung, Black-eye peas, Egg plant, Musk melon, water melon and ochro were made available to farmers at reasonable prices.

212. The seed potato obtained from Canada gave excellent germination. The seedlings were planted on sandy loam, at Atkinson, on the right bank of the Demerara River, and about 25 miles from Georgetown, but they did not survive. The trials with legumes and onions are regarded as particularly important as there is the possibility of replacing sizeable imports. On account of the acute shortage of suitable staff, the investigations are proceeding somewhat slowly.

213. A variety of pulses are being grown at the Central Agricultural Station and this phase of a research is given priority in an effort to find a suitable legume to replace the imported article which forms a very substantial proportion of imported foods in the Colony. Experiments with new crops have shown that Sesame, (Sesamum orientals), Castor (Ricinus communis), Dhall, (Cajanus cajan), Black-eye pea (Vigna sinensis), Mung (Phaseolus radiatus) can be grown successfully on well drained beds of coastal clay up to 66 feet in width and on drained beds of pegassy clay. Since rice also grows successfully on such beds, an attempt is being made to study a rotation system with these crops in order to replace at least partially the monoculture which is now being practised with rice.

214. Yields of about 600 - 700 lbs. per acre of dry seed of Cajanus cajan were obtained in 5 to 6 months from a local selection made from mixture introduced by early Indian immigrants, and from a recently imported Indian Strain EB 38, when planted on well drained coastal clay. The crop can be ratooned, and a second picking made about 5 - 6 months after the first, yielded a further 600 - 700 lb. of dry seed, so that the annual yield is around 1,200 - 1,400 lbs. per acre. The crop was fertilised with $\frac{1}{4}$ to $\frac{1}{2}$ ton of limestone per acre together with half of one cwt. each of sulphate of potash and triple superphosphate, per acre. There are indications that the crop will give satisfactory results on pegassy clay as well, and this soil type occurs in large areas running south of the coastal clay and adjacent to it. It is estimated that the shelled grain, known as dhall, can replace about half the quantity of split pea (Pisum sativum) imported into the country. The recovery of shelled grain using a sample of pea which had undergone some deterioration in the field was approximately 59 per cent. It is expected that with better seed,

the recovery will be increased. A sample of the product (Dhall) produced at the Central Agricultural Station was quite satisfactory.

215. Eleven varieties of Sesame imported from India and Venezuela yielded between 600 and 1600 lb. of dry seed per acre in 4½ months on well-drained coastal clay when fertilised at the rate of ¼ ton of limestone per acre, together with half of one cwt each of sulphate of ammonia, triple superphosphate and sulphate of potash, per acre. The average yield of all varieties without application of fertilizers was about 800 lb. per acre. The best yields were obtained from the Indian varieties, Str. 1 and N.P.7 and the Venezuelan variety Inamar, the yields per acre being 1690, 1619, and 1202 lb. respectively. This oil seed if extended should be able to supplement the present shortage of edible oil in the country.

216. Seven varieties of Castor imported from India and grown on well-drained coastal clay gave yields varying from 250 to 480 lb. per acre of dry beans for the first crop harvested in 4 to 5 months. It is estimated that a similar yield should be obtainable from the ratoon crop. The best varieties were HC 6, HC 1, Rosy and TMV 3 and the yields per acre of dry beans were 481, 461, 447 and 441 lb. respectively. The crop was fertilised with ¼ ton per acre of ground limestone, and half of one cwt. of each of sulphate of ammonia, triple superphosphate and sulphate of potash, per acre.

217. Mung and Blackeye peas were planted at the Central Agricultural Station on well-drained coastal clay and pegassy clay and yielded approximately 500 and 700 lb. per acre, respectively. The grain can be used in the local diet of the population and can also provide protein in the manufacture of stock feeds.

218. Reasonably good quality papain from Papaw (Carica papaya) was produced from local selections and the Ceylonese variety Solo Hawaii, but yield data are not yet available, Praedial larceny of this crop at the Central Agricultural Station where it is grown, has hindered considerably the extraction of papain from the mature fruits.

219. Observational trials have shown that the pegassy clay is more suitable for the growing of bananas than the heavy coastal clay. The most promising varieties for yield, flavour and quality so far are Lacatan, and Congo which were obtained from Suriname, and Dwarf, a local strain.

COCONUTS

220. On account of the shortage of edible oil in the Country thereby necessitating importation of this commodity, the policy of Government is to encourage the expansion of coconuts and the rehabilitation of old plantations by the production and distribution to farmers of quality seedlings at subsidised prices. In 1960 Government will be offering bonuses for new plantings. It is expected that 2,000 acres of new plantings should take place in 1960 and in subsequent years a similar increase for each year up to 1964, the end of the present five year Development Programme. Good quality nuts are selected from plantations by selection of blocks of good palms and in some instances by selection of good individual palms. The abnormal dry weather experienced in the Country over the past three years has affected the yield of nuts per tree and the size of fruit. During the year over 60,000 seedlings were distributed to farmers at the subsidised price of 5 cents each. The Department paid to plantation owners

approximately 7 cents for each selected nut, exclusive of cost of transportation. The percentage germination of nuts purchased varied from 42 to 55. Before seedlings are distributed a final selection is made in the nurseries based on vigour and general appearance of the plants. In addition to the nurseries at the Station which are the largest, there are nurseries at Whim, Corentyne, Suddie, Essequibo Coast, and in Moruka, North West District. A permanent grove is in the process of establishment at the Central Agricultural Station using seedlings obtained from specially selected palms. Kudzu is recommended for intercropping in coconut plantations.

221. Fertilizer experiments were continued during the year on farmers' holdings and in many instances significant responses to limestone in particular, and a mixture of nitrogen, phosphate and potassium were obtained. On one coconut plantation situated at the mouth of the Pomeroon River and on its right bank, mature coconut trees were dying. The recommended applications of fertilizer by this Department which include twenty pounds of ground limestone per tree applied once in about three to four years depending on the condition of the trees, four pounds of sulphate of ammonia, three pounds of triple superphosphate and three pounds of muriate of potash, per tree, were given and the treated trees gave economic increases in yield and only one tree in the experiment died. This trial has been in progress for about two years. The above formula corresponds to 10 pounds per tree of an 8:12:15 mixture. In the Pomeroon River, remote from its mouth, where mature and bearing trees have been dying at an increasing rate, fertilizer experiments have shown that the death rate was reduced somewhat by the use of lime, mixed fertilizers of NPK and magnesium and in some instances the life of the palms was prolonged. However, it is evident that the soil of this area where the death rate is alarmingly high is of a pegassy nature and is unsuitable for coconuts. The Department of Agriculture is not recommending bonuses for new plantings of coconuts on pegasse (peaty) soils.

Pests and Diseases

222. A large number of trees died during the year from Bronze Leaf Wilt disease which was observed in various parts of the coconut producing areas. But rot (*Phytophtora palmivora*) was also observed, but the incidence of this disease was not very high to cause any serious damage.

223. The coconut caterpillar (*Brassolis sophorae*) defoliated many trees in Berbice, Essequibo and Demerara. The most severe attack occurred on a plantation at Chapman Grove, on the East Coast of Demerara where over 150 acres were affected. Hand-cleaning of the trees was the only method adopted for controlling the pest.

224. The coconut moth borer (*Castnia daedalus*) continued to affect production of coconuts in the country. Effective control of this pest has been obtained by spraying with a one per cent solution of dieldrin and where this practice has been adopted on plantations, increase in yield of nuts per tree has resulted. Observational trials have been started on a few plantations in order to investigate whether there was any relationship between manurial treatment of trees and the incidence of Castnia. The preliminary indications are that fertilizer treatment did not seem to have any beneficial effect on the control of the pest. The trials are being continued when confirmatory evidence should be ontained.

225. The Rhynchophorus beetle (Rhynchophorus palmarum) occurred in one coconut plantation in Wakenaam, Essequibo island, but no serious damage was done. The tree nesting ants (Azecta) occurred on many coconut plantations on the East Coast of Demerara. Heavy infestations of the scales (Aspidiotus distructor) were observed on coconut trees in various parts of the country, especially on trees where the agronomic conditions were poor. There was no new outbreak of the locust (Tropidacris latreillei).

CITRUS

226. Fertiliser trials continued at Plantation Georgia, left bank of the Demerara River, on the banks of the Pomeroon River, at Bartica, and in the North West District, have further indicated that an 8:12:15 mixture of N, P and K at the rate of 5 to 6 lb. per bearing tree twice per annum and just before the bearing period has given significant responses in increased number of fruits of good quality and in addition the trees had a healthy appearance. About 10 lb. of ground limestone once in two to three years proved beneficial. At Bartica, where the soil is sandy, about eight pounds of the fertiliser mixture was used in one application per tree and the results were most satisfactory. In the Pomeroon River, where the soil is pegasse (peat) of nearly three feet in depth, limestone is essential in addition to the recommended mixture of NPK. Many farmers are convinced with the beneficial results obtained from the use of fertilizer on this crop and they are fertilizing their trees. Trees which had not borne fruit for 25 years since they were planted are now giving a satisfactory crop through the efficient use of fertilizers. In the North West District where the soil is of ironstone formation (lateritic clay) excellent responses were obtained from application of fertilisers. There is some indication of manganese deficiency and trials are proceeding in order to obtain confirmatory evidence. The orchard at Hosororo is being extended. At Ebini, on the Livestock Station, right bank of the Berbice River, zinc deficiency was observed on the majority of citrus trees. Treatment with zinc sulphate gave marked responses. At the Central Agricultural Station varieties of oranges and grapefruit imported from Trinidad have been established. On many of the Government Land Settlements, citrus is being grown by the settlers.

Pests and Diseases

227. Brown rot disease (Phytophthora sp.) occurred on one citrus estate on the West Bank, Demerara. Spraying with Perenox at the rate of 5 lb. in 100 gallons applied with a Motoblo and completely wetting the tree gave effective control of this disease.

228. The citrus Black Bee (Melipona guianea) caused considerable damage to maturing fruits in many citrus orchards in Demerara, Pomeroon, North West District and East Bank, Berbice. Repeated sprayings of a bait of Malathion and sugar were necessary to control this pest. Heavy infestations of scale insects (Chionaspia citri, Orthezia insignis), Aonidiella aurantii, Palococcus beckii, Lepidosaphes beckii) were observed especially on trees where the agronomic conditions for the crop were not satisfactory. Infestations of the citrus aphids (Toxoptera sp.) were controlled with nicotine and malathion sprays.

229. Gummosis disease (Phytophthora infestans) was responsible for the death of a large number of lime seedlings on the East Bank, Berbice.

COFFEE

Pest and Diseases

230. Sclerotium disease (Sclerotium coffeicolum) caused considerable damage to coffee in the Pomeroon and North West District, and it was particularly severe on young trees resulting in loss of nearly fifty per cent of the crop. Spraying with copper and mercury fungicides was not very effective in controlling the disease. It has been indicated however, that trees which received applications of lime, nitrogen and phosphate showed considerable resistance to the disease.

231. A number of mature and bearing Coffee trees died from attacks by the termite (Nasutitermes sp.). Spraying around the trees with aldrin, chlordane and dieldrin was recommended. The leaf-nesting ants (Azecta sp.) were a nuisance, but effective control was obtained by spraying with chlordane and dieldrin.

