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Queensland.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE

YEAR 1897-98.

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TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE.

Department of Agriculture,
Brisbane, 30th June, 1898.

Sir,—I have the honour to submit the Eleventh Annual Report of this Department, and in so doing have pleasure in being able to state that the principal industries represented have, notwithstanding certain adverse circumstances, been in a fairly healthy and prosperous condition. Good average crops have been reaped, and prices, though not abnormally high, have been upon the whole remunerative. Slowly but surely our chief producing industries are coming into line with the other colonies of Australasia. Our sunny climate and generally abundant rainfall has enabled us to occupy the premier position in the production of sugar, and for the last ten years we can claim the second if not the first position with regard to the average wheat yield. As for butter, the export of last year clearly proved the suitability of our pastures to the production of this article, and the prices realised in the markets of Great Britain show that our manufactures and our factory system are fully up to the most modern achievements of other places. Progress and development continue marked features in the administration of the Department. During last year three additional State Farms have been established, viz.:—A fruit farm at Redland Bay, on the property leased from Mr. L. G. Corrie for a term of three years, with the right of a further extension: the work to be carried out here will be (1) in connection with experiments dealing with the pests affecting many of the fruits grown in Queensland, and (2) the results to be secured by the application of different manures. At Gindie, in the Central district, where special attention will be given to wheat-growing and the other branches of general farming; and at Biggenden, which may be said to be a newly-settled district, where valuable lessons will be learned in the production of crops suitable to the district.

The State Nursery at Mackay, that has in the past been of great service in the distribution of products new to the colony, is to be converted into a sugar experiment station, that will be, it is thought, of great value to the sugar industry. There are now upwards of sixty different varieties of cane growing at that place, the value of which can only be effectively learned when the chemist has submitted them to the test in his laboratory. The Diseases in Plants Act was put into operation during last year. At first considerable exception was taken to the administration, but this to a large extent has subsided, and from many quarters testimony has been received of the good results accruing to our fruit-growing industry as the result of this Act being placed upon the Statute-book.

The *Agricultural Journal* has, from the issue of the first number in July, 1897, been a pronounced success. No less an authority than Sir J. B. Lawes, of Rothamsted, in England, has written, testifying to its usefulness and general get-up, and the letters received from Queensland farmers are numerous.

The transfer from the Home Secretary's Department to this Department of the Chief Inspector of Stock and his staff, and the administration of the Meat and Dairy Produce Encouragement Acts, has led to such an increase of work that the ordinary day is too short, and work has often to be carried far into the night.

The Department has been working at a disadvantage owing to the officers being in different buildings, and the need of further office accommodation has been sorely felt. The promised additions to the present buildings will enable the whole work of the Department (with the exception of the Stock Institute) to be carried on under one roof, and so greatly lighten labour and facilitate operations.

The appointment of Mr. Nevill as Tobacco Expert will doubtless effect a complete change in the system hitherto adopted by our tobacco-growers in their methods of curing, and several have already agreed to give the system suggested by him a fair trial. Mr. Nevill will undertake the cultivation and curing of this plant at the College Farm on such a scale as will afford a fair test of the value of our tobacco in the English market. It is intended that a few acres of land shall be cultivated, the product cured and packed at the college, and sent to London as a test lot.

The appointment of Mr. Rainford as Viticulturist will be of great value to those of our vignerons that are willing to avail themselves of his services.

Both these officers are thoroughly acquainted with the work in their respective branches, and are a valuable acquisition to the Department.

Wheat.—Fear and doubt were heard upon the Downs, during the seeding season, that the harvest for 1897 would be a poor one. Happily these doubts and fears were without foundation, for the return was higher than 1896, and the season was sufficiently good to produce a more than average crop of about 16·86 bushels to the acre—a crop that compared very favourably for Queensland with the returns of the other colonies. The belief in this colony as a wheat-producing country has been more firmly established by the good crop of 1897 succeeding that of 1896, a belief that has been practically shown by the increase of about 67·10 per cent. in the area reaped for grain. From the returns of the Registrar-General, the area under crop for grain in 1896 was 35,831 acres, and in 1897, 59,875 acres. Yet, notwithstanding this large increase, we are far from supplying our own wants, and there is ample room for more land to be placed under this cereal. The yield for 1897 was 1,009,293 bushels, but to supply our wants we had to import 1,850,319 bushels of wheat or its equivalent in flour. Thus it will be seen that we can yet increase our production according to our present population by about two-thirds. The districts that showed the greatest increase for grain in area were:—

	1896. Acres.	1897. Acres.		1896. Acres.	1897. Acres.
Allora	8,403	12,892	Toowoomba ...	10,736	17,076
Dalby	987	1,935	Warwick ...	7,036	13,229
Highfields ...	1,644	3,120	Emerald ...	Nil	130
Killarney ...	2,482	3,079	Crow's Nest ...	144	486
Mitchell ...	1,036	1,636	Laidley ...	168	559
Roma	1,722	3,654	Nanango ...	136	355

The returns per acre for 1897 was slightly in excess of 1896, and it can, I think, be said that the crop to the farmer has been equally valuable, for prices have been good, have remained firm, and so far as can be at present seen from the state of unrest and other causes in Europe, it is probable that there will not be a fall in the price of wheat for some time to come. It is difficult to forecast the prospects for the coming harvest, for in many places the land has only now been seeded, but the area under wheat for grain will probably be increased by at least 25 per cent., and that, given a fair season, the yield will compare favourably with its predecessors. The Darling Downs has hitherto been looked upon as being our granary, but the Central district will this year enter the lists in a degree that will warrant notice being given to that part. Following up the experiments that were carried out by this Department, which proved that, in seasons with favourable rainfall, the soil of the western part of the Central district is suitable to wheat, the farmers are placing increased areas under this crop, and it can be prophesied without much fear of failure that before long the flourmill will be at work there. The most prominent

amongst these pioneers in that district are ex-Victorian farmers, who have come here with the experience gained in the south, and have settled down there to find the prosperity which they could not meet with in the place they have left.

The establishment of a State Farm at Gindie, 13 miles from Emerald, on the Springsure branch of the Central Railway system, will give a great impetus to the settlement of an agricultural community in that district. About 40 acres of wheat, a quantity of barley, oats, and other products have been planted, and the favourable season so far promises satisfactory and profitable returns. I look forward with confidence to the future operations of this farm, and it will be the aim and endeavour of the Department to show, by a proper system of cultivation, that the dry spells said to prevail in the Central district are not so inimical to successful farming operations as many people at the present time think. Similar difficulties have been surmounted in other countries, and I can see no reason why like effects should not prevail here.

A higher average return per acre could, it is suggested, have been obtained were greater care exercised in stacking. During the harvest, and for some time afterwards, heavy rains fell, which, owing to defective stacking, in many cases caused considerable loss and also resulted in an inferior quality of grain finding its way to the miller. This, to my knowledge, led to lower prices per bushel being obtained. It may seem presumption on my part, but nevertheless I am firmly of opinion that, however good and effective the system adopted in the old land of stacking may be, a different system should be adopted here. The winter winds and rains of Britain are of a different character to those experienced here. Apart from the driving rains, the thunderstorms are of such a nature in Queensland that, however much care may be exercised in thatching, the rain is sure to find its way into the stack and cause more or less damaged grain, and consequent loss. Fortunately, notwithstanding the greater area we have better means of manipulating the crop with the number of thrashing machines that can be placed in the field immediately the reaper and binder has done its work. These machines, however, are not yet sufficiently numerous to deal with even our limited output, so that to protect that portion which the farmer is compelled to hold over, it is suggested that the erection of shedding similar to that used for our oaten and lucerne hay would be a step in the right direction. A few rough posts, a few pieces of timber, and a case of galvanised iron would go far towards securing the crop, so that the grower could await the thrashing machine without fear. This, doubtless, would involve a small outlay at the first, but the timber and iron would last for many years, and the time taken to remove and re-erect such a structure in any field convenient would be a mere trifle in comparison with the loss often suffered by the farmer. Such a system of housing may seem somewhat novel to our growers, but the suggestion is, however, I think, worthy of consideration, for I am convinced that it has only to be adopted by some of our advanced men to induce a general adoption in our wheat-growing centres, owing to the general utility and profitableness of the system.

There is one other matter it is desired to refer to in this connection, and that is co-operation in the purchase of thrashing machinery, for as the area under grain increases so will such a system undoubtedly play an important part in this most important industry.

Butter.—The export butter trade, to which reference was made last year, has wonderfully increased since that time. Although butter has been more or less exported to the United Kingdom since 1895, it was only during the season of 1897-8 that the shipments were of sufficient magnitude to be classified by the trade in London, and to warrant particular reference thereto in the circulars that are published by the merchants in Great Britain. In 1895, 17 tons were exported; in 1896 no butter was sent over the seas; but, in 1897, the year in which it can be said that the factories established here had passed the initial stages incidental to the commencement of a new class of business, the export reached 188½ tons, and in the first two months of the present year some 175

tons of butter were sent from Queensland to London. The bonus that was available under the Meat and Dairy Produce Encouragement Act became exhausted at the end of 1897, so that the shipments made during this year have been upon a purely commercial basis, are evidence that the industry is able to stand upon its own foundation, and that it has passed the period when the help of the State was required to establish it. The reports that have appeared in the Press concerning the latest shipment have been most conflicting. The London dealers complained of a falling off in quality, but the Glasgow dealers bear high testimony to the quality of the consignment. These London reports, however, show the necessity for placing only the best article of commerce upon that market, and that in the best form. When funds were available for bonus, it was necessary that all butter exported, for which the owners intended to claim bonus, should be inspected and passed by officers appointed for that purpose. In the shipments under review it is known to the Department of Agriculture that butter which had been rejected by the inspectors had been shipped, and consequently the adverse reports received may have some foundation in fact, but not so with regard to the butter, the owners of which voluntarily desired that their butter should be inspected, notwithstanding that no pecuniary benefit in the shape of bonus was to be derived from such inspection, but rather expense. It is evident that if Queensland is to maintain a first position in the London market for dairy produce, and also for other articles of commerce, the question will have to be seriously considered whether the inspection and marking of produce intended for the European market should not be made compulsory.

The advance of science has made clear the necessity for cleanliness in everything in connection with the dairying industry—a state of things that is not always met with, especially in dairies that supply milk to the residents in towns, and the need for close inspection of all dairies is every day becoming more apparent. This matter is more fully dealt with by the Dairy Instructor in his report, which is embodied herewith.

Malt.—The cultivation of the proper kind of barley for the manufacture of malt is a branch of agriculture that farmers in the cooler districts might well turn their attention to, now that it is established that the Queensland-grown barley of the right variety is well adapted to the making of malt. Under the present system of collecting statistics it is not possible to distinguish between the common and malting barley, but the area under the proper kind is yet so small that it need hardly be taken into account in arriving at the volume of trade awaiting the agriculture of Queensland so soon as it pleases the farmers located in the districts where it will grow to cater for the market that is at their doors. During 1897, 181,465 bushels of malt, to the value of £58,244, were imported, and we used during that year 195,865 bushels, of an estimated value of £61,207. The whole of this money practically left Queensland, instead of which the greater part could have remained here, and have been utilised by the farmers for their advancement. The malting houses established here have testified to the value of our malting barley, and have advertised that they are prepared to purchase. This is a market that will grow with the population, and there is no probability of the supply equalling the demand for many years to come.

The statistics of the Registrar-General for 1897 shows that the area under barley for grain increased in 1897 by some 955 acres, with an increased yield of 30,500 bushels, the figures being respectively :—

	Area.	Yield.	Average.
1896	1,122 ...	19,340 ...	17·24 bushels.
1897	2,077 ...	49,840 ...	24·00 „

A goodly proportion of this increased yield was seeded to malting barley, and an interest is being taken by the farmers on the Downs in the matter, but there is yet room for further advancement.

Timber for Wood-paving.—The suitability of our timber for street-making in preference to stone is now recognised by Municipal and other authorities, and efforts have been made by this Department to show the people of England that here we possess timber second to none in any part of the world for that purpose. Samples of the blocks taken up at the intersection of Queen and George streets during the present street-paving operations in Queen street, that had, to my knowledge, been down for about sixteen years, were obtained through the courtesy of the Town Clerk, and finding that these sixteen years with all the heavy traffic that had passed over them had made but little impression, and that the timber for all practical purposes was as good as the day when it was laid, these blocks were despatched to the Agent-General. In the same consignment a piece of ironbark log about three feet long, that had been used as a drain pipe in connection with St. John's School-room on the North Quay for a period of some fifty years was sent. This log came out of the ground in a perfectly sound condition, and showed no further sign of deterioration than the decay of the sapwood; the inside timber being as sound as a bell. These two samples cannot fail to bear striking testimony to the value of our hardwood for any purpose, where heavy traffic, exposure to the weather, and wearing influence of an almost constant flow of water submit them to the test. The question of making these timbers a marketable commodity rests of course with the millowners.

Bananas (Dried and Meal).—Some years ago several shipments of dried bananas were made to London and Germany, and though the fruit arrived in good condition and a strong effort to popularise this fruit was made by a free distribution in order to create a demand, the result was anything but satisfactory. Banana meal was also sent to England, but the report received was, however, of such a nature that the manufacturer was reluctantly compelled to refrain from any further experiments. During the past year Messrs. Reis Bros., of Woolloongabba, expressed the desire to again test the London market with a shipment of bananas that had been dried by a new process adopted by that firm. A number of cases each containing 28 lb. were sent to the Agent-General, and a small quantity was kept in this Department to test the keeping quality of the fruit. The report from London was not of a cheering nature, and when the samples left here were inspected, the evidence obtained sufficiently proved the difficulty of exporting this product in such a condition that profitable returns could be secured. From what I have learned from visitors to the United Kingdom, it seems to me to be somewhat futile to attempt to place dried fruit of this kind where the ripe fresh fruit, owing to the rapid means of transit, is brought from countries nearer to England, and sold at prices that place it within the reach of all classes of the community.

Rhea Fibre.—A handsome case containing samples of this plant in all stages, from the dried ribbons to the strong, serviceable canvas and the delicate brocade, was received from the Rhea Fibre Company, and handed over to this Department by the Chief Secretary. The contents of the case bear striking testimony to the fact that, however great the difficulties of decortication may have been in the past, they have now been successfully surmounted, and that a most valuable textile is now on the market. Inquiry has been received from England whether a supply of ramie fibre can be procured in the colony, but we are not yet in a position to answer that inquiry in the affirmative. For some years rhea has been grown at our State Nurseries, and a small quantity by others, but the difficulty in manipulation was, however, so great, and the failure of so many machines and chemical processes that were tried to decorticate the plant offered so little encouragement to the grower, that no very persistent effort was made to produce a quantity. Even now that a proper and successful system of treatment has been found, when it is remembered that the supply hitherto provided has been raised in countries where labour is a very cheap commodity, it is a question whether a profitable trade could be established here at the rate of wages now paid to farm hands. For some years I have

carefully watched the different developments of this industry, and notwithstanding the disparity in the wage element of Queensland as compared with India, China, and other places where ramie is grown, no opportunity will be lost of assisting in the production of this fibre in our colony.

Coffee.—The interest that has of late years been shown in this product is now developing itself, principally in the tropics, by the establishment of plantations by private individuals and by joint stock companies. Though the advance in the area is not yet great, it is sufficient to show that there is confidence in this product. The statistics for the last two years are :—

	Area under coffee.	Production.	Average per acre.
1896 ...	138 acres ...	9,707 ...	70·34 lb.
1897 ...	311 „ ...	81,614 ...	262·42 „
Increase	173 „	71,907	

Though the average return per acre is here given, it is not quite fair to strike an average in connection with the cultivation of coffee, because upon the area under this plant, there is much variety in the various stages in which the trees thereon are with regard to their maturity, and, moreover, many of the plantations, although planted out, are still in their infancy. Of the total area under coffee, some 275 acres have been planted in the Northern district, 29 acres in the Southern, and 7 in the Central. It will thus be seen that the Northern district greatly preponderates as regards area, and will no doubt continue to do so. Statistics are not yet available as to the profit to be obtained from these plantations, sufficient time not having yet elapsed to decide this matter from a commercial view, but, so far as is known, those whose plantations are sufficiently advanced to return a partial if not a whole crop are apparently satisfied with their lot, and nothing has yet been heard of the abandonment of the cultivation of this plant. Coffee has been grown in isolated parts for many years, and at Mackay one grower has for a long time placed his product upon the market, but it is only now that definite steps have been taken to establish plantations upon a commercial scale.

Cocoanut Plantations.—During last year an inspection was made of several of the islands off the coast between Bowen and Mackay on which cocoanut planting operations have been carried on.

Shaw Island, Kennedy Sound.—On this island there are three plantations, which for the purpose of this Report I propose to designate as Nos. 1, 2, and 3.

No. 1. Here are 65 young palms growing that were planted out some eighteen months ago, but have not made much progress owing to unfavourable and dry weather.

No. 2. On this plantation are growing 309 palms, some of which were planted five years ago, and a portion eighteen months ago. The older palms look well, but the younger show signs of having passed through a period of very dry weather.

No. 3. In this plantation are 168 palms, planted out three and a-half years ago. These are beginning to form wood at the butt, and thus will be better able to resist the fires from which, unfortunately, several of the plantations have suffered severely. One of the chief dangers experienced at the plantations is that of bush fires. The earlier formed plantations have nearly been ruined on more than one occasion, and consequently are not in that flourishing condition they would have been had it been possible with a sufficient supply of labour to keep the grass down, or had care been taken by persons landing on the islands not to fire the grass.

M (or Carlisle) Island.—Notwithstanding the dry weather and the fires, many of the palms of which a planting of 1,408 was made, should fruit during the coming year. This plantation covers several acres of ground, with several

acres of vacant land available for further plantings. I visited this island and the adjoining islands of Brampton and Keswick four years ago, and considering the difficulties in the way, and the time that has passed, think that fair progress has been made.

Brampton Island.—Here are 370 good healthy palms.

Keswick Island.—There are 240 palms upon this island in a forward condition. In addition to the places mentioned, the accompanying list gives the names of the islands.

"*Lizzie Jardine.*"—This vessel, lent by the Harbours and Rivers Department for the purpose of carrying on this work, has been reported as being unseaworthy, and would cost more to repair than the purchase of a new vessel. When at Mackay I handed her over to the Harbour Master, as it was useless paying a man to look after her, when there was little prospect of using her again. Since, arrangements have been made for carrying on the work by contract.

When at Mackay, in conversation with the Police Magistrate, I was informed that the Home Secretary had asked him to report as to what steps could be taken to ameliorate the condition of the aborigines in that district, and it seemed to me that a valuable work in connection with our cocoanut plantations could be carried out by means of these people with great benefit to themselves. It is well known that at present the aborigines of that district are being employed by men engaged in bechê-de-mer, turtle fishing, and other marine industries, not always to the advantage of the employees, and sometimes under very questionable conditions. I am sure that under the supervision of some one appointed by the Government this condition might be very much improved, and a certain money value received for their labour.

In these cocoanut plantations the foundation of a profitable industry has been laid that could be fostered and built up to the advantage of all concerned without taking into account the great blessing some of these palms may prove to any shipwrecked crews that may be thrown upon the otherwise rocky and barren islands off our coast. Such an event is sure to happen sooner or later, and, indeed, has already happened. Shortly after planting on the islands was commenced, a small vessel, containing three men, in the employ, I believe, of the Bishop of New Caledonia, was blown off that coast, and made for Australia. The first land sighted was an island off Mackay, upon which the planting had just been concluded. The captain reported upon reaching the mainland that they had landed upon an island very much in want of food, and had been tempted to pull up the young plants, but refrained, because if allowed to mature they might in after years be the means of saving lives of persons cast on this island without the means of escape as they had in their boat.

With regard to the manner in which the condition of the coast aborigines in this district between Bowen and Mackay could be ameliorated, and at the same time ensure the safety and cultivation of the cocoanut plantations, it is suggested that a station on Carlisle or adjacent island be formed under the care of a married couple. A small steam launch, which would be worked as cheaply as a sailing vessel, to be purchased, and the men to be employed in tending the present plantations, and as opportunity offered extending their area. As a good many of the palms should fruit next year, the females could be employed in the preparation of copra and fibre.

The cocoanut plantations are much appreciated by seafaring men on the coast, and are likely to prove of great value at some time in the history of Queensland. The plantations were initiated upon the suggestion of the Hon. R. Philp.

List of Islands on which Cocoanuts have been planted.

Islands between Mackay and Bowen.—Keswick, Seawfell, Brampton, Carlisle, Goldsmith, Newry, Rabbit Island, Kennedy Sound, Neck Bay, Seaforth, Dent, Long Island, Repulse, Lindeman, Calder, Wigton, Cockermouth, Fern Reef, Shaw's Peak, Devan's Peninsula, Prodhue, Redcliffe.

Vicinity of Cairns.—Fitzroy, Green, Sand Patch, no name, Oyster Key.
Vicinity of Townsville.—Bramble Rocks, Herald, Orpheus, Eclipse, Fantome, Curacoa, Falcon, Esk, S. Palm.
Vicinity of Cooktown and to the North.—Hope Islands, Low Woody Islands, Clermont, Lizards, Rocky, N. E. Piper, K Island, Forbes, Sir C. Hardy Island.

STATE NURSERIES.—These institutions, which have proved their usefulness by the large number of plants and quantities of seeds of economic value distributed from them, will fill a much more useful position by their retention, not only with regard to new plants of economic value, but as special nurseries for new types of cane not hitherto in general cultivation in Queensland. Many of the canes brought from New Guinea two years ago now give promise of meeting a demand that is sure to arise in the near future for new types to take the place of varieties now chiefly grown by the planters. The establishment of the laboratory at the Mackay Nursery will enable careful experiments to be carried out with these canes, and exhaustive analyses will be made with reference to their commercial value. It will then be a comparatively easy matter to decide what canes are really worth cultivating and distributing and which are worthless. No cane will be distributed that is likely to lead to waste of time and labour on the part of the grower. Although enthusiasm was last year shown in connection with Para and other varieties of rubber, it has to a certain extent waned. Attention is given to the cultivation of these plants at Kamerunga, for there is a large area in the Northern portions of this colony admirably adapted to the production of rubber, a material that is bound to be increasingly in demand, as the bicycle and electrical industries develop. Reports of the overseers of the Nurseries are appended.

SUGAR.—The effect of the operations of the Sugar Works Guarantee Act being now in evidence, it may be interesting to compare the increase or decrease in the area under cane for sugar during 1896 and 1897 in districts cultivating over 100 acres, so that a general idea may be formed of extent of the benefits derived from that Act. The area under cane for sugar in 1897 shows an increase of 15,548 acres over 1896, the acreage being respectively 98,641 and 83,093. The areas in the districts of over 100 acres were:—

	1896.	1897.
Bundaberg	17,987 acres	... 21,167 acres
Childers	10,866 „	... 12,952 „
Gin Gin	2,471 „	... 2,138 „
Logan	1,656 „	... 1,585 „
Marburg	637 „	... 940 „
Maroochy	178 „	... 851 „
Maryborough ...	1,377 „	... 1,062 „
Nerang	1,220 „	... 1,015 „
Tiaro	1,376 „	... 1,239 „
Rockhampton ...	773 „	... 1,192 „
Ayr	6,089 „	... 6,510 „
Bowen	692 „	... 1,102 „
Cairns	3,124 „	... 4,701 „
Douglas	1,208 „	... 2,048 „
Ingham	7,180 „	... 8,331 „
Mackay	21,076 „	... 27,251 „
Mourilyan	5,083 „	... 4,495 „

The above figures have been extracted from the statistics of the Registrar-General.

Though there were, as given above, 98,641 acres under cane, the quantity of sugar-cane crushed covered 65,432 acres only, a lesser quantity by 1,208 acres than in 1896, due to the bad season experienced in 1896. The returns of sugar manufactured was also less in 1897 than in the previous year, the figures

being respectively 100,774 tons in 1896 and 97,916 tons in 1897. There were sixty-three mills at work in 1897, whereat, in addition to the sugar manufactured therein, some 2,364,020 gallons of molasses were made. In connection with the trade of manufacturing sugar, though apart from it, there were five distilleries at work in 1897, from which some 101,763 proof gallons of spirits were distilled. The total number of refineries and factories at work in 1897 in connection with sugar, in which number are included mills for crushing cane, was eighty-one, distributed as follows :—

Brisbane Police District	...	1		Maryborough	...	...	6
Bundaberg ...	...	...	26	Rockhampton	...	...	1
Mackay ...	...	...	12	Sundry places	...	...	35

These factories usually employed 3,715 hands—1,206 in the Northern Division, 111 in the Central, and 2,398 in the Southern Division of the colony.

The coming crop will, it is expected, fully realise the forecast made, but with the anticipated increased yield will come the necessity of finding a further market than Australasia, and then will our sugar come into competition with the beet sugar of Europe and presently of America. The situation in which Queensland will then be placed will require grave consideration, and the difficulty has not been lightened by the adjournment of the Brussels Conference without coming to any definite conclusion upon the beet question. However, the war between America and Spain will for some time have an effect upon the production of cane sugar, therefore Queensland will enter the market under better conditions than she would have done had no war taken place. The practical failure of the beet sugar factory at Maffra will benefit Queensland with regard to the Australian market.

Flood Relief.—It is with great regret that I have to state that, as a result of the disastrous nature of the flood of 1898 in the Wide Bay district, this Department was called upon to give relief in the shape of supplying certain kinds of seeds—viz., oats and lucerne—to many of our farmers who had lost their crops. Two thousand and forty-seven and a-half bushels of oats and 3,825 lb. of lucerne seed were supplied, upon a guarantee from the recipients that the amount expended would be repaid when a return from the crops was secured.

Conferences.—The Conference that met at Gatton in June of last year was this year held at Rockhampton on the 14th and 15th of May last, in accordance with the statement made by the Minister when at the Gatton Conference. The Rockhampton Conference differed from its predecessor in so far that it was practically a dual conference, instead of being as heretofore a Farmers' Conference only, for a conference of pastoralists assembled under the same roof to discuss matters in connection with that industry. Two delegates were nominated from each society that sent representatives. The papers read were of a practical nature, and the discussion that followed, being for the greater part from actual experience, was of great value. The proceedings and list of the delegates have been published in the *Agricultural Journal*, by which means the results will be spread throughout Queensland.

National Agricultural and Industrial Association.—Acting under instructions received from the Hon. the Treasurer, I, on the 24th December last, took possession of the property of this Association, situated at Bowen Park, on behalf of the Treasurer, and this Department has since that date transacted business in connection therewith. At the same time the general manager of the Queensland National Bank, Limited, was informed that the organ, the property of the bank, remained there at the risk of the bank. The annexes erected by the Exhibition Company are now in a very incomplete state; in fact they comprise nothing more than an iron shell, riddled in many places by hailstones, for the interior fittings and flooring have all been removed by those who erected them for the company; and if these iron buildings are in any way to be utilised when the future of this property is

determined upon, it will cost some money to fit them for use. The revenue from the property has been very small compared to the outlay, and has principally consisted of rents for the use of the sports ground and of the concert hall. The National Association having been revived, permission has been granted to them for holding their annual show upon the grounds, free of rent, and preparations are now proceeding for that purpose.

Export of Fruit.—Interest has lately been taken in the export of oranges, and an attempt was made by Mr. Connors, of Maryborough, with the assistance of this Department, to send some of this year's crop to London, but though every inquiry was made, no cold storage suitable for this purpose could be obtained, and the experiment had to be abandoned for this year. The British India Steam Navigation Company could not take the fruit, and the Peninsular and Oriental and the Orient Steam Navigation Companies, that had facilities, were unable to take the fruit because their carrying capacity was fully occupied by New South Wales. Messrs. Roessler Bros., of Toowoomba and Nerang, have, however, made two shipments of oranges to Hamburg by the North German Lloyd, the fruit being sent as ordinary cargo. Sufficient time has not yet elapsed for a return to come to hand concerning the first shipment, but it is awaited with interest. The second shipment did not get beyond Sydney, where it was seized under the Vegetation Diseases Act in force there.

Agricultural Societies.—For a long time it has been considered that Agricultural Societies could and should do more to advance the general interest of agriculture from an educational standpoint by holding monthly or quarterly meetings for the reading of papers and discussing different phases of the industry. Few hold such meetings, nor is any effort put forth to benefit the members other than holding an annual show; and as these societies receive Government subsidy to the extent of 10s. in the £1 up to £125, I consider it my duty to draw your attention to some three matters that are to be seen at some of these shows, which cannot by any stretch of imagination be connected with agriculture. I refer in the first place to the many sideshows, whose displays are anything but elevating in their tendency. Secondly, the presence of men whose known occupation is that of a spieler, and who by their wiles induce a spirit of gambling among our young people that does not result beneficially to them either morally or financially. Thirdly, I find that with some societies the legitimate work of the society at the annual show is further departed from by the usurpation of the province of the turf club, by adding to the schedule, prizes for pony races. No doubt these matters to which reference has been made add to the revenue of the societies that encourage them, but I cannot think that Parliament, when subsidising societies for the advancement of agriculture, had any intention of encouraging such degrading sights as those detailed, for the least reprehensible of them all—pony racing—is, to my mind, degrading when viewed from the standpoint of agricultural education. There are other spectacles also to be seen that should be conspicuous by their absence—such as the worst specimen of a horse, harness, and rider. I would respectfully suggest that any society known to let any portion of their grounds for show or gambling purposes, or such degrading spectacles as a poor emaciated beast, hardly able to drag his hind legs into the ring, decked out in saddle and bridle held together in many places by bits of greenhide, fencing-wire, and other contrivances to make the outfit look as dilapidated as possible, and mounted by a specimen of humanity whose fittest occupation would be that of a scarecrow in a cornfield, should be debarred from receiving subsidy. It is surely a strange anomaly that stands for gambling purposes should be sold in such public places as a showground, where a very large proportion of the visitors are young people, and that such practices are prohibited by law from being carried out on our public highways.

One very cheering feature in connection with some of these shows is the large number of pure dairy cattle that are exhibited. This is, I think, a strong evidence of the interest now taken in the dairying industry, and augurs well for our future export butter trade.

The vote of £200 made available for the year ending the 30th June was allotted to the societies representing different districts, seventy prizes in all being offered, for some of which, however, there was no competition.

Loans in Aid of Co-operate Agricultural Production.—Much correspondence has passed relative to advances under this vote, principally in connection with Co-operative Companies proposed to be established for the erection of flourmills upon the Downs, Roma, and in the Nanango district, but nothing definite has yet been done relative thereto. The only advance during the year was to the Bundaberg Co-operative Dairy Factory Company lately formed in that town.

Diseases in Plants Act of 1896.—It was not until last year that this Act was put into force, the delay enabling the trade and the growers to understand the Act and what was expected of them. The first step taken was the appointment of the Board of Advice as provided for, and the members thereof are, as far as practicable, representative of the different interests involved. The Board meets at intervals, and advises for the consideration of the Minister the matters that may be brought before them, their first act having been to frame the Regulations under which the Act of Parliament is principally worked. All fruit and plants of whatever description that now enter Queensland are inspected and treated as may be required, and such as may be seized for being in contravention of the Act are destroyed. Plants that have to be fumigated before being allowed to reach the hands of the consignees are treated in a chamber specially built for that purpose in this office. Though complaints have appeared in the Press concerning the various Vegetation Diseases Acts in the Southern colonies, it is very satisfactory to be able to report that during the period the Act has been enforced complaints against the administration have been practically *nil*, for those that have been made in the Press have not been of a definite character, and have not shown how the blots in the system, if any, could be remedied. Though not in connection with our Plant Diseases Act, much inconvenience has been felt in the North from the wholesale condemnation in the southern ports of bananas from Geraldton, Port Douglas, and Cairns—an inconvenience that has been further intensified by the indirect knowledge that bananas condemned in one colony have been accepted in another, but, of course, to the detriment of the original shippers. The Chamber of Commerce at Cairns have taken this matter up, and though representations have been made, nothing can be done, for the fruit has been and is affected with disease that is legislated against in the colony to which the fruit was exported. The inspection of orchards, &c., has not yet been proceeded with, owing to want of facilities, but this is now receiving attention.

Whatever may be said against the Diseases in Plants Act, and no doubt in individual cases the enforcement of it may bear somewhat hardly, the Act has been and is of great benefit to Queensland. Instead of the diseased fruit that used to be seen in the market and in the shops, clean and wholesome fruit can now be purchased. It is now a pleasure instead of an eyesore to look at the fruit exposed for sale.

Seeds Distributed.—The packages of seeds and plants distributed direct from the Department between the 1st July, 1897, and the 30th June, 1898, consisted of *Albizzia lebbek*, almonds, artichokes (three varieties from Italy), bananas (Mokee), barley (Sea of Azov, Cape, and Nepaul), beet, broad beans, brocoli, broom millet, buckwheat, buffalo grass, canaigre, castor oil, coccozelle marrow, coffee, cotton (Limbless and Egyptian), cowpea, curled celery, curled lettuce, Deccan grass, divi divi, *Dolichos Lablab*, Egyptian clover, *Fourcroya gigantea*, fruit fir-pine, ginger, gram, grape cuttings, haricot beans, Jerusalem corn, Kaffir corn, lemons, logwood, lucerne, maize, mango, medlars, millet, Mitchell grass, *Musa textilis*, oats, olive, oranges, *Panicum fuscum*, *Panicum millaceum*, Para grass, *Paspalum dilatatum*, pawpaw, pistachio nut, plums, pop corn, potato, prairie grass, pumpkin, red Natal grass, rice, rosella, rye,

saltbush, sesame, shade trees, shamam rock melon, sisal hemp, Soudan millet, sorghum, soya bean, strawberry, strychnine, sugar-cane, sullá, tamarind, teosinte, tobacco (several varieties), vineless sweet potato, watermelon (three varieties from Italy), wheat (several varieties), white navy beans, and yams.

DEPARTMENTAL.—It gives me great pleasure to state that, notwithstanding the great additional work that has been thrown upon the Department during the last year, the officers have all cheerfully, faithfully, and ungrudgingly performed their duty, and it is certainly a pleasure to have the assistance of able and willing officers in the discharge of the onerous duties that have now to be performed by this Department.

Reports from the Officers directly connected with the following branches of the work of the Department are attached :—

Principal, Queensland Agricultural College.	Entomologist.
Agricultural Chemist (General)	Dairy Instructor.
,, ,, (College)	Director of State Farms and Instructor in Fruit Culture.
Mechanical Department, Q.A.C.	State Nursery, Kamerunga.
Farm Foreman, ,,	,, Mackay.
Horticulturist, ,,	Viticulturist.
Librarian, ,,	Tobacco Expert.
English and Mathematical Master, Q.A.C.	Curator, Botanic Gardens.
Colonial Botanist	

PETER McLEAN, Under Secretary.

REPORT OF THE PRINCIPAL OF THE QUEENSLAND AGRICULTURAL COLLEGE.

SIR,—I beg to submit the following Report, with accompanying documents, covering the first year in the history of the College—1st July, 1897, to 30th June, 1898 :—

The work of the College was begun with a teaching staff, as follows :—

Edward M. Shelton, M.Sc., Principal
Johannes C. Brunnich, Chemist of the Department of Agriculture, Chemist
Philip M. Pitt, English and Mathematical Master, Librarian
Joachim S. Hermann Schmidt, Natural Science Master, Secretary
Harold C. Quodling, Agriculturist, Foreman of the Farm
Hugh W. Gorrie, Horticulturist, Superintendent of Grounds
Robert N. F. Quinn, Mechanic, Superintendent of Buildings and Machinery
Captain R. B. Williams, Steward, has had charge of the dining-hall and the living arrangements of the students.