ROOT CROPS AND PLANTAINS

231. Moko disease (Pseudomonas solanacearum) continued to do considerable damage to bananas and plantains, and in some areas, particularly on peaty soils, as much as 50 per cent of the crop suffered. Panama disease (Fusarium oxysporium) and Leaf Spot (Cercospora musarum) were also observed, but caused very little damage compared with Moko disease. The scarring beetle (Colaspis hypochlora) the stem borers (Castnia licoides) and the Banana Weevil (Cosmopolites sordilus) caused some damage to plantains and bananas on the Essequibo Islands, Mazaruni-Potaro, and on the West Coast, Demerara. No measure of control was put into effect as the damage was slight and very sporadic.

CORN

232. Outbreaks of Army Worm (Laphyama frugiperda) occurred on maize in the North West District and in other corn growing areas, but the pest was effectively controlled by spraying with a 0.05% solution of dieldrin. The North West District and the Pomeroon are the main areas which grow corn.

CACAO

233. "Buba" disease also known as Cushion Gall disease, the causes of which are still unknown, was observed on cacao for the first time at Plantation Providence, East Bank, Berbice and at the cocoa Station at Atkinson, East Bank, Demerara, on I.C.S. clones. The control of this disease is being studied. Witches' Broom disease (Marasmius perniciosus) was observed on old re-habilitated cocoa plantations on the banks of the Demerara River. Black Pod disease (Phytophthora palmivora) was also observed on many cocoa estates and caused considerable damage.

234. The Erythrina trees which are used as shade for cocoa, were attacked by the larvae of the Erythrina moth (Arsenura erythrine). The pest was effectively controlled by spraying with D.D.T.

Fungicidal Treatment of Seed Paddy

235. During the year investigations were carried out to determine the fungi present on seed paddy and their effect on the germination of the seed and young seedlings.

Seeds selected from various parts of the country were examined and isolation of the fungi carried out. Some of the fungi isolated were Helminthosporium oryzae, Curvularia sp. Cladisporium sp. and Piricularia oryzae.

Seed dressings which included Agrosan SW., Agrosan GN., Ceresan, Dieldrex C and Mergamma S were tested to determine their effects on the control of the fungi and on the germination of the seed paddy. Agrosan gave satisfactory results and the investigations will be continued in 1960.

Control of Rice Water Weevil by Seed Treatment

236. During the year investigations were carried out on the effectiveness of aldrin and dieldrin when applied as seed treatment on the control of the rice water weevil. It was also necessary at the same time to investigate the effect of the various treatments on the viability of the seed kept for varying periods in storage. There was a slight decrease in the percentage of germination of seed treated with B.H.C. at the rate of 8 oz. of 25%. WP per 100 lb. seed, otherwise all treatments resulted in an increase in the percentage of germination.

THE EXTENSION SERVICE

237. The Extension Service is directly administered by an Assistant Director (Extension). For administrative purposes the Colony is divided into five districts, each supervised by an Agricultural Officer, under whom are junior staff, namely, Agricultural Assistants and Field Assistants. An additional Agricultural Officer was appointed to undertake agronomic work in the Kamarang district following the soil survey of that area. He is required also to do limited extension work.

238. The increasing demand for Agricultural advice and services and the expansion of agricultural development in all districts imposed a constant and severe pressure on the entire extension division. This was further aggravated by the absence of officers on study leave and the existence of vacancies for both senior and junior officers. Until additional staff is appointed, it will be difficult for officers to consolidate their achievements and meet the increasing demands of farmers and of the Administration with complete satisfaction. The District Field Staff exclusive of those on study leave numbered 36.

239. Included in the Extension service and stationed at Head Officer under supervision of the Assistant Director (Extension) were the Divisions of Rural Youth, Land Development, and Education and Information. Each Division is headed by a senior Officer. During the year, Specialists were assigned by the International Cooperation Administration of the U.S.A. to work in Farm Credit, Agricultural Education and Extension and Animal Husbandry. Counterparts selected to work with these officers were the Agricultural Officer (Land Settlement and Development), an Agricultural Assistant and a Grade I Field Assistant respectively.

240. The Field Staff was strengthened by the appointment of one Agricultural Assistant, a graduate of the I.C.T.A., and four (4) Field Assistants, all graduates from the E.C.F.I. There were however one (1) transfer on promotion to Barbados and one (1) resignation. In addition

two (2) Field Assistants were appointed to exclusive duties on the Mara and Garden of Eden Land Settlements.

Programme of Work

241. Extension officers continued with their objectives for Agricultural improvement; mainly as follows:-

Rice: Early planting, use of pure line seed, use of fertilisers, control of red rice, control of blast disease use of weedicides and more efficient use of farm machinery;

Sugar Cane: Extension of improved varieties, use of fertilisers, increased flood-fallowing, replanting after fourth ratoons;

Coconuts: Expansion of area under cultivation, rehabilitation of poor groves, control of pests and diseases, improved drainage and irrigation, better management, planting of selected seedlings, planting cover crop.

Vegetables: Increased production, use of organic manure and fertilisers, control of insect pest and diseases;

Cacao: Increased acreage, better management and husbandry, control of Witches' Broom Disease, planting of selected clones, establishment of cooperative fermentaries, and better processing;

Citrus: Use of fertilisers and trace elements, better field practices e.g. improved drainage and Irrigation, control of insect pests, planting of cover crop;

Dairy Production: Improve hygienic quality of milk; rearing of calves, de-worming, improved feeding, better housing, improved communal pastures, increased area under fodder, castration of scrub bulls;

Pigs: Increased production, improved housing and management, use of balanced rations;

Poultry: Increased egg production, better housing, sanitation and use of deep litter, feeding of balanced rations;

Sheep and goats; Upgrading, deworming, castration of scrub males;

Rural Youth: Training meetings for club leaders and officers, adoption of more project work, stimulating interest among young people and potential voluntary leaders in rural youth work;

School Gardens: Competitions, improvement in maintenance, lectures to students on regular visits of inspection.

Extension Methods

(i) Individual Methods

242. Personal contact with the farmers in the home, field, office and demonstration stations, continues to be the main source of teaching the farmer to improve his farming techniques. The distribution of seeds and other planting material, insecticides, and livestock as embraced within the scope of this method.

243. An important addition in this respect during the current year was the introduction of the Progressive Farmers' Scheme. Under this Scheme an individual farmer was elected by other farmers of his district to undertake a farming project selected by them in consultation with the District Field Officer. The Government shares with the farmer the cost of materials and equipment used in the project on condition that the farmer adopts all the methods laid down by the Officer, maintains records, and permits other farmers to visit his holding to learn what was being done. The Field Officer provides supervision and instructions and uses the project to demonstrate the improved methods to other farmers in the district.

244. A total of 25 projects were started during the year. They included vegetable gardening, cultivation of cacao, coconut, coffee and padi and rearing of pigs, sheep, poultry and dairy cattle.

245. During 1959 farm visits and interviews recorded by the field staff were 26,676 and 30,410 respectively. The corresponding figures for 1958 were 24,183 and 27,450.

(ii) Group Methods

246. Meetings, discussion groups, film shows and demonstrations were widely used as means of transmitting information to farmers. Demonstrations on spraying for insect control, chemical caponisation of surplus cockerels, and other common farm practices were given from time to time.

247. Several Field Days were organised during 1959. Very successful field days were held to promote coconut production at No. 48 Corentyne, Berbice and Chapman Grove, East Demerara. In the North West District a tour was arranged for farmers to see fertiliser trials undertaken by the Department and especially the effect of fertilisers in resisting the Sclerotium disease of coffee. Farmers also observed cacao cultivation, sheep rearing and pea-nut production on the hills. At the Atkinson Field Nursery a field day was held to demonstrate various aspects of cacao cultivation, control of witches' broom, fermentation and preparation of beans for marketing.

248. The largest field day was held at the Central Agricultural Station, Mon Repos, and attended by several hundred farmers from the major agricultural districts. Th field day focused attention on the research work in pro-gress, and on new techniques and crops. It was most successful, helping to create a better appreciation of the work of the Department and the services it offers.

249. During 1959, the field staff recorded a total of 1,314 meetings arranged or attended, 26 films shows organised 1,062 demonstrations given and 35 Field Days held.

(iii) Mass Method

250. The weekly radio programme, "Farmers' Notebook", was continued throughout the year by the Government Information Services. The Government Bulletins and one daily newspaper featured several issues on the work of the Department. Bulletins and leaflets were also distributed.

251. Co-operation was maintained with the Government Information Services and the Press. Through these media many topics of interest to farmers were publicised by the Radio and the daily papers.

252. The Department was invited to take part in several exhibitions and fairs. Although these are useful instruments in carrying the work of the Department to the public, participation was limited by finance, time and staff. Departmental exhibits were displayed at the Uitvlugt Community Centre Fair, the Union of Local Authorities' Agricultural Exhibitions at East Demerara and Essequibo, and the League of Coloured Peoples' Fair.

253. Crop and Livestock competitions were held in conjunction with the Union of Local Authorities' Exhibitions.

SERVICES TO FARMERS

254. The sale of stock feeds and fertilisers was undertaken in several districts through selected agents. Albeit in some districts, viz., the riverain areas, the field officers had to continue handling these farm requisites. Insecticides, fungicides, veterinary supplies and planting materials were still being obtained to a large extent through the district officers.

Pure Line Seed Padi

255. The quantity of Pure Line Seed Padi distributed in relation to the total acreage under rice continued to be disappointing. The main varieties distributed were D.110 and No. 79, and distribution was as follows:-

Berbice - 3,414 bags of 140 lbs.

Demerara - 6,681.5

Essequibo- 1,515

256. A total of 16,044.5 bags (140 lbs nett) of pure line seed was produced at Cane Grove and Anna Regina Land Settlements under the direct supervision of Departmental Pure Line Seed Padi supervisors. In addition, growers recommended by the Rice Producers' Association produced 353 bags under the supervision of the district officers. This padi was purchased by the Department and included in the seed sold to farmers.

257. Both on the Land Settlements and in the Districts in general, a large portion of the seed padi was sold to farmers through Cooperative Thrift and Credit Societies which gave their members loans to enable them to finance their purchases.

Economic Plants and Breeding Stock

258. Budded citrus, clonal cacao, sundry fruit and other commercial plants, grass cuttings, legumes peas and various types of seeds, three-week old chicks, weaner piglets and other pedigree stock were supplied to farmers through the

Extension Officers. For the first time, farmers were able to secure their full supply of chicks, and this was due mainly to production of chicks for sale by the local franchised dealers for reputable U.S.A. poultry breeders.

Duty Free Petrol

259. The policy of granting duty free petrol to assist agriculture was continued, and extension officers were heavily taxed with the onerous task of investigating applications and issuing licences. There were many reports of abuse of the scheme, indicating the need for a more vigilant check on the administration of this concession or for the introduction of a new method. The sooner Extension Officers are relieved of this task the better, as they will be able to devote more of their efforts to improving agricultural efficiency.

260. The quantity of petrol issued for 1959 and for 1958 and 1957 is as follows:-

TABLE XV

	1957 (glns.)	1958 (glns.)	1959 (glns.)
Rice	538,580	513,940	531,580
*Sugar Cane	116,502	110,823	96,437
Ranching	2,290	3,010	4,725
Others	6,731	5,895	6,195
Total:-	664,653	633,668	638,937

*Issued direct to the Sugar Estates on the draw back System.

Local Authorities

261. Close contact between the Extension Staff and Local Authorities was maintained to their mutual benefit. Extension officers continued to help with Community Development projects at Crabwood Creek, Berbice; Golden Grove - Wabaclis, Demerara; and Huis t'Dieren, Essequibo.