You are referred to the reports of the several heads of departments of the College for detailed statements of the work carried out under the immediate direction of these gentlemen.

The College opened its doors for the reception of students on 1st July. The formal and official opening of the school took place on 9th July. On the invitation of the Minister for Agriculture—Hon. A. J. Thynne—the ceremony was performed by His Excellency the Governor, Lord Lamington, in the presence of a large party, consisting of members of both Houses of the Legislature and other gentlemen. In the course of his remarks on this occasion, Lord Lamington pointed out the true function of the Agricultural College in language as follows :—"This institution may be regarded as a centre in which may be focussed the agricultural information of the world. It is a kind of clearing-house, and those who attend the lectures, and are resident students, will become possessed of knowledge obtained, not only from the experimental grounds, but from the experience of men in every other civilised country. One feature, which I have already alluded to, is of the utmost importance. It is that the students should have some sort of discipline. They should learn habits of industry, and how wisely to distribute their hours of labour. . . . It has become necessary, in order to produce satisfactory articles, to have a groundwork of scientific knowledge to go upon. This institution may be regarded as the generalisation of the agricultural knowledge of the world. It may be regarded as a kind of reservoir in which everything known of a particular science may be stored. Those who go out from it will, like rivulets from some system of irrigation, carry into their own homes all that they have learned and gained, and afford a healthy stimulus to their neighbours in the development of the riches of the soil."

Upon the opening day twenty-three young men presented themselves for admission, and were duly entered as students of the College. This certainly was a modest beginning. Our numbers, however, were rapidly augmented, and before the end of the first term the enrolment had reached thirty-four. Thirty-one of these re-entered during the second term, beginning 12th January. This second term witnessed a large accession to the number of our students, the total reaching fifty-four. This number may be said to represent the capacity of the College under existing circumstances. These students come from nearly every settled portion of Queensland. While naturally the Southern and more densely populated portion of the colony have the largest representation upon our roll, yet the pastoral districts of the West and tropical regions of the North have each contributed their quota to the College population.

The average age of the students is a small fraction over eighteen years. Nearly 90 per cent. announce their intention to make farming the business of their lives. The general health of students and all connected with the College has been excellent. In one instance only—a case of epilepsy—have the services of a physician been called to the College Farm in a professional capacity. There were a number of cases of dengue fever during the summer, and minor accidents now and again claimed attention, but in no case has either sickness or accident occasioned much concern.

The conduct of the students, taking the school as a whole, has been good. For months at a time, and indeed during most of the year, the behaviour of students was such as to call only for commendation from those charged with the duty of maintaining order. During the last fortnight of the year, however, a certain restlessness culminated in a series of disturbances which led to the expulsion of one student and the suspension of another from the privileges of the College for a period of one year.

Study and Work.—The underlying idea of the course of study and work followed during the year involves manual labour and class work and preparation for it, in about equal portions of the students' time. The school is divided, for purposes of instruction, into two nearly equal divisions, each working on alternate days, in field and classroom. Every student is expected to take at least three studies. This rule is only departed from for special reasons.

In addition to the work and study above referred to, a system of industrials or education work is carried on. Upon the day given to class work, the division thus occupied devotes three hours to labour, which, as far as possible, is made instructive and illustrative. During the present year the industrial, generally, has been the use of tools in carpentry. The scope of the studies and work involved in the course of study is shown in what follows :—

First Term.—Agriculture (Lectures); Arithmetic; Botany; Chemistry; English Composition.

Second Term.—Arithmetic; Book-keeping; Botany; Chemistry; Drawing; English Composition; Horticulture; Mensuration.

The studies of the year have followed substantially the line laid down in the tentative course proposed in the Prospectus of 1897. Necessarily, more or less of experimenting, or rather feeling one's way, has been involved in shaping study to the wants of students of unknown capacity. The experience of this year has made possible an arrangement of studies for the entire course of three years as given below :—

First Year.

First Term.—Arithmetic; Botany; English Composition; Drawing; Industrials—Farming, Gardening, Carpentry.

Second Term.—Arithmetic; Botany; English Composition; Drawing; Industrials—Farming, Gardening, Carpentry.

Second Year.

First Term.—Agriculture (Lectures), sixteen weeks; Botany, six weeks; Physics; Elementary Chemistry; Mensuration; Farm Book-keeping, two hours per week; Industrials—Farming, Dairying, Blacksmithing.

Second Term.—Horticulture; Entomology; Chemistry—Laboratory Work; Technical Drawing, two hours per week; Industrials—Farming, Horticulture, Dairying.

Third Year.

First Term.—Anatomy and Physiology; Organic Chemistry—Laboratory Work; Agricultural Geology; Industrials—Farming, Horticulture, Dairying.

Second Term.—Agriculture and Stockbreeding; Bacteriology; Agricultural Chemistry; Veterinary Science; Industrials—Special work which, in the case of students sufficiently advanced. may embrace laboratory work and application in the field of the sciences of the course.

It is believed that the studies of the three years outlined above, with the correlative work upon the farm and in the shop, afford every earnest student opportunity for thorough grounding in the knowledge and practice of farming. It must be admitted that outdoor work is the choice of a large proportion of the students, and this can hardly be accounted an unhealthy "sign of the times." The world, and particularly Queensland, needs practical, helpful people more than learned ones. Withal, really excellent work has been done in the classroom, and more than half of the students have made an average standing of over 70 per cent. in two or more studies. The first calendar of the College, a handsome pamphlet of twenty-eight pages, abundantly illustrated, has been published, and very widely circulated, particularly among farming people.

General Lectures.—Steps were taken early in the year towards the establishment of a lecture course, to which the students in general and the public have been invited. Our lecturers were gentlemen from abroad and members of the teaching staff who volunteered for the work. The following is the list of subjects and names of the several lecturers, placed in the order in which the lectures were given :—

The Yellowstone National Park, Edgar A. Hall.
Japan and the Japanese, E. M. Shelton.
Books; or Why, What, and How to Read, S. W. Brooks.
The Australian Commonwealth, J. L. Woolcock.
Ten Years in a Surveyor's Camp, P. M. Pitt.
Pioneering in America, Dr. Frackelton.
Bees and Their Ways, D. R. McConnel.

The Library.—I have great pleasure in reporting that we already have the beginnings of a library. During the year nearly 600 volumes have been obtained, including the ninth edition of the Encyclopedia Britannica, itself a library. Our purchases of books have, aside from this, been largely agricultural and horticultural. A good many books of general scientific interest have also been secured, as well as a small number covering more general topics. These books have seen good service during the year, and have been freely consulted by teachers and students.

The reading-room has been well supplied with newspapers during the year, some twenty papers having been received and filed. This room is always open to students, and I need hardly say, has been almost constantly in use during leisure hours.

Donations.—Below is given a list of various gifts made to the College by interested friends during the year. Several of these donations are of such intrinsic importance and value as to merit much more than such passing notice. During the second term, Miss Munroe (Mrs. Philp), in conjunction with lady friends of Brisbane and Maryborough, raised funds sufficient to purchase a magnificent piano, which in due course was presented to the College. This instrument, manufactured by Metzler and Co., London, is a boon that is sure to be appreciated in a community, located as the College is, quite out of the reach of the ordinary diversions of Queensland life. This graceful and generous action of Mrs. Philp and her friends will be gratefully remembered by future generations of Queensland College boys.

Denham Brothers, of Brisbane, have, with great liberality and enterprise, placed in the College Dairy one of their Sharples Separators of the turbine type. This machine, furnished with boiler, tank, and all necessary piping, without cost soever to the College, is a most complete and useful dairy plant. The following is a list of the principal donations made to the College during the year, with the names of the donors :—

Piano, Metzler and Co., London—Miss Munroe (Mrs. Philp) and ladies of Brisbane and Maryborough.
Sharples Separator, with boiler, tank, and piping complete—Denham Brothers, Brisbane.
Journal Chemical Society of England (16 vols.)—Edgar Hall, Tenterfield.
Coates' Herd-book, 18 vols. with catalogues, books—Mr. Hull, Ingham.
Two Berkshire Pigs—W. R. Robinson, Toowoomba.
Trees, Shrubs, and Bulbs—Geo. Moulday, Allora.
Garden seeds—Barteldes and Co., Lawrence, U.S.A.
Garden seeds—J. Williams, Mount Gravatt.
Garden seeds—Arthur Yates and Co., Sydney, N.S.W.
Garden seeds—Sutton and Sons, London.
Two dozen trees—Curator, Botanic Gardens, Toowoomba.
Aerator and strainer for milk—W. Dobson, Warwick.

A large collection of domestic and foreign wools has been secured, largely through the kind offices of Mr. P. R. Gordon, Chief Inspector of Stock.

The Farm.—The work of the year upon the College Farm and Gardens will be found fully set forth in the reports of the foremen directly responsible for the practical work done in these departments. I must content myself here with a few statements of a somewhat general character, with more specific observations upon a few subjects which have been under my immediate care.

The object of the College Farm is, of course, first of all, to afford instruction to the young men who work it—that is, the students. Other ends will be accomplished by it undoubtedly, but it may be safely said that if it fails to meet the requirements of the students it will be pronounced a failure by those most interested in it. Looking over the work accomplished during the year, from this standpoint, it is impossible to reach any other conclusion than that very great opportunities have been placed within reach of the students. During the year the farm has afforded training in nearly every branch of land tillage, with subsequent cultivation and the harvesting of the crops. But before this the land itself has been cleared by burning and stumping, fences in considerable variety have been made, and the necessary housing for men and stock provided. Our students have been constantly in charge of horses, cattle, and, to some extent, swine, doing every branch of labour in connection with them.

Opportunities even for what may be called the refinements of farming, such work, for example, as ensilage-making and the erection of silos, and the cultivation of experimental crops, have not been wanting. On the whole, the year's work has been a fruitful one. A very considerable number of the students who came to us in absolute ignorance of farming, and whose only interest in agriculture grew out of the belief that farming somehow meant plenty of horseback-riding, leave the College at the end of the year fairly good workmen, speaking generally, and often proficient ones.

Disposition of Crops.—The crops grown this year upon the College Farm over and above our local wants have necessarily not been large. The rule that guides farmers in general in the disposal of the results of their labours has seemed a safe one for us to follow. We have sold our surplus produce at the highest price obtainable, and it is difficult to see what other course could have been pursued. If we are to teach our students practical farming we must follow the methods of practical farmers. Successful cultivators succeed because they grow those things which are in demand, and sell them for all that the market will allow. The fact that the College Farm is producing, and is likely to produce, in the near future, in quantity, various farm crops and products, has awakened apprehensions in the minds of timid and unthinking people, which in my judgment are wholly unwarranted. Many farmers in different parts of the colony have looked upon the College Farm as a possible rival in the markets, and this subject has more than once been brought to the notice of the public in the Press of the colony. I greatly wish to draw the attention of all those farmers who are apprehensive on this point to certain facts which cannot be ignored in any dispassionate consideration of this question. In the first place, our pupils are here avowedly to learn the art of agricultural production. They have a right to expect that, by the knowledge and ability here acquired, they will be able to go from the College Farm equipped for successful production—that is, they will become farmers and the competitors of farmers in the markets. Whether these young men begin their work upon the College Farm, or three years later upon their own farms in different parts of the colony, does not matter much. In other words, if the principle of profitable production upon the Agricultural College Farm is to be set aside, then we may as well consider that the whole end and aim of the school is wrong, inasmuch as it aims at increased agricultural production in all parts of the colony. So much for the part the students play in their apprenticeship work. If the few labourers and officers directing labours of students and men were not engaged in production upon the College Farm, they would be producers on farms of their own, and my impression is that every man employed upon the place in the past year would have been farming elsewhere but for his engagement with the College.

But, dismissing all this argument for the moment, is it not an absurdity to suppose that the products of something under 300 acres of ground, of which a large part will be consumed by the College itself, should in any way affect the markets of the colony, which are supplied from a total of the 336,755 acres now in cultivation in Queensland? On the other hand, we have produced, particularly in the gardens, crops of vegetables and fruits, which it is not too much to say, have been a blessing to the whole district. Many farmers in this section, who before have never known the taste of well-grown vegetables, during the winter months, such as cabbages, cauliflowers, and lettuce, have thanked me personally for the abundant supplies which the College Gardens have made possible to them.

If the sale of crops grown by fifty students and half-a-dozen men is likely to prove an injury to the farmers of Queensland, then indeed the prospects of the colony may be said to be dark enough. The truth is there is no greater fallacy than this idea —that an increase in the number of farmers means excessive competition and loss to all concerned. People, including farmers, live largely upon each other. If we had thousands of farmers in Queensland where now we have none, the prospects of agriculture would be immeasurably brighter than it now is. When we grow in great quantity wheat, maize, pork, cotton, and the like crops, they will quickly get a place in the general markets of the world, and so be independent of the local fluctuations of values which now so often vex the Queensland farmer. Moreover we shall produce better and more economically than is now possible, because increased competition among farmers will compel the largest measure of skill in production.

Live Stock.—The extended scope of operations upon the College Farm, together with the educational requirements of a large body of students in ploughing, harrowing, and cultivation operations generally, have made it necessary to secure a considerable number of farm horses. The large amount of hauling from the College railway station has added to the demand for the services of horseflesh. In the outset, eleven horses were secured, but these proved inadequate, and subsequently five others were purchased, so that at the present time we have sixteen draught horses in service upon the College Farm. These animals were all selected by the foreman of the farm—with excellent judgment, I may add. Besides the draughts, three stock horses also get very steady employment, mostly in connection with the dairy stock and in carrying the mail to and from town.

Dairy Herd.—Interest in the College stock centres chiefly about the dairy herd. It was believed, in the very outset, that no better work could be done by the College in its direct relations to the farming community than by building up a really superior herd of dairy cattle. These, it was felt, would be a perennial lesson to students, and besides would serve to bring forcibly home to the attention of visiting farmers the great value of cows bred up to dairy ideals. At the present time the College herd consists, leaving out the young things, of fourteen Ayrshires, two Holsteins, ten Jerseys, and twelve South Coast cattle. The Ayrshires were selected by Mr. Mahon, the Dairy Instructor, mainly from the well-known Victorian herd of T. A. Grant, Milton, Victoria. The Jerseys, likewise chosen by Mr. Mahon, mostly from the herd of Hon. J. White, of New South Wales. The pair of Holsteins were purchased by myself of Mr. D. Mitchell of Lilybank, Victoria; and the South Coast cattle, also my own selection, were obtained from the herds of Messrs. Craig and Dudgeon, successful breeders and dairymen in the South Coast district, near Jamberoo, New South Wales. These cattle have for the most part seen a full season at the College Farm, and though the change from Victoria and New South Wales to Queensland has doubtless been to their detriment, all have maintained good health, and have milked, if not up to a high standard, at least excellently. Our conveniences for handling the herd itself and the milk obtained have been so crude, that it is impossible now to give very accurate data as to the performances of these cows. With the dairy in full operation another year, we hope to be able to give facts bearing upon the relative value of these breeds to Queensland dairymen.

One fact of special interest and importance has been brought out in the course of our experience with these breeds. It is often urged that pure-bred dairy cattle, for some reason, are incapable of good health and their best performances under the condition of climate and natural herbage obtaining in Queensland. Particularly, it is claimed, that the Jersey breed is constitutionally incapable of withstanding the severity of our climate. Competent authorities in other respects have advised farmers to keep clear of this breed, because of supposed constitutional weaknesses. Our experience with Jerseys completely disproves these often gratuitous allegations. Of the four breeds above mentioned, the Jerseys have suffered least from the summer heat, have taken more kindly to the native herbage, and I believe I may safely say have milked better than any of the other three. Anyone looking over the herd would be instantly struck with the vigorous, full condition of this breed, and that without pampering or coddling. Next to the Jerseys the Ayrshires probably hold their own in flesh and milk production. The South Coast cattle have also done very well with us, but with them, as with the other breeds, time will be required to accurately gauge their merits. The Holsteins are numerically so inferior to the others that any comparison would be obviously unfair. They have certainly done well, but I have fancied that their large frames have shown the effect of the summer suns to a much greater degree than in the other breeds.

The Minister having assented to the principle that all surplus dairy stud stock shall be sold at public auction only, we have not parted with any of the young stock, the offspring of the cows we now possess. There are at the present time on the College Farm some thirty head of young things of the four breeds, male and female, many of them very choice, which quite likely will be sold at public auction during the coming year at a date to be announced.

The need that all stock kept upon the College Farm shall be free from taint of disease, as far as in the present state of our knowledge it is possible to safeguard healthfulness in stock, is admitted. Arrangements have been made to have the entire herd put to the tuberculin test at an early date. Inoculation as a protection against the tick fever, which now may be said to threaten all herds of cattle in the coastal districts of Southern Queensland, is a preventive measure also proposed for the herd during the coming year.

Experimental Crops.—Experiments necessarily have been possible only in a limited way during this the first year in the history of the College Farm. The farm, to begin with, was raw, often abounding in roots and other obstructions to accurate cultivation. Before much can be done with test crops and methods, the farm must be thoroughly subdued by tillage, and, moreover, we must know, either by experience or by chemical tests, something of the capacity of our land for production. Nevertheless a considerable range of test crops have been grown during the year under farm conditions, with the principal object of ascertaining their value to the agriculture of the colony. Among these may be mentioned some 340 varieties of wheats and a considerable variety of forages and leguminous crops.

New forages are attractive alike to the amateur and the practical man. There is a growing feeling in the colony that we ask too much of our stock and give them too little in return in the way of winter food. An increased interest in ensilage and winter fodders, and especially in grasses likely to yield a winter growth, is everywhere noticeable. Our farmers constantly ask, "Where shall we get a good winter grass?" This, I may add, is a want not limited to Queensland agriculture. A good grass that would make growth during the dry and cold conditions prevailing in the Queensland winter would be of incalculable value. Such a forage would make haymaking obsolete, in so far as the wants of farmers in this respect are concerned. We have already certain grasses of great value for their winter growth, notably prairie grass, but unfortunately this vigorous and really excellent grass only flourishes where rains are abundant; and, when we have a dripping winter, the native grasses are, as a rule, sufficient for our needs. It does not seem likely that we shall soon get a grass that will endure drought and cold combined, and it is doubtful wisdom to put forth much effort looking to the attainment of what seems theoretically impossible. Better far gather and store large supplies of hay and fodder from the overwhelming abundance of the summer months; or we may follow the practice of some of the squatters, albeit a somewhat wasteful one, by allowing prairie grass to go unpastured during the autumn months, for use later on when all growth of grass ceases. The question then of forages is of first interest. In this line, a few comparatively new plants deserve special mention:—

Red Natal Grass (*Panicum Tenneriffæ*).—On 4th October, almost exactly one-third of an acre was sown to the seed of this plant. It germinated promptly and came into vigorous growth in a few weeks. The rapidity with which this variety comes to maturity will be understood when I say that early in December 21½ cwt. of first-class hay was cut from this plot. Later, a second cutting of 10 cwt. was taken from the same ground. This grass makes a fine, fragrant hay. It seeds readily, and upon almost any ground. It is not a drought-resisting grass, although dry weather does not easily destroy it. For this reason it must be classed among those grasses whose value is directly dependent upon summer suns and rains. On the whole, and with the experience that we have had with it, this sort seems to me of very great value to the colony. It is currently known as a pernicious weed, a reputation that is without foundation in my own observations. A sward of this panicum is easily killed by ploughing, and even when a fire runs over it, it kills out in patches, showing that it has not the dangerous character ascribed to it. Certainly the seed is carried far and wide, and germinates readily, but cultivation quickly removes those plants which have strayed beyond the limits assigned to them. On the whole, our farmers are safe, I believe, in giving this newcomer—for such it is—a fair trial upon good soils and where summer rains are the rule. Not unlikely, it has a considerable market value as a source of fine chaff suitable for horse consumption.

Teosinte (*Euchlæna luxurians*).—Teosinte is a forage that has for many years had a considerable vogue in the farming operations of the Southern States of America, and quite recently it has been tested along the Australian coast at various points between Melbourne and Cooktown. I am satisfied that it will only succeed upon good soil in a hot climate, and one of abundant moisture. Even in the climate of the College Farm, it does not quite mature its seed. The area cultivated this year by us was small, but the yield certainly is greatly superior to that obtained from that of corn or sorghum, a single seed having resulted in seventy-five stalks, as shown by the foreman of the farm, and this, by actual measurement, standing 10 feet tall. The crop undoubtedly is one to be ensiloed. Of its value as ensilage I can speak only after our present full silo has been emptied. Another year we hope to test this crop in a much larger and so more satisfactory way.

Cowpea (Dolichos sinensis).—Three varieties of cowpea were grown this year—namely, the clay-coloured, the black, and the whip-poor-will. These have each and all made an extraordinary growth, covering the ground with a dense mass of interlacing vines, afterwards producing great crops of peas. The obstacles to the successful culture of the cowpea are harvesting and threshing. If the crop is harvested with a mowing machine, then a large part of the peas are shelled out by the tread of horses and the wheels of the mower, while a considerable portion of those that remain are freed from their pods in the subsequent handling of the crop. The cowpea in this climate always ripens unevenly. There are really a succession of crops, and it is a nice point to decide whether to take the crop in sight or to wait in hopes of the succeeding one, which is sure to come with further rains and heat. We have tried harvesting by the aid of the mowing machine—a method which satisfies nobody; but afterwards the question of threshing these long-tangled vines is yet more troublesome. Another year I shall resort to the old-fashioned method of hand-picking the successive crops as they appear. Such picking is laborious and expensive, but this is more than compensated for by the ease with which these bare pods are threshed. Of the three sorts mentioned, the clay-coloured is clearly the best. It is the most prolific, and it ripens more evenly than the other sorts.

Castor Beans (*Ricinus communis*).—Something over two acres of castor beans were planted. The planting was done in check rows—that is, upon corners of squares 3 feet 9 inches on each side. The crop grew quite evenly, although the ground was too heavy for the best results with this crop. In about ten weeks from the time of planting it came into abundant flowering, and soon made a fair crop of seed, which ripened quite evenly. Unfortunately, a succession of heavy rains overtook the crop at this time. For nearly six weeks our castor bean plantation was a quagmire, and during this time the seed ripened and was cast. The crop in this way became a total loss. Notwithstanding this unfortunate result, I am still of the opinion that the castor bean will prove a paying farm crop, particularly upon the lighter lands of the West.

Haricot, or Navy Beans.—About two acres of these edible beans were grown the past season. They were planted in drills 3 feet 9 inches apart, and the plants stood about 1 foot apart in the rows. The variety grown by us is known as the California Tree Bean, and we have found it excellently suited to the soil and climate of the district. It is an easier crop to grow than maize, and with our present experience, the crop seems even a more certain one. The plants may be pulled by hand when ripe, and threshed out with the flail. There are no serious difficulties either in cultivation or harvesting that I am aware of. A considerable portion of our crop shared the fate of our castor beans, and for the same reason. These facts indicate that the bean crop should be planted very early in the season, probably early in August, so that ripening may be finished before the December and January rains overtake the crop.

Wheats.—Three hundred and forty varieties of wheat were sown in experimental plots during the year. The district has not the characteristics, in respect to soil and climate, of a wheat-growing country, and for this reason I had some misgivings in undertaking so very considerable a trial of wheats here. The soil used for the purposes of this experiment was a heavy clay loam, very fertile, probably too rich for the wheat crop, but it was the only available land for this purpose. The planting was done early in June, and growth followed the sowing almost immediately. The winter being an open one, rapid and even redundant growth was made by the several sorts during the winter months. Interest in this experiment centres chiefly about the behaviour of the several sorts under rust infection. The rust disease, I may say, is the principal obstacle to wheat-growing in this section of the colony. If this pest of the wheatfield could be brought under subjection, wheatgrowing would doubtless soon assume considerable importance in the district, even though the semi-tropical

climate is a condition which, theoretically at least, is opposed to wheat culture. Repeated inspections of the growing wheat during the winter failed to show any sign of the disease. As late as the 9th of September a careful examination failed to show a single colony of rust, but ten days later well-defined colonies of rust could be found with nearly every variety sown, and upon almost every plant. The progress of the disease from this time forth was rapid. It literally grew with the growth of the plant. By the time many of the sorts were in bloom, the stalk, and even the flowering organs of the plant had become hopelessly involved, and long before the time for ordinary ripening, whole classes of wheats had been destroyed by the rust. Those belonging to the widely-grown Purple Straw family were among the first to succumb, but following closely were the Indian wheats, which were rapidly reduced to an undistinguishable mass of blackened rotten straw. Even nominal rust-resistant varieties like Blount's Lambrigg, Defiance, Belatourka, Medeah, and Allora Spring, were completely ruined by the disease long before the ordinary time of ripening. It soon became a question whether we should be able to rescue from the general ruin a single sort. The ultimate result of the experiment may be briefly shown in the list following:—The varieties which made the best grain and suffered the least are a dozen nameless sorts, originated by hybridisation by Mr. William Farrer, of New South Wales. After these, naming them in the order of rust resistance, came—Marshall's No. 29, Marshall's No. 19, Marshall's No. 8, Marshall's No. 9, Marshall's No. 7, Budd's Early, Cook's, Thomas's Rust Proof, Hercules, Robbin's, Rust Proof, Wheedon's Rust Proof, Venning's, Cretan, and Australian Wonder.

These varieties with some others have been planted the present season. It will be interesting to note the behaviour of these so far valuable rust-resistant wheats during a succession of years, and subject to the peculiar influences of this coastal climate.

I desire to append certain notes which have been gathered in the course of my observations of the spread of rust in our experimental wheats during this and preceding years:—

1. Rust in its development sustains a much more intimate relation to the host-plant than I believe has generally been supposed. It seems to partake in a considerable degree of the nature of the host, developing its teleutospores early, and spreading rapidly upon the early sorts, while upon the late varieties its progress is correspondingly slow. Our early Indian varieties showed the teleutospore stage in the development of the disease fully two weeks before the disease had correspondingly developed in the late-ripening sorts, like Defiance and Blount's Lambrigg.

2. Wheats are very differently affected by rust. Some perish miserably under a very light visitation of the disease, while others again maintain their growth and vigour, making fairly-developed grain, under a much more severe attack. In other words, the constitution of wheat is an important factor in rust resistance. This also proves the worthlessness, from a practical standpoint, of the various "standards" of rustiness set up from time to time, and based upon the apparent effect of rust upon the host-plant.

3. Rust: The present season certainly is only one of the causes of "damage by rust" in the popular imagination. The tropical weather experienced in September and October of last year in a sense predisposes the wheat to the attacks of the disease.

Silage Experiments.—One of the first farm buildings located upon the College Farm was the small silo, known now as silo No. 1. This building has floor space 12 x 16 feet, with studs 12 feet in length. It represents substantially the silo the details of which were given in the Bulletin prepared by myself and issued by the Department of Agriculture some two years ago. The building is one of the simplest of its kind. The four walls rest upon ironbark logs flattened at the top and notched securely at the corners. The floor of this building is the ordinary ant-bed broken fine and puddled with the hoe. The studding is of 2 x 6 hardwood, and these are set 2 feet apart. The building is sheeted in part with ironbark and beech, and partly with pine, for the purpose of testing the value of these timbers in silo-making. The work of filling the silo was begun early in April, and finished on the 15th of that month, in the presence of a great crowd gathered for the purpose of witnessing this operation. No attempt was made to weight the silage, nor was it covered in any manner. Great care was taken to pack it firmly by treading, particular attention being given to the corners and sides of the silo. When opened three months afterwards, the silage was found to be for the most part in excellent condition. A few patches at the top were completely rotted, and in the corners and where treading had been imperfectly done,there were considerable masses of decayed material, but as a whole the ensilage was sweet and greedily devoured by all classes of stock. This silo furnished our stock, consisting of thirty odd head of cows and eleven horses, their principal food during three months of the winter.

A fact of great importance to the silage maker was brought out in the course of this trial. That portion of the silage made from green succulent corn made ensilage of the poorest quality, and was apparently not relished by stock, and whenever encountered produced a prompt diminution in the flow of milk of those cows which consumed it. All classes of stock on the other hand gave quick recognition of the well matured corn—that is, the corn that had been allowed to nearly ripen its ears and attain to almost full maturity made ensilage double and probably treble the value that given by very green stuff. This is a lesson that a Queensland silo maker can well afford to bear in mind.

On the whole, I consider this small silo perhaps the best investment made upon the College Farm this year. By means of it we were enabled to use a great lot of late sown corn, which otherwise would have almost certainly gone to waste, thus saving a large outlay for hay and grain, and ensuring a full flow of milk from the cows consuming it.

Silo No. 2, a larger building (12 x 16 x 16), is at this writing in process of filling. With this addition to our capacity for silage making, we can well afford to laugh at westerly winds and biting frosts, the terror of unprepared stockmen.

Nutgrass.—The selection of the present College Farm has often been seriously criticised on the ground that it was largely occupied by this farm pest. With my present acquaintance with the farm, I am unable to either affirm or deny satisfactorily current reports on this subject. There is undoubtedly a good deal of nutgrass upon the College Farm, but much of it belongs to a comparatively harmless species. Indeed, according to the Colonial Botanist, it exists with us in at least two or three forms, possessing close affinities, but having very unequal powers as noxious weeds. We have found that certain forms of nutgrass yield very readily to treatment, but the more common variety, *Cyperus rotundus*, is in farm land an evil almost without mitigation. Cultivated land once thoroughly set with this pest, with our present means of dealing with it, is nearly or quite lost to agriculture, so far as the coastwise districts of Queensland are concerned.

At the College Farm we have found it in considerable abundance upon the banks of the Lockyer in its entire course past the farm. In the north-east corner of the farm, where the creek in flood often breaks across the pocket paddock, a good many acres are almost completely covered by nutgrass. Again, the low land near the railway line is thickly set with the pest, while in the interior it is only found in small patches here and there. Often 80 or even 100 acres may be selected having only two or three small colonies of nutgrass, and happily this is true of our best soils. In a word, it may be said to be abundant enough everywhere to demand vigilance on the part of the cultivator, but it is not sufficiently strong, taking the farm as a whole, to be an object of alarm.

Nutgrass, once possessing the country, as I have intimated, cannot be completely eradicated with the knowledge we now have. Small patches, however, may be removed, but this is only possible with the cultivator who hates weeds. By carefully forking out the "nuts," especially during dry weather, and never allowing the plant to come to the surface, two seasons of patient work will clear it out. Again, we have found that in breaking sod land during dry weather, the nutgrass is almost completely destroyed; but of course when the land has been worked so that the "nuts" have taken possession of the subsoil, ploughing does little good and often, by distributing the nut, helps to spread the pest about the farm. I have found, too, that by completely covering up those patches with tarred pap during the entire season, the grass has been smothered and apparently killed. Again, liberal applications of common salt seem to check it, and, in conjunction with a thorough forking out, the salt has been tolerably efficient. All these measures, looking to the destruction of nutgrass, are, however, only applicable in a small way, and, so far as general agriculture is concerned, must be labelled impracticable. So, too, smothering crops like the cowpea and other members of the Dolichos family greatly restrain it.

Fortunately, nutgrass with us is eagerly grazed by all classes of stock, and seems to be a most nutritious grass. The nutgrass area before referred to is, winter and summer, gnawed close to the ground; while the blue grass and other excellent members of the native species near by remain untouched.

This is certain: nutgrass is an evil likely always to be with the College Farm, provoking the ingenuity of its managers and workers to the end. It is hoped that a means of extermination may be found.

In bringing to a conclusion this brief *résumé*, my last work, indeed, in connection with the College, I desire to express my grateful obligation to those members of the teaching staff who, from the first, have stood loyally by me with honest advice and ready hands in the work of administration that has fallen to me. It is impossible to

look over the great accomplishments of the past year with feelings other than those of satisfaction. Errors there have been, without doubt, but, withal, this one year's work will bear criticism. The line along which the College must move in the years to come has, I firmly believe, been made. This year's work has been done, not for to-day or for the students of this year, but for the interest of generations of Queensland youth yet to come.

Respectfully submitted,

E. M. SHELTON.

REPORT OF THE AGRICULTURAL CHEMIST RELATIVE TO THE COLLEGE.

I have the honour to submit herewith a short Report of my duties in connection with the Queensland Agricultural College for the year ending 30th June, 1898 :—

At the beginning of the College year we found it necessary to start a class of chemistry with some of the older and more advanced students, although the chemistry in the ordinary course of studies only begins in the second year. A class of seven students was consequently formed, and the lectures began shortly after the opening of the College.

The result of these lectures, which in accordance with the general plan of study began with elementary physics, continued with the study of the elements of water (oxygen and hydrogen), water, chlorine, and other halogens and their compounds, and ending in the first term with sulphur and compounds, was exceedingly successful, and the students obtained for the term an average of 83 per cent. This same class continued the study of elementary chemistry during the second term of the College year, and we proceeded with the study of nitrogen, phosphorus, arsenic, carbon, silicon, boron, and their principal compounds. The result of the study was again highly satisfactory, as the students obtained an average of 84 per cent.

In the beginning of the second term another division of students of twenty-four pupils received a lecture in elementary physics, as introduction to the usual course of chemistry, the result, with an average of 71 per cent., was, considering the great difference in the mental capacity of the students, a very fair one. The discipline in this class was not so perfect as in the former smaller division. The study of chemistry with this B division was discontinued after the middle of the second term, as we found that the students had rather too many studies and did not find sufficient time for preparation of their work. This class will, however, resume the lectures of chemistry again at the beginning of next term.

The class of the advanced students will continue the study of chemistry with a short review of the metals and organic chemistry. This class will also receive one afternoon a week practical instruction in laboratory work.

J. C. BRÜNNICH.

REPORT OF THE AGRICULTURAL CHEMIST.

I have the honour to submit herewith a short Report of the work and duties performed in my joint capacity as Chemist to the Department of Agriculture and to the Queensland Agricultural College since my appointment on the 31st March, 1897, to the 30th June, 1898.

As the appointment of a chemist to the Department was a new one, and pending the establishment of a laboratory for the carrying out of analytical work, a visit was paid to the Agricultural Laboratories in Sydney and Melbourne, and the chemists thereat, Messrs. F. B. Guthrie and A. N. Pearson, were very kind in supplying me with data and facts for my guidance in the establishment of such a laboratory. At the same time I visited the magnificent chemical laboratories of the Sydney University, and paid also a short visit to the Hawkesbury Agricultural College and to the Wagga Experimental Farm.

From all the information gathered, I could see that not only a laboratory was needed for the carrying out of the departmental work, but also for the successful teaching of chemistry at the Agricultural College. I learned that the teaching of chemistry to our students would have to be carried out in a far more practical manner than, for instance, that practised at the Hawkesbury College, where for the want of a proper laboratory the students receive only a theoretical knowledge of chemistry.

In order, therefore, to reduce the expenses, the Minister decided upon my suggestion to erect a laboratory building at the Agricultural College, which, in any case for some years to come, would serve as well for the instruction of our students and for the carrying out of analytical work for the Department and the public. The building was completed towards the end of last year, and the fittings towards the end of May.

The laboratory building contains a well-lighted and well-ventilated class and practical demonstrating room, measuring 43 feet by 34 feet, with bench-room for thirty-two students at practical work, also five draught cupboards, and a small detached room (23 feet by 5 feet) for the chemical balances used by the students. Each student has three feet front to the bench, with sink, two gas and two water taps, cupboard and drawer underneath to keep glassware and apparatus. The building further contains a senior laboratory room or the departmental laboratory proper (43 feet by 17 feet) with well-fitted working benches, shelves, sinks, draught cupboards, &c. A small adjoining room (6 feet by 14 feet) may be used for any special work. Another adjoining room (15 feet by 20 feet) is used as study and balance room; a room of the same size is used as office for the chemist in charge. A storeroom (10 feet by 14 feet) and a darkroom (7 feet by 14 feet) are also provided.