Regional Development Committees

262. Extension Officers served on Regional Development Committees and area Sub-committees. They attended meetings, investigated applications for loans, and advised both farmers and the Committee on economic agricultural projects. Applications for financial assistance by Self-help schemes and Land Societies also received attention.

Machinery Hire Pools

263. Officers continued to serve as members of the Area Committees. During the prolonged dry weather at the beginning of the year, officers had a busy time in some areas with the allocation of pumps for use in rice fields.

Crop Valuation

264. Officers from time to time assisted with the valuation of crops on lands taken over by Government Departments, notably the Drainage and Irrigation Department.

Agricultural Education and Information

(i) School Gardens

265. Field Officers visited gardens according to schedules planned in cooperation with Head teachers, and gave lectures to the pupils on these visits. Efforts were directed towards maintenance of gardens, and the continuation of projects started in previous years. The number of school gardens in operation were 112 in comparison with 106 for 1958. These were distributed as follows:-

Berbice	37
East Demerara	36
West Demerara	14
Essequibo	25
	112

266. Schools were given maintenance grants and some were given special grants for building fences and purchasing tools.

267. The annual school gardening competitions in the three counties were judged on an arrangement by the exchange of district officers. Judging was also carried out for the award of the Bannister Shield for the best School Garden in the Colony.

(ii) Publications

268. Radio scripts were furnished to the Government Information Services for inclusion in the programme "Rural Notebook", and the following were the series of radio scripts:-

(i) Fertilisation of corn and maize;

(ii) Care and Maintenance of tractors and equipment;

(iii) Some important pests and diseases of crops;and control measures (Rice, corn, cocoa, coconut and bananas);

(iv) Insect pests in the Vegetable Garden (Tomato pests)

(v) Insect pests in the Vegetable Garden (Egg Plant)

(vi) The original Home of Items of Guianese Christmas Fare;

In addition 33 press releases were submitted to the press through the Government Information Services.

269. The new publications issued for the year were as follows:-

(i) Planting cocoa;

(ii) Fertilisation of cocoa;

(iii) How to grow onions;

(iv) Selection and preparation of livestock for agricultural shows;

(v) Preparation of exhibits for agricultural shows;

(vi) Some common diseases of poultry;

(vii) Control of wild (black) Bees and cow flies;

(viii) Culling poultry for egg production;

(ix) The shaping and pruning of cocoa trees;

(x) Cocoa Pests and Diseases (Witches' Broome Disease) - Marasmieus Pernisioses Stahal)

270. There were four (4) issues of the Farm Journal covering the quarters December 1958, March 1959, June 1959 and September 1959. The farming community showed an increased interest in the Journal.

271. 12 maps and plans were prepared for various officers, and a total of 203 diagrams, illustrations, signs and posters prepared for agricultural exhibitions.

272. Due to the absence on study leave of the Field Assistant for Photography, little or no work could be done in this respect during the year. The Government Information Services' Photographer however helped occasionally and this help is gratefully acknowledged.

Rural Youth

273. Agricultural Officers continued to have supervisory charge of rural youth work in their districts. The shortage of staff and transfers of junior personnel which had to be made after short tenure in an area adversely affected youth work - I.C.A. Extension Specialist, Mr. Mr. Knickerbocker assisted with staff training and other youth activities.

274. The following leaflets were issued in 1959:-

(i) Cereal Foods

(ii) Candies - sweets from local materials

(iii) Doughnuts

(iv) Jams, Preserves, Marmalades

(v) Jellies

(vi) Homemade washing machine

(vii) Judging tips

(viii) Measuring dairy calf

(ix) Grooming dairy calf

(x) Planning Home grounds

(xi) Conducting group discussions

(xii) Farm Credit (prepared by Co-operative Officer)

(xiii) Planning community events

(xiv) 4 H Club member needs a project - (prepared specially for parents).

275. In addition six (6) different types of Record Books for Club Members were prepared. Garden leaflets were revised and leaflets added for several individual crops.

276. During the year monthly leaders' letters were introduced. A different subject was taken for each month, e.g., "Let's talk together"; "Club emblems and uniforms"; "Guiana Sings"; "Use of leisure time, etc.".

277. At the close of the year there were 36 4-H Clubs and 12 Young Farmers' Clubs with a total membership of 1862. The distribution of these is shown below in Tables XVI and XVII.

TABLE XVI

District	No. of 4-H Clubs	Membership	
		Boys	Girls
Berbice	8	228	281
Demerara	13	133	341
Essequibo	14	207	373
North West District	1	17	16
Total	36	585	1011

TABLE XVII

District	Number of Local Leaders for 4-H Clubs		No. of Young Farmers' Clubs	Membership	
	Men	Women		Men	Women
Berbice	15	29	4	86	48
Demerara	4	31	2	27	13
Essequibo	15	34	6	61	45
North West District	-	-	-	-	-
Total	34	94	12	174	106

278. The project work of the club members consisted of the following:-

(a) Gardening, dairy farming, pig rearing, sheep rearing, goat rearing, poultry rearing, bee-keeping, and fish culture. There were 150 projects in 1959 compared with 360 in 1958.

(b) Food and Nutrition - Nutrition and meal planning is integrated in food project at all levels - jams and jellies were popular projects. Methods of food preparation were demonstrated at 15 county events. Youth groups co-operated in the campaign to popularise pasteurised milk. There were 442 projects in 1959 compared with 475 in 1958.

(c) Clothing - An important feature was the training programme sponsored jointly by the Rural Youth Division and the Singer Sewing Machine Company. Over 50 members made and modelled dresses at Achievement Day Programmes' Clothing. Judging contests were also held. There were 381 projects compared with 665 in 1958.

(d) Home Improvement: In one country, clubs concentrated on the improvement of Beds and Bedding. In another there were demonstrations of a smokeless chula (local cooking facility). Although handicrafts did not receive special attention because other Government departments were directly concerned with this work, an attempt was made to feature coconut handicrafts in keeping with the coconut expansion programme. Home furnishings both for utilitarian and beautification were made by members. There were 232 projects in 1959 compared with 381 in 1958.

279. The continuity and faithfulness of Local Volunteer Leaders to the 4-H Programme were good. Leadership recognition pins were given to 27 Leaders in 4-H work and to 16 Young Farmers' members for work done in their clubs during 1959. Home Economics Field Assistants attended 333 meetings, gave 190 demonstrations, held 426 interviews and made 754 farm and home visits. In an effort to evaluate periodically the work being done and to assist in the guiding and development of the entire programme, a steering committee was appointed. Members of the Committee included the Agricultural Officers, the I.C.A. Extension Specialist and the Agricultural Assistant, Rural Youth Work.

280. Clubs were encouraged to pay more attention to recreation and a booklet on Games for Club Meetings was distributed to all Clubs. This increased activity has served to unite club members, and to give a pleasing informality and friendliness to group work.

281. An important innovation in the 1959 competitions was Club Members' Demonstration contests, and it has proved so successful that it will be an annual feature in each county. Judging contests were held with Poultry, Dresses, Boulangers and Cornstarch Custards. Winners in the various contests were selected at Achievement Day.

282. The Agricultural Officer and Agricultural Assistant Rural Youth Work took part in a 5-day Agricultural Extension Conference in Suriname and gave talks. Agricultural Officer, Mr. Madramootoo attended the Latin American Rural Youth Seminar in Honduras, and presented two case studies. The Ford Motor Company, U.S.A. sent a commercial photographer to take photographs for feature articles for the Latin American Yearbook.

Special Duties

(i) The Peasant Sugar-cane Farming Industry

283. The Department maintained close and constant contact with peasant cane-farmers through the Cane-farming Officer, a member of the Extension Staff. The organisation of the peasant cane farmers received special attention, mainly through the Agricultural Officer, East Demerara, the ex-officio Vice-Chairman of the East Coast Central

Cane Farmers' Committee. As a result of dissatisfaction expressed by farmers, proposals for re-organisation of the Committee were put up, and a sub-committee formed to meet cane-farmers and consider proposals for re-organisation. A member of the peasant cane-farmers' represented the colony at the Peasant Cane-farmers' Conference held in Jamaica during the latter part of 1959.

284. The production from peasant cane for 1959 was 5,723 tons of sugar.

285. Due to increases in yield the Estate authorities decided to carry out a survey and fix areas and lands for cane. This action caused great dissatisfaction, and was strongly criticised by peasant cane farmers.

286. Despite the advice by Extension Officers, farmers continued to insist on the sole use of sulphate of Amonia as a fertiliser. Efforts will be made to secure a mixed fertiliser for cane-farmers as is being done for rice farmers. Flood fallowing, the planting of varieties resistant to Leaf Scald, improved husbandry, the sale of better quality of canes to the Mills continued to receive attention in the Extension Programme.

287. The froghopper pest was almost non-existent during the year. After two years of freedom from damage by this insect, farmers felt that the froghopper fund was serving no useful purpose. They voted for the discontinuation of the fund and asked for a refund of their contribution.

288. Farmers continued to use the recommended varieties B41-227 and B13341-227 when renewing or supplying their cultivations. A total of 75 acres was thus planted.

289. The average price paid to farmers varied from $8.18 to $12.35 per ton, depending on quality. The Agricultural Chemist continued to carry out periodic tests of juice sample at the factories. He also performed the duties of Chairman of the price fixing committee for farmers' canes.

(ii) Bee-keeping

290. The Botanical Gardens Apiary continued as a demonstration unit, and for the production of queens and nucleus hives - 80 queens and 56 nuclei were distributed to bee-keepers.

291. 325 visits were paid to bee-keepers and demonstrations given to prospective bee-keepers and private and secondary schools. 14 persons attented a 4-day training course at the Botanic Gardens Apiary. Exhibits were shown at three (3) exhibitions.

292. The Bee Officer received training in the U.S.A. Under the sponsorship of the International Cooperation Administration.

(iii) Agricultural Demonstration Stations

Berbice

293. Four stations were maintained. One at the Mara Land Settlement was being developed as a demonstration farmstead. Fifteen acres of land were cleared and 12 acres planted with citrus cocoa, maize, peas, jute and catch crops.

Settlers were given demonstrations in the planting out and care and management of citrus and cacao.

294. At Providence, the sole function was the production of clonal plants for distribution to farmers. 21,067 stem and leaf cuttings were set, 16,228 plants basketed and 3,714 distributed.

295. The Whim Station was re-organised and the station divided roughly into two (2) sections, one for nursery work, mainly with citrus, and the other for fodder investigation and fodder nursery. 14,000 citrus seedlings were planted and 420 budded. Also 1,000 dwarf coconut seedlings were produced and sold in the district and 10 acres fenced and planted with Pangola grass.

296. At No. 63, the work was mainly the production of coconut seedlings and budded citrus plants. 5,404 coconut seedlings were distributed and there were 1,000 about ready for distribution and 4,000 nuts sown. With citrus 2,000 seedlings were planted out for budding, 4,000 sent to Whim for budding there, and 6,000 seeds set in old nursery beds.

297. Demerara: The Atkinson Field Nursery was extended for increased citrus propagation. At the Garden of Eden Land Settlement a 20-acre-unit on pegasse was being developed as a demonstration holding for dairy farming and the limited production of citrus and food and vegetable production. At the Atkinson Nursery production was as follows:-

Cacao - 65,000 cutting propagated, 42,328 basketed, 30,875 plants distributed and 1,275 planted out in the nursery fields;

Citrus - 196.5 lbs seville orange seeds sown; 37,300 seedlings transplanted; 5,000 lime cuttings basketed; 13,716 oranges, 1,611 grapefruit, 1,713 tangerine, 4,128 lime and 37 lemon distributed.

298. Essequibo: Four stations were maintained. The La Belle Alliance station produced mainly cacao plants for distribution to farmers and a citrus plot is maintained for demonstration and for bud wood - 2,500 selected coconuts were set during the year - 5,600 cacao plants were propagated, 4,322 basketed and 150 distributed to farmers.

299. At Maria's Lodge and Suddie 4,451 citrus plants were propagated and 2,971 distributed. Of vegetables produced 1,101 lbs. were sold to the Public Hospital Suddie. 2,500 selected coconuts were set, and should be ready for distribution early 1960.

300. 2,140 Liberica coffee seedlings were distributed from the Charity nursery.

301. At Bartica the livestock management demonstration was discontinued, but the demonstration citrus orchard and nursery were continued. Flooding of the nursery by the overflow of water from the adjoining creek occurred several times during the year and retarded the nursery work. 495 citrus plants were propagaged and 377 distributed.

302. North West District: Re-organisation and expansion of the Hosororo Station were carried out. The plots of citrus, cacao, coffee, avocado pear, coconuts, rice, pineapple, vegetables and grasses were maintained. In addition

to the small herd (1 bull and 6 cows) of dairy animals, a small flock of poultry and a few pigs were also maintained for demonstration, and the production of foundation stock for farmers. 10 Acres citrus and 5 acres cacao were established. Experiments with fertilisers and weedicides were carried out.

303. The seedling plot of cacao was weeded, pruned and fertilised. 6,352 pods were reaped, and they yielded 832 lbs of cured cacao beans. The remaining acre of I.C.S. 84 Clone under natural shade was completed. Growth was fair, and the plot was weeded and the plants fertilised. The new 5-acre plot was planted with 1 acre each of I.C.S. 1, 40, 60, 84 and 90 - A fertiliser trial was laid down on the entire acreage. Another 26½ acres were felled and will be prepared for planting.

304. 0.5 acres each of Liberica and Robusta coffee were planted on the hill. The avocado pear plants were rested, no scion material being taken from them during 1957 and 1958, and they gave a fair crop of fruits in 1959. The trees planted in 1955 bore for the first time during 1959. Several large, well formed fruits were reaped.

305. The hill plot of St. Lucia dwarf and local coconuts was treated with a heavy dressing of potash fertiliser, and showed a marked response. A trial plot of ginger was continued on the hill. Fertiliser trials with pine-apple were laid down on the pegasse swamps. 5 acres of swamp land were cleared and planted with Locuntu grass (Ischaemum spp:) Establishment was difficult because land preparation could not be carried out. Small demonstration plots of coastal Bermuda, Nardi Blue and Pangola were maintained.

306. Planting material distributed were as follows:

Cacao: 3,898 plants to farmers and 21,255 for expansion of the station;

Citrus: 3,581 to farmers and 525 for expansion of the station;

Avocado: 139 plants to farmers.

307. The cattle, poultry and pigs all maintained good condition 12,816.5 pints of milk were produced. The Rhode Island Red flock of 37 birds was reduced to 29 by year end due to culling and death. Their production from March to December 31, 1959 was 5,815 eggs. The Single Comb White Leghorn flock of 24 birds was reduced to 19 by year end due to sale and deaths. Their production from September to December 31 was 1,297 eggs.

308. 14 acres of land were cleared at the Kumaka-Quebana Station in the Moruca district. The plot is being developed as a demonstration for the establishment of coconuts and cacao, and for soil conservation practices. 4 acres were planted with coconuts and 1½ acres with cacao under natural shade. A section cleared is being used as a nursery for the production of coconut seedlings, and temporary shade plants. 15,000 selected coconuts were set in the nursery and 9,535 seedlings distributed.

EVALUATION OF EXTENSION WORK

309. The steadily increasing demand for the services of the extension staff, the need for improved types of livestock and better planting material, and the increase in agricultural production and improved agricultural

practices throughout the colony are ample testimony of the invaluable services of the extension staff.

310. This increased demand for advisory service plus the appointment of field officers to various committees and statutory bodies are imposing a great deal of strain on field officers. Long hours of work, working on Saturdays and holidays and on Sundays are steadily becoming the rule of many field officers' normal duties. Unless the extension staff can be increased within the next few years, the service might lose its reputation for efficiency .

311. Extension Officers were called upon to assist farmers and arrange for pumping in several areas during the prolonged dry weather early in the year.

312. Through the indefatigable efforts of the field officers large areas were saved from destruction, and these efforts contributed in no little measure to the colony's record production of an estimated 104,075 tons of rice from 195,776 acres reaped.

313. Although 1959 was not as favourable a year as 1958, there was nevertheless record production also of, poultry meat, citrus, eggs and milk. There were also abundant supplies of food crops and green vegetables.

314. The number of coconut seedlings, cacao seedlings, chicks, pure line seed, and in-calf heifers distributed was the highest on record.

315. The Progressive Farmers' Scheme, introduced to facilitate on-the-farm demonstration of types of farming suitable to particular areas, proved a useful method of teaching and of introducing new methods.

316. Some achievements by way of improved techniques adopted by farmers were:-

(i) The use of dieldrin in the control of acoushi ants; some 10 square miles in Canals Polder were cleared of this pest;

(ii) The use of mercuric fungicides to control Blast disease of rice;

(iii) The use of malathion and molasses for the control of wild bees on citrus;

(iv) Satisfactory spacing in the planting out of citrus and coconuts;

(v) The use of cover-crops in orchards

(vi) The cooperative marketing of coffee, and plans for cooperative processing in order to improve quality;

(vii) The establishment of pangola pastures.

VETERINARY SERVICES AND ANIMAL HUSBANDRY

Organisation

317. The Veterinary Division is staffed by the Assistant Director (Veterinary) five Veterinary Officers with one or more Technical Assistants attached to each Officer.

318. The Veterinary Officers are stationed at St. Ignatius Livestock Station for the Rupununi Area, New Amsterdam for Berbice, at Central Agricultural Station for East Demerara and at Georgetown for West Demerara. One vacancy exists for a Veterinary Officer in Essequibo.

319. The function of the Veterinary Officer in the district is to diagnose and treat animal diseases and to take measures to control and prevent the spread of infectious and contagious diseases. The main measures adopted are prophylactic innoculation, isolation, restriction of movement and the slaughter policy on occasions. Each district has a small laboratory and technical staff. In addition, the Field Assistants of the Extension staff undertake the treatment of minor ailments, render assistance at parturition and first aid.

320. The Veterinary Officer also advises on animal husbandry and nutritional problems and is an integral part of the Extension Service on these matters.

321. The animal breeding policy of the Department is carried through by the Veterinary Division and a Veterinary Officer undertakes the direct supervision of the Central Agricultural Station's Stock Farm where the Colony's dairy breeding stock are kept.

322. It is proposed, however, as soon as qualified staff is available to delegate all animal husbandry and animal breeding matters to trained animal husbandry men.

323. The Artificial Insemination Service is centred on the Central Agricultural Station where the bulls are kept, and semen is collected, prepared and despatched to the districts. The Service operates on the whole of the coastal belt.

ANIMAL HEALTH

324. The main outbreaks of disease during the year were Paralytic Rabies and Equine Encephalomyelitis.

325. Other Bacterial and viral diseases encountered including Anthrax, Mastitis, Vibro fetus (abortion) Pullorum, Fowl Typhoid, Fowl Cholera, Newcastle disease and Fowl Pox.

Trichomoniasis

326. This disease was diagnosed at the Ebini Livestock Station in a herd in which many abortions were occurring. Testing of all bulls on the Station revealed 100% infection. It would appear that the disease must have been present for a considerable number of years. A programme of eradication is being planned.

Anaplasmosis and Piroplasmosis were frequently diagnosed and for the most part treated successfully. Coccidiosis was diagnosed in poultry and in calves.

Parasites

327. Both internal and external parasites occur generally and are treated with appropriate drugs. It was found, however, that the ticks were no longer sensitive to Gamexane and new preparations have been introduced.

Veterinary Research

328. Very little research work is undertaken due to limitation of staff.

329. The Liver Cirrhosis problem on the Intermediate Savannahs with foci at Waranama, Dubalay and Ebini received attention and biopsy work on animals at the three points has commenced and is proceeding.

330. The specimens are being studied at Cambridge, University College of the West Indies, Jamaica, as well as locally by the Government Pathologist. Feeding trials using an extract of a Crotalaria weed growing in the area have been started at Central Agricultural Station on calves. Biopsies were made prior to the commencement of the trials and will be repeated quarterly.

331. Fertility Studies of Incubated Eggs begun in 1958 continued and has proved to be very useful in pinpointing defective incubation, infertility and hatchability and deformities.

332. Pig Feeding Trials using cassava meal were run with two litters. Starter grower and finishing rations were composed of 8.5, 10 and 19.1 per cent respectively of cassava meal. Pigs were weaned at 8 weeks and marketed at 24 weeks. Carcase grades were good. Cassava is abundantly available and cheap, but extremely low in protein value.

Laboratory and Clinical Services

333. The Division began organizing a comprehensive laboratory service to include work in Bacteriology, Histology, Parsitology, Biochemical analyses etc. In the past, most of this work was done at the Central Medical Laboratory of the Georgetown Hospital. One technician has completed training and a second is receiving training.

334. The following number of examinations were carried out at Georgetown:-

Animal & Poultry	- 861
Faecal Blood and Brain Samples	- 366
Post Mortems	- 240.

ANIMAL HUSBANDRY

335. The Department's policy is to encourage Animal Husbandry and to foster livestock production. Extension work in this field carried bn by Veterinary and Agricultural Officers is more fully described under "The Extension Service".

336. The three Livestock Stations at the Central Agricultural Station in Demerara, Ebini on the Intermediate Savannahs of Berbice and St. Ignatius on the Rupununi Savannahs were expanded. Ebini and St. Ignatius are concerned mainly with beef cattle.

Animal Breeding Policy

DAIRY CATTLE - Cross bred Friesian-Zubu (Sahiwal) to produce an animal suited to local conditions;

BEEF CATTLE - Santa Gertrudis, Sahiwal Zebu) and Jamaican Brahman) crosses

PIGS - Large White, large Black;

SHEEP - Improvement of local mutton types; experimentation with Border Leicester crosses;
GOATS - British Alpine

CHICKENS (for eggs) - Rhode Island Reds; White leghorns.

337. The Livestock Industry is served by the Artificial Insemination Service for Dairy cattle by the sale of bulls from the Ebini and St. Ignatius Stations and by the sale of breeding stock of all the other types of livestock maintained. A hatchery for chicks is operated at the Central Agricultural Station.

LIVESTOCK FARM (Central Agricultural Station)

Cattle

338. A total of 168 cattle was maintained on the Livestock Farm comprising 17 bulls, 69 cows and 82 calves. 24,000 gallons of milk were produced, the average daily production being approximately two gallons per cow.

339. One bull Brimstage Czar reacted positive to the tuberculin test and was slaughtered.

340. The Dairy Heifer Scheme reached a total of 424 animals by year-end made up of 128 cows, 158 heifers and 138 calves. 64 in-calf heifers were handed out to farmers in the districts.