All the chemical apparatus, glassware, and chemicals were ordered direct from England, and arrived here in splendid order, the breakage being exceedingly small.

A large tank to supply the laboratory with water has been erected near the building. An old gasolene gas plant has been obtained from the Railway Department, and this plant will be fixed shortly, and will be in working order before the commencement of next term. As the size of this plant is not sufficient for our requirements, being only a twenty-five light plant, another Müller's Gasolene Gas Plant for fifty lights has been ordered from the makers in England.

The laboratory will be ready for work during the month of July; instructions for taking of samples and also a schedule of fees to be paid by the public for analyses carried out, have been prepared by myself, and are now in the printer's hands.

College Duties.—In connection with my work as a teacher at the Queensland Agricultural College, my Special Report has been sent to the Principal of the institution, and will be incorporated in his Report.

Departmental Work.—On the 25th February, I received instructions to investigate, in company with Mr. J. B. Henderson, the Hydraulic Engineer, the complaint made by the Maryborough Corporation against pollution of their water supply by the Mount Bauple Central Mill.

On the 5th of March we paid a visit to the locality, and the result of our investigations is given in our Report, dated 6th May, in which we recommend purification of the waste waters before they are allowed to run into Tinana Creek.

A similar complaint was made against the Moreton Central Mill at Nambour, and according to your instructions I paid a visit to this mill on the 1st of June. In this case the complicated purification process of the waste waters may be avoided, and I recommended in my Report of the 6th June to run the waste waters into the creek at a point reached by the tides. This way out of the difficulty is to be recommended in all similar cases, where the distance from mill to tidal creeks is not too great.

On the 4th of May I also received instructions to draw out plans and specifications for a laboratory suitable for a sugar experiment station, and to make out a list of the chemicals and apparatus required. A complete set of drawings of plans of building and internal fittings, with a list of chemicals, &c., were sent to you on the 20th May.

I did little literary work during the year, as nothing original offered itself for publication. A few articles as "Composition of Foods," "Starch Contents of Potatoes," "Denitrification," "World's Cane Sugar Industry," written for the *Agricultural Journal*, are mostly *résumés* of articles appearing in other papers.

J. C. BRÜNNICH.

REPORT OF MECHANICAL DEPARTMENT.

I have the honour to submit the following Report of the works accomplished in the Mechanical Department for the year ending 30th June, 1898.

The pressure of work in my department during the past year has been very great, for, in addition to the numerous improvements to the College buildings, repairs of all kinds, and instructions to students generally, we have erected three cottages, silo, corn store, dairy, and carpenters' shop, and also laid down a comprehensive water service from the well to all stock centres, and a steam pump and service for the irrigation of the gardens.

Twenty-eight students commenced work in the shops during July, 1897, none of whom had the slightest knowledge of the use of tools, and consequently had to be taught how to handle and use the simplest. Still, they gave very close attention to instruction, and in a very short time were able to go on with the practical works. The number of students increased during the term, at the end of which there were thirty-three on the roll in the Mechanical Department.

At the commencement of the second term we had fifty students working in the shops and buildings, the work of this term being greatly facilitated by the first term students being much advanced in their work. In addition to the student labour in the Mechanical Department we have kept employed during the past year one journeyman carpenter, and when the pressure of work was very great one extra carpenter; one handy man and one bricklayer were employed as occasion demanded. With the exception of these men, the students have carried out in the most satisfactory manner the erection of all buildings detailed below, and numerous other works, of which I can give only a general description.

The more important works comprise the erection of a five-roomed cottage for men's quarters. This building is on ironbark stumps 3 feet out of the ground, framed of hardwood throughout, galvanised iron roof,veranda in front 6 feet wide, sheeted outside with hardwood weatherboards, brick chimney, 1,000-gallon tank on stand, E.C. building. The interior is divided with matched pine boards into two bedrooms, 10 feet x 8 feet, two bedrooms, 10 feet x 6 feet 6 inches, kitchen and dining-room combined, 14 feet 6 inches x 12 feet.

The erection, under the dining-hall, of a large meat store, size 16 feet x 10 feet, with concrete floor, fitted up inside for butcher's shop, with iron rods, shelves, salting-table, tubs, blocks, &c.

Excavated ground under Dormitory A, making same dead level; laid wood floor; enclosed the whole building with 1,200 superficial feet of hardwood lattice-work, and painted same three coats. At west end of Dormitory A erected galvanised iron wall, 37 feet x 7 feet, made six double carpenters' benches, fifteen tool-cupboards, with all fittings required for neatly storing carpenters' tools. This large room now forms an excellent carpenter's shop, size 68 feet x 37 feet. Erected cottage for farm foreman, containing the following rooms:—Dining, 15 feet 6 inches x 12 feet 6 inches; drawing-room, 14 feet x 11 feet; bedrooms, 14 feet x 11 feet, 12 feet 6 inches x 11 feet, and 10 feet x 9 feet; bathroom, 9 feet x 8 feet 6 inches; kitchen, 15 feet x 15 feet; verandas all round; 8 feet 6 inches wide; double brick chimney; all walls of house double-lined; fixed two 1,000-gallon tanks on high stands; made and fixed two cedar mantelpieces, fitted up pump and shower in bathroom, and painted the whole house outside in three coats best lead and oil paints.

Fixed a screen around Dormitory C, forming store for all farm implements, with four pairs of gates, hung with strap hinges; total length of screen 210 feet.

Erected shelter-shed for bulls, size 50 feet x 16 feet, covered roof with galvanised iron, the sides and ends being left open.

Erected cottage for herdsman, containing dining-room, 12 feet x 12 feet; kitchen, 12 feet x 10 feet; bedrooms, 12 feet x 11 feet, and 12 feet x 10 feet, veranda in front 6 feet wide; 1,000-gallon tank on stand, and the usual outbuildings. Put together and erected over well, windmill and steel tower, fixing anchor posts, with large blocks of concrete, 6 feet x 5 feet x 2 feet, making the tower very rigid. Connected mill with pump and laid water pipes from well to the 10,000-gallon storage tank, which is fixed on the crest of hill near laboratory, total length of pipes as follows:—$1\frac{1}{2}$-inch galvanised iron pipes, 1,712 feet; $\frac{3}{4}$-inch pipes, 703 feet. 1-inch pipe, 73 feet, making connections with tanks and watertroughs, fitting all outlets with float valves. Made 10 galvanised iron watertroughs, and fixed same in hardwood frames.

Fixed steam pump on the banks of the Lockyer Creek, and carried $1\frac{1}{2}$-inch galvanised iron waterpipes through the gardens, with all branches and standpipes for hose connections, &c., the total length of pipes laid being 1,000 feet. The whole of this water supply scheme was carried out exclusively by the students, including all cutting and threading of pipes, making connections, &c., the whole work being done in a most workmanlike and satisfactory manner.

Erected new silo, of hardwood throughout, with ant-bed floor, galvanised iron roof, size 16 feet x 12 feet x 16 feet inside measurement, capacity of silo 75 tons.

Prepared plans and specifications for proposed dairy, with schedule of quantities and estimate of cost; these plans were approved.

Erected dairy buildings; excavated site, removing 60 cubic yards of stiff clay and rock shale; laid concrete floor throughout; the building stands on sleeper walls 4 feet 6 inches high all round, the walls being brick in cement. The upper part of the dairy is a timber structure of hardwood, sheeted outside with pine chamfer boards,

the cool-room is double-lined throughout, and insulated with dry sawdust, the roof is covered with red tiles; an awning 8 feet wide surrounds the building. The whole of the work outside and the cool-room has received three coats of asbestos paint: the rooms comprise cool-room, 16 feet x 15 feet; separator room, 33 feet x 16 feet; manufacturing room, 21 feet x 17 feet.

In addition to the works specified in the foregoing Report, the students have carried out a very large number of smaller jobs, and have also had a large experience in engine-driving, cutting chaff, ensilage, and firewood by power; they have also carried out the whole of the painting which has been done during the year—a very large amount indeed. They have also had a large amount of teaching and work in the shops, making farm gates of all descriptions, tables, shelves, joints of all kinds, models of framed work, and glazing. This with the numerous repairs which have been done, and which always occur when using a very large plant of machinery and implements, has proved a very valuable training to our students, and I must add that they have taken full advantage of the opportunities offered, and during the year have made wonderful progress.

I have, &c.,

R. N. F. QUINN,
Superintendent, Mechanical Department.

REPORT OF THE FARM FOREMAN, QUEENSLAND AGRICULTURAL COLLEGE.

Sir,—I have the honour to submit herewith a report of proceedings in the above Department since my connection with this Institution, which began on the 4th January, 1897. Acting under your instructions to procure eleven head of suitable work horses, I traversed parts of the Toowoomba and Dalby districts, and secured them at an average purchasing price of £7 per head. These were trucked in due course to Gatton. Upon my arrival at the College operations were at once started to make a secure paddock for the College stock.

Clearing by Contract.—A large amount had already been accomplished preparatory to cultivation. Some 200 acres were finished before the end of 1896, and an area of 32 acres had been broken up and harrowed during November. Cross ploughing was at once proceeded with to prepare for maize with the ultimate intention of making silage for winter feed. Eighteen acres were planted with a one-horse drill following a corn-marker, using at the rate of 10 lb. of seed per acre. Scuffled three times during growth, varying from deep cultivation at first to shallow at the latter end. This crop made good progress, notwithstanding the dry weather.

Water Supply.—A splendid supply of water was struck at a depth of 47 feet, early in July, the water rising 23 feet in the shaft. Suitable troughing was made upon the place, and an extensive system of piping to supply the needs of stock in different paddocks, has been laid down. A windmill was erected as early as practicable, and a large supply tank has been put up. A large portion of the farm between the buildings and the railway was without water, so a dam was started to meet the difficulty, but rain fell when some 18 inches were excavated, and filled it, and frequent showers renewed it from time to time, till the recent dry weather necessitated watering stock at the river. This work will be proceeded with as soon as practicable.

Road-Making.—A formation some 20 chains in length was made and partly gravelled during the intervals when rain prevented farming operations, the character of the soil on the ridge allowing such work to be carried on.

Clearing.—Work under this branch has been carried out at occasional intervals about the farm buildings and surrounding building sites, as well as over the greater portion of a new fifty-acre block, reserved for a cultivation area. Students have been instructed in the working of the "Forest Devil" and the methods of handling timber when uprooted, by subsequent burning off, using cross burners, and converting huge logs into a series of handy lengths, thus saving an immense amount of labour. This system is especially useful for one or a number of workers.

Fencing.—*Type of "Dropper" Fence*:—Average height, 4 feet 4 inches; straining posts, 12 inches in diameter, ironbark, placed 5 chains apart; cross-pieces let into posts below ground; depth in soil, 3 feet, stayed on each side. Stays, 11 feet long, let into 3 x 4 mortise, and butted against broad piece of wood firmly wedged up with stout pegs. Posts of ironbark, and averaging 20 square inches, and placed 30 feet apart and 26 inches in soil, bored with 1¼-inch auger, iron "Lochrin" droppers

being placed 10 feet apart. Corners on fence lines stayed with cap rails let into mortises in strainer, the opposite ends being dovetailed into top of split posts, a double No. 8 wire being strained from top of split posts to bottom of strainer.

Gates.—On roadways where there is extra traffic, stout "frame" gates stayed with $\frac{5}{8}$-inch iron have been erected. Entrances to paddocks on subdivision lines have double-batten gates with double stays. Closing posts rebated and spring catches attached to closing stile of frame gates. Gateways being set off with two panels of two-railed fencing on each side.

The farm is divided by two public roads, running east and west, thus making three distinct blocks of land, called, for convenience in this Report, the Railway block, College block, and River block.

Contracts had been let before my arrival for the boundary fences to enclose the River block, with top rail and three barbs. The substantial character and workmanlike manner in which it was erected gave evidence of careful administration in a very necessary improvement and valuable asset on a well-appointed place.

A subdivision fence of top rail and two barbed wires of old material dividing the block was erected. The river frontage was secured by substantial fence with posts 15 feet apart, having three wires attached with tying wire and a dropper interspaced between posts, running a distance of 45 chains.

A handsome clump of Moreton Bay Chestnuts (*Castanospermum australe*) were separated from the grazing paddock, as bean-eating stock soon succumb to the effects, dysentery in a violent form setting in. Outside clumps were cut down and burnt.

The cultivation areas were next subdivided with the "dropper" style of fence, one enclosed portion being used for a bull run.

To facilitate watering of stock uprights were attached to swinging cables with flood-poles attached at one end, the opposite side resting on pegs, a track being made down the bank for convenience.

The boundaries of the College block were then fenced with top rail and three barbed wires. While these new fences were in progress we renewed in parts, raised, and put in repair, the whole eastern boundary fence, some 120 chains in length. Two subdivision fences at convenient angles and distances enclosing the buildings in the centre, with a grazing paddock on either side, were erected. The lane leading from farm to stockyard was fenced on both sides.

A pig paddock, 15 acres in area, was fenced off with posts 10 feet apart, having three wires attached, with suitable netting secured with galvanised tying wire; and a calf paddock, 30 acres in area, was also fenced.

The Railway block was enclosed with top rail and three barbs on the western boundary, and a "dropper" fence on the northern, the railway fence forming the southern.

Stockyard.—This is a substantial yard, erected at a cost of a little over £20, with three gateways Dimensions, 2 chains by 2 chains 10 feet, the cowshed occupying one corner. Material: Ironbark posts and rails. Posts, 8 feet long, 10 inches x 4 inches. Rails, 9 feet 10 inches by 10 inches x 3 inches. Depth in ground, 30 inches; mortised for three rails and cap, 6 inches; cap strapped down with broad hoopiron.

Pigyard.—2 chains by $2\frac{1}{2}$, approximately. Material: Ironbark posts, 6 feet long, 10 inches x 4 inches; rails, ironbark and spotted gum, 10 inches x 3 inches. Subdivided with two fences radiating from a corner of building block, made with two pieces of 6 x 1 hardwood nailed to posts 9 feet apart. Four barbed wires interspaced between to a suitable pig-proof gauge.

Below the stockyard a handy enclosure, some 3 acres in area, with top rail and three barbed wires, and netted, has been used for all classes of stock to advantage. A similar area alongside the above was also enclosed.

Students have had a good insight into different classes of fencing, and have become very handy in the use of the mortising axe, adze, and other tools. A fair proportion of bush work has also come under this branch—procuring building stumps, straining posts, struts, &c.

Quantity.—New top rail and three barbs, $7\frac{3}{10}$ miles; netting, 66 chains; old top rail and two barbs, $2\frac{1}{10}$ miles; pigyard, 9 chains; dropper and three barbs, $5\frac{5}{8}$ miles; stockyard, three rails and cap, 7 chains; old two rail, 20 chains.

Silage.—A silo, 12 x 12 x 16, was in course of construction, and a start was made to fill it on 20th April, 1897, the standing corn being cut down by the "Scientific Harvester," carted up, "chaffed," and elevated into silo, the balance of the crop being "stooked" while the grain was in the glazed state. When cured, part was husked out and fed to stock, the remainder stacked and afterwards husked out, the "stover" chaffed and mixed with silage when feeding. The silo was opened on 10th June, in the presence of the delegates to the Farmers' Conference, and pronounced a great

success. From this date the milch cows were fed at the rate of a cubic foot of silage per day; later all the horses received the same feed, both classes of stock thriving on it. An increased number of stock necessitated the construction of a second silo early in 1898; dimensions, 12 x 16 x 16.

To provide for the winter of 1898 both silos have been filled with the following different kinds of fodder:—Maize, red Kaffir corn, pigeon pea, teosinte, and lucerne. Although Southern Queensland, and especially the Darling Downs, is generally favoured with good seasons during the spring and summer, when sorghums and maize thrive well, yet the end of autumn and winter is generally so severe that reliance cannot always be placed on imphee and green crops to form a safe standby. Maize can generally be relied on and made profitable by turning it into silage, the value of which cannot be overestimated from a dairyman's point of view. Numerous inquiries from interested visitors have been made, some coming long distances for the purpose, and expressing their intention of imitating the practice. Fully fifty head of different classes of stock have been fed for several weeks from the smaller silo.

Stock.—*Horses for Draught Purposes*: These number sixteen head of active farm horses, which have proved suitable to requirements.

Included with these are two young horses selected for the Horticulture Department at a cost of £4 15s. per head. They have since been broken and are proving suitable for the class of work.

Saddle Horses.—Three in number. Two additional horses are required.

Cattle.—*Dairy Purposes*: Our present herd comprises:—

Cows.		Bulls.	
Ayrshires	11	Ayrshires	3
Jerseys	9	Jerseys	1
New South Wales South Coast	11	South Coast	1
Grades	16	Holstein	1
Holstein...	1		
Total	48	Total	6

Increase.

	Heifers.	Bulls.
Ayrshires	5	5
Jerseys	5	1
South Coast	2	2
Grades	2	...
Holstein...	2	1
Total	16	9

Great interest has been taken by some of the students in this branch. During the term all have learned to milk; some had already acquired the art, but the majority had not.

Learners were kept to the one set of cows, but so many different milkers soon affected the yield.

I would suggest that the students taking a special dairy course next session be employed at this work, and to have their own separate cows to milk.

Latterly, during the cold weather, the yield of milk has decreased perceptibly for various reasons.

Owing to alterations and breakages the windmill has been working very little, necessitating cows being driven every day to the river, the injurious effect of which was very noticeable.

Stores.—One hundred head of speyed cows of good quality were purchased at 37s. 6d. per head in November, 1897. Some thirty head were sold at an advance of 16s. 6d. per head. The balance are all ready for the butcher; some being very prime should realise satisfactory prices. Sixty head of bullocks were purchased at prices averaging 36s. per head; ages 3 to 5. Some have fattened, the balance just holding their own on account of having to be driven to water.

Pigs.—This class of stock is especially adapted for this institution, on account of the amount of swill and classes of produce that can be turned to profitable account. Numbers: 33 mixed sexes being fattened, 9 breeding sows, 1 Berkshire boar, 54 increase, 15 fats sold at 30s. per head; total, 112.

Cartage.—A large amount of building material and other necessaries have been carted from time to time as occasion demanded.

Crops.—*Maize*: An area of 86 acres was planted, the land being marked with corn-marker followed by a one-horse drill. Rows 4 feet apart, individual plants averaging 16 inches. The system employed was to harrow, mark, and plant immediately after plough, in order to keep ahead of weeds. First cultivation with two-horse spading cultivator with fenders attached was given as soon as plants attained a few inches in height. Subsequent cultivation by Planet junr. and handwork. First planting 29th September, last planting for silage 29th January, 1898. Steam-power thresher with husking, winnowing, and bagging attachments, employed to fit grain for market. One hundred bags have lately been sent to market and realised highest value, ruling 2s. 10d. per bushel.

Varieties.—Large Yellow (imp.): A good variety with characteristic golden-yellow colour; grain square-topped, with very little space between rows on ear. Peat's Corn: A Darling Downs corn, somewhat similar to Sydney Red; sample hybridized too much; piths thick; grain shallow, and too open between rows on ear. Abercrombie: Hybridized; yield poor, 20 bushels to acre; unfavourable conditions; too much rain on a heavy soil immediately after planting. Hogan's Red: Poor yield; affected by same conditions as above.

A considerable quantity of this crop has been stacked for winter use as fodder, and as this has not yet been husked have not the data for yield and cost of production.

The Rotary stalk-chopper was used after the ears were pulled, and cut stalks ploughed in.

Lucerne.—Eight acres of this valuable crop has been sown, proving extremely useful. An area of some 30 acres is in course of preparation for the spring sowing. Drilling *versus* broadcasting will be given a test.

Red Kaffir Corn.—Area, 2 acres. Yielding an abundance of good grain for pigs and poultry. Seven and a quarter tons of green fodder cut and made into silage. Rows 4 feet apart, with plants thinned out to mature good seed. Sown, 18th November; harvested, 25th March. An advantage in this crop is that both grain and fodder can be saved.

Natal Grass.—An experimental sowing over an area of $1\frac{1}{2}$ roods was made on 4th October, 1897. When established made great progress. Cut and made into hay, 26th January. Weight: $21\frac{1}{2}$ cwt., first cutting; 10 cwt. second cutting.

Millet.—Two varieties: Golden and German; the latter yielding the most hay. Area, 8 acres. Made into hay; used, mixed with lucerne, as chaff.

Teosinte.—A small area was planted and made into silage, the quality being good. Average yield, 35 lb. of fodder from each seed; in some cases seventy-five stalks shooting from a single seed.

Pigeon Pea.—Sown, 7th October, 1897; harvested, 4th May, 1898. Area, $1\frac{1}{6}$ acre. Yield, $5\frac{1}{5}$ tons. An Indian fodder grown in enormous quantities for stock; the grain also is used as an article of food. Sown in drills 3 feet apart; attains a height of 8 feet.

Grains.—A small sowing was made, yielding a fair proportion of seed.

Paspalum dilatatum.—This valued grass has not had a sufficient trial to become properly established, although at this time of the year (winter) it is green when other grasses have dried out.

Flax (*Linum usitatissimum*).—An area of $1\frac{1}{4}$ acre was broadcasted on 4th October, 1897, but did not do well on account of lateness of sowing.

Hairy Vetcheling.—Did well, yielding a quantity of fodder.

Potatoes.—Some 7 acres were planted on 4th August, 1897. Variety: Circular Head. Scuffled three times during growth with Planet Junr. Harvested 8th November, 1897. Highest values ruling at market obtained for crop. Average yield, $3\frac{1}{2}$ tons. An area of 3 acres was planted on 21st February, 1898. Harvested 16th May. Yield, 3 tons to the acre. Eight acres of different varieties were planted in the early part of March, 1897, but owing to the late planting and dry season the yield was exceedingly poor. Circular Head, Brownell's Beauty, Manhattan, and Herd Laddie made a fair return, but the remainder (twelve in number) were a failure.

Oats.—Tartarian: Sown 28th March, 1898. Area, 7 acres 3 roods 18 perches. Have made great progress, and promise well, this soil being apparently suitable.

Barley, Cape.—Sown 16th March, 1898. Area, 6 acres 1 rood 27 perches. Has not done so well as oats.

Wheat.—Some 320 varieties were sown in June, 1897, and the best rust-resistant varieties have been given a further trial this year. An area of $2\frac{1}{2}$ acres has been sown with Allora Spring and Budd's Early on 4th June, 1898, in order to test the ridge land as to capabilities of growing grain.

Cow Peas.—Three varieties—the clay-coloured, black, and spotted—have proved very successful. Sown 5th October, 1897; area, 3½ acres. Seed threshed out, haulms stacked for winter feed being greatly relished by stock. Much has been written as to the value of this crop, and the experience of farmers in this colony bears out its special value for fertilising soils deficient in nitrogen.

Pumpkins.—Three acres were planted 27th October, 1897, and made a good yield, being used for pigs, the best picked for College use. Several stacks of various material have been built during the last few months, giving students an insight into this important branch.

Nut Grass.—This pest appears on the banks of the Lockyer and some portions of the farm where the 1893 flood distributed it. Experiments have been tried to ascertain the best means of eradicating the grass. An isolated patch, 2 acres in area, has been set apart and received five ploughings at a depth of 4 inches during the hot weather. The result has been very gratifying so far; only a few plants can be detected. A crop of millet was grown after the last ploughing. Other small isolated patches have been pegged off and plants dug out, a constant watch being kept, and any making their appearance received the same treatment. This process has completely overcome the pest on portions treated.

In conclusion, I wish to draw your attention to the fact that the students as a whole have taken a keen interest in farm work, and great progress has been made. My endeavour has been to distribute work as evenly as possible, giving each individual an insight into every branch.

I am, &c.,

H. C. QUODLING, Farm Foreman.

REPORT OF THE HORTICULTURAL DEPARTMENT.

Sir,—The work of this department has been distributed over the grounds, the orchard, vineyard, and vegetable garden.

In the grounds a great deal of pioneering work has been accomplished in the way of grubbing out and burning off trees and dead timber, levelling the ground, cleaning up and burning the accumulated *débris* of years over an area of 20 acres or thereabout in the vicinity of the College buildings.

Borders have been trenched and planted with shrubs, roses, and flowering plants; and climbers have been established on all unsightly building stumps, tankstands, and outbuildings. All of these shrubs and climbers, although planted in poor soil, have made excellent growth, roses in particular having grown well and flowered profusely.

A commencement of tree-planting has been made, groups of ornamental trees having been set out in various places, and most of these have made good progress. The work of preparing the ground for additional tree-planting is now being proceeded with, and it is intended to have a considerable area ready to plant in the coming spring.

The whole of this work has been done by the labour of the students, most of it during the first term.

Orchard.—On the alluvial flat adjacent to the creek, 6 acres were subsoiled to a depth of 16 inches. Of this area 5 acres were planted with a representative collection of fruit trees, embracing nearly all kinds suitable for the district. One acre was planted with twenty varieties of grape vines. Most of the trees have made very robust growth, and all of them are in a healthy condition. The grape vines have also made good progress. From a quarter of an acre of strawberries planted last season, so excellent a crop was obtained that it was decided to try this fruit on a larger scale. Accordingly 2 acres were planted in the autumn, and from present appearances an excellent yield may be anticipated. The soil and climate here seem to be admirably adapted for the culture of the strawberry. The yield is very heavy, and the quality of the fruit good. The varieties chiefly grown are Marguerite and Pink's Prolific. The latter is a very good strawberry, and with us has so far been entirely free from strawberry leaf blight, although growing in close proximity to other varieties, some of which have been badly affected with this disease. Several other kinds besides the two mentioned are being grown experimentally; but it is yet too soon to decide upon their merits.

Vegetable Garden.—In the vegetable garden considerable time has been occupied in growing vegetables for the supply of the College dining-hall. Work in this direction has been hitherto greatly hampered by the want of an efficient water supply, but a system of irrigation has now been initiated which will enable a

considerable area of the garden and the whole of the strawberry ground to be watered at will, and also to provide a supply of water in tanks for use when required. Notwithstanding the inconvenience attached to having to draw water from the creek by means of a bucket and windlass, some excellent crops of vegetables were obtained, and of these some are worthy of more than a passing notice.

The soil of the garden is admirably suited for plants of the Brassica order, and in particular for cabbages and cauliflowers. By careful planting, judicious watering, and thorough cultivation, very high-grade crops of these vegetables were raised, although not a drop of rain fell from the time of planting until shortly before the crop was ripe. After providing a liberal supply for the College the surplus was sold on the ground at 4s. to 5s. per dozen for cabbage, and 5s. to 6s. per dozen for cauliflowers. Had the area under these crops been ten times as large, the whole could have been sold at the same prices. This is worthy of note by small farmers. Cauliflowers are imported to Queensland from the southern colonies in very large quantities, while at the same time they can be grown here equally as good, and sold for better prices, because they can be put on the market in better condition.

It may be said that it is easy to grow these crops where every appliance for making work easy is provided; but here at that time there were no aids of any kind which are not at the command of every farmer. Among other vegetables which have been successfully cultivated may be mentioned asparagus, rhubarb, and onions.

Asparagus planted in July made splendid stools, and appears to have found a congenial soil and clima'e. This excellent vegetable should be more extensively grown than is the case. Its cultivation is easy and the profits large. Rhubarb of excellent quality and abundant quantity has been in constant supply since September last; and with the water supply now available even better results may be looked for in the future. Onions also succeed well here, enough for the supply of the College for nine months having been grown in six drills, each 300 feet long. There is money in onions for any man who is not afraid of work. All the ordinary garden crops have been grown in their seasons, the aim being to instruct the students in the cultivation of as many varieties of vegetables as can be successfully grown here.

Vegetables valued at lowest market rates have been supplied to the College dining-hall to the value of £50, and the sum of £54 16s. has been received for surplus vegetables sold for cash.

Experiments.—*Kidney Beans*: Eight varieties of kidney beans were tested. Of these the best in every way was Davis' Kidney Wax, one of the yellow podded or butter beans. The crop of this variety was very heavy, and the pods absolutely stringless, and free from anthracuose.

Velvet Bean (Mucuna pruriens, var. *utilis)*.—Six seeds of this bean were planted, of which five germinated. These, planted in a row at 3 feet apart, covered during the summer an area of 20 feet by 12 feet, the growth being very rank, doubtless owing to the richness of the soil. This bean is highly spoken of as a green manure. A quantity of seed has been saved from the plants, which will enable a fair trial to be made of it next summer.

Pineapples.—A small area of pineapples has been planted with a view to ascertaining the possibility of growing this fruit so far inland. Up to the present the plants have not made much growth, but are in a healthy condition.

Fibre Plants.—Several kinds of fibre producing plants are being experimented with. Among these are the sisal hemp *(Agave rigida*, var. *sisalana,)* and the Mauritius hemp *(Fourcroya gigantea)*. These plants have made excellent growth, and are already large and robust. The quality of their fibres has not yet been tested here.

Potatoes.—Twenty-four varieties of potatoes are now being given a thorough test. Of these twenty-one came from Tasmania and three from Kansas, U.S.A.

They were first planted in July, 1897, and the whole crop saved over the summer, and again planted in February of this year.

The following are the results obtained so far:—

Name.	Yield.	Size of Tubers.	Season.	Remarks.
Magnum Bonum	good	large	late	A white potato; very even crop, very litte waste; a good variety.
Purple Kidney	,, ...	,, ...	,, ...	Very dark blue; regular in size; one of the best.
Grey Backs	very small ...	medium ...	early	White; of poor quality.
Derwent Blacks	good	,, ...	,, ...	Blue skin, very regular in size; good.
Orange	heavy	rather small ...	late	Red skin, even crop; fairly good.
Fox's Seedling	good	medium ...	medium ...	One of the best; pink with eyes bluish; an excellent potato.
Pink Eyes	fair	,, ...	,, ...	White, eyes pink; rather inferior.
American Snowball ...	,, ...	large	early	A good potato; pink; eyes deep.
Early Rose	heavy	very large ...	,, ...	The well-known old variety.
Ashleaf Kidney	light	medium ...	very early ...	Has not succeeded well here.
Californian	,, ...	small	,, ...	Very good; white; regular in size.
Silver Skin	good	large	early	Yellowish; a good variety.
White Elephant	...	...	...	Apparently identical with Silver Skin.
Redskin	good	medium ...	early	Red; firm; fairly good.
Rough Whites	,, ...	small	medium ...	White; has greatly deteriorated.
Smith's Wonder	medium ...	large	late	White; regular in size; fairly good.
American Early Rose ...	,, ...	medium ...	medium ...	Red; regular in size; a good potato.
Blue Tartan	fair	large	,, ...	Blue, striped white; a very good variety.
Purple John's	,, ...	small	early	Worthless.
Bismarck	small	,, ...	,, ...	Worthless.
Carmen No. 1	fair	medium ...	,, ...	These three are American varieties, and the seed having been in very bad condition when first planted they have not yet been fairly tested.
Carmen No. 3	...	...	...	
Extra Early Boree.. ...	...	...	very early ...	

The best of the above varieties will be again tried in the spring, and further reported on.

During the second term of the year a course of lectures on horticulture was delivered to a class of thirty students. The lecture course was so arranged as to be as closely as possible in touch with the practical work—as, for example, during strawberry planting the subject of the lectures would be the strawberry. Thus the information imparted in the classroom would be supplemented, and impressed upon the minds of the students by actual practical experience. The results of this system I have found to be good, the students, almost without exception, having taken a keen interest in the work of the course, and applied themselves diligently to make the best use of the opportunity afforded them of acquiring both theoretical and practical knowledge. In the practical work of this department an average of six students per day have been employed, and with few exceptions I have found them industrious, and very anxious to learn. Very few of them had ever handled either farming or gardening tools previous to coming here, and their knowledge of horticulture was practically *nil.* Taking into consideration the fact that only one week in four has been devoted to practical horticulture by each student, the progress made has been very good.

The general conduct of the students while under my charge, both in the lecture-room and the garden, has been excellent.

I beg to submit the following suggestions to your notice :—

(1) A team of horses should be reserved for the work of the Horticultural Department entirely.

(2) Sets of implements and tools should also be provided for the use of the garden alone.

(3) An efficient spraying plant, together with all appliances and materials, should be provided for the orchard and garden.

(4) A toolshed and seedroom, packing-room, and drying-shed should be erected, also stables and cartshed.

(5) The vegetable and fruit gardens are entirely at the mercy of depredators, and some trouble has already been experienced from persons stealing fruit and damaging trees and vegetables; therefore I would suggest the advisability of erecting a residence within the garden area, so that the property of the College may be watched over and safeguarded.

This portion of the farm being situated nearly a mile from the nearest residence, will never be safe from marauders until someone holding a responsible position is permanently located there.

I have, &c.,

H. W. GORRIE, Horticulturist.

REPORT OF LIBRARIAN.

Sir,—I have the honour herewith to submit my Report on the College library for the year ending 19th May, 1898.

At the opening of the College our library consisted of about 200 volumes. During the past twelve months constant additions have been made, and we have now on our shelves 410 volumes.

Besides works dealing with the cultivation of land—about 125 in number—we have a fine collection of valuable scientific works, including text books on Chemistry, Botany, Bacteriology, Surveying, Physiology, &c., comprising some ninety volumes. We have, too, about ninety works on stock of various kinds and dairying.

Among the latest additions I may mention: "The Encyclopædia Britannica," 25 volumes; "The Times," "Atlas," and "Webster's Unabridged Dictionary." The remainder of our library is made up of general literature, including works on History, Biography, &c. During the year we have received a large number of pamphlets issued by the Governments and Agricultural Colleges of Great Britain, the United States, the other Australian colonies, and India. These have all been carefully classified.

In the reading-room, the students have had access to some eighteen newspapers, including a Brisbane daily and the principal weekly papers published in these colonies, as well as several English and American publications on farming and general subjects.

I regret to say that the library is not used by the students as much as it should be, the number of those who draw books regularly being comparatively small. I hope, however, that as their knowledge of the various sciences taught here increases, they may be more disposed to avail themselves of the books at their disposal.

In conclusion, I must acknowledge the valuable assistance rendered me by Mr. Andrew Reid, who throughout the year has acted as sub-librarian.

I have, &c.,

P. M. PITT, Chairman, Library Committee.

The Principal, Queensland Agricultural College.

REPORT OF THE ENGLISH AND MATHEMATICAL MASTER.

Sir,—I have the honour herewith to submit my Report for the year ending 19th May, 1898.

I entered upon my duties as English and Mathematical Master on 28th June, 1897, and, on the opening of the College on 1st July, superintended the entrance examination for students.

The young men coming forward were, with few exceptions, found to be very backward in both English and arithmetic. In the former subject the spelling of many of the candidates was decidedly bad, and their ideas on English composition very elementary.

In the time at my disposal—from two to three hours per week for each division—during the past year, I have exercised my classes in spelling, by means of dictation, and composition by essays on various subjects such as the students were likely to be interested in or acquainted with.

In arithmetic, too, in many instances, our students were very backward; in the majority of cases, perhaps, this was owing to the length of time that had elapsed since they had attended school. This necessarily led to my having to undertake a large amount of elementary work, during the course of which the progress of the more brilliant was delayed by the weaker members of the various classes. In connection with this matter, I would suggest that in future such backward students should be formed into a "preparatory class," in which they should be required to remain for one term before commencing the regular College course. By this means all would be enabled to start their first year's work on practically the same footing,

The course in arithmetic has included a careful grounding in the handling of vulgar and decimal fractions, and the ordinary rules of arithmetic, such as Rule of Three, Percentage, Simple and Compound Interest, Partnership, Stocks, &c.; and in connection with this work I have endeavoured to make the students familiar with such calculations as are likely to be of use to a farmer.