Horses

341. There were 3 horses on the station during the year kept mainly for transportation during wet weather.

342. Donkeys are used for hauling carts about the station. Five donkeys, two males and three females were on the station at year end.

Sheep

343. The number of sheep on the station at year end was 108. Lambs born for the year numbered 112. 66 animals, 54 rams and 12 ewes were distributed for the year.

344. A Barbados Black Belly ram was imported during the year.

Goats

345. Seven bucks and two does were sold to farmers during the year as breeding stock. At year end there were 33 goats (7 bucks 26 does) on the Farm.

Pigs

346. Breeding stock of the Large White and Large Black breeds were distributed for 1958 number 202 (95 boars, 107 sows). Total number of litters were 43 with an average of 9.1 pigs per litter. There was a suspected outbreak of Swine Fever toward the end of the year when 19 pigs were lost. At year end the total stood at 110.

Poultry

347. The flock of Rhode Island Reds and Leghorn at year end totalled 2,187, made up by 1005 pullets and hens

186 cockerels and 996 chicks (replacements) 158,885 eggs were produced of which 46,452 were incubated. 29,450 chicks were distributed in the districts. Vaccination against Fowl Pox and Newcastle disease as well as de-beaking of chicks to avoid cannibalism was done routinely.

EBINI LIVESTOCK STATION

Introduction

348. During 1959, developmental work reached a satisfactory state and the station has been able to concentrate increasingly on experimental work. The trail to the Berbice River was completed. The original target of a square mile of planted grass has been exceeded; approximately 1,000 acres are now regularly grazed.

The Pastures

349. Pangola grass is the species most extensively planted. Its main virtues are the rapidity with which it becomes established and its palatability.

350. During July an area of ¼ - ½ acre of Coastal Bermuda grass was planted as a nursery plot. (The material was provided by the Central Agricultural Station). This rapidly became established. During 1960 a larger area will be planted so that the species can be given a satisfactory trial.

351. About twelve acres of Molasses grass were established from imported grass in June. Germination was good; the pasture was first grazed during December.

352. A further acreage of Pensacola Bahia has also been established from seed imported from the U.S.A. Again, germination was very good and grazing commenced about four months after sowing.

353. During the latter part of the year, reconditioning of the older pastures by planting Bahia was continued. These pastures, originally mixtures of Bahia and two species of Carpet grass were invaded by weeds. Bahia is a very good suppressor of weeds. Otherwise it is doubtful whether 'patching up' with Bahia is justifiable; the process has proved to be slow and costly and Bahia is not relished by the stock.

354. There is as yet no satisfactory grass legume mixture for these savannahs. Alfalfa has been tried but satisfactory results were not obtained.

The Herd

355. The herd totalled 954 head and was comprised of 17 bulls, 545 cows, 57 heifers over 1 year old, 131 steers over 1 year old and 204 calves. The 1959 calf crop was 216 with 18 still births.

356. The breeding policy continued to be to grade up the original cattle with Santa Gertrudis and Sahiwal bulls in single sire breeding units. Both lines are proving satisfactory and the Santa Gertrudis is quite prepotent for colour. The original herd contained a good deal of Zebu blood.

357. The calf weights compared unfavourably with those of 1958 but they approximated to those of 1957.

358. The weight at 360 days was 381.1 lb. and compared unfavourably with 416.3 lbs the figure for the 1957 calves. Yet many calves grew exceptionally well: five calves exceeded 600 lbs. at 360 days and a further seventeen were in the 500 - 600 lb. range.

359. At birth, the 1958 calves were heavier with less difference between the weights of the two sexes. At 360 days however, not only were the weights of both sexes lower, but the difference between the two sexes was greater.

360. Calves born during the first half of the year generally grew better than the calves born late; the July and August calves however fared better than the May and June calves. In this, there was some measure of agreement with the 1957 calves.

361. The poorer performance of the late 1958 calves was attributed to the dry conditions prevailing from August 1958 to May 1959. The dry conditions affected the range cattle much more than those on Pangola pasture.

Experiments in progress

Steer grazing trial on Pangola grass begun January, 1959:

362. Forty-eight (48) steers of unknown breeding were used. Their quality and temperament were poor and they had had insufficient handling. All had been born and reared on range although a few had lately been on Pangola pastures. Eight 10-acre pastures were grazed rotationally; the animals were moved to new pastures at 3½ day intervals. When the grazing was not considered close enough a large herd was used for follow up grazing for a period not exceeding 24 hours. Many of the steers were fit for slaughter at the end of August.

363. Particulars of this trial are given below:-

Mean live weight	15th January	540.2 lbs.
	26th March	603.8 lbs.
	25th June	708.5 lbs.
	8th October	816.9 lbs.
Total live weight gain (47 steers)		13,049 lbs.
Daily live weight gain per steer	15th January - 8th October	1.04 lbs.
Carcase weights (Meat Marketing Ltd.)		384 - 356 lbs. mean 368
Killing percentage (Meat Marketing Ltd.)		59.68
Addition grazing 15th January to 8th October -		(1949 mature animal grazing days (68 yearling grazing days (643 calf grazing days.
Total consumption of Trace elemented Bone Flour		496 lbs. plus 248 lbs. salt
Total fertiliser applications (3 applications December, 1958, April 1959 and September 1959)		1½ cwt. sulphate of Ammonia, 1½ Triple Super-Phosphate and ¾ Muriate of Potash.

Steer grazing trial on Pangola grass begun 1st July, 1959.

364. Sixty-four steers of 9 months and over were available; all were used, there was no selection. The breeding of the older ones was unknown but in the majority of cases both sire and dam were known.

365. Initially seven 10-acre pastures (Pasture 17) were used; the eighth only planted in July could not be grased until December. Again the pastures are being rotationally grazed; the animals were moved at 3½ day intervals and any surplus grass was grazed by a large herd. In spite of this follow-up grazing there was considerable stemmy growth which the steers did not eat.

366. The soil of much of pasture 17 is better than that of 11 and 12 where the earlier trial was carried out; both the clay and organic matter content of the soil were much higher. The area was planted during June 1958 and was grazed regularly from December 1958. It received applications of fertiliser in December 1958 and in August 1959; the total quantity per acre has been 7/8 cwt. sulphate of Ammonia, rather less than 1¼ cwt. triple super phosphate and rather less than ¾ cwt. muriate of potash.

367. Mineral consumption by the steers 1st July - 31st December has been 448 lb. trace-elemented bone flour and 224 lbs. salt.

TABLE XVIII

Particulars of Steer Grazing trial begun 1st July, 1959. The animals are grouped according to sire.

Sire	Number of Animals	Mean age 1st July	Mean Weights (lb)				Mean daily live-weight gain (lb.)
			1st July	2nd Sept.	4th. Nov.	30th Dec.	
Unknown	14	1 yr. 365 dys.	458.3	526.7	595.3	631.3	0.95
S.G. 2	4	319 "	376.5	410.7	473.7	526.0	0.82
177	7	1 yr. 109 "	477.6	535.2	616.0	656.0	0.98
182	9	1 yr. 78 "	359.2	432.8	512.6	551.7	1.05
200	8	1 yr. 135 "	595.9	667.6	735.3	761.5	0.90
Sahiwal 35	15	1 yr. 88 "	419.7	463.2	534.0	579.6	0.82
C.1561	1	362 "	433.0	512.0	588.0	648.3	1.18
D. 83	2	1 yr. 71 "	398.0	419.0	459.7	492.7	0.52
Brahman W.P. 27	1	308 "	259.0	316.7	404.0	473.3	1.17
Holstein 9	2	347 "	530.7	583.3	-	692.5	0.89
Sahiwal 468	1	1 yr. 8 "	414.0	444.4	498.0	519.3	0.58

Each weight is the mean of 3 weighings.

An experiment is also being carried out to determine liveweight changes and reproductive performance of cows under different systems of management.

368. A mineral feeding experiment was begun October, 1959. This is being done on planted pastures. In-calf cows and heifers are the experimental animals. The cattle are rotationally grazed on eight 8½ acre pastures, which had complete fertiliser in August and September and which will be fertilised periodically throughout the experiment.

The Treatments are:-

(1) Control - no supplement
(2) 1.3 oz per day of Churns Protective High Phosphorus mixture
(3) Copper, cobalt, zinc and molybdenum
(4) Cobalt, zinc, molybdenum - no copper
(5) Copper, zinc, molybdenum - no cobalt
(6) Copper, cobalt, molybdenum - no zinc
(7) Copper, cobalt, zinc - no molybdenum.

Liver Cirrhosis Investigation

369. Samples have been taken from animals of ages ranging from 6 months to 3 years. It is hoped to establish the degenerative changes which take place and the age at which these changes are initiated. So far, the striking findings were abnormalities in young animals of about six months and secondly the apparently good physical condition of some animals with advanced cirrhosis.

Botanical Survey of the Savannahs

370. The report of S.G. Harrison of the Royal Botanic Gardens, Kew, who completed a Botanical survey is referred to under "Research and Experimentation".

ST. IGNATIUS LIVESTOCK STATION

371. The Station is managed by an Agricultural Officer. An Agronomist and a Veterinary Officer complete the senior staff.

Rainfall

372. Although less rain fell in 1959 than in 1958 (52.90" compared with 59.47" for 1958) the distribution was better. Consequently the savannah was in a much better condition at year end than at the same time last year. No major floods were experienced this year and with a more even distribution it is probable that the effective rainfall was greater in 1959 than in 1958.

Construction

373. New quarters were constructed to house the Agronomist.

374. A dipping tank has been constructed but a few minor works are necessary for its completion.

Cattle

375. The long dry season 1958/1959 and the habitual indiscriminate burning of the savannahs had an adverse effect on the cattle for a considerable portion of the year. Rains in April and subsequent months improved conditions so that the animals looked better at the end of 1959 than at year end of 1958. The poor condition of the stock led to an increased incidence of tick fevers and consequent losses. Dipping of cattle is to be a routine part of management.

376. During the yeara total of 121 calves was born - 57 males and 64 females.

377. Deaths from disease were 34, while 28 animals were sold or slaughtered leaving a total of 518 animals on the station at year end.

378. It is proposed, for the meantime, to limit the total number to 450 so that there is to be some culling early in 1960.

379. From a total of 5 pure bred Santa Gertrudis which comprised 3 bulls and 2 heifers imported in 1957, the pure stock now stands at 12 (4 bulls, 3 heifers, 2 cows and 3 heifer calves).

380. The Station herd is divided into 7 herds, viz.

(1) Fattening steers and cull cows;
(2) Heifers, young bulls and steers;
(3) Single Sire Santa Gertrudis unit with 33 cows and heifers;
(4) Santa Gertrudis unit with 2 bulls and 66 cows and heifers;
(5) Brahman unit with 2 bulls and 53 cows and heifers;
(6) Brahman unit with 55 cows and heifers and 3 bulls
(7) Brahman unit with 1 bull and 11 cows.

381. Regular monthly weighing of calves continued throughout the year. Towards year end the regular weighing of all stock on the Station was started. Below are given in more detail some of the data arising out of this recording.

Birth Weight of Calves 1959

Mean for all calves	61.7	(101)
Mean for all male calves	65.0	(52)
Mean for all female calves	58.2	(49)
Mean for Xbred Santa Gertrudis calves	60.8	(57)
Mean for Xbred Brahman calves	63.5	(39)

Subsequent weighings up to 150 days indicated that the Brahman calves grew faster than both the Santa Gertrudis and the local cattle. The average daily liveweight gain was 0.97 lbs. compared with 0.85 lbs. for Santa Gertrudis. At 150 days the Brahman calves were 209.5 lbs. compared to 189.4 lbs. for the Santa Gertrudis.