Six of our students, who were considered at the beginning of the second term to be so far advanced in English and Arithmetic as to be able to dispense with their studies in these subjects, were formed into a separate division, and have been during the last four months following the course prescribed for the second year. They have been receiving from me lectures on Practical Mensuration, including the calculation of areas by means of angular and linear measurements and the computation of the volumes of solids. They have also taken part in any surveys which I have had to make in connection with the farm.

Including these advanced students, 70 per cent. of those who joined us during the first term, and presented themselves at the recent examination, are now competent to undertake second year's work. Several others who failed to pass have signified their intention of studying during the vacation, and will be afforded an opportunity of qualifying on their return in July.

The number of students in the various classes under my charge during the past year has been as follows:—

	First Term.	Second Term.
Division A.	14 students	... ... 6 students.
„ B.	19 „	... ... 22 „
„ C.	... ...	... ... 23 „

On the whole the progress made by my classes has been satisfactory, and the behaviour of the students during school hours almost invariably good.

I have, &c.,

P. M. PITT, English and Mathematical Master.

The Principal, Queensland Agricultural College.

REPORT OF THE DAIRY INSTRUCTOR.

Sir,—I have the honour to submit this my eighth annual report of the work performed by me during the year ending the 30th June, 1898.

My duties were not confined to the dairying industry alone, for during the year I inspected and reported upon twenty large properties proposed to be surrendered to the Government under the terms of "*The Agricultural Lands Purchase Act of* 1894." These properties required careful inspection, and considerable time was occupied in so doing. Another function in connection with my duties was visiting the shows of the agricultural societies, at which, in nearly every instance, I acted as judge for the dairy stock, farm and dairy produce, &c., and conversed with farmers, dairymen, and others on many matters pertaining to their respective interests, and it is thought that

some good has been done in this direction. At these shows I carried out a series of milk testing, and instructed those who were desirous of learning the methods. I also explained to exhibitors defects, if any, in their exhibits.

Ayrshire bulls specially selected by the Department for the improvement of dairy herds were competed for, and won at the following shows—viz.: Rosewood, Gympie, Bundaberg, and Toowoomba.

Since submitting my last report I was present at the following shows—viz.: Brisbane Exhibition, Drayton and Toowoomba, Warwick, Laidley, Royal Agricultural Society Toowoomba, Rosewood, Beaudesert, Beenleigh, Wellington Point, Gympie, Bundaberg, Rockhampton, Ipswich, and Lismore (New South Wales). During my trip to the Tweed and Richmond Rivers I visited many of the farms, dairy herds, butter and bacon factories, made inquiries and obtained an insight into their methods of working, and on my return prepared a report on my trip, which was made public through the Press. I purchased in New South Wales nine pure-bred Jersey heifers from the Kirkham Estate, the progeny of imported stock by the late Hon. Jas. White, and a bull from Mrs. Smart. These cattle were selected for the College at Gatton, and, in the opinion of Professor Shelton, have done much better than any other breed.

The past year's actual work in connection with dairy instructions was commenced in May, when I carried on practical demonstration in dairying in all its branches during the Brisbane International Exhibition. I am not prepared to say that much good resulted from these operations to those who were likely to profit from instructions of this nature, because the greater number came to the city as pleasure seekers, and only devoted a part of their spare time to the dairy. Lectures or dairy instruction at agricultural shows do not command much attention.

During the year my services in direct connection with dairying were requisitioned at the following places, viz.: Milford, Agricultural Conference (Gatton), Mount Mee, Bingera, Gooburrum, Kalkie, Burnett Heads, South Kolan, Rockton, Beenleigh, Cressbrook, Ramsey, Wellington Point, Biddeston, Westbrook, Rockhampton, Stanwell, Kabra, Gracemere, Yeppoon, Emu Park, Emerald, Clermont, Springsure, Mackay, Rosevale, Agricultural Conference (Rockhampton), and Pittsworth.

In conjunction with yourself, I also inspected and branded butter intended for export. I supplied information to factory and creamery managers upon the subject of butter for export. Articles for the *Agricultural Journal* upon dairying formed also part of my work for the year.

The demands upon my time being greater than it was possible to fulfil, my assistants (Messrs. Winks and McGrath) visited several places and gave instructions in dairying. Mr. Winks visited Kilkivan and Woodford; Mr. McGrath, Blackbutt, Withcott, Kenilworth, Caboolture, Mackay, Milford, Beaudesert, and Roma. Without egotism, I think it is admitted, especially by the producers, that my assistants and myself have done good work in furthering the interests of the dairying industry.

It is suggested that a dairy school is much needed in Queensland, wherein practical instructions might be given in the commercial side of the business in pasteurising milk and cream, and in preparation of butter for export, practical and actual results from feeding, in treatment of cattle, as well as in the many other points that are necessary for a dairyman of the present day to have a knowledge of.

To my mind this and other practical work should be carried out at the Agricultural College, where records could be kept, and the results made public. It is submitted that this matter deserves immediate attention, and that it is of great importance to the welfare of the dairying industry. Theoretical knowledge is not, and never will be, appreciated by the farmers or dairymen.

From the following figures it may be seen that phenomenal progress has been made during the last year in the dairying and pig-raising industries of this colony:—

IMPORTS AND EXPORTS, 1896-97.

Imports.

	1896. Value. £	s.	d.	1897. Value. £	s.	d.
Butter	43,075	0	0	11,498	0	0
Cheese	1,820	0	0	511	0	0
Bacon	305	0	0	245	0	0
Condensed Milk	26,494	0	0	28,253	0	0
	71,694	0	0	40,507	0	0
Total Imports, 1896 ...	...	...	...	71,694	0	0
„ „ 1897 ...	...	...	...	40,507	0	0

EXPORTS.

	1896. Value. £	s.	d.	1897. Value. £	s.	d.
Butter	618	0	0	16,771	0	0
Cheese	205	0	0	131	0	0
Bacon	4,385	0	0	18,252	0	0
Condensed Milk ...	—			—		
	5,208	0	0	35,154	0	0

Exports	5,208 0 0
„	35,154 0 0

EXPORT TRADE.—From the foregoing figures it will be seen that during the last two years £54,747 worth of condensed milk was imported into this colony, an article which, I believe, can be successfully manufactured here, and hope to see made in such quantities that the imports of condensed milk will practically cease. A commencement has already been made at Cressbrook, where Messrs. McConnel and Munro have started large works, and who are, I believe, placing a good article on the market.

The most noticeable increase in the exports of dairy produce is that of bacon, which rose from the value of £4,385 in 1896 to £18,252 in 1897. In cheese we are not likely to produce very much more than will supply our own demand, for under present circumstances we can hardly turn out an article of a uniform quality of sufficient merit to command the best price in the London market.

BUTTER.—The following is a list of the shipments to London for the year ending 30th June. From January, 1897, to June, 1898, 377 tons 12 cwt. 3 qr. 12 lb., 202 tons 17 cwt. 3 qr. 12 lb. of which carried the Government bonus, about 1·4794d. per lb., or a total sum £2,801 10s. 2d.

The butter shipped during 1898, viz., 179 tons 15 cwt. did not carry a bonus, for the fund had become exhausted. Some factories, however, shipped without Government inspection, and others whose butter was good had it inspected and branded. Butter branded as "Choicest Queensland Factory" was rejected by me upon inspection, as unfit for export; but, notwithstanding that it had been rejected, the owners shipped it per "Jumna" to London and placed it on the market with the brand above referred to. This action, to my mind, will have a bad effect on the sale of Queensland butter, and may be considered as an attempt to deceive English consumers. Under such circumstances it is not surprising that the "Jumna" butter was considered inferior and irregular in quality; but I know that the article which carried the Government brand sold for 94s. per cwt., whereas the rejected lots realised but 82s.

Former shipments have been reported upon as being inferior, but in answer it is contended that those reports were unreliable and interested, for it is a fact that a greater portion of the butter referred to was sold at prices equal to the "Choicest Australian"; and, for instance, to indicate how interested the reports were, the prices quoted in the Press, as supplied by the London agents, were from 88s. to 92s. per cwt., but in reality the top price realised was up to 103s. per cwt.

The Australian butter is all sold privately in England and the prices are fixed by the buyers, whereas the price of Danish butter is fixed by the Danes themselves. A manager and three assistants sell over £4,000,000 worth of Danish butter annually, thus avoiding the trickery of the trade. It may be out of place in my referring to the methods of distribution in England, but I cannot refrain from doing so, for I am of opinion that our butter did not meet the merit it deserved during last year.

In further reference to the export of dairy produce under Government supervision, I have always been of opinion that to build up a business upon a sound basis, too much care cannot be exercised in preventing unscrupulous agents from buying up inferior lots of butter and shipping them as "Choicest Queensland Factory Butter," and so misleading buyers in the home market. If Queensland dairy products are to hold a first-class reputation, the name can only be obtained by offering an article of undoubted quality, and if strict supervision of all dairy products be not enforced, the export trade will never reach the dimensions that are now looked forward to. Supervision over the export trade will give confidence to the English consumer; will be taken as a guarantee that, as far as possible, we are supplying an article of food—clean, pure, free from adulteration, and of the highest excellence of quality.

I am of opinion—opinions to the contrary notwithstanding—that the Government brand is a guarantee of good quality, for the English consumers are aware that no Government would tolerate inferior goods being branded as first-class. If inferior goods are to be exported they should be shipped without a brand, and sold on their merits.

It has been put forth that butter suffers deterioration during transit to such an extent as to cause it to become inferior, but an argument of that nature will not carry weight—*i.e.*, providing the temperature during the voyage is not allowed to go over 35 degrees F.

In support of Government supervision, Mr. David Wilson, Victorian dairy expert, in his annual report this year, writes that to the present system of Government supervision of dairy products is due the large amount of money received by the producers annually. Out of 5,387 tons shipped for the past season 7 per cent. only was shipped without the Government brand; the latter, to use Mr. Wilson's own words, was of second-class quality. The amount of butter branded as "Pastry" was a little over 1 ton for the whole season.

Mr. Samuel Lowe (Messrs. Weddel and Co.'s buyer), who, I believe, is opposed to Government supervision, gives his case away in his report on this year's shipment of butter per the "Jumna." He (Mr. Lowe) states that the evil effects of having brands will be better understood when it is known that the agents in London cannot sort out the good from the bad, but all must be sold together. A common procedure in buying is for the purchaser to select from the bulk four or five boxes and taste them. Suppose he finds three sweet and good and the fourth not worth so much by 8s. per cwt. as the others, it is easy to see how the values of the three good butters is depreciated for the sake of one bad box. It is this mixed quality that will damage Queensland butter in the English market.

Mr. Lowe's opinion to my mind proves beyond all doubt that Government inspection of the exports and supervision over the distribution in England is essential in building up a reputation for Queensland products.

At the Agricultural Conference held in Rockhampton this year, it was the unanimous opinion that supervision over the exports of perishable products is essential. In nearly all my annual reports I have emphasised the importance of shipping dairy produce under strict supervision.

PROGRESS MADE.

Ordinary dairy cattle have increased in price at least 70 per cent. during the past year, and land that a few years ago was practically unutilised, because unfit for agriculture, is now carrying dairy herds, and giving employment to many young people who were hitherto unemployed.

In fact to me, who am continually among the farmers, it appears that a reign of prosperity has set in, and to those who adopt a system of mixed farming prosperity will continue.

The healthy condition of the dairying industry is fully indicated by the number of milk and cream cans that are to be seen at nearly every railway station within 150 miles of Brisbane, the work in connection therewith being for the most part performed by the younger members of the family of the farmers.

The hog industry is increasing in proportion to dairying, and the day known as "pig day" is a sight worth witnessing. It is not unusual to see from thirty-five to forty carts at a railway station delivering their pigs on that day. The cost of fattening pigs is a mere trifle to the farmer, for the waste products from the dairy and the farm are almost sufficient, consequently the pig is almost all profit.

The late Dr. Scholes, at Goodna, Captain Pennefather, at St. Helena, and Mr. W. R. Robinson, of Toowoomba, have done a great deal to improve the breed of pigs in this colony. It is to be hoped the Agricultural College will follow suit. The farmers are always ready to pay a good price for a good pig for breeding purposes, and experience some difficulty in getting the class they want.

Dairy Cattle.—The farmers, dairymen, and others have at last arisen to the fact that successful dairying is dependent to a great extent on a good herd, and I am pleased to say steps are being taken by nearly every dairyman in Queensland to improve the herds, and it is much to be regretted that we have not sufficient well-bred dairy cattle in this colony to supply the demand. Many inquiries have and are being made at this office for "Dairy bulls," which are not to be had unless at exorbitant prices.

It is suggested for consideration in connection with the introduction of new blood that if those who are anxious to obtain stud bulls were to supply their names, the price which they would be prepared to pay, and the class of animals required, whereupon an officer (who should be a good judge of stock) might be sent South to procure the required number, the transit of which would to each person be very little.

Feeding of Cattle.—A better system of growing feed and feeding stock during the winter months is slowly but gradually gaining ground, and is fully indicated by the amount of cream that is being sent to the various depôts in the city and elsewhere. Owing to our mild winters we should be able to keep up a regular supply all the year round, and this will be accomplished when the dairy herds are regulated, so that an equal number of cows will be kept in milk all the year.

The Present System of Dairying.—There are about thirty-two large cheese and butter factories in the colony at the present time, fourteen of which are drawing cream supplies from 554 creameries. Although the number of factories is not increasing very rapidly, the number of creameries has doubled since last year. The quantity and quality of the dairy herds are improving, and are being made more suitable.

The factories and appliances that were erected a few years ago, with few exceptions, are inadequate to successfully treat the present supply, consequently the same results as regards quality of butter are not obtainable. This is chiefly owing to the want of refrigeration, with the consequence that good and bad creams are mixed in the one cooling vat and all churned together, a method that is greatly to be deplored.

Tuberculosis.—This disease is gaining ground very rapidly, and from tests and personal observations, I am quite satisfied that 20 per cent. of the dairy herds in Queensland are more or less affected with tuberculosis, and under the present system of careless feeding of calves—in most cases they are poorly fed—the constitution is weak and susceptible to the disease.

I have made tests with tuberculin in several dairy herds in this colony, and in every case have found the disease present.

The question may be asked, why this disease was not prevalent years ago. The answer is, that the disease is spreading more rapidly every year, and for every one beast that is affected this year, five times the number will contract the disease next year, and so the disease will continue to spread, unless stringent measures are adopted to check it. One of the greatest sources whereby the disease will be spread is feeding skim or separated milk to calves, and if permitted, I would strongly advise scalding the separated milk before feeding it to calves.

Although numerous suspected cases have come under my notice, I leave the matter to be dealt with by scientific persons, or persons more competent to handle the subject.

The Use of Preservatives.—A great deal has been said of late and adverse opinions have been expressed with regard to the use of preservatives in butter. Samples of Queensland butter have been analysed by our Government analyst, and the results which were made known to the manufacturers were anything but satisfactory, several samples containing over 1 per cent. of boracic acid.

The use of preservatives of late have been so injudicious that I fully anticipate serious results sooner or later. Under the present sources of milk and cream supply, and the manufacture of butter, it is impossible to determine to what extent preservatives are used. In the first place, it is a common practice for the farmer to use them in preserving the night's milk; they are again used by the creamery owner, and lastly they are used by the manufacturer in the cream and butter. To my mind the matter is becoming a serious one, especially as the English authorities have not, and probably will not, fix a standard whereby we may be guided. As regards this use of preservatives, I have always claimed that we can do without them altogether. Ninety per cent. of the people who use preservatives at the present day have never made any tests as to their efficacy or otherwise, but simply use them for reasons unknown.

We all know that boracic acid is not the only chemical used in the various preparations that are now to be found in the markets. And perhaps the local health authorities would not be exceeding their duty if they were to exercise a little precaution as regards the adulteration of foods.

Inspection of Dairies, &c.—Relative to the inspection of dairies, dairy herds, and all sources of milk supply, it must be admitted by all who have the slightest knowledge of the filthy system upon which dairying is now carried out in some country districts, that an Act of Parliament of the most stringent measures is necessary.

The factories (with few exceptions) are most elaborate, fully equipped with modern machinery, substantially built, with good drainage, and free from all bad odours, and the cleanly manner in which they are kept reflects very great credit on the managers who have no reason to fear a visit from an inspector; but with all these advantages, and skill combined, the man is not yet born who can deal satisfactorily with milk or cream that has been handled in a dirty manner on the farm. At creameries where milk or cream is received for the factories, ample evidence is available of the treatment of milk by some dairymen. It will be often found that the milk is carted to the creamery exposed to the sun without any protection while on the road, where, upon delivery being taken, it is run through a strainer before being separated. In these strainers I have seen filth of almost every description, including dung, blood, hair, flies, and scab from sore teats. Of course a great deal of the finer particles of filth are held in solution, and are carried through the strainer into the cream separator, machines have had to be stopped and the dirt removed before finishing the separating. In many cases where I have shown this slime and filth, the people present declared they would never drink a drop of milk again. Again the men in charge of the creameries are sometimes careless, know nothing about milk, and receive it in any condition. For example, in one place where the Travelling Dairy was located, I refused to take milk that was in a state of decomposition. That milk I afterwards found was sent on to the local creamery and there taken delivery of, mixed up with many other samples of milk, and separated. It has also come under my notice that cream has been carted for many miles with the driver perhaps, perched on top of a can, and no other protection whatever from the sun's rays. In the face of these and numerous other instances I say that it is not possible to turn out an article of the highest quality, without compulsory cleanliness.

A great many private dairies in this colony are unequalled for cleanliness, and have not the slightest reason to fear inspection of the most stringent nature, but there are others who, keeping to the dirty system of dairying, cannot dispose of the article, excepting at a ruinous price, evidence of which can be seen in the differences between the prices of good and bad butter in our local markets, as quoted in the Press.

There is no gainsaying the fact that in many instances dairying is being carried out under the most filthy circumstances, from the driving of the cow to the yard, to the manufacturing of the butter.

I have seen cows driven into a dirty yard, with udders dipping into the dirt, and have seen them milked without being cleaned in any way, with filth oozing through the hands of the milker into the bucket, and during wet weather, the rain washing the dirt from the animal's body into the milk can. Milk handled in such a manner contains bacteria of the worst description. I have very often seen blood from the sore teats and udders dropping into the milk, and on several occasions have seen unhealthy cows being milked.

Dairy Buildings and Milking Yards.—It is not uncommon to find the milking-yard, the piggery, closet, and dairy all situated within a few feet of each other. Fowls are to be found roosting on top of the dairy, and I have often seen rooms which were utilised for dairies divided from the kitchen and bedroom by a few slabs only. On one occasion I was invited to inspect a dairy, where the person in charge could not make a good article, and on my arrival found the door of the water-closet about eight feet away facing the dairy door. These are only a few of the very many instances that I could mention. During the operations of the Travelling Dairy milk has been received from dairies which it was impossible to manufacture into a good article.

We have some first-class cheesemakers in this colony, many of whom inform me that they are handicapped greatly owing to the milk suppliers exercising no care in the handling of the milk. I am in receipt of a letter from one large factory proprietor, who informed me that unless an Act for compulsory inspection of the sources of milk supply be passed he would be compelled to shut down his business until such time as an Act shall become law.

Compulsory aeration of milk will be a necessity before successful competition can be effected with the excellent New Zealand cheese now on the market.

Cleanliness in a warm country favourable to the growth of bacteria is of greater necessity than in a cold climate.

With regard to the Act now in existence, it is my experience that the local authorities never trouble or attempt to move in such matters; for instance, in one district not very far from Brisbane I saw a cow in an acute state of cancer grazing and drinking with other cattle. On my reaching the township and inquiring for the health officer, I was advised to see the secretary of the divisional board, who told me the police might be able to supply the information required. The officer of

police there said that he knew nothing about the Health Act, and would not destroy the animal. However, I borrowed a rifle, and in company with a constable, who thought I might shoot some of the neighbours, shot the animal, and gave notice to the secretary of the divisional board, who refused to have the carcass destroyed, and it was left for some days within a few chains of a State school. The police had the carcass burnt, and I believe the man who did the work has not yet been paid for it, for the local board would not pay because it was of opinion that the expense should be borne by the Stock Department.

I am of opinion that an Act of Parliament should be passed whereby every dairyman should be compelled to register his dairy, so that not only the inspector, but also the public, may have an opportunity of knowing the condition in which the premises are kept. In New South Wales every dairyman is, by law, compelled to register his dairy. and affix a notice to that effect on the buildings. These dairies are disinfected and whitewashed once a week, whereas, in this colony few, if any, dairies have ever been whitewashed. The dairymen would not incur any extra expense in carrying out the above methods, but compulsion must be the predominating power.

I have, &c.,

JOHN MAHON.

REPORT OF THE COLONIAL BOTANIST.

Sir,—I have the honour to submit the following brief Report as to the work done in the Botanical Department during the year 1897-8.

It is most satisfactory and helpful to me to find the continued and increasing interest which is taken by the general public in botanic matters. Never a day passes without there being callers for verbal information, which with the large number of correspondents keep both myself and assistant so fully occupied as to necessitate much work being taken home for finishing up during evening hours.

During the year many interesting objects appertaining to the vegetable kingdom have been added to the Museum collection; but for the past three months the cases containing the exhibits have had to be closed up together in order to make room for temporary offices during alterations to be carried out in the front portion of the building. When these are completed I have a good number of fresh interesting exhibits to add to the collection.

The compliment paid to Botany by my being invited to accompany His Excellency Lord Lamington's party to New Guinea in April last was most gratifying to me, and the observations I was enabled to make on the spot of the indigenous flora will come in most handy when working at specimens from that locality for various correspondents. I may here state that although this was my first visit to New Guinea, I have been in the habit for many years past of determining botanical specimens from there for correspondents, thus I possess a fair knowledge of the flora which I may be forgiven if I venture to state bears no comparison to Queensland, either in an æsthetic or economic point of view. A large number of the plants are such as are to be met with in all similar countries. New Guinea is as conspicuous for its want of useful timbers and grasses as Queensland is for its abundant supply of these plants. When the flora of New Guinea becomes more fully known it will be in alpine plants that she will differ principally from Queensland, for while we are altogether wanting in these plants the lofty ranges in New Guinea will in all probability furnish them in great variety. I did my best to preserve the herbarium specimens collected by the party, but with only a very partial success, the "Merrie England" having no accommodation for drying; but from descriptions written on the spot and the specimens brought home I will be able to publish in the August number of the *Queensland Agricultural Journal* a short paper giving descriptions of a dozen or more plants which I believe have not been hitherto described. Anyone visiting New Guinea will observe that the collecting of "rubber" from indigenous plants is one of the principal industries that is being carried on there. A large number of plants produce rubber, but the two which seem in most favour are the "Rigo" fig, named and described by me in *Queensland Agricultural Journal*, Vol I., Part III. This is a very large tree, making when young very rapid growth. According to Mr. A. C. English, of Port Moresby, it has been known to attain the height of 35 feet in two years. The other plant is a vine, of which I had only faulty specimens given to me by the same gentleman (Mr. English), but have the promise of better material being forwarded from which to determine the plant botanically. Before closing this short paragraph I again advise that careful search be made

among our indigenous plants for a rubber product. It is not confined to one genus, or even one natural order of plants, and of the orders and genera known as "rubber" producers we have in Queensland among our indigenous plants many representatives, particularly in the far Northern portions of the colony. Before leaving this subject I would again draw your attention to my remarks in last Report *re* formation of "rubber" nursery at Somerset.

Being most anxious for several specimens from the Bunya Mountains, and particularly to obtain leaves of an oil-bearing tree *(Backhousia angustifolia)*, I sent my assistant to that locality in October last. On his return he distilled the leaves and obtained a fair quantity of the oil, which is of a very peculiar character.

At the request of Mr. Benson my assistant visited the Darling Downs in February last, and collected seeds of a number of the known superior indigenous grasses, which were required for experimental purposes on the State farms.

The publications from this office during the year have been about twelve papers in the *Queensland Agricultural Journal*, besides one which will appear in the August number, which is confined to an account of some of the new or rare and interesting plants observed or collected by Lord Lamington's party in British New Guinea during April and May last. This paper, which I hope will prove of more than ordinary interest, will be followed by others on the same subject when I can find time to work up the material which was collected.

In addition to the above my assistant has prepared several papers for the *Journal* on economic botany.

I much regret that the Department cannot afford publishing a coloured plate of each of the indigenous fruits as such could be obtained. The one plate issued in Part VI., Vol. II., of the *Journal* does credit to the artist of the Department (Mr. Wills), and adds to the attractiveness as well as the usefulness of that publication. It should be borne in mind that this colony compared with, I may be allowed to say, any other, holds a very high position in regard to indigenous fruits. Of course these, taken in their crude state, are not worthy to be placed alongside and judged with those of our gardens, but numbers even in their wild state are superior to what the apple, pear, plum, peach, and others were before being brought under cultivation. It is not from a personal motive that I draw attention to the matter of our indigenous fruits, the illustration of them could bring no honour or glory to me; but it would add rather to my already heavy work. My idea is that were a plate now and again to grace the *Journal* the people both within and beyond Queensland would have brought before their notice some of our important natural products.

I am pleased to say that my writings on the flora of the colony attract favourable notice from botanists and horticulturists in Europe and elsewhere. This has been particularly the case with regard to new plants collected at Cape York and Torres Straits.

A large number of Museum and Herbarium specimens have been despatched to various botanic departments beyond the colony, and in exchange for these we have received specimens of plants of many foreign places. Many seeds of indigenous plants have also been sent to various botanic gardens.

In October last I was enabled, with the help of a number of correspondents within easy railway and boat communication, to make a very good display of our indigenous flowers at the Horticultural Society's spring show.

The library has been enriched during the year by the addition of many most valuable works, and I am happy to say begins to be worthy the name of a Botanic Library. The majority of these have been purchased but a large number have been donated by kindred institutions.

The specimens which have been sent to me during the past year as noxious weeds or suspected poisons have for the most been well-known harmless plants, and call for no special remarks.

Following my usual custom, I give a list of the additional fungus blights and their hosts observed since last Report:—

Phyllachora graminis, Pers. On leaves of kangaroo grass, Toowong.

Stigmatea seminata, Berk. and Rav. On pods of small Desmodium among grass, Toowong.

Uromyces fusisporus, Cke. and Mass. On foliage of Acacia, Torres Straits.

Puccinia caricis, Rel. On leaves of "nut grass" (*Cyperus rotundus*), Gatton. This fungus also had the parasite *Darluca filum* growing upon it.

Phyllosticta acaciæ, Cooke. On foliage of Acacia, Torres Straits.

Phyllosticta flavidula, Sacc. On leaves of *Callistemon lanceolatus* (red bottle-brush), Endeavour River.

Phyllosticta uvariæ, Berk. On leaves of *Uvaria membranacea*, Somerset.

Glœosporium carpophilum, Mass. On fruit of *Xanthophyllum Macintyrii*, Mourilyan Harbour.

Glœosporium Kurzeanum, Niessl. This pest quite destroyed a fine strong plant of everlasting pea which was growing in a Brisbane garden.

I have, &c.,

F. MANSON BAILEY, Colonial Botanist.

REPORT OF THE ENTOMOLOGIST.

Sir,—I have the honour to submit the following Report for the year ending 30th June, 1898, relating to the branch of the Department under my direction.

INVESTIGATIONS.—INFORMATION FURNISHED.

In response to numerous applicants submitting questions pertaining to both Economic Entomology and Plant Pathology, investigations have been conducted and inquiries have been satisfied that have frequently involved considerable scientific research. They have related, moreover, to the following amongst other topics :—

ECONOMIC ENTOMOLOGY.

Apple.—The Fruit Fly (*Tephritis Tryoni*), Brisbane and elsewhere; Codling Moth (*Carpocapsa pomonella*), Stanthorpe; Orange Maize Moth (*Conogethes punctiferalis*), Brisbane; Tree Cricket (*Œcanthus sp.*), Stanthorpe; Red Scale Insect (*Aspidiotus coccineus*), Isis; Greedy Scale (*Aspidiotus camelliæ*), Coomera and Mount Tambourine; Parlatoria Scale Insect (*Parlatoria proteus*), Brisbane; San José Scale Insect (*Aspidiotus perniciosus*), Darling Downs, &c.; Red Spider (*Tetranychus, sp.*), Brisbane.

Pear.—The Gall Mite (*Phytopus pyri*), Warwick; Parlatoria Scale Insect (*Parlatoria proteus*), Brisbane and Maryborough; San José Scale Insect (*Aspidiotus perniciosus*), Darling Downs; Greedy Scale (*Aspidiotus camelliæ*), Darling Downs.

Quince.—The Fruit Fly (*Tephritis Tryoni*), Darling Downs; Wood Borer (*Xyloryctidæ*), Darling Downs; Black Scale (*Lecanium oleæ*), *ib.*

Plum.—San José Scale Insect (*Aspidiotus perniciosus*), Darling Downs; Parlatoria Scale Insect (*Parlatoria proteus*), Mackay; Long Soft Scale (*Lecanium longulum*), Isis.

Peach.—The Fruit Fly (*Tephritis Tryoni*), Brisbane, &c.; Orange Maize Moth (*Conogethes punctiferalis*), *ib.* and Darling Downs; Tree Cricket (*Œcanthus, sp.*), Warwick; Peach Diaspis Scale Insect (*Diaspis amygdali*, Tryon), North Coast Railway Line, &c.; Parlatoria Scale Insect (*Parlatoria proteus*), Woombye and Brisbane; San José Scale Insect (*Aspidiotus perniciosus*), Darling Downs, North Coast Railway Line, &c.; Red Scale Insect (*Aspidiotus coccineus*), Rockhampton; Black Scale Insect (*Lecanium oleæ*), Darling Downs; Peach Aphis (*? Myzus cerasi*), Darling Downs, Tambourine Mountain, North Coast Railway Line, &c.

Almond.—Red Scale Insect (*Aspidiotus coccineus*), Pinbarren.

Apricot.—San José Scale Insect and Black Scale Insect, Darling Downs.

Fig.—Wood-borers, Brisbane district; Fig-leaf Beetle (*Galerucella australis*), Brisbane; Soft Scale Insect (*Lecanium, sp.*), Cunnamulla.

Persimmon.—Long Scale Insect (*Lecanium longulum*), Brisbane district and Mount Gravatt; Stem-borer (*Xyloryctidæ*), Rockhampton and Buderim Mountain.

Citraceous Plants.—The Fruit Fly (*Tephritis Tryoni*), Brisbane, &c.; Leaf-gauging Weevil (*Curculionidæ*), Rosewood, Pialba, &c.; Black Aphis (*? Siphonophora, sp.*), Brisbane, &c.; Bronze Bug (*Oncoscelis sulciventris*), Brisbane, &c.; Green Bug (*Rhynchocoris sp.*), Clermont; Orange Mite (*Phytopus oleivorus*), Woombye, Brisbane, Maryborough, &c.; Purple Wax Scale Insect (*Ceroplastes ruber*), Brisbane, &c.; Red Scale Insect (*Aspidiotus coccineus*), Brisbane, Darling Downs, Childers, Mackay, Eidsvold, North Coast Railway Line, &c.; Purple Round Scale Insect (*Aspidiotus ficus*), Brisbane, Mackay, &c.; White Scale Insect (*Chionaspis citri*), Childers, Maryborough, North Coast Railway Line, &c.; Glover's Scale Insect (*Mytilaspis Gloveri*), Burpengary, Buderim Mountain, Blackall Range, Wellington Point, &c.; Fulvou's Mussel Scale Insect (*Mytilaspis citricola*), Cairns and Redland Bay;

Pergande's Parlatoria Scale Insect (*Parlatoria Pergandei*), Mount Cotton, Redland Bay, Nambour, Childers; Cotton-Cushion Scale Insect (*Icerya purchasi*); Black Scale Insect (*Lecanium oleæ*), Warwick and Darling Downs; *Lecanium hesperidum*, Darling Downs and Mackay; Tick Lecanium (*Lecanium baccatum*), Augathella; Circular Lecanium (*Lecanium filicum*), Gatton, &c.; Lecanium, Charleville; various scale insects, Mount Cotton and Carrington; Orange-piercing Moths (*Ophiderinæ*), Bowen, Zillmere, &c.; Flower Beetle (*Glyciphana brunneipes*), Coorparoo; Red Spider (*Tetrancychus telarius*), Brisbane.

Paw Paw or Papaya.—Orange Maize Moth Caterpillar (*Conogethes punctiferalis*), Redland Bay.

Mango.—The Fruit Fly, Brisbane; Pink Wax Scale (*Ceroplastes rubra*), Brisbane, Redland Bay, &c.; Flower Beetles (*Aulacophora spp.*), Cairns and Johnstone River; White Scale (*Diaspis sp.*), Mackay; various pests, Mount Cotton.

Custard Apple.—Long Soft Scale (*Lecanium longulum*), Redland Bay, &c.; Mealy Bug (*Dactylopius sp.*), do.; Fruit-piercing Moths (*Ophiderinæ*); various insect enemies, Sunnybank.

Pomegranate.—The Fruit Fly (*Tephritis Tryoni*), Warwick.

Mulberry.—Soft Brown Scale (*Lecanium*), Augathella.

Olive.—Black Scale (*Lecanium oleæ*), Darling Downs; Olive Lygœus, Darling Downs.

Date.—Parlatoria Scale Insect (*Parlatoria victrix*), Winton; Seed Weevil (*Dryocœtes dactyliperda*), Brisbane.

Fruit-trees generally.—Caterpillars, Cape York; St. José Scale (*Aspidiotus perniciosus*), Coomera.

Grape Vine.—Bag Worm (*Oiketicus*), Mitchell; Fruit Fly (*Tephritis Tryoni*), Brisbane, Darling Downs, Maryborough, &c.; Leaf-eating Beetle (*Pyropida sp.*), Eight-mile Plains; Leaf-eating Insect, Roma; Twig-borer, Deception Bay, Bowen, Mackay; Grasshoppers, Croydon; White Ants damaging cuttings and grafts, Croydon; Long Soft Scale (*Lecanium longulum*), Brisbane, Isis, Mackay.

Pineapple.—Mealy Bug (*Dactylopius bromeliæ*), Nundah district.

Rosella.—Rosella Aphis, Broadwater, &c.; Flea Beetle (*Nisotra bicolor*), Brisbane.

Sugar-cane.—Beetle Grubs, Cairns, Johnstone River, Herbert River, Isis, and Marburg; Wire Worm, Mackay; Stem Gnawer (*Heteronrychus sp.*), Herbert River; Leaf-eating Caterpillar (*Hesperidæ*), Cairns; Grasshoppers (*Œdipoda flava*, Linn.), Ingham.

Tobacco.—Potato Moth Borer (*Lita solanella*), Texas.

Coffee.—Slug-Caterpillar (*Limacocidæ*), Leaf Miner (*? Cemiostoma*), White Scale (*Pulvinaria sp.*), and Stem Girdlers, Cairns and Russell River districts; Seed Weevil (*Bruchidæ*), Russell River.

Banana.—Root-boring Beetle (*Sphenophorus sp.*), Mackay; Fruit-piercing Moths (*Ophideres cajeta*), Bloomfield River; Fruit Fly (*Tephritis Tryoni*), Cairns, Townsville, and Brisbane; Root Nematode or Flask Worm (*Tylenchus*), Enoggera.

Arrowroot.—Bulb Mite (*Rhizoglyphus Robini*), Maroochie.