382. While the average birth weight for all calves was 61.7 lbs., that for females was less - (58.2 lbs) than that for males, (65.0 lbs.). There was also a seasonal change in birth weight, - the lowest weights occurring in March, April and May, the means for these three months all being below the yearly mean. This is the period at the end of the dry season. The rains normally start in mid April or early May. Animals which are heavier at birth tend to have a better growth rate and be heavier throughout their early life. The data collected so far is insufficient to show this clearly, but the indications are there. If this is so, then it would be better not to have calves born during the period mid February to mid May, a total of 3 months. (This would lead to better grown cattle later on.).

Grass

383. The planting of pangola grass (Digitaria decumbens) was continued during the rainy season, some 50 acres being planted to this grass at 3 different sites. The establishment of this grass is very slow on savannah sites despite

the use of fertiliser and little or no grazing can be obtained in the first season.

384. The performance of the 13 acres planted in 1958 was not as good as was earlier expected. Cattle, mainly weaner calves did well on the grass during the first month of grazing. However, there was a build up of intestinal parasites and despite dosing they failed to thrive. In future this point will have to be watched very closely and a deworming routine for all cattle on pasture has been worked out. This grass plot is now well established and it should do better next season. A great deal still needs to be learnt about the establishment and management of this grass under Rupununi conditions before it can be recommended for general use in the area.

Range Management

385. The division of the station into paddocks for improved management proceeded and should be completed during 1960.

Research Programme

386. An Agronomist was posted to the station at mid-year. A research programme has been worked out and it is hoped to get this started during the 1960 season.

387. A research programme has also been agreed for the Veterinary Officer who resumed duty during the year after having received further training in the United Kingdom.

FISHERIES

Marine

388. The survey of the coastal waters, undertaken by the trawler the "Cape St. Mary" on behalf of Government, ended on 30th April, following which the vessel left for Hong Kong. The report of the survey has been published. Briefly stated, the survey located many areas where fish are abundant between the 10 and 20 fathom lines.

389. A local entrepreneur has since launched two trawlers and has landed 375,000 lbs. of fish during 1959. Another trawler was nearing completion at year end.

390. The "Cape St. Mary", apart from discovering fish resources, was used to train local personnel in trawling.

391. A great deal of the time of the staff was spent in organising and assisting owners of 22 trawlers to establish operations for catching shrimps. A total of 1,206,336 lbs. was caught of which exports amounted to 1,140,567 lbs. valued $746,511.

392. The staff assisted the local owner of trawlers with the supply of gear and gave him information to enable him to operate successfully.

393. The use of mechanical handlines for snapper fishing which had been introduced by Mr. Taylor, I.C.A. Specialist was further demonstrated and a few units issued to fishermen.

394. Close contact was maintained with Fishermen's Cooperatives. This movement among Fishermen appears to be virtually at a standstill.

395. The Fisheries Officer continued to help fishermen with the use of facilities at the Fish Marketing Centre e.g. boat repair, net preservation, docking and the supply of duty free gear and supplies.

Use of the Fishermen's Lodge

396. 9,266 tickets were sold for the use of the Fishermen's lodge. The canteen continued to flourish and an average of 30 meals were served daily.

397. Continued help was given to the processing and drying of shrimp and the marketing of fish meal. Stock feed manufacturers purchase 28,566 lbs. of this material.

398. Production of fish glue continued and 8,965 lbs. were exported.

399. The Fisheries staff maintained the service of licensing fishermen, arranging sites for fish pens, settling disputes among fishermen with respect to the use of fishing grounds and negotiating compensation for fishermen whose gear were destroyed by ships in the rivers.

400. The Fisheries Division administered the Scheme for refunding import duty on gear and supplies. $26,242.92 was paid in this connection.

401. An unusually large number of enquiries was dealt with from foreign interest who wished to engage in shrimping, fishing and fish processing.

Inland Fisheries

Fish culture

402. The programme of fish culture has been handed over to the Agricultural Extension Service. There are at the moment over 500 small fish ponds which have been supplied with Tilapia mossambica. During the past year the dry weather has affected somewhat the extension of this work, but nevertheless there are certain districts, particularly in Western Berbice area, where water supply from the high tide has ensured the success of ponds which are established there. Tilapia has been distributed from the Department's Hatchery in the Botanic Gardens as well as from district ponds where farmers are supplied on a "lend-lease" basis.

403. The Brackishwater Fish Culture Station at Onverwagt has been almost completed. The ponds are all constructed and the kokers are established. All ponds have been stocked with varying populations and it is expected that in November, 1960, after a full year's operation of the ponds, the average yield per acre can be obtained from the various combinations of fish types in the 10 different ponds. The station has had a profound effect on the locality and a number of ponds have been established by nearby residents.

404. Additionally there have been training courses held at the Station and residents from different parts of the country have attended and have been persuaded as to the success of fish culture in foreshore swamplands of which there are several thousand acres available in the Berbice county.

405. Fish population in the various ponds are as listed below:

Pond A - Shrimps

Pond B - All types of fish - normal swamp population.

Pond J1 - Foragers (Mullets, Croakers, Tilapia)

Pond J2 - Predators (Bashaw, Cuffum, Snook)

Pond J3 - Omnivores

Pond J4 - All types

Pond H1 - Tarpon, Snook, Tilapia, Shrimp

Pond H2 - Snook, Tilapia, Shrimp

Pond H3 - Mullets, Tilapia, Shrimp

Pond H4 - Normal swamp population.

406. During the year after the operation of the ponds, enough fish have been cropped to sell to the marketing division, a total of $2,300.00 worth of fish. Towards the end of the year information indicated that funds will be provided for the completion of the station by C.D.& W. grant. This will provide for all the equipment required for further information such as tide guage, evaporimeter, microscope and laboratory equipment as well as for fencing the station and for the repairs to the building which houses the laboratory and quarters for the officers. When the station is completely established it would be one of the largest brackish water fish culture stations in the western hemisphere and it is believed that it will be one of the least expensive in construction in the world. It should also be providing more information than has been obtained from other efforts in neighbouring territories on the cultivation of fish and shrimp in brackish-water.

Fishery Research Work

(a) Weed Control

407. During the latter seven (7) months of the year a good deal of investigations were carried out on the use of manatees for the control of aquatic weeds in canals. Initial experiments were carried out with manatees in canals adjacent to the hatchery and it was found that a large manatee about 8½ feet was capable of clearing a canal at the rate of one acre in 8 weeks. A total of 23 manatees were obtained for introduction into waterpaths of various land development schemes controlled by the Drainage & Irrigation Department. These field experiments clearly indicated that the manatee is capable of controlling the aquatic grass as is evident at the Land Development Scheme, Garden of Eden and in the Tapacooma water paths and Essequibo Coast where considerable clearance of established water weeds has been effected by these animals. Other places have been encouraged to acquire manatees for weed control work and sugar estates namely Port Mourant and Uitvlugt have purchased manatees from fishermen for this purpose, as well as the Department of Land Development on a Station at Mara. A major snag in the use of manatees is that they are frequently slaughtered by fishermen for sale as meat. Legislation is now being drafted for the control of the slaughter and/or capture of manatees.

(b) Publications

408. During the year considerable data was compiled for publications in Fisheries Bulletin Nos. 1 and 2. Fisheries Bulletin No. 1 was a review of the fishery industry and an assessment of progress since the previous publications on fisheries. The Fisheries Bulletin No. 2

is the report of the trawl survey research vessel "Cape St. Mary". Both these publications have been widely distributed throughout the world and have provided much literature on an exchange basis from institutions from various parts of the world.

(c) Cold storage of fish

409. Tests have been carried out on the various types of fish held in cold storage at temperatures varying from 15 to 28°F. Tests have been subsequently carried out at the Carnegie Trade School where samples of fish were cooked and tested for palatability.

Extension work

410. A film on the operations of the brackish water Fish Culture Station and the research work in progress there, has been prepared by the Government Information Service.

Aquarium Fish Trade

411. There are now four (4) major exporters of aquarium fish. The weather has adversely affected this industry but supplies have still continued to be sent to various parts of the world particularly the United States and England. Efforts are being made to effect control of this industry for its general improvement through the registration of exporters and collectors as per fishery ordinance.

412. The Honorary Fishery Officer (Dr. R.H. McConnell) continues to collect, analyse and assess the data available from the Cape St. Mary trawler fishery survey. These records have been published in book-form as Fisheries Bulletin No. 2 (Fishery Bulletin No. 1 - A Review of the Fisheries of British Guiana 1958, has contained an earlier summary of the Cape St. Mary's work). Apart from this the classification of the fishes collected in the survey have continued and investigations into freshwater fishes of the Rupununi has also proceeded. A full description of all the species of fish collected in the Cape St. Mary's trawl survey will subsequently be published by Dr. McConnell and this would be a very useful guide to the occurrence of fishes in off-shore waters.

413. The total quantity of aquarium fish exported was 962,000 valued at $179,000. These were exported largely to the United States of America and also to Trinidad, Holland, Canada, the United Kingdom and other places in Europe.

MARKETING DIVISION

Policy

414. The general policy of the Division remained unchanged, namely, encouraging local agricultural production by offering producers an assured market, paying economic prices and organising distribution of supplies to consumers, at fair prices throughout the coastal areas.

415. The following services were operated by the Marketing Division:-

I. Government Produce Depots (3)
II. Processing Factory
III. Ham & Bacon Factory
IV. Fish Market & Centre
V. The Milk Pasteurisation Plant.

416. A total of 180 persons was regularly employed in various capacities during the year.

GOVERNMENT PRODUCE DEPOTS

417. The Depot maintained centres for purchasing farmers' produce at Charity and Diamond (Pomeroon), Parika (West Demerara), New Amsterdam (Berbice) and Georgetown. Purchasing in the North West District was carried out by the Farmers' Co-operative Society. With the exception of New Amsterdam and Georgetown which operated on a wholetime basis, the centres were visited weekly by Marketing Assistants on such days as the Government steamer made its call. Sailing vessels were also extensively used to supplement the Government steamer service in the conveyance of produce from these areas to Georgetown.

418. By the nature of its operations, farm produce sold to the Depot represents supplies surplus to the requirements of private traders.

419. Supplies of ground provisions, except sweet cassava and plantains, were generally below requirements. Purchases of plantains were considerably less than in 1958, due mainly to the fact that surplus production was to a large extent absorbed by exporters to the West Indies. Cassava, although showing a substantial decline on the previous year, again presented the problem of satisfactory disposal, chiefly because of its highly perishable nature and limited storage life. Disposal was effected mainly to peasant producers of starch and in a lesser degree to pig rearers; in each case at prices below cost.

420. Following is a breakdown of the comparative purchases of Ground Provisions in 1958 and 1959:-

	1958 (lbs.)	1959 (lbs.)
Plantains	5,487,324	1,858,684
Cassava	5,208,705	2,029,889
Sweet Potatoes	83,290	108,496
Yams	25,855	50,424
Tannias	4,642	6,363
Eddoes	136,715	71,368
	10,946,531	4,125,224

Coffee and Cocoa Beans

421. 79,756 lbs. of Coffee Beans and 20,676 lbs. of Cocoa Beans were purchased during the year. The quality of the cocoa continued to be poor owing to unsatisfactory fermentation and drying. Coffee beans were unusually small, due principally to unfavourable weather conditions, and this fact affected sales and previous price levels on the export market. The Division continued to act as an export clearing house for the North West District and Pomeroon Farmers Co-operative Societies respectively. Exports totalling 130,800 lbs. were satisfactorily undertaken.

Fruit

422. Supplies of bananas showed a substantial decrease. Citrus fruit were more readily available but were of very indifferent quality and inclined to be overly small.

	1958	1959
Bananas	49,552 lbs.	27,230 lbs.
Oranges	51,467 only	83,516 only
Grapefruit	15,748 "	14,682 "

Livestock Feeds, Veterinary Supplies, Insecticides and Fertilisers

423. Sale of these commodities through the Depots continued to provide a valuable service to farmers. Due to heavy demands on the time of Agricultural Officers and Field Assistants, sales previously made through the out-stations were discontinued. Exceptions were however later made in the case of the more remote areas.

PROCESSING FACTORY

424. The Factory manufactured a full range of rations for poultry, pigs, cattle and horses, but was again handicapped by the shortage of the lower priced local ingredients, particularly stock feed rice and copra meal. Moreover, there was a sharp increase in the price of locally produced corn. This, coupled with growing and intense competition from imported feeds and the withdrawal of credit facilities in the face of increased inducements of this nature by our competitors, both local and foreign, has had an adverse effect on sales and therefore on the successful operation of the Factory. Production of mixed feeds was 868,800 lbs. compared with 959,225 lbs. in 1958 and 1,488,164 lbs. in 1957. A comparative statement of feeds produced is given below:-

	1957 (lbs.)	1958 (lbs.)	1959 (lbs.)
Chick Starter	52,253	33,360	35,000
Growing Mash	67,125	37,758	51,900
Layers Mash	282,523	134,990	82,750
Breeders Mash	83,020	52,300	71,200
Broiler Starter	250	-	-
Broiler Finisher	500	-	-
Dairy Meal	455,406	329,307	372,245
Calf Meal	38,502	61,750	48,200
Pig Starter	87,905	42,000	34,925
Pig Grower	111,517	103,609	83,150
Pig Finisher	38,150	16,700	14,400
Sow Ration	201,950	92,700	46,950
Horse Feed	43,000	33,050	17,300
Turkey Ration	563	-	-
Weaner Ration	25,500	21,701	10,780
	1,488,164	959,225	868,800

Corn

425. The Government guaranteed farmers price remained at 4½¢ per lb. on spot, but a crop shortage forced the price up and purchases were made at an average of 5¾¢ per lb. delivered in Georgetown. High moisture content with consequent heavy loss in mechanical drying brought the finished price to approximately 7¢ per lb., or 1¼¢ per lb. above the average price in the previous year. Purchases for the year amounted to 1,234,374 lbs.

Corn Meal

426. Demand increased steeply and manufacture was more than double that of 1958. A comparative statement of

manufacture is given below:-

	1959 (lbs.)	1958 (lbs.)	1957 (lbs.)
Corn Meal Manufactured	245,473	104,407	84,510
" " Sold	237,079	104,387	82,311
" " Used in Feeds	92	2,432	681
Corn Germ Manufactured	-	-	353
" " Sold	-	-	360
" " Used in Feeds	-	-	321
Corn Bran Manufactured	185,720	96,436	59,962
" " Sold	30,181	2,967	1,946
" " Used in Feeds	162,591	94,414	50,917

Plantain Flour

427. Manufacture of Plantain Flour was undertaken as a means of relieving the heavy glut of plantains. Production for the year amounted to 26,465 lbs.

HAM AND BACON FACTORY

428. The Factory continued to operate for the benefit of the Pig Industry by providing an assured market for pigs of a quality suitable for processing. Successful operation of the Factory was, however, severly handicapped by a shortage of pigs throughout the Colony. Resulting increased price demands placed the average price paid at 10¢ per lb. above that paid in 1958. On an increasing and highly competitive import market, this unprecedented increase in the cost of pork put the local finished products at a great disadvantage and is materially responsible for the enforced overall decrease in production.

429. A total of 1,465 pigs weighing 127,697 lbs. was purchased for $69,677.57; an average of 54½¢ per lb. Purchases for the previous year were 2,134 pigs = 196,738 lbs. for $86,689.20 or an average of 44¢ per lb.

430. A comparison of Finished Products production for 1957 - 1959 is given hereunder:-

	1959 (lbs.)	1958 (lbs.)	1957 (lbs.)
Ham	8,752	9,026	5,917
Bacon	27,475	48,342	44,808
Sausages	3,816	8,500	9,139
Lard	4,066	7,568	7,342

FISH MARKETING CENTRE

431. The Centre provides facilities for the orderly marketing of fish either by the fishermen themselves or by sale to the Wholesale Fish Market which is operated by the Marketing Division.

432. Other functions of the Centre include the storage of fish for fishermen and vendors; the sale of ice (in blocks or crushed) at $1.70 per block; the running of a dormitory, for the use of which a very nominal charge is made to fishermen; net drying and tar-dipping facilities; a ramp and grid for boat repairs; piped water and the sale of gasolene and oils.

433. The Wholesale Fish Market handled 665,380 lbs. of fish valued at $249,901.89. The main types were Snapper, Queriman, Grouper, Snook, Basha, Grey Snapper, Croakers,

Sea Patwa and Banga Maree.

434. The over-all volume disposed of represents a decrease of 280,540 lbs. on the previous year's operations. The withdrawal of the trawler "Cape St. Mary" was immediately responsible for the decrease, as very little fish of the trawler varieties were subsequently landed at the Fish Dock.

435. Cold Storage accommodation continued to be gressly inadequate. The Refrigeration Plant was both inefficient and uneconomical, and these conditions resulted in heavy losses from spoilage. Moreover, inadequacy of cold storage accommodation negatived any effort to stabilise fish supplies and led to frequent gluts, during which disposal had often to be effected at very low marginal profits and in many cases at a loss.

436. Successful operation of the Wholesale Fish Market, and indeed of the whole local fishing industry is entirely dependent on the provision of adequate and efficient cold storage facilities.

437. Provision has been made in the Development Programme for the extension of these facilities.

MILK PASTEURISATION PLANT

438. Milk purchased for 1959 was 498,876 gallons, this is an increase of 23,687 gallons over 1958.

439. Sales of pasteurised milk were 376,162 gallons. Chocolate milk was also introduced in May. Sales of this amounted to 100,499 gallons. This makes a total increase in sales of 78,649 gallons.

440. The consumers' response to liquid milk is still very poor. The house-to-house deliveries implemented by local bakeries have not made any further increase of sales.

441. The milk production for 1959 remained fairly constant at approximately 14 - 1500 gallons per day rising in November and December to 18 - 1900 gallons and is still increasing. On the recent survey in the Corentyne and Berbice it was shown that there is approximately 2,000 gallons of milk per day available, should the need ever arise for the Plant to extend the area from which it collects milk.

442. Surplus milk given away free of charge was 28,999 gallons.

443. Recombined Milk was not manufactured during 1959. Milk powder was occasionally used in the manufacture of Chocolate milk.

Finances

444. The total cost of maintaining these Marketing Schemes was $ 367,749.00 as shown hereunder:

Government Produce Depot) Processing Factory) Bacon and Ham Factory)	$154,200.00
New Amsterdam Depot	5,431.00
Fish Marketing Centre	68,259.00
Milk Pasteurisation Plant	139,859.00
	$ $367,749.00

ECONOMICS DIVISION

445. The post of Agricultural Economist remained vacant throughout the year, as a result of which, the work of the Division was curtailed.

Agricultural Census

446. The extraction of data from the 1956 agricultural sample census was completed.

Stocktaking of Agriculture

447. In view of the expanding need for information, on which to base agricultural policy, and the long interval between agricultural censuses, the annual stocktaking of agriculture was re-introduced. The main objective of the operation, is to provide estimates on a village to village basis, and it is intended that the extension staff, with the cooperation of other rural agencies and estate proprietors, would collect statistics on crop acreages, production and livestock numbers. The statistics are to be recorded on a return, showing crop acreages under cultivation and the production thereof during the year. The Division would collate the statistics for presentation.

BOTANIC GARDENS

448. The Gardens were kept in an attractive condition during the year. Clearing of bush and levelling areas occupied formerly by the Rice Station was completed. These grounds have been made a part of the Gardens. A start was made with the establishment of a museum of local species of economic forest trees.

449. The Gardens continued to offer vegetable seeds for sale and to propagate ornamental and fruit trees with the exception of cacao, coffee and citrus. Sales were:-

Mixed vegetable seeds	23,056 packets
Tomato Seeds	2,816 "
Onion Seeds	305 "
Cauliflower seeds	187 "
Selected Black Eye Peas	1,374½ lbs.
Economic Plants	3,449
Ornamental Plants	8,020

450. Floral decorations at official celebrations continued to be one of the functions of the Gardens' Staff. This work is greatly appreciated by the community and helps to give these 'occasions' a local character of dignity and enchantment.

PLANT PROTECTION SERVICE

451. A Plant Protection Service was formally established within the Department to regularise the inspection of plants and plant products imported and exported. The following were examined:

Imports

Chick Peas	4,242 bags
Black eye peas	4,061 "
Garlic	13,389 "
Flowers and Vegetable seed, bulbs, etc.	210 packages

Imports (cont'd.)

Sugar Cane Cuttings and fuzz	23 packages
Coriander seed	826 "
Canary seed	936 "
Cummin seed	500 "
Millet seed	12 "
Fenugreek Seed	86 "
Mustard seed	112 "
Other seed	246 "
Ornamental Plants	30 "
Economic Plants	104 "
Vegetables	18,813 "
Fruit	15,954 "
Xmas Trees	136 "

Exports

Flowers, seeds and bulbs	135 packages
Vegetables	46 "
Sugar Cane cuttings and fuzz	1 package.

452. One Plant Protection Officer was sent to the U.S.A. for training.

METEOROLOGICAL DIVISION

453. Records of atmospheric pressure, temperature humidity, sunshine, radiation-temperature, rainfall evaporation, and velocity of wind were taken at the Botanic Gardens, Georgetown; temperature, humidity and rainfall at New Amsterdam Gardens, Hosororo Experimental Station, North West District, 72 miles Bartica-Potaro Road, and St. Ignatius, Rupununi; temperature, humidity, sunshine and rainfall at Anna Regina, Essequibo, and Mazaruni Prisons; records of atmospheric pressure, temperature, rainfall and velocity of wind at Mabaruma, North West District; temperature, humidity, rainfall and velocity of wind Lethem, Rupununi, and Enachu, Mazaruni.

454. Rainfall Records were also taken at 68 stations situated within 15 miles from the coast viz: 19 in Berbice, 41 in Demerara and 8 in Essequibo, and 29 stations situated more than 15 miles from the coast.

455. Observations at the various stations are under the supervision of the following:-

Botanic Gardens:	Meteorological Observer and Assistants;
New Amsterdam Gardens:	The Agricultural Officer;
Anna Regina, Essequibo	The Post Master;
Hosororo Experimental Station:	The Agricultural Officer;
72 miles, Bartica-Potaro Road:	An Officer of the Public Works Department;
Mazaruni Prisons:	Two Officers of the Prisons Department;
Mabaruma:	An Officer of the Telecommunications Department;
St. Ignatius Experimental Station:	The Agricultural Officer;
Lethem, Rupununi	An Officer of the Postal Department
Enachu, Mazaruni:	An Officer of the Telecommunications Department

456. Close contact was maintained with the Director of the West Indies Meteorological Service, Trinidad, to whom monthly reports are sent. The Director and Staff gave technical advice and undertook the adjustment of instruments.