Leguminosæ (Beans, Peas, Cowpea, Vetch. &c.)—Boll Worm in peas (*Heliothris armiger*); Orange Maize Moth Caterpillar (*Conogethes punctiferalis*), in Velvet Beans (*Mucuna*); Caterpillar of brown pyralid Moth (*? Eucarphia sp.*), Redland Bay; Bean Maggot (*Oscinis sp.*), affecting Cowpeas at Childers, and Haricot Beans, at Brisbane and Redland Bay. Cowpea Bug (*Riptortus annulipes*), affecting Cowpeas at Childers, Bundaberg, and Broadwater; Black Aphis (*Aphis rumicis*), affecting Vetches (*Vicia*) at Ingham, Childers, &c.

Potato.—Potato Moth Borer (*Lita solanella*), Westbrook, Coomera, Kilkivan district; Spotted Lady-bird (*Epilachna multipunctata*), Laidley district; Nematode disease, Kilkivan district.

Sweet Potato.—Potato Weevil (*Cylas formicarius*), Herbert River, Brisbane, Broadwater, &c.; Flea-beetle (*Halticidæ*), Moore's Pocket; Hawk-moth Caterpillar (*Sphinx convolvuli*), Burpengary and Eagle Farm; Green Aphis, Moreton district.

Cabbage.—Leaf-eating Caterpillars (J. Landy); Stem-boring Caterpillar (*Hellula costalis*), Rockhampton; Diamond Moth Caterpillar (*Plutela cruciferarum*), Brisbane, &c.; Cabbage Aphis (*Aphis brassicæ*), Brisbane, &c.

Cucurbits.—Spotted Lady-bird (*Epilachna multipunctata*), Brisbane.

Beet.—Leaf-eating Caterpillar (*Zinckenia recurvalis*), Warwick.

Strawberry.—Green Aphis, Woombye and Nambour.

Wheat.—Grain Moth (*Sitrotroga cereallela*) Roma.

Shade Trees.—Poinciana: Branch-girdler (*Symphyletes albocincta*), Brisbane; Defoliating Caterpillars (*Homoptera ustipennis*), Rockhampton.

Moreton Bay Fig.—Fig Psylla (*Psylla fici*), Brisbane.

White Cedar (*Melia composita*).—Defoliating Caterpillars (*Teara tephrosis*), Toowoomba.

Ornamental Plants.—Gardenia: Red Spider (*Tetranychus telarius*), Pink Wax Scale (*Ceroplastes rubra*), Soft Scale (*Lecanium sp.*), White Scale (*Pulvinaria*), Root Galls (*Tylenchus*), Brisbane. *Acalypha*: Long Soft Scale (*Lecanium longulum*), and Red Spider, Brisbane. *Dombeya*: Red Spider, ditto. *Alamanda sp.*: Green Treehopper (*Flattoides sp.*), Herbert River. *Acacia sp.*: Tick Scale Insect (*Lecanium baccatum*). Rose: Red Scale Insect (*Aspidiotus coccineus*), Brisbane, Broadwater, &c.; Cottony Cushion Scale (*Icerya purchasi*), Toowoomba; Flower Beetle (*Glyciphana brunneipes*), Bundaberg; Duranta: White Wax Scale (*Ceroplastes cerifera*), Buderim Mountain; *Schinus molle*, Soft Scale *Lecanium sp.*), Jimbour and Augathella; *Andira enervis*, White Mussel Scale (*Mytilaspis*), Brisbane, Hawthorn: Black Scale Insect (*Lecanium oleæ*), Warwick.

Timber Destroyers.—Introduced pine wood, Anobium Beetle (*? Theca sp.*), Brisbane.

Pasturage.—Grasshoppers (*Œdipoda flava*), Clermont, &c. Army Worms or Caterpillars (*Leucania obsoleta* and *Spodoptera sp.*), Moreton district.

Miscellaneous.—Flesh-piercing *Hemiptera*, Herberton and Johnstone River; Utilisation of Spider Silk, Cow Fluke (*Amphistoma conicum*), Fowl Lice (*Dermanyssus gallinæ*), Brisbane (the lastmentioned also received from Deception Bay).

Parasites and Predaceous Insects.—Information has been requested concerning the nature, habits, mode of action, and utilisation of many of the natural enemies of insect pests. Amongst these may be mentioned the Scale-eating Moth (*Thalpochares cocciphaga*), the smaller Scale-eating Moth (*Fam.* Tineinæ); the Fruit Fly maggot parasite (*Opius sp.*), and the Aphid parasites (*Aphidius sp.*) and predatory *Syrphus* insects; as well as the parasitic and predatory insects inimical to the increase of the various scale insects, especially those embraced in the coleopterons families—*Coccinellidæ* and *Scymnidæ*.

Note.—The part taken, from the time of its inception onwards, by this Branch of the Department in furthering the knowledge of useful insects has been specially recognised during the year by the arrival of Mr. Howard Newport, a duly accredited agent of the Government of India and of the Central Indian Planters' Associations, to whom had been committed the duty of introducing scale-eating beetles to the peninsula as a means for contending with the various pests inimical to the successful growth of the coffee therein. Instruction was imparted to this officer—whose zeal and ability specially qualified him for the work entrusted to him—as to the localities where the various insects in quest were procurable, their habits, the means to be adopted for obtaining them, as well as regarding their generic and specific determination. And Mr. Newport having already left this colony in the possession of a large number of living Lady-birds, including *Cryptolæmus Montrouzicri*, *Orcus australasiæ*, and *Rhizobius ventralis*, as the outcome of his assiduous labours prosecuted continuously during several weeks in the face of somewhat adverse conditions, there are good grounds for anticipating the ultimate success of his mission.

Identification.—Many insects have been submitted for the purpose of identification, and these, as far as practicable, have been specifically determined. This is a branch of research that alone necessitates a large expenditure of both time and energy.

General Remarks.—Of the noteworthy incidents coming within the scope of this section of the Report, has been the announcement of the discovery of the San José or Pernicious Scale Insect (*Aspidiotus perniciosus*) in both Western Australia and Victoria, and of its wide dissemination in Southern Queensland. In February, 1895, public attention was called in the colony by this officer to its existence in the neighbouring colony of New South Wales, and to the facility with which it spreads from country to country, as well as to its notorious harmfulness; and in the Report of the Entomologist for 1895-6, a paragraph was devoted to the account of its recent arrival in Queensland. Had a Diseases in Plants Act been

enacted when such a measure was first brought before our Legislature, it is highly probable that the opportunity for making this discovery would not have transpired, and the colony would have been spared the presence of so decided an enemy of the orchard. But by November, 1897, the date at which the active administration of the Diseases in Plants Act—passed during the session of 1896—was entered upon, it was found that the pest in question had meanwhile become very generally distributed here in the course of the commercial operations of two firms of New South Wales nurserymen, hitherto doing large business in Queensland. This has been abundantly shown by the investigations in different districts carried on by the Fruit Expert (Mr. A. H. Benson) and the officers associated with him, as well as by the Entomologist's own personal research. It is, however, improbable that any further prevalence of *Aspidiotus perniciosus* will be effected by the means indicated in consequence of the Regulations under the above-mentioned measure, relating to plant importations, now being vigorously enforced. But the fact must not be lost sight of that it is highly prejudicial to the interests of our fruit-growing industry to continue to fail to take cognisance of the existence of the many centres for further dissemination that are known to have already been established in the colony; and that rather should we adopt the procedures prescribed by our Diseases in Plants Act, and that are similar in effect to those already resorted to for a like object both in Victoria and New South Wales; and this notwithstanding the fact that the conditions that obtain in our coastal districts are not so favourable to its numerical increase as are those that are experienced in other colonies, and indeed beyond our own Dividing Range, it being in the former often decimated by a fungus enemy of armoured scale insects, named *Sphærostilbe coccinea*, whose serviceable operations would, however, be at once suspended should a dry season supervene.

Amongst other pests that, already introduced into our orchards, are now becoming generally disseminated, are a Parlatoria scale insect of deciduous fruit trees named *Parlatoria proteus* by the late Mr. Maskell, and a cogeneric scale insect, Pergande's *Parlatoria* or *P. Pergandei*, formerly derived from Florida.

Again, amongst the Soft Scales (*Lecanidæ*) there is the Long Scale (*Lecanium longulum*, Douglas). Although this has existed in the Brisbane district for at least ten years, it has only quite recently been remarked as harmful. It has, however, now found its way into our orchards, in which it attacks the orange, the vine, the persimmon, the custard apple, occasioning on all alike a sooty black investment of fumagine. How readily this may be disseminated will appear from the fact that it has been detected at this office in course of distribution attached to and living upon *Acalypha*, *Poinciana*, *Rose*, *Acacia arabica*, *Abutilon*, *Hibiscus*, *Carya olivaformis* amongst ornamental plants, as well as upon several different kinds of fruit trees.

Already to share the profits to accrue from the cultivation of the Date Palm, two insects have been introduced—viz., the beetle *Dryocætes dactyliperda*. This was brought to Brisbane a few years since in the seeds of that plant. Now, there at least, it bores into its ripe fruit whilst this is still upon the tree. From Egypt or Arabia has been brought a special date-palm scale insect named *Parlatoria victrix*, the specific title having reference to the difficulty that has elsewhere attended its extermination. It has been received at this office from Winton.

VEGETABLE PATHOLOGY.

Numerous instances of constitutional plant derangement, as well as of plants that have suffered through having become the host of fungus and other related organisms, have been referred to this branch of the Department for investigation, as well as for the purpose of eliciting some indication of the means to be resorted to for coping with them. Grouping these under their respective plant-hosts, the following conspectus is produced:—

Apple.—Leaf Mildew, caused by *Podosphæra tridactyla*, Brisbane; Leaf Mould, caused by *Cladosporium sp.*, Stanthorpe; Bitter Rot, caused by *Glœosporium versicolor*, Toowoomba; Black Spot or Apple Fusicladium, caused by *Fusicladium dendriticum*, on imported fruit.

Pear.—Black Spot or Pear Fusicladium, caused by *Fusicladium sp.*, Toowoomba; Fruit Rot of Japanese Pear, Brisbane; Leaf Scab, caused by the mite *Phytopus piri*, Brisbane and Darling Downs.

Peach.—Leaf Pockets, caused by *Exosacus deformans*, Darling Downs; Leaf-shedding, caused by *Puccinia pruni*, Brisbane, Darling Downs, and Maryborough; Die Back, caused by fungus (*gen. et sp. ?*), Woombye.

Apricot.—Leaf-disease, caused by (?) *Puccinia pruni*, Darling Downs; Shot-hole of Leaf, caused by *Phyllosticta circumscissa*, Warwick.

Plum.—Leaf Rust or Shedding, caused by *Puccinia pruni*, Warwick and Broadwater; Gumming of Stone, Brisbane.

Fig.—Fruit Rot, Darling Downs.

Citraceous Plants.—Sootiness or Fumagine, Brisbane and elsewhere; Rotting of Fruit, Logan district; Growth Retardation, caused by Aphis and a special Acarus, Brisbane and Eight-mile Plains; Leaf and Fruit Scabbiness; Browning of Fruit, caused by Oil-cell Mite (*Phytopus oleivorus*), Buderim Mountain, &c.; Gumming of Fruit, Warwick and Redland Bay; Lemon Scab, Cooroy and Brisbane; Black Brand of Oranges and Lemons, on imported fruit; Melanose of Orange, on imported fruit; Die Back, Darling Downs, &c.; Bark Fungus (*Corticeum*), Redland Bay district; Foot Rot, Brisbane district.

Mango.—Black Fungus of fruit causing dropping thereof, Brisbane and elsewhere; Sootiness or Fumagine, ditto; Sterility, ditto.

Vine.—Black Spot or Anthracnose, caused by *Glœosporium ampelophagum*, Brisbane, Ipswich, Stanthorpe, and Maryborough districts; Powdery Mildew or Oidium, Darling Downs; Leaf Spot, caused by *Cercospora viticola*, Brisbane, Darling Downs, and Maryborough; False Black Rot, caused by *Tubercularia acinorum*, Brisbane; Bark Fungus (*Pestalozzia sp.*), Brisbane; Shrivelling of Fruit, Rockhampton; Woody Exostosis of Stem, Roma.

Strawberry.—Leaf Blight, caused by *Sphærella fragariæ*, Blackall Ranges and South Brisbane.

Rosella.—Undetermined disease, Brown's Plains.

Sugar-cane.—Leaf Freckle or False Rust, caused by *Cercospora sp.*, Mackay, Johnstone River, &c.; Leaf Rust caused by *Uredo Kuhni*, Brisbane; Root Rot, Herbert River; Gumming Disease, Bundaberg.

Tobacco.—Leaf Mold, caused by *Peronospora hyoscyami* (*fide* Cooke), Warwick and Brisbane.

Banana.—The occurrence of dense tissue in fruit of the "Sugar" variety at Enoggera; Root Disease, caused by Nematodes (*Tylenchus*), at Enoggera; Fruit Rot, at Blackall Ranges; Fruit Scab, caused by *Glœosporium musarum*, at Brisbane and Bundaberg.

Coffee.—Fungus Disease of Berry, Cairns and Blackall Ranges; Root Rot, Cairns and Russell River districts; Leaf Spot, caused by an undetermined fungus, at Cairns, Mackay, and Brisbane; injury through submergence, Mackay; disease related to the Indian Kelroga (caused by *Pellicularia sp.*), Russell River.

Note.—During the month of February the Press gave currency to a rumour that Leaf Disease (*Hemileia vastatrix*) existed in the Cairns district, but no such disease had been detected during a personal visit made by the Entomologist to the plantation alluded to at a slightly earlier date, nor was any satisfactory evidence in support of its occurrence forthcoming at the time or has since been available.

Potato.—New Potato Disease or Tryon's Disease, caused by *Bacillus vasculorum solani*, Tryon, Toowoomba and Milton; Leaf Disease, probably caused by *Macrosporium solani*, Mackay; partial failure of crop caused by leaf-destroying insects, Kilkivan district; Potato Scab, caused by *Oospora*, Kilkivan district; Potato Pimple, caused by Nematodes (*Tylenchus*), Kilkivan district.

Cucurbitaceous Plants (Melons, Pumpkins, &c.).—Leaf Disease caused by *Erysiphe sp.*, Brisbane.

Sweet Potato.—Sterility, Bundaberg and Brisbane districts.

Pulse.—Fruit Spot of bean, caused by *Glœosporium lindemuthianum*, Brisbane; Leaf Disease of peas, caused by undetermined fungus, Brisbane.

Rose.—Leaf Spot, caused by *Actinonema rosæ*, Brisbane.

FIELD WORK.

From the 23rd August to the 11th November, an absence from office was occasioned by a protracted visit to the Cairns, Russell, Johnstone, Herbert River, and Mackay districts, undertaken for the following purposes:—(1) To make a detailed study of the sugar-canes, originally introduced by myself on behalf of the Department from New Guinea, and under cultivation at the State Nurseries at Kamerunga and Mackay respectively; (2) to inquire into matters relating to the grub pest of sugar-cane in the districts north of Mackay; and (3) to inspect the cultivations of coffee in the districts named in order to ascertain the nature of any pests and diseases from which this plant might suffer.

The observations under the above headings made during this visit to the Northern part of the colony will be incorporated in or form the subject of special reports now in hand; though with regard to the second, the occurrence of an unexpected season of comparative drought prevented the accumulation of such data as it was anticipated would be obtained, and this, notwithstanding the full resources of the Colonial Sugar Refining Company were most generously placed at my disposal for the perfecting of the inquiry.

DISEASES IN PLANTS ACT.

The duties connected with the post of Inspector under "*The Diseases in Plants Act of* 1896," and services rendered as official referee to other Inspectors under this measure, have absorbed a large portion of official time since September, 1897. Their performance also has served often to temporarily suspend investigations that could not be interrupted without detriment to their successful issue. This work forms the subject of a separate Report.

EXPERIMENTS.

The conduct of field investigations relating to the action of insecticides or fungicides in combating special plant diseases and plant-feeding insects, with a view to the discovery of the most appropriate means for contending with them under different circumstances, though constituting a work that is usually regarded as being one of the most important duties devolving upon the official entomologist and vegetable pathologist, as is exemplified throughout the world, has not during the past year claimed the attention of the writer. This has not been on account of any lack in the recognition of its importance to the public interest, but by reason of the continuous demand on his time and resources by work of a different nature. And indeed there is no prospect of this very important requirement being satisfied in the immediate future, unless the assistance of one having special qualifications for conducting this description of work—to act under his direction—be forthcoming. Instruction in the employment of known methods and appliances in combating recognised pests and diseases is regarded as coming within the province of an Instructor in Fruit Culture, and is ably rendered by my colleague, Mr. A. H. Benson, and his staff; but there are numerous instances in which special investigations are called for, which imply for their successful issue a thorough knowledge of both the habits and nature of the pests and diseases to be contended with, as well as of the nature and conditions of healthy plant life generally and of plant structure, that can alone be obtained by exclusive attention to these subjects. This especially applies to the many pests and diseases met with in Queensland, but not experienced in other countries.

PUBLIC ADDRESSES.

Lectures have been delivered at Halifax (Herbert River), and at Wellington Point respectively, before local associations of agriculturists, on the following themes:—(1) Preventative Treatment in Plant Disease; and (2) Measures for coping with the Grub Pest of Sugar-cane in the Herbert River district.

PUBLICATIONS.

The following publications have issued from this office, viz.:—(1) "Destructive Insects Liable of Introduction to Queensland," *Queensland Agricultural Journal*, Vol. I., Pt. 2. (2) "Insect Friends and Insect Foes," *op. cit.*, Vol. I., Pt. 6, October, 1897. (3) "Scale Insects—Coccidæ," *op. cit.*, Vol. I., Pt. 2. (4) "Bees and Orange Blossoms," *op. cit.*, Vol. II., Pt. 1, January, 1898. (5) "Orange-piercing Moths—Fam. Ophiderinæ," *op. cit.*, Vol. II., Pt. 4, April, 1898. (6) "Pernicious or San José Scale," *op. cit.*, Vol. II., Pt. 6, June, 1898. (7) "Preventive Treatment in Plant Disease—Hybridisation and Inoculation,"' *op. cit.*, Vol. II., Pt. 6, June, 1898. (8) "The Synonymy of *Ceratitis capitata*," Wied, *Journ. West Austr. Bureau of Agriculture.*

In addition to these several Reports have been written on different subjects that have been published by the Queensland Press.

COLLECTIONS.

The necessity for the preparation of a general collection of Queensland insects, as well as of one of plant pests, with illustrations of their destructive work, for the purposes of reference and instruction, has been especially felt during the year; but the demands made by other duties have left but little opportunity for the obtainment of such material by personal effort. However, a number of insects of all orders—principally Lepidoptera—have been purchased. This, together with previous accessions, has now been, for the most part, systematically arranged, the individual insects

being, where practicable, specifically determined. In the latter work, moreover, much assistance has been obtained from reference to the Queensland Museum and Library, which have always been made available by tne Curator of that Institution whenever need be. Similar service has also been rendered, from time to time, by several local entomologists. In this connection, also, may be acknowledged the indebtedness of the collections to several private donors, amongst whom the following may be especially mentioned :—Dr. T. L. Bancroft, Dr. J. Turner, Mr. R. Illidge, Mr. F. P. Dodd, Mr. McNamara Robinson, and Mr. L. J. Nugent.

LIBRARY.

Accessions to the library have been made both by purchase and donation. The principal source of income has, however, been constituted by the latter means, and the thanks of the Department are accordingly due to many public institutions and official investigators located not only in the other Australasian colonies but in numerous foreign countries.

TEMPORARY ASSISTANCE.

In the Annual Report for 1896-7 allusion was made in connection with the subject of "Arrears in Work" to a prospect of usefulness in overcoming this, arising from the attachment to this office of a youthful cadet to undergo special training in partial return for services rendered; and it may be now added that Mr. R. Howard Wood, who has been granted for service in this connection, has, by his diligence, served to realise this expectation.

ACCOMMODATION.

It may not be redundant to point out that the accommodation hitherto provided for the Entomologist and his official equipment has not been such as is conducive to the best results accruing from his employment, or to the safe keeping of the property committed to his custody. The special dampness that has characterised his rooms has not only from time to time affected his health, but has also jeopardised the existence of the insect collections, it having been alone practicable to preserve these from the destructive attacks of mould by the adoption of unusual precautions. The same condition affecting them has also served to injure valuable instruments of research, especially microscope objectives and condensers. Moreover, defective lighting has militated against the successful employment of the latter.

HENRY TRYON, Entomologist.

REPORT OF THE DIRECTOR OF STATE FARMS AND INSTRUCTOR IN FRUIT CULTURE.

In addition to my especial work as Fruit Expert, I have undertaken, during the past twelve months, the duty of supervising the establishment and working of the various State Farms, so that the combined duties have necessitated a considerable amount of travelling on my part, and have given me an opportunity of forming an opinion of the farming as well as of the fruit-growing capabilities of a large portion of this colony.

As the two branches of my work have necessarily been more or less distinct, I will deal with them separately, and, in the first place, will give a brief *résumé* of the work already accomplished at the various State Farms, and of the lines on which it was my intention to have worked these farms had my position as Director of State Farms not been abolished.

Previous to the commencement of the financial year, preliminary work, such as fencing, clearing, breaking up land, and the erection of managers' residences, had been partly completed at the Westbrook and Hermitage Farms, but no cultivation of the land, other than that of breaking-up, had been commenced. Work was then pushed forward rapidly, with the result that at Westbrook 28 acres of land were subsoiled and reduced to a fine tilth, 20 acres being planted with fruit trees and 8 acres with vines.

Twenty-five acres of land was also planted with cereals of various kinds, including oats, malting and nepaul barley, several selected varieties of milling wheats, including Marshall's No. 3, Marshall's No. 8, Australian Talavera, Defiance, Tardent's Blue, Allora Spring, and Belatourka; also, a nomenclature collection of wheat obtained from Dr. Cobb of the New South Wales Department of Agriculture, and grown by him at the Wagga Wagga Experiment Farm.

The orchard was planted entirely with deciduous fruits of various kinds that were deemed to be suitable, or likely to prove suitable, to the district. In addition to this collection of varieties of deciduous fruits, a number of varieties were planted with a view to testing their commercial value for drying or canning purposes; thus, several varieties of plums, prunes, peaches, apricots, and pears valuable for drying or canning have been planted in sufficient quantities to enable a good test to be made, and to prove whether the Darling Downs can or can not produce fruit suitable for these purposes, instead of the colony having to import all that are required for local consumption, as is the case at present.

Olives have also been planted, and from the growth that these trees have made at the Hermitage, I have reason to hope that they will become a valuable crop to grow on well-drained soils rich in lime, such as occur in many parts of the Downs.

The vineyard at Westbrook has been planted with a number of wine, table, and raisin grapes, with a view of testing the suitability of same to the soil and district, and to determine the value of the fruit for wine-making or other purposes.

At the Hermitage 22 acres of land was subsoiled, 20 of which were set out in fruit trees, a similar collection to that at Westbrook being planted.

The vineyard, however, simply consists of a collection of wine, table, and raisin grapes, only a few vines of each variety having been planted, the object being merely to test their suitability or otherwise to the soil and climate. Some 35 acres of land was sown with cereals—wheat, oats, and barley. The wheats sown consisted of Marshall's No. 3 and Marshall's No. 8 obtained from Wagga, and of Allora Spring and Belatourka obtained locally.

At both farms, owing to new land, the lateness of the season, and the comparative sourness and unworked condition of the soil, the returns from the cereals planted were not good; but, at the same time, we were enabled to save sufficient seed of the best varieties to plant about 150 acres of wheat at these farms this present season. Great care was taken with the harvesting of the nomenclature and stud wheats, the whole of this seed being saved and thrashed by myself or under my personal supervision, with the result that we have now sown a magnificent collection of wheat at the Hermitage, and only slightly smaller collections at Westbrook and Gindie. At the Hermitage, however, it was my intention to have made a speciality of wheat culture and to have devoted considerable time and attention to this work, and this season's planting has been so arranged by me that, had it been deemed advisable for me to continue this work, I could have gone on systematically with the breeding and improving of wheats, especially so with regard to the improvement of their milling and rust-resisting qualities. This, in my opinion, is one of the most important if not the most important branch of work connected with the State Farms of the Darling Downs and Central districts; and, moreover, it is a work that will require to be systematically and thoroughly carried out if any good results are to be obtained.

In addition to the growth of cereals at the Westbrook and Hermitage Farms, considerable attention has been given to the cultivation of many varieties of crops such as pulses, a speciality being made of cowpeas, sorghums, millets, corn, pumpkins, vegetables of many kinds, root and other fodder crops, &c. And the results obtained thereby are of value to the farming community, as showing what crops to grow and what not to grow in these districts in order to obtain the best results.

In addition to the State Farms of Westbrook and Hermitage, two other farms have been started during the year—viz., one at Gindie, near Emerald, and a second at Biggenden, in the Wide Bay district. A fair start has been made at Gindie, and some 40 acres of cereals, including a large collection of wheats, have been planted, but at Biggenden the work has only been preliminary so far. At Gindie it was my intention to test wheat culture thoroughly, and at the same time to make a speciality of the growth of fodder plants, particularly of our native grasses, salt bushes, and other edible drought-resisting plants. In this alone there is a wide field for experiment, as anything that will tend to improve our pastures, or to save our rapidly disappearing drought-resisting grasses and edible fodder plants, will be of immense value to the colony generally and to the pastoral industry particularly. In my position as Director of State Farms I drafted a scheme for the working and management of the farms, of which the following is a brief outline:—

The work proposed to be carried out was of two kinds—experiment work and work on a commercial scale.

The experiment work embraced every branch of agronomy that the soil and climate of the district in which the farm was situated was suited for.

These experiments were to be conducted—

To determine the most suitable varieties of all kinds of farm crops, economic plants, vegetables, fruit trees, vines, &c.

To determine the best method or methods of growing same.
To determine the best means of utilising the crops when grown.
To carry out experiments in draining, manuring, liming, and general cultivation.
To carry out experiments in the rotation of crops.
To carry out experiments in the feeding of stock.
To carry out experiments in fruit culture and in the drying, canning, and preserving of suitable fruits.
To determine the varieties of fruits or vines best suited to each district.
To carry out experiments for dealing with insect or fungus pests of all kinds.
To carry out experiments with a view to improving existing varieties of grain or other farm crops—fruit trees, vines, &c.—with a view of producing varieties adapted to the climate.
To carry out experiments for improving the natural pastures of the colony, and to encourage and propagate valuable drought-resisting grasses and fodder plants.
To keep an accurate and concise record of all experiments.
To compare the results of similar experiments conducted at different farms.
To compare the results of experiments with the results of similar experiments conducted in other colonies or other parts of the world.
To publish the results of experiments, whether successful or not.
To give information in all or any one branch of agronomy.
To distribute seeds, plants, cuttings, or scions of any new varieties of farm or economic plants—fruit trees, vines, &c.—that prove themselves worth cultivating when tested on a commercial scale.

Work on a commercial scale to be confined to the growing of that crop or crops that are found by experiment to be the most suitable to the soil and climate of the district; in brief, the work on a commercial scale should be governed by the results obtained by the experiment work.

In order to carry out the work mentioned, I deemed it absolutely essential that the working and management of the State Farms should be conducted in a thoroughly systematic and business-like manner; as, in my opinion, the value of the work carried out at the State Farms depends entirely on the accuracy with which the records of such work are kept, as without accuracy the results of experiment work are of little if any value.

In order to obtain this accuracy, I therefore defined the duties of everyone connected with the farms, drafted a set of books for keeping record of all experiment and other work, and emphasised the importance of systematic, business-like, accurate working in everything connected with the farms. I then claimed, and still claim, if the farms are to be a success, that this method of working is absolutely essential, and had I retained the directorship of the State Farms and possessed the necessary authority, I should have endeavoured to work them in this manner.

I now come to my particular work—viz., that of fruit; and as I have now had an opportunity of visiting a considerable portion of the colony since my appointment in November, 1896, I trust that a few general remarks respecting the present state of the fruitgrowing industry, and the possibilities of its future development, may not be out of place in this Report.

From what I have seen of fruitgrowing in Queensland, I am sorry to say that as a rule this important branch of agriculture has not received the attention it deserves, and which is essential to success. In many instances the orchard is looked upon as of only secondary importance to the farm, dairy, or canefield, with the result that it is often kept in a more or less neglected state, and instead of being a source of profit is one of loss and annoyance to the owner; and not only this, it also, on account of its neglected condition, becomes a fruitful source for the breeding and dissemination of all kinds of pests.

Though such orchards are numerous, I am glad to say that they are not universal, as there are many pineapple, banana, orange, and other fruitgrowers in different parts of the colony who make the growing of fruit their main source of income, and who devote the care and attention to their orchards that is necessary to success. One great fault has been made throughout the length and breadth of the colony, and still continues to be made despite all that one can say or write respecting it, and that is—that growers have planted trees in unsuitable soils and in unsuitable positions, and not only this, but they have planted and still continue to plant large numbers of trees that are absolutely unsuitable to the climatic conditions of the district in which they are attempted to be grown. Such injudicious planting in the past has resulted in much loss and many failures, and the trees, where not actually dead, are generally so diseased as to be a source of danger to any other trees growing in their vicinity.

The pruning of fruit trees of all kinds has generally been very much neglected, and the treatment of fruit pests, one or two instances excepted, has seldom been systematically carried out. In some cases the cultivation of the orchard has been well carried out, but in many instances it has been badly neglected.

The handling, packing, and marketing of fruits is often very badly carried out, though in this respect there are notable exceptions, some of the pineapple and citrus growers attending to this very important matter, and placing their produce on the market in a satisfactory manner. This is, however, the exception and not the rule.

As to the possibilities of the future development of the fruit industry in this colony, I am of the opinion that the cultivation of certain fruits can be made a commercial success, but this success will depend on the industry being run on a purely business basis; that is to say, no fruits will pay to grow unless they can be produced of first-class quality and at a low rate, as in order to compete in the markets of the world we must combine quality of fruit with cheapness of production. In order to obtain these results it is essential that the commercial cultivation of fruit be confined to those districts that possess the soil and climate that is best adapted to the production of the fruit or fruits that it is desirable to grow, and that such fruit or fruits only should be grown. This will tend to concentrate the industry, and will cheapen the cost of production, distribution, or utilisation of the fruit, as large quantities of any given fruit can be handled cheaper and distributed or utilised to better advantage when grown in one particular district than when spread over a large area; the cost also of marketing fruit grown in outlying districts and the injury the fruit receives in transit, is so great that the price realised is often insufficient to meet the expenses incurred. The common practice of growing all kinds of fruit in the same soil, whether suitable or unsuitable, cannot be too strongly condemned, as by it it is impossible to produce any one kind of fruit in such quantity that it will pay the dealer or speculator to go to the expense of making the necessary arrangements for the proper handling or utilisation of same, as no business man is prepared to spend money unless he can see a reasonable chance of profit, and to obtain a profit he must have a supply of the right kind or kinds of fruit. Thus, for example, fruitgrowers in a district that is best adapted to the growth of oranges should make the growing of oranges a speciality, or where pines, bananas, lemons, or other fruits of commercial importance do best, the fruit that does best should be made the especial industry of the district. We have large areas of first-class fruit soils in many parts of Queensland, and if those soils are planted with the right kinds of fruit, I see no reason why fruit culture should not become of much greater importance than it is at present. Only few fruits of commercial importance are adapted to Queensland conditions, for though we can grow, and do grow, many varieties of fruit to perfection, there are comparatively few that one can grow that will build up a big fruit industry, as to build up a big fruit industry we must grow fruits to supply markets outside of Australia.

The following fruits are adapted for this purpose in the coastal districts, as if planted under the most favourable conditions they can be grown to great perfection and at a minimum of expenses as compared with other parts of Australia or of the Southern Hemisphere.

1. The Sweet Orange.—When grown to perfection, the Queensland orange is hard to beat. The tree is a rapid, vigorous grower, and very productive, and when grown under favourable conditions, and properly looked after, is easily kept free from disease. The sweet orange, though subject to the attacks of many fruit pests, especially when grown under unfavourable conditions, is naturally so vigorous in this colony when grown under favourable conditions, that it is able to resist and throw off many diseases if given a fair chance to do so.

The sweet orange, ripening as it does from April to September, or at a time that the oranges of the Northern Hemisphere are out of season, is a valuable fruit for export to London or other parts of the Northern Hemisphere, especially as it is a good carrying fruit, when gathered at the right stage and properly handled and packed. Our season being earlier than that of the southern colonies, would permit export from one to two months earlier than they can, consequently we do not clash with them but are able to place our fruit on the home markets at a time when they are practically bare of oranges; and this will insure a ready sale for our fruit.

2. The Bitter Orange.—This is one of the hardiest of our fruit-trees, a vigorous grower, heavy bearer, stands neglect well, and is less liable to injury by insect pests than any other variety of citrus fruit. For the manufacture of marmalade the true Seville orange is the best in the world, and I see no reason why this colony should

not become a very large producer of this commodity, as we can produce the sugar and the fruit required for its manufacture at such a rate that I doubt if the raw materials can be produced elsewhere as cheaply.

3. The Pineapple.—This fruit can also be grown to perfection and produced profitably at a low rate when grown on suitable soils. With the improved methods of ovea-sea carriage I see no reason why pines should not be shipped to Europe successfully and return a fair profit to the shipper; but in addition to this the canning or otherwise preserving of pines should be a profitable industry to combine with the manufacture of marmalade. The pineapple is not injured to any extent by insect pests, the chief sources of injury being due to frost or badly drained unsuitable land, and these drawbacks can be largely overcome by the exercise of ordinary forethought and care.

4. The Mandarin.—The remarks made with respect to the sweet orange apply generally to the mandarin, with this exception: that many of the mandarins grown here are of exceptional quality, and, taken as a class, are superior to the sweet oranges. With careful handling, selection, and packing, I believe that our best Queensland mandarin, "The Beauty of Glen Retreat," could be sent to Europe successfully, and should such turn out to be the case, the extra quality of the fruit will be certain to commend a ready sale.

5. The Banana.—Though this fruit thrives in suitable soils and situations along the whole of the eastern seaboard, I doubt if any large increase in the area at present in cultivation is advisable, as the demand for this fruit is purely Australian, and the market is therefore limited. I do not see a chance of our competing satisfactorily in the Old World markets with this fruit, as the price at which this fruit can now be landed and sold in London is so low that the fruit would not pay for the high freight incurred in shipping from this colony. The only chance of extending this industry profitably is, that we may be able to utilise or preserve the fruit in some manner, and that there is a demand for the product so obtained. In order to determine this matter it is proposed to carry out a series of experiments to determine the best method of preserving the fruit, and utilising same when preserved.

In addition to these fruits there are several others which, if the means of utilising same are available, should be profitable to grow, and of these fruits the mango occupies a prominent position. When the climate is favourable it is undoubtedly the hardiest of the Queensland fruits, standing all kinds of hardship and neglect as well as many indigenous trees, having heavy crops of fruit and thriving in all kinds of soils.

The production of first-class mangoes is very limited, though an enormous quantity of inferior fruit is grown. For really good mangoes I believe there will be a steady and increasing demand once the public of the other colonies get to know what a first-class mango is. I believe a market could be found for high-class preserved mangoes put up in glass, provided the same were got up in an attractive manner, and if so this should provide a good market for this fruit.