Weather

457. Reports are sent twice daily by radio to the headquarters in Trinidad and a daily weather forecast for the Georgetown area is publicised by radio and newspaper.

SECTION III

L E G I S L A T I O N

Summary of Legislation affecting Agriculture Enacted during 1959.

Ordinances		Purpose
20.	Animals (Control of Experiments) Amendment	To amend the Animals (Control of Experiments) Ordinance, 1957.
Orders in Council		
23.	Animal Diseases (Conditions of Importation of Poultry) (Amendment)	Animal Diseases (Conditions of Importation of Poultry) Order No. 8 of 1958.
24.	Control of Distributions (Coconuts and Coconut Oil) (Revocation)	To revoke Order in Council regulating distribution of coconuts and coconut oil.
42.	Delegation of Powers (Wild Birds Protection)	To delegate to Director of Agriculture powers of Wild Birds Protection Ordinance, Chapter 260.
86.	Animal Diseases (Anthrax) Order.	To declare a section of the West Coast Essequibo an anthrax infected area.
Regulations		
1.	Fisheries (Amendment) Regulations	To amend Regulations No. 13 of 1957.
6.	Importation of Fruits and Vegetables (Temporary Provisions) (Revocation)	To revoke Regulations No. 13 of 1956.

SECTION IV

(i) BOARDS AND COMMITTEES

The Director of Agriculture served as Chairman of the following Boards and Committees:-

(1) Sugar Industry Price Stabilisation and Rehabilitation Funds Committee;

(2) Sugar Experiment Stations' Committee;

(3) Marketing Committee;

(4) Fisheries Advisory Committee.

The Director also served as a member of the following Committees:-

(1) British Guiana Rice Marketing Board;

(2) British Guiana Rice Marketing Board - Executive Committee;

(3) Selection Committee for Imperial College of Tropical Agriculture Scholars;

(4) Davson Memorial Fund Committee;

(5) Scholarship Selection Committee;

(6) Museum Committee (Board of Trustees for the Georgetown Cultural Centre);

(7) Industrial Development Advisory Committee;

(8) Rice Committee.

He served as Director of the British Guiana Rice Development Company Committee and as a Director of the Royal Agricultural and Commercial Society.

The Director attended the following meetings outside the Colony:-

Natural Resources Council	-	In Trinidad
Rice Conference	-	In Trinidad
Trade Mission	-	In Jamaica
Trade Mission	-	In Venezuela

A meeting of the Regional Standing Committee for Agriculture, Fisheries, Forestry and Livestock Committee of which the Director is a member, was held in British Guiana during November.

(ii) SENIOR STAFF CHANGES

The following changes of staff occurred during 1959:-

Appointments

R. Hewson	-	Agronomist
L.E. Palmer	-	"
M.K. Rayman	-	Agricultural Assistant (Ag.)
E.J.A. Khan	-	Chemist
F.E. Mongul	-	Veterinary Officer
C. Hennecart	-	Farm Manager (Ebini Livestock Station)

G.D. Baxter	-	Agricultural Officer
V.S. Ho-a-Shu	-	Agricultural Officer
S.A. Harris	-	Soil Surveyor

Transfers

R.O. Williams, Deputy Director to Sarawak as Assistant Director (Research);

E.G. Giglioli, Agricultural Officer, to Kenya as Agricultural Officer;

H.L. Morrison, Assistant Accountant, to Treasury;

Resignations

Dr. A.S. Mittelholzer	-	Agricultural Officer to Venezuela;
R.A. Yates	-	Economic Botanist;
J.M. Fletcher	-	Assistant Director (Veterinary and Animal Husbandry).

Expiration of Contract Employment

J.H.L. Messing	-	Soil Scientist
D.I. Allen	-	Agricultural Engineer.

(iii) SENIOR STAFF AS AT 31ST DECEMBER, 1959.

Director of Agriculture	- G.B. Kennard D.I.C.T.A., A.I.C.T.A. Dip. Agric. Econ.
Deputy Director of Agriculture	R.O. Williams, D.I.C.T.A., A.I.C.T.A. (Transferred)
	P.A. Chan Choong, B.Sc.(Hons.) (Lond.), A.I.C.T.A. (Acting)

RESEARCH & LABORATORIES

Assistant Director (Research)	- H. Paul, M.Sc.(McGill) B.Sc. Ph.D.(Lond.), D.I.C., F.R.I.C.;
Entomologist	- C.P. Kennard, D.I.C.T.A. M.Sc., B.Sc. (McGill);
Economic Botanist	- R.A. Yates, B.Sc., M.Sc. (Wales)
Agricultural Officer (Grasslands)	- G.D. Baxter, M.Sc.
Agricultural Officer (Perennial Crops)	- P. Poonai, D.I.C.T.A., A.I.C.T.A.
Agricultural Officer (Annual Crops)	- Vacant; Dr. A.M. Mittelholzer (resigned)
Plant Pathologist	- Vacant;
Padi Pest Research Officer	- L.D. Cleare, F.R.E.S.
Agricultural Economist	- Vacant;
Sugar Agronomist	- L.S. Birkett, D.I.C.T.A., A.I.C.T.A.;
Soil Scientist	- J.H.L. Messing, B.Sc.(Wales)
Chemist	- N. Ahmad, D.I.C.T.A., A.I.C.T.A.; M.Sc. (Br. Colombia) Ph.D.(Nott.);
Chemist	- E.J.A. Khan, M.Sc. (Wales) B.Sc. (Edin.);
Chemist	- Vacant;
Agricultural Engineer	- D.I. Allen, N.D.A.
Research Officer (Ebini)	- S.P. Legg, B.Sc., M.A.;
Agricultural Officer (Hosororo Station)	- D.E. Gollifer, B.Sc. Agric.

Agricultural Officer (St. Ignatius)	-	E. Cundiff, B.Sc., M.A.;
Hon. Fisheries Officer (Research)	-	R.H. McConnell, D.Sc.;
Fisheries Officer (Research)	-	W.H.L. Allsopp, M.Sc. (Wisc.)
Fisheries Officer (Extension)	-	E.A. Shepherd;
Curator	-	G.E. Wolstenholme;
Soil Surveyor	-	S.A. Harris, B.Sc., M.Sc.
Senior Field Assistant (Meteorology)	-	J.E. Isaacs;

VETERINARY AND ANIMAL HUSBANDRY

Assistant Director (Veterinary)	-	J.M. Fletcher, M.R.C.V.S. (resigned) E.M. McWatt (acting)
Veterinary Officer	-	E.M. McWatt D.V.M. (Ont.)
Veterinary Officer	-	P.F. Byrne, M.R.C.V.S. (Dublin)
Veterinary Officer	-	C.E.O. Fraser, B.V.Sc, M.R.C.V.S.
Veterinary Officer	-	F.E. Mongul D.V.M.
Veterinary Officer	-	Vacant;
	-	
Veterinary Officer (St. Ignatius)	-	G.D. Paine, M.R.C.V.S., Dip. T.V.N.
Field Manager, (St. Ignatius)	-	C.A. Vieira
Field Manager, (Central Agricultural Station)	-	C.A. Bannister, Dip. of Agriculture;
Field Manager (Ebini Station)	-	C.E. Hennecart, Dip. of Agriculture;
Senior Field Assistant	-	C.A. Veerasammy;

AGRICULTURAL EXTENSION

Assistant Director (Extension)	-	P.A. Chan Choong, B.Sc. (Hon.) (Lond.) A.I.C.T.A. E.I. Hugh (Acting)
Agricultural Officer, Rural Youth	-	O.F. Churaman, D.I.C.T.A., Dip. Extension Education;
Agricultural Officer, Berbice	-	H. Madramootoo, B.S.A. (Br. Colombia);
Agricultural Officer, East Demerara	-	B.O. Ho-Yen, M.Sc., B.Sc(McGill), D.I.C.T.A.
Agricultural Officer, West Demerara	-	Vacant
Agricultural Officer, Essequibo	-	Vacant
Agricultural Officer (Land Settlement & Development)	-	E.I. Hugh, M.Sc (Iowa) B.Sc., Agric. (McGill) D.I.C.T.A., Dip. of Agric. (Read.);
Agricultural Officer	-	V.P. Chung, M.Sc. (Ag. Engineering) B.Sc. (Mech. Eng.)
Agricultural Officer		V.S. Ho-a-Shu, D.I.C.T.A., A.I.C.T.A.;
Agricultural Officer (Headquarters)	--	A.V. Wan Ping, D.I.C.T.A., B.Sc. Hons. (McGill)
Agricultural Assistant	-	H.A. Cole
do	-	L.H. Hope
do	-	B.W. Carter, D.I.C.T.A.
do	-	M. Ramnaraine, Dip. of Agriculture (Wye Agric. College)
do	-	Vacant.
Senior Field Assistant	-	P.O. Jackson

MARKETING DIVISION

General Manager	-	C.I.V. Mittelholzer
Chief Accountant	-	G.F. Chan
Marketing Officer	-	L.F. Paul
Manager, Government Produce Department	-	Vacant
Dairy Manager	-	J.E. Riley
Secretary/Accountant, Milk Pasteurisation Plant	-	D. Seeram

SENIOR ADMINISTRATIVE STAFF

Executive Officer	-	E.S. Douglas
Accountant	-	M.V.A. Spencer
Assistant Accountant	-	Vacant
Senior Woman Secretary	-	Miss M. Cheong

OFFICERS WORKING ON COLONIAL DEVELOPMENT SCHEMES

Agronomist	-	R. Hewson, B.Sc., D.T.A.
do	-	L.E. Palmer, B.Sc., D.T.A., A.R.C.S.;

INTERNATIONAL COOPERATION ADMINISTRATION

M.E. Knickerbocker,	B.S.-	Extension Specialist
D.H. Lee,	B.S.-	Marketing Sepcialist
J. Wheat	B.S.-	Horticultural Specialist
Russell, B. Gregg	B.S.-	Rural Credit Specialist
Alfred C. Hale, B.S.A.;	M.Sc.-	Vocational Agriculture Specialist.

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APPENDIX "Y"

Year of Assessment 1958
Not Taxables examined in period May, 1958 - April, 1959

Employees other than Government classified by Industry

Classification	No. of Cases	Gross Income	Allowances
Agriculture	135	$239,722	$ 297,791
Forest & Mining	198	330,880	425,441
Building	15	23,535	28,672
Banking, Insurance & Finance	22	30,158	36,310
Distribution	61	116,270	137,216
Manufacturing & Processing	51	94,478	121,753
Transport	10	16,391	20,512
Others	374	684,478	829,301
Total	866	$1,535,912	$1,896,996

APPENDIX "Z"

Year of Assessment 1958
Not Taxables examined in period May, 1958 - April, 1959
Traders classified by Industry or Occupation

Classification	No. of Cases	Gross Income	Allowances
Agriculture	81	$101,083	$ 186,126
Forest & Mining	43	104,452	210,082
Professional	22	22,744	42,695
Distribution	179	262,837	417,770
Manufacturing & Processing	2	-12,013	19,646
Transport	9	14,078	26,825
Others	349	364,424	632,927
Total	685	$857,805	$1,536,071

51.