There are many other fruits, such as the lime, persimmon, citron, papaw, &c., which could be grown profitably provided we had the means of utilising the same. In addition to coastal fruitgrowing districts we have those of the Downs and Western parts of the colony, and it is to these that we must confine the culture of deciduous fruits, such as apples, pears, European plums, peaches, apricots, figs, quinces, almonds, &c., as though varieties of these fruits will grow on the coast they do not thrive, nor do they produce fruit that is valuable for utilising by means of drying, canning, or jam-making. In the South-western portion of the colony fruits suitable for drying, such as apricots, figs, peaches, raisins, and sultanas can be grown, and, as a rule, those varieties suitable for drying also can well. Fruit-drying as an industry is unknown in Queensland, though I have every reason to believe where water is available for irrigation, and suitable land is selected in the district mentioned, that first-class dried fruits and raisins can be produced. Oranges and lemons can also be grown to perfection under these conditions. In fact, the lemons so grown are superior in every way to those grown on the coast, as the coastal climate, except at a high elevation, such as the top of Tambourine Mountain, just under the range at Toowoomba, or on the Upper Logan, is not suited to the growth of high-class lemons, the fruit being usually coarse and overgrown. Good lemons are grown in the Emerald district when irrigated, and their cultivation should be extended there, as there is always a good local demand for this fruit.

Lemon culture will also pay in the South-west if the trees are planted on well-drained, light soils, and irrigated with suitable artesian water, as there is a steady demand for good lemons in Brisbane and the colony generally, as this fruit is looked upon as a necessity in a climate such as this.

Olives will also do well, especially on and to the west of the Darling and Peak Downs, as though they will thrive alright near the coast, both the trees and fruit are much more liable to the attacks of insects than when grown further inland. Olives do well in any deep, well-drained soil, especially such as is naturally rich in lime, and when the trees are well established they will stand considerable neglect and hardship. At present Australians do not appreciate the value of the olive as a food, but the time will come when it will be looked upon as an everyday article of food instead of being a practically unknown fruit. The olive is both wholesome and nutritious, and its general use would undoubtedly be of benefit to the health of the colony.

On the whole the season's fruit crop cannot be said to have been a good one. The crop of deciduous fruit on the Downs was generally light, and on the coast this crop was practically destroyed by the fruitfly. The mango crop was also light. Pines, however, have done well, and realised satisfactory prices. The banana crop of the Southern part of the colony has been good, and prices fair, but the Northern banana industry has received a severe check on account of the stringent measures enforced in the southern colonies to prevent the introduction of fly-infested fruit. A considerable percentage of the loss could, however, be avoided if the shippers would carefully inspect all bunches before shipment, and cut out and destroy all fly-infested fruit. I strongly recommend this being done, as I have been informed by the Chief Inspector of New South Wales that many bunches of fruit now condemned could be saved were ordinary care exercised. The citrus crop is under the average, but prices for high-class fruit have been good, the Maryborough oranges shipped to the southern colonies having realised satisfactory prices. During the year the Diseases in Plants Act has been brought into operation with regard to the importation of trees, plants, and fruit, and the result is satisfactory, as the quality of the fruit sent to the colony has greatly improved, and no trees or plants are now imported into the colony without being fumigated; such fumigation tends to minimise the chance of any new pests being introduced into the colony. Unfortunately, pests of all kinds have been considerably in evidence throughout the year, and the need of stringent measures being taken to deal with same is becoming more and more apparent if we wish to be able to grow any fruit at all. San José Scale, the most destructive scale insect that attacks deciduous fruit-trees, is unfortunately firmly established in several parts of the colony. This scale made its appearance at the Department's orchards at Gatton, Westbrook, and Hermitage, and very stringent measures have been taken to exterminate it. During the year a number of experiments have been conducted with a view to determining the best methods of dealing with fruit pests, and I am glad to be able to say that, as far as the destruction of scale insects is concerned, I believe that we are now on the right track, and that by the use of hydrocyanic acid gas we shall be able to keep our citrus and mango orchards free from the ravages of these pests. Of the fruitfly, however, I cannot speak so hopefully, though it is my intention to carry out a number of experiments with this pest during the coming season.

During the year I have to report the establishment of an Experiment Orchard at Redland Bay, near Cleveland; 26 acres of land having been obtained from Mr. L. G. Corrie at an annual rent of £31, for a period of three or five years, as may be deemed advisable. The land is of volcanic origin, part originally forest, and part scrub, and is similar in character to a large portion of our coastal fruit soils. The land has been under fruits of various kinds for many years, and when obtained was in a very dirty and neglected condition, and considerably impoverished. The first work has been to take up and burn all worthless trees—pines and bananas—and to thoroughly clean the ground of couch and other weeds. Eight acres of land has been subsoiled to a depth of 20 inches, thoroughly cleaned and planted with bananas and pineapples, vegetables being grown between the rows of bananas. Small patches of corn and cow peas for fodder have been grown, and some 6 acres of land, mostly between young fruit-trees, has been planted with oats, the object being, first, to save expense in keeping down weeds; secondly, to smother out the couch; and, thirdly, to produce feed for our horses. An acre of land has been subsoiled and thoroughly cleaned for planting with lucerne with which to feed our horses, and of the balance of the land a portion has been set aside as a nursery, a second portion has been planted in persimmons, and the balance is fallow, and will be planted with a pulse crop which will be ploughed in as green manure, this portion of the land having been much neglected and in very bad order. Experiments have been conducted with various pulses to determine the variety that is best adapted for growing for green crop manuring in such soils. Experiments have also been conducted in the treatment of scale-infested citrus and other fruit-trees with hydrocyanic acid gas, and arrangements are now being made for a complete outfit with which to give demonstrations of

this method of treatment in various parts of the colony. The important question of orchard manuring is also receiving careful attention, and a series of experiments will be conducted during the coming and following seasons to determine the value of various manures. Records of all experiments will be kept, and same will be published. The work of this Experiment Orchard has been under the management of Mr. James Henderson, who has shown himself to be a capable, enthusiastic, energetic manager, who is both able to do hard work and to keep accurate records of same.

During the year I have written several articles and the monthly fruit notes for the *Agricultural Journal*. I have lectured on fruit and other matters in various parts of the colony, and have attended and acted as judge at several agricultural shows. I paid an extended visit to the Northern coastal districts during the spring of the year, and have paid many visits of inspection to the various State and proposed State Farms and other districts. During February I am glad to say that I was supplied with an assistant (Mr. S. Voller), who, since his appointment, has visited and reported on a number of orchards on the Downs, Isis, Blackall Range, and several other districts. He has given several pruning demonstrations, and instruction in fruit culture generally. He has also assisted in the whole of the cyanide experiments, and has worked hard to perfect the method of applying the gas so as to obtain the best result with the least cost. Mr. Voller has also assisted me in many other ways, such as the pruning and dressing of the Westbrook and Hermitage orchards, and in the work at Redland, and I have found him to be of great assistance to me. He is a hard worker, very careful and accurate in his work, and has got on well with those fruitgrowers with whom he has been brought in contact. With Mr. Voller's assistance I have every hope of doing good permanent work, and of improving the fruitgrowing industry of this colony.

ALBERT H. BENSON.

ANNUAL REPORT OF OVERSEER, STATE NURSERY, KAMERUNGA.

SIR,—I have the honour to submit my Annual Report for 1897-98.

The season has been most favourable up to date, and considerable information has been obtained from almost every branch of tropical vegetation.

The visit of various Government officials, including the Premier, has served to advertise this Nursery, and perchance may lead to more extended operations. Mr. Tryon, the Entomologist, paid this Nursery a visit, and inspected his selection of New Guinea canes, but, acting under your instructions, no general distribution of these canes has been made.

NEW GUINEA CANES.—Several plants of each variety have been sent to the Colonial Sugar Refining Company, from which it is presumed an analysis will be obtained of the values of the different varieties. There is no reason to believe that any single variety may not prove a good milling cane, but some are certainly not estimable from a farmer's point of view: as Mr. Tryon justly remarks, what cane may be good in one district may prove to be bad in another. *Chenoma*, a cane somewhat resembling the China cane, supports this argument. This cane was introduced by the writer some years ago from New Guinea. From Port Douglas a report has been sent from a planter of this variety that excellent results have been obtained both in the field and mill, and the manager of the Colonial Sugar Refining Company at Goondi has classed it, as being one of the "allowed" canes on that plantation under the name of New Guinea "Green or Yellow." By others this cane is condemned. The question of nomenclature of canes has long had my serious attention, and nothing, in my opinion, but numbers is practicable; as, for instance, No. 1 Rappoe, No. 2 Meera, and so on according to the established value. This would make the best varieties apparent and comparison easy. It is necessary, too, to obtain results from different soils and localities, though this would be tedious and difficult.

Kew Seedling.—This cane is a slow grower, and will perhaps be discarded on that account.

New South Wales Canes.—Varieties received from New South Wales, mostly of the Bamboo varieties, seem to have done well, and are appreciated by some growers. They resemble the Rappoe in many particulars, but have not the vigour of that variety.

Moore's Purple is without doubt a strong rapid-growing cane, and in some localities would probably prove a useful cane. It has, however, the habit of growing from the nodes persistently, even before the cane may be said to be ripe.

Malabar and *Tanna* have been excluded from the Nursery. They are useless except as show canes.

COFFEE.—Considerable excitement has been evinced in regard to this plant during the year. It was feared the dreaded leaf disease had made its appearance in one portion of the district, but from the Entomologist's Report on that district there is no sign of that disease. There is one disease, however, at this Nursery as reported last year, and that is the drying of the pulp on to the parchment. This prevents the berry from being properly pulped when first passing through the pulper. *Liberian* and *Maragopipe* varieties are quite out of the question, they both being of peculiar growth and subject to the pulp adherence disease. I fear the climatic conditions below the Range are too forcing. Inquiries have been received from all parts of Australia regarding this plant by persons wishing to experiment. Queensland coffee yields a small berry, but is said to have a better flavour. Considerable areas have been planted in parts of this district, and several coffee pulpers have also been introduced.

RUBBER.—The fact that caoutchouc has of late years been steadily rising in value has been the cause of many inquiries from would-be growers of caoutchouc-yielding plants..

Manihot Glaziovii or *Ceara Rubber*.—This plant does well here, and should give rubber-planters in North Queensland remunerative crops. No proper authenticated accounts of its rubber-producing capabilities are at present available, but it has been found that the seed germinates within a month from time of planting; that cuttings of half-ripened wood strike readily, and that hardened wood will not strike at all. A large plantation of this tree has been arranged, and will probably in two or three years yield sufficient seeds and cuttings to supply any reasonable demand.

Ficus elastica.—This plant does well with us, but as it takes some twenty years' growth before it can be tapped it is not likely to become a favourite.

Para Rubber.—Seeds obtained through Christy, London, failed to germinate. It would perhaps be advisable to get a few plants from Ceylon, as several different lots of seeds have all proved unfertile—perhaps from length of time of exposure.

The rubber question has been the subject of a series of articles in the *Agricultural Journal*, and has been the cause of considerable inquiry from parties outside Queensland. Whether it can be economically produced in our colony has yet to be solved. What is being done at this Nursery may help to elucidate matters; and whether there are any rubber-producing plants in our scrubs has yet to be determined. A diligent search from Cairns northward might be rewarded by finding some.

Correspondence has been opened up with the New Guinea authorities in regard to the rubber-producing plants of that Possession.

Ficus Rigo would seem to be an estimable plant, and it is probable cuttings from this fig will be obtainable. Seeds do not germinate either in this colony or in its habitat.

There seems to be a climber there which gives good results, but unfortunately the plant is sacrificed in collecting the sap. What this climber is I am unable to say, as no specimens were available for our Colonial Botanist. Rubber trees should be planted in sheltered localities. This can be safely said of any variety, Ceara perhaps more particularly.

VANILLA.—The vanilla plant suffers during our winter months, for it is essentially tropical, and in its habitat the thermometer never goes so low as it does here. There have been many inquiries about this plant, but it would seem hardly commendable, except for experiment purposes. It should, however, thrive in the east end of British New Guinea. Supports for the vine must be arranged beforehand. Plumeria, on which most orchids grow well, answers for the purpose. The trees should be planted 10 feet apart, with the cuttings of vanilla at the base.

Up to the present no plants here have flowered, although some of them look healthy enough.

THEOBROMA CACAO (COCOA).—This plant suffers from the cold and the lack of a continued humid, warm atmosphere. It is perhaps more suited for the Russell or Johnstone rivers. Vain endeavours have been made to get this plant to grow in a symmetrical form by pruning, but the abundance of young wood after this process is alarming. Our trees have flowered, but up to the present no fruit has formed.

Cola acuminata (Kola Nut).—Contrary to my expectations, this plant has not flowered during the past year; however, the plants are robust, and show great vigour. Cuttings of half-ripened wood may be struck under a bell-glass or in a properly constructed bush-house. Baron von Mueller is guarded in what he wrote, and it seems that no reliable information can be obtained regarding this useful plant. At present it would appear that the cultivation of the *Cola acuminata* and other like plants in Queensland will remain in abeyance for some time at least.

Carica papaya (Papaw).—This plant has come into great favour recently owing in a measure to the manufacture of papaw sauce in this neighbourhood. The cultivation of this plant is to be recommended, for its fruit makes an excellent vegetable when nearly ripe, and when ripe, as a fruit it is a recognised delicacy. Medical men also advise its use for its digestive quality.

There are several varieties growing here, the only difference being in the shape and arrangement of the fruit, though perhaps one or two may have a more delicate flavour. A pear-shaped one grows apart, and fruits only at the axile of the leaves. One variety is round, and the fruit cluster together round the stalk in such a degree as to quite spoil their formation. Another variety noticed has the fruit borne on a long peduncle; two or more sometimes on the same stalk. The tree gives a return in twelve months, and there is a comparatively steady market. It is advisable to plant the seed where you wish the plant to remain, for it rarely stands transplanting.

Fibres.—The culture of fibre plants has received considerable attention at this Nursery. Specimens of Mauritius hemp, sisal hemp, and Manila fibres have been exhibited in different localities. There are besides several introduced and indigenous fibres growing on the roadsides.

Fourcroya gigantea and *Agave rigida, var. Sisalana.*—The Mauritius and sisal hemp do well here, and there is always an abundance of young plants for distribution.

Musa textilis (Manila hemp) also does well, and there are numerous suckers for distribution.

Bananas.—No variety yet introduced has come up to the Chinese cavendish, and the persistency with which the Chinese farmers grow it is convincing. Except a few of what are called sugar bananas, none others are even looked at.

The discarding of various shipments of bananas in Sydney has had good effect here, and it is more than probable that only very few "affected" bunches will be shipped from this port.

Cæsalpinia coriaria (Divi Divi).—This plant continues to flourish at this Nursery. It is gratifying to learn through the Agent-General that the pods grown at this Nursery last year received such favourable comments by London experts. It is a tree well worthy the farmer's consideration. Several applications for seed have received attention. The season for collecting the pods is now commencing, and applicants for seed can be supplied. It may be well to remark that it is best to have walks between each row of trees, on to which the pods can fall, and be collected without much trouble. When the plant becomes umbrageous no difficulty will be found to keep the paths free from grass and weeds.

Yams (Dioscorea).—The various forms of this esculent have degenerated during the past three years more or less. As, however, there is but little demand from the farmers at present, no harm eventuates. The bulk of last year's crop was given to the aboriginal natives. A patch of new land will be apportioned for its growth this year.

Zingiber officinale (Ginger).—A small plot only of this tuber was planted last year, and comparisons have been made between the Chinese and Indian varieties. It is shown that the former yields a larger tuber than the latter. Our soil is, however, not sufficiently heavy for this crop.

Curcuma longa (Turmeric).—This does very well with us, notwithstanding that an insect pest in the shape of a boring beetle was found infesting it last year. There is a quantity for distribution.

Maranta arundinacea (Arrowroot).—This is a plant evidently at home in North Queensland. Specimens of the prepared article have been sent to the various shows. There is any quantity for distribution.

Elæis guinecensis (African Oil Palm).—This plant continues to bear, but up to the present no fruit has been found fertile, although both male and female flowers were seen on the same tree. Perhaps a sufficiency of time has not elapsed since the last planting of the seeds was made.

Artocarpus incisa (Breadfruit).—This tree bore abundantly during the past season, the fruit proving of excellent quality. An effort will be made to produce young plants from root-cuttings this season.

Citrus Fruits.—This family cannot be said to do well here, the rough-skinned lemon and the Seville orange alone excepted, bark-splitting and numerous pests being prevalent. The former is most deadly. All the Jaffa oranges have perished through this.

Permanent Improvements.—A kitchen has been erected for the use of the labourer who attends to the working of the pump. A cement flooring was placed in November last underneath the office and cottage adjoining. This floor has been badly needed, and proves of great service, especially during the wet season. A slight alteration was made to this cottage by the enlargement of a back room. A road has been commenced along the northern boundary; along the eastern boundary, which connects with the Kamerunga-Redlynch road, a fence has been placed across this road at the north-east angle, thus forming a paddock for pasturing the horses. This fence adjoins the strip of Meston's land, which has been cleared, and was secured by the instructions of the late Minister for Agriculture.

General Remarks.—The pump has been working satisfactorily. It will, however, require overhauling by a competent man during the coming season.

It will be absolutely necessary to purchase a draught-horse for ploughing, harrowing, &c.

The horse we have was purchased eight years ago, and he then was an old horse. It is also desirable that a saddle horse, or in lieu of this a light cart and horse, should be obtained for use here. It is a long walk to Redlynch Railway Station, and in summer visitors are prevented from coming to see the Nursery.

Cockatoos and flying-foxes are here this year in absolutely thousands. Fruitfly destroys all the fruit. Not one orange was allowed to ripen by this pest, although every year the attacked fruit is boiled and buried. The only way to get rid of this pest is to introduce its enemy. The adjacent scrubs also harbour all manner of enemies to the farmer and fruitgrower.

I have, &c.,

EBENR. COWLEY, Overseer.

SCHEDULE A.

Weather Report from 1st July, 1897, to 30th June, 1898.

Month.	Mean Maximum.	Mean Minimum.	Mean Temperature.	Rainfall.	No. of Days.
1897.					
July	78·6	64·4	71·5	1·855	9
August	78·2	60·0	69·1	0·670	5
September	82·0	61·0	71·5	0·790	3
October	89·0	69·0	79·0	1·780	5
November	87·5	72·3	79·9	1·620	6
December	87·5	72·1	79·8	7·310	16
1898.					
January	88·3	74·1	81·2	9·092	18
February	87·5	73·2	80·3	8·918	22
March	82·1	72·3	77·2	25·035	24
April	81·6	69·8	75·7	6·640	20
May	79·1	60·8	69·8	2·980	5
June	71·1	53·2	62·1	1·960	6

SCHEDULE B

SEEDS RECEIVED FROM 1ST JULY, 1897, TO 30TH JUNE, 1898.

Month.	Quantity.	Name of Plant.	From whom Received.
1897.			
July	None received		
August ...	3-lb. packet of each	Coffee seed, Shamam melon, Chrysophyllum, Albizzia	Under Secretary, Department of Agriculture, Brisbane
	Packet of each	Palmyra palm, Umzimbiti, Flowering tree	James Wilson, Zanzibar
September ...	Packet of each	Egyptian melon, Artichoke	Under Secretary, Department of Agriculture, Brisbane
October ...	None received		
November ...	1 lb. seed	Manihot glaziovii	J. Christy, 25 Lum street, London
December ...	1 packet	Albizzia lebbek	Under Secretary, Department of Agriculture, Brisbane
	100 seeds	Hevea braziliensis ... }	J. Christy, 25 Lum street, London
	1,500 seeds...	Manihot glaziovii ... }	
1898.			
January ...	None received		
February ...	None received		
March	Few	Luffa	Under Secretary, Department of Agriculture Brisbane
	Five...	Oreodoxia Regia	Botanic Gardens, Brisbane
April	Small box of each	Oxalis crenata, Manihot glaziovii, Castilloa elastica, Achras sapota	Colonial Botanist, Brisbane

SCHEDULE C.

Seeds and Plants Distributed.

Month.	Seed or Plant.	Quantity.	Number of Persons.
1897.			
July ...	Coffee seed	41 lb.	22
	,, plants	12 ,,	1
	Teosinte, Kaffir corn, ginger, yams	1 lb., 1½ lb., 1 lb., 1 lb.	4
	Kola-nut cuttings	number	1
August ...	Coffee seed	23 lb.	17
	Rubber	24 cuttings	1
	Divi-divi, ginger, sappan, *Cassia florida*, guinea-grass, bauhinia, *Passiflora laurifolia*, teosinte, cassava	from 4 oz. to 1 lb. each	12
	Ptychosperma Beatricæ ...	1 lb.	2
September...	Coffee seed	14 lb.	13
	Divi-divi	4 ,,	5
	Teosinte	2 ,,	2
	Fibre plants	50 ,,	1
	Cowpea, *Manihot glaziovii*, yams, marrow, artichokes	from 4 oz. to 1 lb. each	6
October ...	Coffee seed	6 lb.	4
	,, plants	24 ,,	1 Plantations.
	Each variety of sugar-cane ...	2 doz. plants	1
	Divi divi	2 lb.	4
	Indiarubber (varieties) ...	24 cuttings	3
	Ginger, arrowroot	3 lb. and 9 lb.	4
	Orange (Seville and Bahia) ...	cuttings and seeds	2
	Rosella	1 lb.	2
November...	Sugar-cane	1,336 plants	4 Persons.
	Divi divi	3 lb.	4
	Coffee, arrowroot, cinnamon, rosella	3 ,,	4
December ...	Sugar-cane	210 plants	2
	Bananas	35 ,,	4
	Custard apple and orange ...	7 ,,	3
	Fibre plants	75 varieties	5
	Coffee, teosinte, bauhinia, red Natal grass, rosella, Kaffir corn, rubber plants, mango, poinciana, tamarind	different small quantities	15
1898.			
January ...	Sugar-cane plants	4 bags	1
	Rubber plants	48 plants	4
	Breadfruit	12 ,,	2
	Tamarind	3 lb.	6
	Teosinte	3 ,,	
	Rosella	24 plants	
	Kaffir corn	3 lb.	
	Kola-nut, erythina	12 plants each	
February ...	Sugar-cane plants	8,595 plants	6
	Coffee plants	337 ,,	3
	Divi-divi, Kaffir corn, rosella, papaw, banana	small quantity of each	5
March ...	Coffee	86 plants	2
	Rubber	30 ,,	3
	Six varieties shadetrees (seeds)	packet of each	1
	Arrowroot	4 lb.	2
	Pomegranate	No. of cuttings	2
	Fibre plants	9 plants	1
	Mango, banana, orange, papaw	small quantity of each	3

SCHEDULE C—*continued.*

SEEDS AND PLANTS DISTRIBUTED—*continued.*

Month.	Seed or Plant.	Quantity.	Number of Persons.
1898.			
April ...	Coffee seed	15 lb.	1
	„ plants	70 plants	2
	Sugar-cane	45 „	1
	Date-plum, sweet potato, panicum maximum, croton, bauhinia, ceara rubber, arrowroot	small quantity of each	10
May ...	Coffee seed	36 lb.	10
	Ptychosperma Beatricæ ...	¾ „	2
	Arrowroot	5 „	2
	Custard-apple, pomegranate, divi-divi, papaw, fibre plants, ramie, cassava	small quantity of each	5
June ...	Coffee seed	85 lb.	14
	Papaw seed	8 oz.	2

REPORT OF THE OVERSEER OF THE STATE NURSERY, MACKAY.

SIR,—In submitting my Annual Report, I have the honour to state that the most prominent matters of occurrence were the long-continued drought—which can be said to have covered more than twelve months, for 1897 commenced with the ground in a parched condition—and the cyclone.

The rainfall for the twelve months ending the 31st December was 44·3 inches, of which 24·97 inches fell in August, so that for many months there was a very deficient rainfall, and the lagoon so far dried up that the engine could not be worked to pump water. To obtain water it was necessary to sink a well; but as sinking near the engine was dangerous on account of the probability of the bank not overlaying the original bed of the river, the first well was sunk on the flat pocket, where we were sure of finding water, and at 16 feet a good supply was struck. The windmill is capable of raising a large quantity of water, but a 4-inch force-pump was the largest to be got here, and that was not large enough to keep the 2-inch pipes full. When you suggested another well near the engine, the water in the lagoon had so far dried up that we were enabled to get down to the old river bed, and at 12 feet struck an abundant supply of water; but unfortunately the sinking was in quicksand, and the bricklaying became dangerous, but by adapting the suction pipe to the new source of supply the engine was kept going, but after several days' ineffectual labour, owing to the action of the sand, we had to give it up, for we could not get deeper than 12 feet.

The lagoon might be dammed at the north end, and the water consequently be raised a foot, and thus give a large supply that would be a benefit to the public as well as the Nursery.

Notwithstanding the small amount of rain, it was so well distributed that the cane made good progress here, as well as in the district generally, and had not the disastrous cyclone of 3rd February visited us, a very favourable report would have been possible. That calamity, however, did much damage. The buildings, exposed as they were to the full force of the wind, escaped marvellously—a good proof of their substantial construction. The bush-house, principally built of scrub timber, had become frail, was blown down, and in its fall much of the contents were destroyed; but the worst damage was in the propagating house in the early part of the morning. I had previously found that some of the roof iron had become loose, and had renailed it, but that did not save it, for the whole structure was lifted and cast 42 feet, where it lay in a heap; even the brick walls that are 4 feet high were partly blown down, and most of the contents were destroyed. At 5 o'clock, when the wind had abated somewhat, I went out to try and save some of the plants that were heaped up together, but was blown against the broken wall, and there held until the blast lulled

a little, when by stooping down and backing I got into the shelter of the buildings. The iron was very much torn, but by soldering it was again utilised. The roof has now been fastened down by four irons bent at the ends, let well into the ground and loaded. The buildings have been restored; but the restoration of trees that have been growing since the place was opened will be a slow process; the Para rubber (*Hevea braziliensis*), the trees of which have grown well with stems over 4 inches in diameter, were all broken over excepting two, and on these the branches were much broken. None of the stumps are dead, and are throwing out fresh shoots, but the original tree of the Ceara rubber (*Manihot glaziovii*), which made a 15-feet shoot last season, has been quite killed; however, five of the six are alive, but whether they will survive the winter is not certain. The Para rubber is hardier than the Ceara, and would evidently do well in this district as a rubber-producing tree, but the further North the better it will probably thrive.

The grape vines suffered greatly, and were completely stripped of their leaves, and the ground being so full of wet, the great heat that followed caused them to "break" the buds that ought to have produced the coming season's crop, and I now find when taking cuttings for distribution that three-fourths of the young wood is dead.

The coffee-trees that were in beautiful condition, and had such a crop of berries, have been fearfully knocked about, branches on the windward side being almost entirely swept off, and the trees drawn up. A row of forty-five plants received as Mocha coffee were all killed but one. The large bushes have been stripped on one side, and will take two or three years to fill up. There will be but little seed for distribution this season. The row of lemon-trees that formed such a good windbreak to a part of the grounds were all heeled over, and as they are too large to think of setting up, they must be cut away on the hanging side. Several of the Japanese plums that have grown into large trees, although not all blown over, have died. The Leechee (*Nephelium Litchi*) were all broken excepting two; one only was broken below the graft, the others will yet make bushes, and are now breaking from the stumps. The tree of the Star apple (*Chrysophyllum Cainito*) has stood with very little injury, but it is sheltered by the row of tamarind trees; it bore fruit last season for the first time, and is now showing fruit. The tamarinds stood the storm with very little injury, showing what a hold they have of the ground, and how well adapted they are for planting in exposed places for breaking the wind. These and the large trees of seedling mangoes escaped with little injury. The Indian mangoes have suffered a good deal, one having been blown down altogether, but may yet live lying on the ground. All the others have been heeled over, and as they are too large to set upright, they can only be lightened on the lower side, the roots, however, on the windward side having been broken, the trees will be crippled, rendered unhealthy, and more subject to the scale with which the most of the mangoes in the district are infested.

The Sweet Sop (*Anona squamosa*) were all blown down, but by reducing the weight of branches we managed to set them up again. The Madagascar plums (*Flacourtia ramontchi*) were broken down, excepting one, which was sheltered by some seedling mangoes—large trees; the stumps are, however, alive and are "breaking." The Candle-nuts (*Aleurites triloba*) planted near the lagoon side of the Nursery stood very well, although transplanted less than two years, showing that they also would grow in exposed places; whereas the Rain-tree (*Pithecotobium saman*), several of which are in the same line with the Candle-nuts, seem to have no power to grow upright, but throw their straggling branches all on the lee side, necessitating the cutting away of these branches to relieve the weight. From an ornamental and also from a commercial point of view, the destruction of the row of green wattles (*Acacia decurrens*) planted along the edge of the lagoon that were so much admired by the public, is greatly to be regretted. These trees had grown over 16 feet in less than two years since they were transplanted at about 2 feet high; their airy, graceful foliage was very beautiful, and they were showing flower, but as the water stood 4 feet up around their stems for several days, they could hardly be expected to survive. Several other wattles in another part of the ground, and on a slope where the water could not stand, were also all killed but one small one, which is now showing flower, and from which I hope to obtain seed, for it is evident, presuming that wattle-growing will pay, that the tree is admirably suited to this neighbourhood. The piece of ground to which they were transplanted is very poor. The worst calamity, however, resulting from the fury of the cyclone—but the one that will be soonest remedied—was the destruction of cane, which was twisted, broken, blown down, and consequently rooted up. It also sprouted, causing a great deal of waste, insomuch that it has been cut for plants. There has not been so much taken away for plants as there was in the previous season. The cane here last year was so much

better than the general crop that the farmers came for it in preference to planting their own; this season, however, the general crop being so much better than during the two years past, they have planted their own cane, therefore there is a large quantity to go to the mill. One of the original importations from British New Guinea—Batoe—which has done so well since its introduction, succumbed to the cyclone and to the 43 inches of rain that fell in February, and has shown something like rust. There is a large crop on the ground, but the foliage is brown. I have made inquiries and find that in many places (for it is largely grown) it has shown little or no signs of the browning. The largest portion of it and several other of the older canes will be ploughed out as soon as cut, to make more room for the last importation from New Guinea, for among these there are a splendid lot of canes, and those that have been proved to be indifferent can be well spared, for there are too many varieties. If the analysis of the eighteen that have already been tested holds good in future seasons, they will be a great acquisition, although I know there is an evil report anent them. When the second replant was made there was room only for one row of each, and for the third planting only those that have been analysed and found good were put in. Of the New Guinea varieties I have noticed Nos. 26, 29, 42, and 43 produce good cane on the land outside where no other canes have done any good; they are evidently canes that will do well on very poor land. Yeppoon has been objected to at the Marian Mill as being deficient in sugar, but at Yeppoon both farmers and the mill consider it an excellent cane. Here it produced a very heavy crop. Kewensis still exhibits all its good characteristics—good health and great crop—the farmers, however, object to it as it takes too long to mature; but if planted at the end of August it will come on well at the end of the crushing, and being cut in the warm weather the ratoons would rush up so quickly that it would be ready again for the next season. Even if the ratoons could not be made available it would pay well to plant it every year. The original row which was planted here from plants raised from single eyes is still throwing a heavy crop of ratoons. Louzier, or what some call White Bamboo, one of the canes introduced from Mauritius, still retains its good character, and was all cleared off early this season.

Cane first, and coffee second, are the two products that are looked after in this district; the principal inquiries for information, however, have been about coffee. Fruitgrowing may be looked forward to, but it will be some time yet before it makes much progress. When Mr. Benson came to the district for the very purpose of pressing the subject and instructing, one farmer only made his appearance, and he is in his official capacity. The circumstance was much to be regretted; but it was an evidence how little interest the farmers had in the subject.

Unfortunately four schools in the district arranged to keep Arbor Day on the same date, and having an invitation from each to attend and give instruction in inarching, grafting, budding, and planting, I much regret that it was not possible to attend to all; but as the State schools in Mackay and Hill End were but a short distance apart, I was able to attend to both, and my son went to Walkerston. Coningsby, however, could not be reached. I am glad to say a good deal of interest was shown and attention paid in each case, especially at the State school, Mackay.

The great amount of rain which fell in the end of February, and the cold weather that followed so quickly afterwards, so cooled the earth that the April planted cane is making very little progress. It grew more in one week last season than it has this in three, and unless moisture and warm weather set in after August, it will make cane for plants very late.

I have got a large batch of ramie seed up, and coming up, which will be ready about January.

D. BUCHANAN.

SEEDS, PLANTS, &C., DISTRIBUTED DURING THE TWELVE MONTHS ENDING 30TH JUNE, 1898.

Number of Recipients	142	Seeds in packets	37
Quantity of Sugar-cane distributed	38 tons	Mango (Indian) Stones	300
Quantity of Sugar-cane sent to the Mill ...	45 tons 10 cwt.	Mango Stones in bushels ...	1
Number of Cuttings ...	4,550	Rhizomes in bushels	5½
Seeds in pints	16	Rhizomes in number	354
Seeds in pounds, principally Coffee	112½	Suckers—pines	89
		Plants and Trees	3,257

List of plants, cuttings, seeds, &c., for distribution. In all cases where packages have to go by steamer it is absolutely necessary for applicants to name an agent at the port of delivery. The months named are those when plants, &c., can be obtained.

Plants and Trees.

Bahia orange—February next.
Japanese orange—February next.
Indian orange, Mozambique—February next.
Indian mandarin, Ladoo—February next.
Seedlings of these Indians—February next.
Seedling oranges of fine sorts—February next.
Seedling mangoes—July to December.
Arabian coffee (if not all gone)—April to July.
Pinus insignis—May next.
Brazilian cherry (*Eugenia uniflora*)—July to September.
Madagascar plum (*Flacourtia ramontchi*)—January next.
Mauritius hemp (*Fourcroya gigantea*)—At any time.
Sisal hemp (*Agave rigida*, var. *Sisalana*)—At any time.
Ramie—January.
Indian Fig, Poona—June and July.
Sweet sop (*Anona squamosa*)—January next.

Cuttings.

Grape vines (*Vitis vinifera* and *Labrusca*)—May to July.
Frangipani—At any time.
Duranta plumieri—Best in December and January.
Cassava (*Janipha Manihot*)—January to March.
Pineapple (*Ananassa sativa*)—Any time; but best planted in warm weather; 5 sorts.

Rhizomes.

Turmeric (*Curcuma longa*), curry powder—July and August.
Arrowroot, white (*Maranta arundinaca*)—July and August.

Seeds.

Guinea-grass seeds and clump—At any time.
Teosinte—At any time.
New Papaw (*Carica papaya*)—At any time.
Arabian coffee—July and August.

Meteorological Report to the end of June, 1898.

Date.	Extreme Maximum.	Mean Average.	Date.	Extreme Minimum.	Mean Average.	Rainfall.
1897.			1897.			
1 July ...	78	73·19	14 July ...	39	49·3	1·91
23 August ...	81	74·29	8 August ...	39	50·14	1·18
30 September ...	87	80·2	9 September ..	44	55·0	0·20
26 October ...	93	88·26	31 October ...	56	63·25	2·51½
2 November ...	93	88·22	5 November ...	61	64·20	4·18
10, 14 December ...	94	85·30	8 December ...	63	66·15	12·16½
1898.			1898.			
18 January ...	93	86·27	24 January ...	63	69·28	17·52
20, 21 February ...	90	84·4	4 February ...	62	70·1	43·21
7, 8 March ...	95	83·21	31 March ...	60	67·28	18·17
5 April ...	87	80·9	1 29 April	56	61·25	3·35
28 May ...	84	75·30	22 May ...	42	51·17	1·0
17, 18 June ...	81	74·3	27 June ...	38	52·22	0·29
Mean average maximum for the year	...	81·1	...	...	...	...
Mean average minimum for the year	...	...	...	...	59·91	...
Rainfall for the year ...	...	...	...	...	...	105·69

REPORT OF THE VITICULTURIST.

Sir,—Appointed on 1st January, 1898, to this Department as Viticultural Expert, I was too late to be of any practical assistance to vignerons for the past vintage, except on the Downs. My first work, therefore, consisted in making a tour of the principal vineyards of Queensland, becoming acquainted with the conditions of the viticultural industry of the colony, and making myself known to the gentlemen engaged in it.

Adverse climatic conditions compelled me to return from Roma to Brisbane when the vintage was about to commence, and later on I finished my tour to Warwick and Stanthorpe.

Each month I have contributed an article to the *Agricultural Journal* referring to the more important points of viticulture and winemaking.

I have also attended to applications for advice on various matters connected with viticulture, &c., by vignerons, and tested wines, &c.

With the pruning of the vine, which marks the initiation of the vine cultivation, I have inaugurated a more instructive method of assisting our vignerons than by articles in the *Journal*, and that is by visiting the various districts and giving practical illustrations in pruning, which is one of the most important points in viticulture, and very improperly effected in many of the vineyards. I propose to continue these practical lessons in viticulture at those periods when I consider they would be useful and beneficial up to the time of the vintage, during which the same practical assistance to those vignerons who desire it would, I am sure, prove valuable to them. I have already travelled over a wide area in different districts in execution of this plan.

Suggestions to Make.—It has been proposed that this Department should maintain a State Vineyard in various places for the instruction of Queensland vignerons in viticulture and winemaking. I do not advise such a course. The expense would be great, and in all probability only a few of the nearest vignerons would avail themselves of this system of instruction. More information would be imparted at a less expense by an expert visiting the vineyards at various periods, as already alluded to. I, however, strongly advocate the planting of various qualities of vines at the State Farms adapted to different systems of pruning, which will show what varieties are best adapted to the various districts, a matter that at present is troubling many of our vignerons about to plant a vineyard. Many varieties are condemned in the coastal districts as unsuitable to the climate because in nearly all cases no precautions have been taken against fungus disease. Some of these qualities, if carefully cultivated in a State Farm, might yet prove a success.

Prospects of the Industry.—A large part of the Southern district is adapted for viticulture, and wine could be made there of a quality able to compete in the London market with South Australia and Victoria, but at present the price of labour, casks, and railway freights would prevent them competing in price. Vignerons have therefore turned their attention exclusively to the home market, and with a heavy duty on imported wine in their favour are able practically to monopolise it. But when federation is an accomplished fact Queensland vignerons will have to meet southern competition, a competition that embraces quality and price. In South Australia fair quality grapes, like Mataro Black Cluster and Doradillo, can be purchased at £2 the ton, making about 120 gallons of wine. The finer qualities, such as Carbenet Malbec, Riesling, &c., cost more, as fewer vineyards are to be found planted with these varieties. But it is against wine made from the lower price grapes that Queensland vignerons will have to compete, and similar grapes in Queensland cost £5 the ton, whilst the South Australian vignerons produce a better quality of wine, dry or sweet. It behoves Queensland vignerons, in order to be able to meet this probable competition, to try and reduce the cost of grapes and improve the quality of their wines. Unfortunately, both from climatic causes and the price of labour, the first is a difficult matter, but there is room for improvement in quality, and our vignerons should study how to produce clean, sound, dry, and sweet wines which would compete with outside wine even if the prime cost is somewhat higher; but if they delay doing so until federation is an accomplished fact, and the competition has begun, it will then be *too late*.

E. H. RAINFORD.

REPORT OF THE TOBACCO EXPERT.

SIR,—I have the honour to report upon the work done by me as Tobacco Expert since my arrival in Queensland in November last. On my arrival in the colony I found the tobacco crop already planted, and much of it considerably advanced, and too late to permit of much modification of methods heretofore employed. Have visited the various districts that have heretofore produced tobacco, but found only the Texas and Inglewood districts now growing it, except one farmer at Wallangarra. There is much good tobacco land in these districts, and with improved methods of handling the crop, it should be made profitable. I have arranged in Texas and Wallangarra with several farmers to remodel their curing-sheds, and to adopt modern methods of cultivation and handling, from which we hope to get good results, and to demonstrate to the tobacco-growers a better quality can be produced, and at a lower cost than heretofore. Arrangements have also been made to grow a crop at the Agricultural College. The verdict of the tobacco manufacturers in Australia is that tobacco grown in these districts has the best flavour and is in every way the most desirable of any grown in the colonies.

The output of the Queensland factories for 1897 was 596,026½ lb., of which only about 7 per cent. was imported; against 519,697½ lb. in 1896, of which about 9 per cent. was imported; showing an increase of over 14 per cent., and a relative decrease of imported raw material of 2 per cent. By improving the quality grown we hope to stop the import of the raw material, and make heavy inroads upon the imported manufactured product, and to be able to create an export demand.

I have visited several places in the North of Queensland, and have found some excellent soil for growing cigar tobacco, especially in the Cairns, Bowen, and Rockhampton districts. Have arranged with some forty farmers to grow crops experimentally in these districts. From the above it will be seen that my work has so far been of necessity elementary, as no finished product has yet resulted from it, but I believe the conditions good, and that results in the end will be encouraging.

Respectfully,

To the Under Secretary for Agriculture. R. S. NEVILL.

REPORT OF THE CURATOR OF THE BOTANIC GARDENS.

SIR,—The following Report on the condition and management of the Botanic Gardens during the past year is herewith presented.

GENERAL.—It was very satisfactory to be able to report at the conclusion of the last financial year that the condition of the Gardens had greatly improved during the year then under review, and it is a source of still greater satisfaction to be now able to report that this improvement has been steadily maintained, and that the Gardens are now in as high a state of efficiency as is at all possible with the means at command. A recent well-known traveller and writer, who has visited every large capital in the civilised world, and who has written a book of his impressions of Australia, which is read wherever the English tongue is spoken, thus refers to these Gardens, which he visited a short time ago:—

"Its Botanic Gardens, overlooking the river from near where the Legislative Buildings command a like prospect, are much admired by all visitors. There is a charming public garden not far removed from the centre of the city and overlooking the river, which is a gem in its way, and would be an envied ornament to the best planned city in Europe. It is beautifully planted with all the choicest trees, shrubs, and flowers of this prolific climate, and its great attractiveness invites the citizens to its agreeable shades and riparian vistas for *al fresco* repasts."

It happens that every year numbers of people come from the southern colonies with considerable prejudice against our climate, which they image to be of a torrid nature, but when they see the plants from so many different parts of the world, including comparatively cool regions, flourishing side by side, they not only go back with a much better opinion of our climate, but urge their friends upon their return to be sure on the first opportunity to prove for themselves what is undoubtedly a most remarkable fact.

It is often possible from the object lessons here afforded to prove to visitors on the lookout for investments in this country the marvellous productiveness of our soil and the equable nature of our climate. Calls for information of this nature are frequently made here; it is always freely given, and the seekers referred to your office for the information at your disposal relative to the rich farming and dairy lands of the colony.

COST.—In estimating the work done in any public institution, the question of cost is a very important one, since of course, as in every other undertaking, the results bear (all other things being equal) a direct ratio to the ways and means.

This is the ninth Annual Report submitted to you by the present Curator, and during these nine years the sum spent upon the Botanic Gardens has been positively £240 less than the sum spent upon them during the nine years immediately preceding. In other words, during the past nine years the sum of £2,209 7s. 8d. per annum was expended, and during the preceding nine years £2,236 1s. per annum, showing a decrease in expenditure of £26 13s. 4d. per annum. How does this compare with the expenditure of the other botanic gardens of Australia? These are the figures: Melbourne, 1897-8, £6,478; Sydney, 1896-7, £6,140; Adelaide, 1897-8, £5,550; Brisbane, 1897-8, £2,234.

Everybody who cultivates a garden in Queensland knows that at certain seasons of the year the growth of vegetation is so great that a staff which would be more than sufficient to cultivate a piece of land of the same area in a southern colony, or in Europe, is simply overwhelmed for the time being; and the fact that during the past year these Gardens have been not only kept in a creditable condition but greatly improved, and, as I have pointed out, with less expenditure than formerly, is due solely to the proper use made of the best and most improved machinery which the funds would admit of, and what is believed to be a greatly improved system of organisation.

Of the whole vote of £2,234, 74 per cent. has been spent in wages, all other expenditure accounting for 26 per cent.

Unemployed.—Four years ago the numerous Brisbane unemployed were sent to work in these Gardens on the principle that every man who performed a day's work to the satisfaction of the Curator should receive a week's rations for himself and family in payment thereof. They were chiefly employed in performing work which could not be regarded as in any sense competing with outside labour. The greatest possible care was taken that their status here was precisely that of any other man engaged in the ordinary work of the place, and they were uniformly treated with the consideration and respect which is due to every man who is earning his bread, as they were. In the first month, June, 1894, 1,287 days' work were performed; in December of the same year it had fallen to 584. Last month, June 1898, it was 34, or an average of about one man per day. It is hardly necessary to add that this accession to the available labour is of no consequence whatever. There is one thing which ought to be placed on record to the credit of the unemployed. Although it was freely prophesied at first that great difficulties would arise in dealing with these men, brought together under circumstances of some irritation, and put to unaccustomed work, it is pleasurable to be able to report that during the four years not a single instance of insubordination has occurred. They have always at least done what they have been told, so far as they have been able, and without difficulty or grumbling. The average daily attendance of the unemployed for twelve months has been 2·8. In the half-year, July to December, 1897, 564 days' work were done; and in the half-year, from January to June, 1898, 325 days' work have been done, a falling-off in the last half-year of 239 days' work. The class of men who come now are those who are physically unfit for any regular or laborious work, but who are infinitely more content under the present conditions, and it is believed of less expense to the State, than if they were compelled to seek the shelter of a State institution, where the rigid discipline and regularity, to which they have never been accustomed, becomes at first irksome, and finally hateful.

Weather.—No less than 48·80 inches of rain fell during the year under review over and above the quantity registered for the previous twelve months. The figures are—1896-7, 31·40 inches; 1897-8, 80·22 inches. In the four consecutive months, December, 1897, January, February, and March, 1898, 53·87 inches were registered, the heaviest fall in twenty-four hours being 5·32 inches on the 21st March, 1898. The highest temperature recorded was 92 degrees on the 17th February, 1898, and the standard thermometer reached 90 degrees on two other occasions only. The only occasion upon which the thermometer fell below 40 degrees was on the 26th June, 1898, the minimum then registered being 38·3. The daily maximum temperature ranged from 60·8 to 92 degrees, the daily mean being 77·56. The daily minimum temperature ranged from 38·3 to 74 degrees, the daily mean being 59·19. The following are the totals of rainfall for the twelve months:—

1897.	Inches.	1898.	Inches.
July ...	3·82	January ...	16·96
August	1·38	February ...	10·31
September	3·36	March ...	15·51
October	6·90	April ...	1·05
November	3·36	May ...	3·34
December	11·09	June ...	3·14
Total			80·22

Flood.—On the 12th January, 1898, flood-water entered the Gardens to practically the same height as in 1890, but, however destructive to other interests, the precautions taken after the flood of 1893 allowed the waters to pass again so swiftly that the damage done was comparatively trifling and soon remedied. Recently there have appeared in the Press reports upon the improvements of the Brisbane River, in some of which it has been recommended that a portion of the point of the Domain and the Gardens, which has been formed by the deposit of alluvial matter in the slack water of the river, should be cut away. In the great flood of 1893 the river itself cut away about as much of this point as the then abnormal condition of the river seemed to demand, and no doubt the work of providing for the rapid exit of the flood-water by the construction of training-walls at the mouth of the river, cutting off Kangaroo Point, &c., will be proceeded with before the cutting away of this point is seriously considered.

What it is desired to direct attention to is the possibility (should it be imperatively necessary at any future time to cut away this point) of using the material cut away to form an embankment right round the Domain and Gardens from a point in Alice street near the corner of William street to the Masonic Hall, half-way down Alice street. This embankment would be made irregularly upon the Gardens' side so as to form natural-looking gullies. It would have a carriage road on top with trees and so on, and with the addition of a floodgate or two, would be an effectual defence against any future flood. Of course this method of disposing of the material would be cheaper than sending it out to sea, but it would have to be removed in a dry condition as in an ordinary excavation, and not by means of pump dredges.

Plant Diseases.—Part of the ordinary business of every garden consists of one perpetual fight against insects and fungi injurious to plant life. In the absence of any authenticated case during the centuries which man has been engaged in this warfare, of his having succeeded in exterminating a solitary enemy to plant life, it is not confidently hoped by the writer that this miracle is going to be now accomplished. But that persistent effort directed no less to general cultivation, drainage, judicious pruning, selection of non-susceptible plants, and the elimination (so far as convenient) of susceptible ones, than to the application of insecticides and fungicides, will reduce most pests of horticulture within manageable limits, is proved by the fact that the insect and other pests in these Gardens are now insignificant in number when compared with their appalling profusion eight or nine years ago.

The experience of cultivators throughout the world has ever been that the combating of insect pests has to be taken "in the day's work." Dr. J. A. Lintner, the Government Entomologist of the State of New York, estimates that at least 15,000 distinct species of injurious insects have been named and described in the United States alone, and that between 7,000 and 8,000 of these are justly entitled to be called pests. When it is remembered that owing to conditions favouring the multiplication of one of these species it may suddenly assume formidable proportions, as has been the case with so many of these pests, it will be seen that here alone is an army of potential foes sufficient to occupy the attention of the cultivator for the present generation at all events.

It has been several times pointed out in reports of these Gardens that good cultivation is one of the most important factors in keeping plants clean, and by endowing them with a vigorous constitution enabling them to make headway against their enemies. Nearly every wash, such as Kerosene Emulsion, Bordeaux Mixture, Eau de Celeste, London Purple, Paris Green, and others, the composition of which was sufficiently distinctive to warrant a trial, has been in use here. Our stock insecticides are Kerosene Emulsion and a resin wash, varied in composition to suit the plants upon which they are used. The destruction of insects on living plants by surrounding the latter with an atmosphere of hydrocyanic acid gas has, of course, long ago passed out of the experimental stage, and the proportions of cyanide of potassium, sulphuric acid, and water used for its generation at present is that recommended in your report for 1891-2, Bulletin No. 16, p. 16.

The experience here is that it requires a little study and care to use this gas with the best effect, but all observations up to the present prove one thing—viz., that in the proportions referred to, which are practically those of the Government regulations, it is absolutely fatal to every insect hitherto observed here. It appears that there has recently arisen some doubt upon this point, because it has been suggested that plants which are treated here according to the Government requirements should be detained for some days with a view to deciding whether certain scale insects had been really killed by the process or not. It should be a very easy matter to decide once and for all whether the process prescribed by law is, or is not, to be depended

upon in the case of any given insect. To keep plants which are intended for distribution in a garden or nursery, which, from the very fact of cyaniding being considered necessary, is presumed to be infected, is only to expose them to further infection between the times of cyaniding and sending off.

As regards the cyaniding of large plants, it is, as you are well aware, always done by the use of a tent; but for growing plants in nurseries, we find here that a very light wooden frame covered with oiled calico, and readily lifted about by one or two men, as the case may be, is more manageable than a loose tent or cover. For very small parcels of plants any air-tight box suffices, even a kerosene tin turned mouth downwards has been used with success. It is found that ants can be destroyed by generating the gas over their nests, and placing over the vessel a kerosene tin to confine and force it into interstices of the anthills.

There are two matters which appear to be very often overlooked by those who recommend certain courses of action with regard to insect pests with a view to their extinction. These are, practicability and cost. Take, for instance, some of the scale insects. They are to be found in every garden, large and small, in the neighbourhood of Brisbane, and often in such positions that neither cyanide gas nor any other insecticide can be brought to bear upon them. The large weeping figs, for instance, which lend such a charm to the scenery of Brisbane, are, wherever planted, covered by the pink waxy scale; but they are in many instances 60 feet or more in height. They cannot be covered by a tent, nor effectively reached by any ordinary spraying apparatus. It has been clearly proved in America that scale insects are transported from place to place in the larval condition by birds, and indeed it has been found that certain insects have special organs to enable them to cling to birds with this very object. So long, therefore, as these trees stand in their present condition, districts in which they are can never be said to be free from such insects. This difficulty has been so clearly recognised in America that the system originally instituted in the State of New Jersey of giving certificates that particular nurseries and orchards were free from disease, has had to be abandoned in that State because, amongst other things, as has been explained by the State Entomologist, the examination necessary to enable an inspector to conscientiously give such a certificate for a large establishment would occupy a considerable portion of his lifetime, since he would find it necessary to begin again when he had made one inspection. (See *Agricultural Gazette*, N.S.W., May 1898, p. 533.)

I have endeavoured during the past year to obtain the use of a small steam-pump belonging to the Hydraulic Department, with which I hoped to demonstrate the American method of spraying by steam-power, in use in several public parks in New York and elsewhere. The conditions, however, upon which it was possible to obtain the loan of the machine, such as its repair and so on, it was not found convenient to comply with. It is believed by the writer that this system of steam-spraying, though even now of proved efficacy, will be found eventually in point of convenience, speed, usefulness, and cheapness, to be superior to the cyanide process. Just as in the old country it was usual to see a steam threshing-machine going round from farm to farm, so a steam-spraying plant could serve the needs of a large number of individuals, the largest as well as the smallest trees being accessible, and that without the nightwork necessary with the cyanide process. The mention of nightwork suggests the question of cost. Where there is a large fruit ranche all set out in lines, and with proper appliances for quickly shifting the tents, the cyanide process can, of course, be effectively carried out on moderate-sized trees with some degree of celerity; but in a place like this, for instance, where the trees are of all sizes, and where some of the staff would have to be kept up at night to do the work at a maximum rate of about one tree an hour with one tent, it is not considered that practically the cyanide process offers any advantages over a persistent use of liquid insecticides. Just as it is possible for a merchant to spend upon bookkeeping more than he makes out of his business, so a gardener may very readily spend upon cleansing his trees more than the trees themselves are worth.

In an Indian paper published recently, and largely read by persons who might be our best and most intelligent money-investing emigrants—I mean Indian civil servants and planters—this country is described as "pest-stricken Australia." I deny the truth of the statement. It is not half so pest-stricken as India. We cry out more about it, that is all, perhaps because we are younger. There seems little use in sending commercial agents to Europe and America to induce trade and immigration if we are not prompt to nail the statement that the country is pest-stricken, or if we allow intending emigrants of the very classes who may be of the greatest service in our horticultural industries to infer that these industries are handicapped by the presence of pests which it is found necessary to take very extraordinary and expensive

measures to cope with. The writer contends, as he has all along, that this country is no worse than others of like fertility in the matter of insect pests. So far as these Gardens are concerned the inevitable struggle is being fought out, but in the direction of insect control and not of insect extermination.

To frame pest remedies in an office is one thing, to apply them in the field or garden is another, and a very different thing. Thus the magnificent figs of fifty years' growth here are supposed to have no scales on them. Well, they have scales in abundance. So have thousands of trees of all sorts in this district alone. They cannot be cut down, and although to clean them is not perhaps impossible, it would be most expensive, and they would soon be as bad as ever with insects from the trees over the way. I feel bound to point out these practical difficulties on behalf of many struggling people who really cannot afford to follow all the directions of a man with a microscope. Science has been, and will ever be, of the utmost assistance in practical horticulture, but the man of science must allow the man of action to examine the proposals of the former from his own point of view, and not expect him to blindly adopt methods which the scientist himself would not, and could not, adopt under similar conditions. Every effort within the range of practice continues to be made in the direction of controlling insect and fungoid pests, and the provisions of the Insect Diseases Act are closely adhered to.

Machinery.—The mowing machines obtained during the last financial year have done splendid service. The introduction of these machines has relieved the staff here from the most laborious work of mowing with scythes during the hot summer months. A good plough has been added and two small garden ploughs of an improved variety, which will be described and illustrated in the *Queensland Agricultural Journal* for August next.

Bicycles.—In the Report for last year it was pointed out that special regulations for bicycles were desirable; complaint was also made that when the Gardens were unsually crowded, as on Saturday and Sunday afternoons, the use of bicycles by inexperienced riders was positively dangerous. With the exercise of ordinary care and courtesy no difficulty need ever arise, unless the number of bicycles brought into the Gardens should become much larger than at present. Some bicyclists, however, seem incapable of exercising either courtesy or care, and of course there is a tendency to judge all by the sins of the very few. As a matter of fact, there is no by-law dealing with cyclists in any shape or form, except the one which prohibits the entrance of any vehicle except by special permission. If only one bicycle gate were allowed, *i.e.*, at Edward street entrance, and if bicycling were prohibited on Saturdays and Sundays after 2 p.m., and if the Curator were empowered to require any person riding in such a way as to be a danger or annoyance to pedestrians, or causing injury to the Gardens, to remove his machine and not to allow that person to ride in the Gardens again, the matter could, it is believed, be satisfactorily dealt with.

Should it be found necessary to restrain bicyclists to the river drive, or even to exclude them after the above suggestion has had a fair trial, they will then, of course, understand that they have only themselves to blame for this restriction of their privileges. Of late, some bicycle instructors have made it a point to give lessons to their pupils upon the Garden walks. For several reasons these lessons should be given in a riding school, but the one which chiefly concerns us is that as it takes some little time to learn to guide a machine, persons venturing along these walks are in frequent danger of being run into, and have to dodge in order to avoid collision with learners, who generally require the full breadth of the road to zigzag upon. It may be pointed out that if bicyclists desire to retain the privilege of viewing the Gardens on their machines, it will be necessary that the practice of using them as a riding school shall be discontinued, as this leads to more remonstrance on the part of pedestrians than anything else. With one bicycle gate only, some control can be exercised by the simple expedient of locking an offender in, and, if necessary, impounding his machine. There should be a by-law to enable this to be done. I shall be glad to frame short by-laws if desired.

Kiosk.—The refreshment Kiosk during the past year has increased in popularity, and now fully bears out the opinion expressed, when it was first established, that the opportunity of having refreshments of superior quality in the open air, and amid pleasant surroundings, would be largely availed of. The opportunity for a midday outdoor relaxation, conveniently distant from hot and dusty streets, is now eagerly seized by many business men from the city, who frequently meet their families and friends at luncheon under the shade of the surrounding trees. Mr. Muling, the proprietor, who has conducted the establishment with much courtesy and success

during the past seven and a-half years, is now erecting, as an addition, an ornamental shelter for use on wet days or during the sudden showers which occasionally fall during the summer season.

PROPAGATING.—A new bush-house has been built for propagating purposes, and a new nursery formed. This and the new seed-raising house are described, and the latter illustrated, in the *Journal* for May, 1898.

PLANT LABELLING.—This is always a work of some difficulty here. The climate always proves particularly injurious to labels, and where zinc is used an oxide forms which renders the writing very obscure. Varnish soon wears off under the sun heat. All plants are numbered and registered if of any particular importance, and afterwards labelled.

SHADE GARDEN.—The shade garden, or bush-house, continues to attract large numbers of visitors. It is kept in a high state of perfection, but care is taken not to allow cultivation to deprive it of that natural appearance which is its chief charm.

GLASSHOUSES.—These have been filled with charming plants during the year, and as weather permitted these were exhibited in the small showhouse off the shade garden. It is proposed to utilise a piece of ground below the shade garden for the reception of delicate or rare plants which cannot be placed in the shade garden. They will be protected by wire netting, as plants of this type are, more than others, likely to disappear mysteriously if left unprotected.

ECONOMIC PLANTS.—The number of plants which may be called by the above title, signifying that they minister to the wants of man directly, is simply enormous, and every now and then one attracts popular attention, and has all sorts of excellences ascribed to it. In ninety-nine cases out of 100, the plant is found, though useful in its way, not at all what it was described to be, and quickly sinks out of sight to be again "discovered" and experimented upon in course of time. No garden possesses anything like a tithe of the useful plants of the world. Our collection here is large, and new species are constantly being added, and from month to month in the *Journal* of the Department these are described by me, their positions in the Gardens pointed out, and their propagation and cultivation indicated.

In this way the information reaches the cultivators of the soil, and I have been greatly pleased to receive notes of appreciation from far-away places, in some cases from old comrades whom I have not seen for a good many years. This shows the far-reaching nature of the operations of the Department.

PALMS.—These Gardens are fast becoming noted for their tropical palms, and the number is being added to.

Those recently planted have begun to show vigorous growth, and during the year seeds of these magnificent plants have been received from abroad, and many seedlings raised.

HILL GARDEN.—A piece of land known as the Hill (about 5 acres) has been always a kind of waste, with a coarse, uneven patchy turf. It has now been thoroughly ploughed and cross-ploughed, and will be immediately manured as far as practicable, and laid out in borders for useful and ornamental plants. In grouping these, botanical affinities will be adhered to as far as practicable without sacrificing scenic effect. On the portion not so planted a leguminous crop, such as cowpea or velvet bean, will be grown for one year in order to supply the land with the nitrogen it so badly wants. This will then be ploughed in. This hill garden will be above flood level, and when the plants begin to grow, which will not be long in this climate, it will be very instructive and very beautiful, commanding a view of the rest of the Gardens and the river.

MUSIC.—The Police and Rifles Bands played here upon one occasion for each band during the past year. It is regrettable that some means cannot be found of inducing the military bands to perform here more frequently. In Sydney and Melbourne beautiful bandstands have been erected in the Gardens; that in Sydney is now being completed by the Government of that colony. The bandmasters very naturally object to play in the structure which is known as the bandstand here.

CORRESPONDENCE.—The number of letters copied and registered outwards was 708, as against 405 the previous year. Five hundred and forty-two letters have been received. Fifty-three letters, covering twenty-nine additional papers, have been referred here for report by you, and were duly reported on.

A large number of minutes referring to the work of the Gardens have also had to be written—orders made out, vouchers checked, and seed-lists prepared, &c. Seeds and other consignments as they come in have to be attended to. All this demands a large amount of clerical work.

Exchanges, Distribution, &c.—During the year exchange relations were maintained with the Botanic Gardens at Antigua, Bangalore, Baroda, British Guiana, Calcutta, Cape Town, Ceylon, Cooktown, Dharbangah, Durban, Freiberg, Gambia, Ghorpuri, Gold Coast, Grenada, Gwalior, Hongkong, Jamaica, Kew, Kurrachi, Lagos, Lahore, Mauritius, Mysore, Nagpur, Old Calabar, Ootacamund, Penang, Perak, Saharanapur, Singapore, Toowoomba, Trinidad, Udaipur.

The various Queensland State Farms, Acclimatisating Association of Southern California, Agri-Horticultural Society of Madras, University of California, Colonia Cosme, Paraguay, and with horticulturists at home and abroad.

Plants, seeds, &c., were distributed to forty-seven schools and a number of public institutions, churches, hospitals, cemeteries, State Farms, Gatton College, &c. The number of plants distributed in this way and by way of exchange was 5,165 and 1,143 packets of seeds. Lists have been published in the *Journal* of seeds and plants available, and this will be continued from time to time.

Stock is being taken of plants, &c., available for distribution. There is a large quantity, and a list will shortly be issued.

Staff.—No change has been made in the *personnel* of the staff since the date of the last Report. With the development of agricultural activity in the colony generally, and as a natural result of my great desire to render the Gardens, even with scanty means, of the highest possible credit to the State and to the Department, the work has very greatly increased, and more is expected from the staff than formerly, not in long hours, since these have been shortened without disadvantage, but in forethought, interest, and the sense of duty which urges a man to prevent a thing going wrong if by any means in his power he can set it right.

Men attending to special divisions send in at the end of each week a brief report of what has been done in their divisions for that week, and they are invited to note special facts of interest from a horticultural standpoint which come under notice. These reports are initialled and noted by me, and all are sent round to each of the writers, so that each may have full knowledge of, and be interested in, all that is going on. These reports will be submitted to you. They are proving of educational value to such of the writers as endeavour to improve. They will form a useful record, and it is particularly satisfactory to note that the fullest and most interesting up to the present are those written by one who commenced here as a boy nine years ago. The provision of a proper messroom and the formation of a small library of useful books for the staff are things to be desired.

Visitors.—The number of visitors is ever on the increase. Very little damage is done as a rule. Some person or persons, however, steal young plants directly they are planted out. This leads to an inconvenience greater than the loss of the plants, as it makes gaps which are often difficult to refill. It seems incredible that any sane person should expose himself to all the disgrace of an appearance in the police court, and the certainty of fine or imprisonment, for such a small advantage. In the shade garden small plants are sometimes pulled up by the roots. This has not been so frequent of late. It was apparently the work of some discriminating person, as a rare plant was sure to vanish. There is another class of visitors who consider their names of such importance to the world at large that they must scratch them on cactus leaves and carve them on tree trunks, garden seats, &c. It may not be generally known that by criminal law this offence is punishable by a fortnight's imprisonment. But the persons who take up the time of the workmen in idle gossip are perhaps the most objectionable. The workmen have instructions to courteously refer persons seeking information to the office, and any man who allows visitors to take up his time and attention with gossip is likely to have his services dispensed with.

Walks.—Two asphalt walks are badly in need of repair. This cannot be done out of the ordinary vote.

Government Domain.—The pleasure grounds of Government Domain were formerly kept by a gardener and one assistant. During the past two years another assistant has been added, and the vote increased from £300 to £400 per annum. During the year under review 93·5 per cent. of the vote has been spent in wages, and 6·5 per cent. in sundries.

I have, &c.,

PHILIP MACMAHON, Curator.

The Under Secretary, Department of Agriculture, Brisbane.

ANNUAL REPORT OF THE CHIEF INSPECTOR OF STOCK AND REGISTRAR OF BRANDS FOR 1897.

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE, BRISBANE.

Sir,—I have the honour to submit the following Report on the working of this Branch Department of the Agricultural Department for the year 1897:—

The following Acts are administered through this office:—Diseases in Sheep Acts, Diseases in Stock Act, Live Stock and Meat Export Act, Brands Act, Sheep Brands and Marks Act, Marsupial Destruction Act, and Impounding Acts. The Stock Institute is worked as an adjunct to this Branch Department, and the assessment under the Meat and Dairy Produce Encouragement Act has hitherto been collected through this office.

SHEEP.

The number of sheep in the colony as at 31st December last, classified according to the pastoral districts, together with the increase or decrease in each of the districts, are given in the following table:—

Pastoral Districts.	1897.	1896.	Increase.	Decrease.
Burke	1,780,801	1,681,435	99,366	...
Burnett	31,913	25,907	6,006	...
Cook	408	860	...	452
Darling Downs	1,967,768	1,795,079	172,689	...
Gregory North	1,559,783	1,432,739	127,044	...
Gregory South	347,715	359,561	...	11,846
Kennedy	644,414	4,275	640,139	...
Leichhardt	314,230	943,152	...	628,922
Maranoa	1,772,810	2,143,313	...	370,503
Mitchell	6,120,624	7,494,732	...	1,374,108
Moreton	7,064	6,926	138	...
Port Curtis	21,352	22,281	...	929
Warrego	3,225,495	3,680,462	...	454,967
Wide Bay	3,506	2,974	532	...
Total	17,797,883	19,593,696	1,045,914	2,841,727

Showing a decrease of 1,795,813, equal to 9·17 per cent.

Of the decreases, it will be observed from the above table that 2,828,500, or over 14 per cent., occurred in the Leichhardt, Maranoa, Mitchell, and Warrego districts, and are, of course, attributable to the late severe drought.

The number of sheep imported during the year was—

	No.		Value.
By sea	13,418	...	£44,161
Overland	277,350	...	96,413
	290,768	...	£140,574

The number of sheep exported during the year was—

	No.		Value.
By sea	360	...	£155
By the borders	1,113,910	...	262,731
	1,114,270	...	£262,886

The numbers of sheep operated on at the various meatworks during the year 1897, were—

Frozen—		
Lake's Creek	32,710	
Gladstone	16,788	
Eagle Farm	12,340	
Geddes, Birt, and Co.	6,342	
Queensport	5,656	
Ross River	3,373	
	———	77,209
Tinned—		
Lake's Creek	62,772	
Queensport	43,800	
Oakey Creek	39,160	
Eagle Farm	9,291	
Gladstone	5,158	
Ross River	29	
	———	160,210
Extracted—		
Oakey Creek	52,772	
Longreach Boiling Down Works ...	97,026	
	———	149,798
Boiled—		
Westbourne	251,596	
Longreach	125,938	
Torrens Creek	125,000	
Blythdale	27,991	
Oakey Creek	26,987	
Lake's Creek	21,346	
Raceview	12,000	
Selma	11,627	
Gladstone	3,034	
	———	605,519
		992,736
Exported during the year	1,114,270	
		2,107,006

With the exception of intestinal worms on the older occupied pastures, where many of the more nutritious grasses and herbs have disappeared, from long continuous feeding, no diseases in sheep has been reported during the year.

CATTLE.

The numbers of cattle in the colony as at 31st December last, classified into the pastoral districts, were as under :—

Pastoral Districts.	1897.	1896.	Increase.	Decrease.
Burke	1,104,215	1,154,712	...	50,497
Burnett	440,301	429,888	10,413	...
Cook...	259,804	155,127	104,677	...
Darling Downs	294,256	263,245	31,011	...
Gregory North	589,752	523,558	66,194	...
Gregory South	304,445	259,482	44,963	...
Kennedy	752,417	715,569	36,848	...
Leichhardt	726,233	681,716	44,517	...
Maranoa	275,844	383,004	...	107,160
Mitchell	167,894	324,931	...	157,037
Moreton	344,536	319,086	25,450	...
Port Curtis	354,014	492,762	...	138,748
Warrego	346,065	671,978	...	325,913
Wide Bay	129,237	132,319	...	3,082
Total	6,089,013	6,507,377	364,073	782,437

Showing a decrease of 418,364, or 6·42 per cent.

It will be seen from the above that in only two tick-infested districts (Burke and Port Curtis) has there been a decrease on last year's numbers, and that of only 11 per cent.; while in the other two infected districts (Cook and Kennedy) there was an actual increase of 16 per cent. Of the decrease of 782,437, the drought must be held responsible for 76 per cent. But in respect of the decrease in Burke and Port Curtis, it has to be borne in mind that the drought was also very severe, so that a large portion of that decrease must be credited to that cause. It will thus be seen that the statement made in my interim report of March last has been verified by the returns made under the Stock Returns Act—namely, that although there have been severe individual losses through ticks, the aggregate losses in the tick infested districts have not been so great as have generally been reported.

The number of cattle imported during the year was—

	No.		Value.
By sea	54	...	£1,936
Overland	13,143	...	26,350
	13,197	...	28,286

The number of cattle exported during the year was—

	No.		Value.
By sea	*Nil.*	...	*Nil.*
Overland	176,329	...	£535,873
	176,329	...	£535,873

Numbers operated on at the various meat-curing establishments during the year 1897 :—

Frozen—		
Bowen	29,124	
Eagle Farm	24,918	
Ross River	20,815	
Queensport	19,627	
Geddes, Birt, and Co.	11,605	
Lake's Creek	9,226	
Gladstone	7,727	
		123,042
Tinned—		
Queensport	25,398	
Lake's Creek	21,172	
Ross River	4,881	
Gladstone	3,082	
Eagle Farm	1,654	
		56,187
		179,229
Extracted—		
Alligator Creek	38,328	
Burdekin River	15,653	
Bowen	9,453	
Ramornie	5,885	
Mackay	1,366	
Longreach	900	
Ross River	625	
		72,210
Boiled—		
Broadsound	5,281	
Mareeba	5,000	
Ross River	4,338	
Gavial Creek	3,602	
Kingston (Bowen)	3,343	
Gladstone	3,277	
Selma	2,504	
Belle River	2,500	
Lake's Creek	2,032	
Torrens Creek	1,700	
Blythdale	965	
Boolburra	360	
Raceview	200	
Burdekin River	50	
Mackay	4	
		35,156
		286,595
Exported during the year	176,329	
		462,924

Pleuro-pneumonia.—Cases of this disease have not been numerous during the year, and those of a sporadic character. Mr. Pound deals more fully with this subject in his Annual Report.

Mr. W. C. Quinnell, the Veterinary Inspector under "*The Live Stock and Meat Export Act of* 1895," has directed my attention to articles in the *Veterinary Record* of 16th April and 7th May, 1898, which, if correct, will revolutionise the practice of inoculation as a preventive of pleuro-pneumonia, inasmuch as the virus can—if the information is correct—be cultivated apart from the animals' bodies, and thus completely freed from contamination; and, in addition, will place us in the position of keeping constant supplies on hand and in all seasons.

Discovery of the Pathogenic Microbe of Contagious Pleuro-pneumonia.

M. Nocard, who has done so much for agriculture, as well as for medicine, human and veterinary, has, in conjunction with Dr. Roux, at last discovered, it is said, the micro-organism of contagious pleuro-pneumonia of the ox. Making known his communication to the Central Veterinary Society of Paris on the 31st March, he said that the microbe is certainly, and very much so, the smallest of any of those known, and it is for this reason that it has hitherto escaped all other researches. It is scarcely visible even when the highest powers and the most powerful illuminations are used. In consequence of this, the authors conclude that it can only be recognised by cultures or even by the effects of cultures inoculated into susceptible animals. Isolated by successive series of culture, this microbe kills oxen as does the most virulent serosity. (L'Eleveur, 10 Avril, 1898.)

A small quantity of fluid cultivated in collodion sacs when injected into five Brittany cows caused the development of the absolutely characteristic pleuro-pneumonia engorgement. One of these succumbed with a formidable œdematous infiltration, the other four resisted. Two of them reinoculated in the defended region with a strong dose (one cubic centimetre) of pulmonary serosity did not absolutely manifest any local or general symptoms, whereas a fresh cow inoculated at the same time as they, with ten drops of the same serosity, succumbed twenty-two days after inoculation. A third cow reinoculated after four months with a cubic centimetre of pulmonary serosity derived from a sub-acute lesion did not exhibit any local lesion or fever. The fourth cow has not yet been reinoculated. (Revue Veterinaire, 1er Mai, 1898.)

TUBERCULOSIS.

Tuberculin is now being prepared at the Stock Institute, and it is satisfactory to be able to report that many owners of valuable stud cattle are taking advantage of this valuable diagnostic agent with a view to weeding out of their herds all stud cattle which react to the test. By this means, if owners will more generally adopt this test, a few years should show a marked diminution of tuberculous animals in the herds of the colony. In the Annual Report of the Director of the Stock Institute, which appears as an Appendix to this Report, this subject is dealt with in detail.

SYMPTOMATIC ANTHRAX (Blackleg).

Cases of this disease have been somewhat numerous in the Southern coastal districts. This subject has also been specially dealt with in the Report of the Stock Institute.

TICKS (Diseases in Stock Act).

A large expenditure was incurred during the year in connection with the administration of this Act, principally in maintaining a large staff of inspectors and a number of patrols on main roads leading from infected centres. Special attention has been devoted to experiments for the purpose of testing the value of inoculation with recovered blood in the protection of cattle from tick fever. When its efficacy had been proved by Mr. Pound, Director of the Stock Institute, and Dr. Hunt, Government Pathologist, arrangements were made for the distribution of blood, and for the instruction of owners in the mode of

inoculation. The Director of the Stock Institute has visited many centres in the South, giving lectures on the subject and demonstrations of the practice, and Dr. Hunt and his assistants have given weekly demonstrations in the Rockhampton district. It has been deemed advisable, for a time, to employ agents instructed by the Institute to visit different centres in Southern Queensland to instruct owners in the operation, and each of the stock inspectors in the infested districts are also giving practical instructions in the manner of defibrinating blood and the use of the hypodermic syringe and clinical thermometer. Details of the various tests that have been carried out by the officers of the Institute are also supplied in the annexed report. While special attention has been and is being devoted to this subject in the South, Dr. Hunt, Government Pathologist, has been engaged in the Central district investigating the conditions of tick infestment, without apparent disease, where it has occurred in such tick infected areas as those at Boolburra and Mount Cornish. He is also engaged in an investigation of the causes which in other infested areas have delayed the appearance of fever for long periods—in some instances years—after the cattle had become grossly tick infested. In the course of his progress reports, Dr. Hunt has supplied detailed results of actual experiments conducted by him, which have shown that cattle taken from a clean inland district and placed in contact with tick-infested cattle in the Boolburra infected centre have become grossly tick infected without contracting the fever; that blood from grossly tick-infested cattle in the Boolburra infected centre when injected into clean cattle in a district far removed from infection, produced no reaction; that grossly tick-infected cattle from the same centre were travelled for thirty-seven days, and exposed to all the hardships attendant on travelling on the roads and being yarded at night without producing the fever; and finally some cattle from Boolburra that had been tick-infested for two years without any apparent sickness, were placed in tick-infested country near Rockhampton, where the mortality from tick fever had been very severe, with the result that when they became infested with fresh ticks in the coastal districts, all suffered from acute fever, and over 60 per cent. succumbed. These results led Dr. Hunt to the conclusion that some cattle ticks are not contaminated with the micro-organisms of tick fever. This question becomes a complicated one when taken in connection with the fact that the ticks on Mount Cornish and Boolburra cattle—where in both places no fever has yet appeared—were the direct progeny of those left on those pastures by the Fort Constantine and Brighton Downs cattle in November, 1895, in which there were not only a heavy mortality while the cattle were *en route*, but which also caused the serious mortality in cattle at North Rockhampton. Dr. Hunt is now engaged on a series of experiments, conducted with a view to ascertain, if possible, how or where ticks acquire the contamination and become pathogenic. As these experiments and investigations are intended to lead up to results which—when they become established facts—will be turned to practical account, it is not deemed necessary for the present to embody in this report all details, as at a later period I will submit for approval a recommendation that all ascertained facts in connection with the investigations, together with the data on which they have been based, be collated and printed in the form of a Bulletin for general information. In the meantime, it may be confidently affirmed that in inoculation we have an agent which is capable of reducing the losses from tick fever to a very small minimum.

Dr. Hunt has also undertaken to carry out experiments with a view to the discovery of a dip which will, without injury to the cattle, effectually cleanse them by one dipping.

Dr. Hunt has submitted a summary of results of his investigations, which is given as an appendix hereto.

PARALYSIS (Rickets).

The paralysed condition in cattle—improperly termed "Rickets"—resulting, as it is generally assumed from cattle eating the macrozamia plant, has caused much more serious losses than those from ticks in some portions of the coastal

districts. At my suggestion, Dr. Hunt has undertaken to study the nature and course of this disease, with a view to practical suggestions for its prevention, and he has been promised the active co-operation of several cattle-owners in the investigation.

INSPECTORS.

With the extension of the ticks to fresh areas, it has become necessary to make several changes in the distribution of the staff of inspectors, it being desirable to station these officers so as to concentrate their work on the outskirts rather than in the centre of infection. It will also be desirable to rescind some of the quarantined areas north of the northern and southern quarantine lines, which have been maintained at considerable cost to the department, but which are now rendered unnecessary in consequence of the intervening spaces, formerly clean, having now become infested.

BRANDS ACT.

The number of brands allotted and registered during the past year was 748, and the total number registered up to 31st December, 1897, was 38,375. The number transferred up to 31st December, 1897, was 6,298.

Cattle-owners now recognise the injury done to hides by branding on the more valuable portions, and although most of them are unwilling to dispense with their present brands, many have adopted the recommendation of tanners of imprinting the brand on the least valuable portions of the hide, such as low down on the thigh and shoulder. The subject of amending the Brands Act was carefully discussed at Rockhampton on the 12th May, and the conference unanimously recommended amendments in the Act which would permit of the use of single-piece brands, and the adoption of a systematic registration of earmarks which should, when taken in conjunction with the brand, be held to provide *primâ facie* evidence of the ownership of the animals.

MARSUPIALS DESTRUCTION ACT.

The number of scalps destroyed (1,522,835) during the year 1897 is a record, being nearly double the number destroyed in the preceding year, and greatly in excess of any previous one year's operations. The great increase is under the heading of kangaroos and wallaroos, the number being 684,077 as against 288,658 for the previous year, showing an increase of 395,419. The number of paddymelons destroyed is also very large, while a satisfactory increase is shown under the heading of dingoes.

With the close of the year "*The Marsupials Destruction Act of* 1895" expired, and "*The Marsupial Boards Act*, 1897," came into operation. In the latter the system of endowment has been completely altered by the introduction of a sliding scale, by which it is intended to provide additional assistance to those districts and special districts where it is found necessary to levy the maximum assessment of 2s. 6d.

It is estimated that over 12,000,000 marsupial scalps have been paid for by the Marsupial Boards since the first Act came into force in Queensland, and it is a well-known fact that many hundreds are destroyed annually which are not presented for payment.

The largest returns for the year are sent in by the Warrego Board, being 203,512, followed closely by the Barcoo Board with 200,426, the Northern Downs Board coming third with a total of 132,987 scalps.

It has not been found necessary to proclaim any new districts during the period under report, but several alterations in boundaries are now under consideration.

A statement of each Board's operations is appended hereto.

STATEMENT OF OPERATIONS for the YEAR ending 31st December, 1897.

Board.	SCALPS DESTROYED.						Total.
	Kangaroos and Wallaroos.	Wallabies.	Paddymelons.	Bandicoots.	Kangaroo Rats.	Dingoes.	
Aramac	89,386	6,931	...	...	400	249	96,966
Barcoo	95,356	103,330	...	...	770	970	200,426
Belyando ...	25,472	8,668	...	...	...	...	34,140
Booringa ...	8,592	...	48,625	...	2,156	1,008	60,381
Boulia	...	...	...	...	...	496	496
Bowen	229	...	...	...	...	22	251
Bulloo	32,563	1,906	..	...	...	3,270	37,739
Bungil	498	31,198	...	...	3,127	850	35,673
Burnett	5,657	...	11,292	...	...	1,664	18,613
Camooweal ...	322	6	...	...	...	464	792
Clermont ...	...	...	...	...	...	...	100,918
Cloncurry ...	111	6	...	...	...	977	1,094
Dalrymple ...	8,044	...	...	...	...	561	8,605
Dawson	6,665	...	9,285	...	1,122	...	17,072
Diamantina ...	...	...	...	...	...	895	895
Eastern Downs...	1,325	39,834	...	35	2,126	334	43,654
Gogango ...	735	7,042	...	1,642	...	770	10,189
Gregory	43,126	548	...	...	7	125	43,806
Hughenden ...	41,812	1,824	...	...	383	601	44,620
Leichhardt East	4,174	14,361	...	...	172	...	18,710
Leichhardt South	11,641	77,939	...	9,074	...	3,041	101,695
Mitchell West ...	55,555	...	...	...	...	409	55,964
Northern Downs	130,359	...	...	...	1,090	1,538	132,987
Paroo	24,728	...	...	...	54	241	25,023
St. George ...	...	...	50,067	...	...	2,301	52,368
Waggamba ...	7,839	23,592	...	...	84	1,186	32,701
Warrego... ...	55,018	145,711	...	...	644	2,139	203,512
Western Downs	8,588	70,657	...	...	1,778	561	81,584
West Moreton ...	2,350	...	28,164	5,714	...	598	36,826
Windorah ...	23,932	473	...	...	...	730	25,135
Total ...	684,077	534,029	147,433	16,465	13,913	26,000	1,522,835

IMPOUNDING ACTS.

Several irregularities in the conduct of pounds have been investigated and adjusted during the year. The local benches who appoint the poundkeepers exercise little, if any, surveillance over them beyond that required of them under sections 32 and 34 of the "*Impounding Act of* 1863," in certifying that the animals intended for sale have been properly described, and signing orders for the sale of unbranded cattle. Further experience of the working of this Act only emphasises the recommendations I have previously made that the administration of the Impounding Act should be transferred to the municipalities and divisional boards throughout the colony.

"LIVE STOCK AND MEAT EXPORT ACT OF 1895."

Appended will be found reports of the various inspectors on the working of this Act. It can be confidently asserted that no disease-tainted meat has left these shores for other countries; but, unfortunately, a considerable amount of meat in inferior condition has been shipped from Queensland on owners' account, and the authorities in England seem to regard our veterinary certificate as to freedom from disease as also certifying as to the quality of the meat. It is safe to assume that the meat companies, in their own interests, have not shipped meat of inferior quality; but most of them also operate on stock on owner's account, and it is the latter class of exports that have been unfavourably commented on in the British market. I have long foreseen that such a contingency as this was likely to arise, and your instruction to submit for discussion at the recent Conference at Rockhampton the question as to whether our meats

and other products of the soil should not be "graded" prior to shipment, afforded an excellent opportunity for ascertaining the feeling of the representatives of the pastoral industry on the subject. The expression of opinion on that occasion was most emphatic in favour of the adoption of classification; and a Bill embodying the suggestions of the Conference has been submitted for approval.

The recent condemnation of Queensland mutton per "Buteshire," and the unsatisfactory reports on some of the butter shipped per "Jumna," afford strong evidence for the necessity of such a measure.

Through the Agent-General, a copy of the report of the Royal Commission on the danger to man through the use of food of the meat and milk of tuberculous animals has been received, and it is satisfactory to know that the recommendations of the Commission as to the instructions to be issued for the guidance of meat inspectors are identical with the practice of our veterinary inspectors at the various meatworks, decided upon at a conference of Messrs. Quinnell and Barnes, V.V.S., two years ago, and adopted by all the other inspectors.

I have, &c.,

P. R. GORDON,
Chief Inspector of Stock.

REPORT FROM THE DIRECTOR OF THE STOCK INSTITUTE.

(Mr. C. J. Pound.)

Tick Fever Experiments.

The most important research work of last year was in the continuation of the study of tick fever and its prevention, to which I briefly referred in my last Annual Report.

On the arrival of the recovered animals from Inkerman, preventive inoculation experiments were commenced at the Indooroopilly Station in February, 1897, and carried on for several months in order to determine the most satisfactory method of obtaining blood from the recovered animal and injecting it into the animal to be protected. It was found that for withdrawing blood, a specially designed trocar and canula was very much superior to the usual (now almost obsolete) instrument, the fleam. The most suitable instrument for injecting the defibrinated blood is a hypodermic syringe such as is used for injecting the anti-toxic serum for diphtheria in human beings. From time to time several additional improvements have been added, including a bi-way tap or in its place two automatic valves, about 12 feet of thick-walled rubber tubing, and a specially constructed needle. With this complete outfit the operator has absolute control over the animals, thereby rendering inoculation an extremely simple process, and so rapid that over 200 bullocks can be operated on under the hour; moreover, it can be guaranteed that each animal has been efficiently inoculated with the standard quantity of blood.

Some of the experimental animals inoculated with recovered blood were subsequently inoculated with a large dose of virulent blood, but no reaction followed whatever.

By April the inquiry had reached a stage where it was necessary to test the efficacy of preventive inoculation by the application of the improved methods on a large scale, which resulted in the experiments at Mundoolun, where forty-one animals were inoculated with blood in doses of from 1 to 10 cc. from a recovered Inkerman animal. Subsequently thirty-five of these protectively inoculated animals, together with twenty-two uninoculated or control animals, were sent to Inkerman, a grossly tick-infested district. Within three weeks after arrival all the twenty-two controls became very sick and emaciated, and suffered severely from tick fever, and 40 per cent. died. The following is a very important observation: Of the inoculated cattle, those which were injected with 5 cc. or more of recovered blood, and all those which had fever after inoculation with less than 5 cc. of blood, remained healthy when subsequently submitted to gross tick infection; but those that were not affected with fever after injection of a very small quantity of blood afterwards suffered from a severe form of fever, and two died when placed in a tick-infested district.

The results of these carefully conducted experiments, which afford very valuable information, have formed the basis for all our subsequent experiments. They prove that it is absolutely necessary for an animal to have had fever in some form (either mild or acute, which can be produced by inoculation of recovered blood) in order to protect it from a subsequent more fatal attack of fever, either produced naturally by ticks, or artificially by inoculation; and moreover, this remarkable power of resistance can only be brought about with anything like safety and certainty by injecting not less than 5 cc. of defibrinated blood (which has been recommended and adopted as the standard dose for animals of all ages and sexes) from an animal which has recovered from natural tick fever or one that has been inoculated from it—*i e.*, every successfully inoculated animal will in about six weeks after inoculation supply blood to inoculate other cattle with; and, according to our latest researches, the protective properties may be carried on through a large number of successive generations, without any perceptible degree af attenuation or alteration.

Since the success of inoculation has been demonstrated, there has been a demand for stud and herd bulls from New South Wales and Southern Queensland. In the case of bulls which, after inoculation, were left unmolested in a good grassed and well watered and shady paddock, not a single death occurred, and the animals, although naturally sick from the effects of inoculation, made rapid strides towards recovery. On the other hand, however, of the bulls which were driven for some distance to the place of inoculation and immediately afterwards driven back and placed in an indifferent paddock, a considerable number died. And in another case where, in order to carry out a certain experiment, it was deemed advisable to take the temperatures of a number of bulls after inoculation every night and morning for about three weeks, several died, while no deaths occurred among four times the number of young animals (steers and heifers) which were subjected simultaneously to precisely the same conditions and treatment.

These observations and facts very clearly confirm the experiments carried out in 1893 in America by Drs. Schroeder and Kilborne, who state how essential it is that all classes of animals be well cared for before, during, and after inoculation. It is worthy of mention how carefully these rules are adhered to by some stockowners. On some stations all inoculations for tick fever are carried out either early in the morning or towards sundown, and the operations being allowed to proceed steadily and cautiously without any attempt to break a previous day's record, which is so characteristic on some other stations I have visited: and after inoculation all animals are allowed to travel slowly back to their natural pastures and camping places, and last, but not least, the animals are never disturbed or molested in any way whatever until they have perfectly recovered from the fever produced by inoculation.

Although bulls and adult cattle generally are more or less susceptible to acute fever from inoculation, which in a small percentage of old animals, especially bulls, may be attended with fatal results, it should be specially pointed out that mortality from inoculation amongst calves and yearlings is practically unheard of.

Experiments with Filtered (Recovered and Virulent) Blood.

The question has frequently been asked: Does the blood of animals affected with or recovered from tick fever possess, apart from the micro-organism, any property of a toxic or anti-toxic nature, or would filtered, recovered, or virulent blood, if injected into susceptible cattle, be the means of rendering animals part or wholly immune to an injection of unfiltered virulent blood or to gross tick infection?

To determine this, the following experiments were carried out:—

About 600 cc. of recovered blood was taken from the original Inkerman steer, and after passing it through (under pressure) a Pasteur-Chamberlain filter in order to exclude all possible traces of the specific micro-organisms, I injected three steers and three heifers, all of which were healthy animals, each receiving about 70 cc. of the filtered blood.

Simultaneously three steers and three heifers were injected with the same quantity of filtered blood obtained from an animal suffering from a severe attack of acute fever.

The whole of the twelve animals were kept in a paddock, and although their temperatures were carefully recorded morning and evening for twenty-four days after inoculation, no perceptible rise was noted, nor was there any noticeable alteration in the condition of any of the animals.

On a subsequent date each animal was injected with 10 cc. of unfiltered virulent blood, with the result that each of the twelve animals suffered from an acute form of fever, and two died.

In another experiment at Mundoolun four steers and two heifers were injected with filtered recovered blood and showed no reaction. Several months after four of the above animals were sent to Inkerman and placed in a grossly tick-infested paddock, and within fourteen days each animal exhibited most pronounced symptoms of sickness and fever, and on the eighteenth day after arrival one died.

The remaining two animals at Mundoolun were each injected with 8 cc. of unfiltered recovered blood from the same Inkerman steer. Result: In both animals the fever commenced on the eleventh day, reaching the maximum on the fourteenth, and descending to normal by the twentieth, when both animals recovered.

Although the experiments in this direction are still in progress, sufficient evidence has been adduced to show that the blood of recovered or fevered animals does not contain any toxic or anti-toxic properties, and that immunisation can only be accomplished in susceptible animals by the introduction of the specific microprotozoa of tick fever.

Examination of Various Specifics for the Cure of Tick Fever.

Since the Intercolonial Stock Conference held in Sydney in August, 1896, a very large number of specifics for the cure of tick fever have been received and carefully examined in the laboratory, and in some instances, where necessary, subsequently tested on cattle affected with the disease by either Mr. E. T. Hancock, Inspector of Stock at Mackay, or Veterinary Inspector B. O. Meek, at Bowen.

Up to date nearly 300 different specifics have been received from various parts of Australia and New Zealand.

Usually a very lengthy letter accompanies each different specific, stating that the latter is undoubtedly a certain cure for tick fever.

Needless to say, most of these so-called specifics are ridiculous in the extreme; in fact, the majority of the people who send them have neither seen the cattle tick nor have they apparently, from the tone of their letters, read any of the official reports or literature on the subject of ticks and tick fever; consequently all this results in a vast amount of unnecessary correspondence, also a great deal of time is taken up in testing the action of the remedies on ticks and their eggs and larvæ and upon the diseased cattle.

Up to the present time I have never found any one of these different specifics answer to all the special points the owner expected of it; and, moreover, there were a large number that proved absolutely impracticable, even if they were found in any way to be efficacious.

Collection of Tick Specimens.

In consequence of the very keen interest that has been centred in the tick question, and the number of visitors calling at the Institute for the express purpose of gaining information on the nature and characteristic appearances of the different varieties of ticks, successful efforts have been made in forming a collection illustrative of the life history of the various species of ticks which are found attached and peculiar to our native and domestic animals.

It has been found by experiment that a 3 per cent. solution of Formalin will preserve the ticks in as nearly as possible their natural colour.

I have received a number of cattle ticks for identification from various other countries, including South America, South Africa, India, Ceylon, Batavia, and New Guinea, and it is interesting to note that in these countries where tick fever is or has been present, the ticks coincide in all their anatomical characters, &c., with the Queensland cattle tick. This is very valuable information with respect to India and Batavia, as both these countries, the former importing horses and the latter cattle from Australia, intend to place certain restrictions upon these animals for fear of introducing the cattle tick, which not only already exists in these countries, but the cattle there have evidently, in consequence of many years of constant tick infestment, acquired immunity to tick fever. In any case the matter is one which can easily be tested.

Lectures on Ticks and Tick Fever, and Demonstrations on Preventive Inoculation.

Apart from my official duties I have devoted a considerable amount of time and attention in preparing an extensive series of lantern photographic transparencies illustrating the complete life history of the cattle tick, the micro-organisms of tick fever in various stages of development, tick-infested cattle, country favourable and unfavourable to tick life, and maps showing the geographical distribution of the cattle tick, also a series of photographs illustrating in detail the various preventive inoculation experiments, &c.

By the aid of the lantern and the above photographs I have delivered upwards of fifty up-to-date lectures in various towns and station centres in pastoral districts, including Rockhampton, Brisbane, Gladstone, Bundaberg, Maryborough, Gympie, Rosedale, Tiaro, Mount Perry, Gingin, Gayndah, Kilkivan, Degilbo, Mount Cornish, Edenderry, Curra, &c. At each of these various centres I have also given practical demonstrations on the method of preventive inoculation for tick fever, and the use of the various instruments that are required in the process. The different inspectors of stock that I have met during my travels have also been personally instructed and supplied with the necessary instruments, in order that they might render every available assistance and impart reliable information to stockowners in their respective districts.

The demonstrations and lectures have in every case been highly successful, and at each centre have been attended by a large and representative gathering of stockowners, all of whom manifested a keen interest in the whole of the proceedings. On each occasion from twenty to 100 calves were inoculated in order to supply blood for the inoculation of the general herds in the surrounding districts.

In accordance with a request from the Honourable the Minister of Agriculture for New South Wales, I delivered a lecture on tick fever and the experimental work in connection therewith at the Hawkesbury College before the Dairy Conference; also another before a representative gathering of stockowners at the Chamber of Commerce in Sydney in July, 1897.

Professor Koch on Tick Fever and its Prevention.

It is highly satisfactory to know that such an eminent authority on bacteriology as Professor Koch has fully confirmed the investigations I made in the Gulf district in 1894, and since that time in other parts of Queensland, concerning the nature and cause of tick or Texas fever; and, moreover, endorses in every particular the method of preventive inoculation for that disease which I initiated some eighteen months ago.

In addition to the above, I have recently received a letter from the Bacteriological Institute, Grahams Town, Cape Colony. Dr. Edington, the Director, states that for some time past he has been working at the subject of tick fever and preventive inoculation, and has arrived at almost the same results that I have in Queensland, only that he prefers to inoculate already protected cattle intravenously with virulent blood, and then wait twenty-eight days, and then, if during this period the animal has not had any great degree of fever, and if no symptoms have arisen, he uses this animal's blood to inoculate susceptible cattle in doses of from 5 to 10 cc. subcutaneously.

It is worthy of mention here that this method, very slightly modified (the blood being injected subcutaneously instead of intravenously), was carried out in connection with the inoculation of bulls at Rathdowney, belonging to Mr. William Collins.

Supply of Pleuro-pneumonia Virus.

The past year has been a record one for the supply of pleuro-pneumonia virus, which, as I have stated in previous Reports, does not leave the laboratory unless guaranteed (as far as crucial examinations by modern bacteriological appliances will prove) free from all traces of tubercular taint, and, further, no virus is despatched unless it can reach its destination and be used before it is three weeks old. However, I am sorry to report that, in consequence of the rapidly increasing demand from various parts of this and the neighbouring colonies, some stockowners have had to be disappointed. This is chiefly to be accounted for by the fact that when the rain sets in after a long spell of drought and there is fairly good feed along the stock routes, there is usually a sudden and general rush of store cattle into the Southern markets; therefore it becomes practically impossible to meet the requirements of all owners who are particularly anxious to have their stock, before travelling, inoculated with departmental virus, knowing that by its use they do not run the risk of inducing any other serious contagious disease.

During the last year virus was supplied to inoculate 47,750 head of cattle in Queensland, and 6,250 in New South Wales. Pleuro lymph for cultivation purposes has also been supplied in small quantities to several stockowners and each of the Stock Departments in Victoria and South Australia.

Stockowners who have been desirous of utilising lymph collected by themselves have invariably submitted samples of such lymph, together with portions of the lungs and lympathic glands, for examination. Not unfrequently the virus has had to be condemned in consequence of the presence of tubercle bacilli either in the virus or glands. Only a few days ago a gentleman in the Logan district, who takes a keen interest in this subject, forwarded for examination a bottle of pleuro lymph, together with portions of the lungs, glands, spleen, liver, &c. On examination several small

tubercles were detected in the lungs, and tubercle bacilli were very numerous in the pus of a tubercular abscess which was adhering to and removed from the inside of the chest. Although repeated microscopical examinations were made of the virus, no tubercle bacilli could be discovered; but as the animal was proved to have been tainted with tuberculosis, I considered it absolutely necessary to inform the sender that there would be a very great danger in using the lymph for protective inoculation purposes. I am pleased to state that this gentleman, as on previous occasions, acted on this advice.

It is needless for me to state that if all stockowners who use pleuro virus collected by themselves would act in accordance with instructions issued by this Institute, and submit a sample of the virus and portions of the lungs, glands, &c., for bacteriological examination, and not use any virus unless approved of by this Institute, we should soon find a controllable disease like tuberculosis showing a marked decrease in the number of animals condemned at our meat export works in this colony and at the public abattoirs in the southern colonies.

Considering that in the artificial cultivation of pleuro virus in the calf, the œdematous condition can only be carried on for about three generations, as in the fourth remove the virus becomes so attenuated that the inoculation of a fifth calf will be attended with negative results, the Institute has to rely upon stockowners to supply virus from a natural case. It not infrequently happens that some six to ten pints of pleuro virus are received, and, contrary to our instructions, not a single specimen of any of the internal organs is forwarded. A special wire is accordingly despatched for the required specimens, which on arrival are submitted to a most crucial examination, with the result that sometimes the whole of the virus has had to be condemned in consequence of the presence of tubercle bacilli or some septic or pyogenic organisms. Thus we are prevented from using such virus for cultivation purposes, and hence the trouble and inconvenience of being unable to supply stockowners with virus immediately on receipt of application.

However, considering that pleuro-pneumonia rarely assumes that virulent and severe epidemic type that it did during the first few years of its existence in the colonies, there are definite reasons why cattle should be left uninoculated rather than inoculate them with virus which is not above suspicion. In fact, in some districts inoculation for pleuro-pneumonia has been abandoned altogether. At the same time we must not overlook the fact that there are some stockowners who will not have a single animal in their possession unless it has been inoculated. In these cases I would therefore respectfully urge that these owners should have their stock inoculated with none other than virus which has stood the test of a laboratory examination, for there can be no doubt whatever that the experiments which I conducted some two years ago, and the experience of a number of stockowners, have proved conclusively that the prevalence of tuberculosis among station cattle in these colonies is due in a great measure to the indiscriminate method of inoculation for pleuro-pneumonia.

The above facts are further confirmed and recognised by stockowners, by reason of the continued increased demand for the departmental virus.

Symptomatic Anthrax, or "Blackleg."

After a long spell of dry weather, when the general rains set in and there is a good spring in the grass, stockowners who have cattle on low-lying coastal country frequently report that some of their cattle, especially young animals, are affected with some sudden and severe form of sickness which they describe as being apparently due to eating poisonous plants, and which occasionally ends fatally. I have gone into the history of some of these cases very carefully, and have requested owners who have suffered losses to forward me specimens (in accordance with instructions) from some of the recently dead animals. The examination of these specimens has invariably resulted in the discovery of a specific bacillus, which, on subsequent culture and animal experiments, proved that the disease from which the animals had died was symptomatic anthrax, more commonly known as "blackleg."

As fresh outbreaks may be expected to occur from time to time, I have deemed it expedient to carry out a series of experiments in order to determine the efficacy of a means of prevention of the disease as recommended by Arloing, Corvin, and Thomas, or some modification of the same.

Quite recently Dr. T. L. Bancroft wrote to the Department stating that the disease was fairly common around Caboolture and Burpengary. In several stained specimens he forwarded from an animal dead of the disease, I readily detected the bacilli of symptomatic anthrax.

As the disease is most frequent on the low-lying portions of the coastal country, where the holdings are small, it is strongly recommended that stockowners should use every endeavour to destroy, by means of fire, carcasses of animals which have died of the disease. This will largely assist in the prevention of the spread of the disease to other animals.

Recently Roux and Chamberland have found that filtered cultures of the bacillus of symptomatic anthrax can produce immunity from that disease when properly introduced into susceptible animals.

I feel confident that if this investigation could be carried on without interruption, the results would prove fruitful, and farmers and dairymen would consequently derive an incalculable benefit thereby; but with our present imperfect accommodation it would be impossible to guarantee the purity on a large scale of cultures of the "blackleg" bacillus, and until the necessary facilities are afforded I cannot possibly proceed with this urgent inquiry.

The Tuberculin Test.

Now that the value of tuberculin is gradually being recognised by stockowners, there has been an increased demand for this very reliable agent from the Institute, which is the only laboratory in the Southern Hemisphere where it is being prepared.

During the past year tuberculin has been supplied to test some 280 stud and dairy cattle, and, contrary to the anticipations of the owners of the cattle tested, the results varied very considerably. In some instances where several stud animals, the progeny of a tubercular sire, were tested, they were shown to be perfectly healthy, which is further evidence that heredity plays a very small part not only in the transmission of the disease but also in the predisposition to it.

In the case of five cows, all apparently in a good healthy condition, and tested by Mr. J. Irving, Government Veterinary Surgeon, three showed a distinct reaction. This result was further verified when they were slaughtered, as each animal exhibited, on *post-mortem* examination, clearly defined lesions of tuberculosis, although the disease was in the early stage.

I have experienced great difficulty among the small dairy farmers around Brisbane in recommending them to have their cows tested with tuberculin. Most of them say that they do not want to know that their cows are tubercular; others are willing to have them tested if the full value of a healthy animal is allowed for those that react; in fact, all bring forward various absurd excuses why their animals should not be tested. Apparently all overlook the fact that it would be to their advantage, and the best advertisement they could possibly have for their products, to have the entire herd guaranteed free from tuberculosis, and therefore to their own interests to have all the animals showing a reaction to the test immediately destroyed. I am pleased to report, however, that a number of people who possess milking cows for their own private use have had them tested, and also that arrangements have been made to have several pure-bred herds of shorthorns and Herefords subjected to this test.

It should be pointed out that when tuberculin is supplied from the Institute, the applicant is requested to return a list of the temperatures of the tested animals; also to furnish information as to the nature of the *post mortem* examination, and, wherever doubt exists, to forward portions of the suspected internal organs, in order that a record may be kept as to the value of the tuberculin test, and also to obtain reliable information as to the prevalence of tuberculosis among various breeds of cattle.

Tuberculosis in Swine.

On the 19th March last, Mr. W. C. Quinnell, M.R.C.V.S., Government Veterinary Inspector for the various meat export works in and around Brisbane, brought to the laboratory a number of morbid specimens taken from six different pigs which were suspected to be affected with tuberculosis. In only one or two specimens did the disease resemble tuberculosis to the naked eye. However, each specimen was subjected to a crucial microscopical examination, with the result that I succeeded in demonstrating in one specimen only a few tubercle bacilli. To make the test still more crucial, I inoculated five guinea-pigs intraperitoneally—*i.e.*, into the abdominal cavity, with a little of the diseased tissue mashed up with sterilised boullion. *Result*—Within six days three of the guinea-pigs died from septicæmia in consequence of the tissue not being quite fresh. The other two remained alive, but developed unmistakable symptoms of tuberculosis within four weeks; by the end of the fifth week both became emaciated, and one died in forty-one days after inoculation, and the other on the forty-second day. *Post mortem* examination in both cases gave positive results. The inguinal and mesenteric glands were very much enlarged and undergoing caseation, while the liver and spleen were studded throughout with yellowish tubercular deposits, and on the lungs there were several small greyish milliary tubercles.

As tuberculosis in pigs manifests itself in so many various ways, all of which are quite unlike tuberculosis in cattle, Mr. Quinnell has promised to forward to the laboratory, for subsequent examination and experiments, any fresh cases that come under his notice. However, from the above experiments and my own observations in other parts of the colony, particularly at boiling-down works and small butchering establishments, I have no hesitation in stating that tuberculosis in swine is by no means an uncommon disease, and that its prevalence is largely due to the feeding of pigs on the offal from tubercular cattle, which is consumed in an uncooked state.

These investigations clearly demonstrate the importance and value of Government veterinary inspection, and the necessity in the near future of the establishment of public abattoirs in place of our present system of slaughtering animals in small unsanitary butchering establishments.

During my visit to some of the boiling-down establishments in the Northern districts, I noticed at several places large numbers of pigs, all of which were fed entirely on the offal, which in a number of cases came from animals obviously affected with tuberculosis. Needless to say, such a practice should be discountenanced, for it has frequently been proved by repeated experiments (*vide* Royal Commission on Tuberculosis) that pigs are extremely susceptible to tuberculosis by ingesting tubercular material.

Destruction of Rabbits by Means of Chicken Cholera Bacteria.

Although this matter is taken up by the Department of Lands, I deem it expedient to briefly state here what has been done on this subject.

During the past year a considerable amount of care and attention has been bestowed in supplying Messrs. Cheeseman and Dudgeon (the instructors in the process) and stockowners with virulent cultures of chicken cholera bacteria. Over 1,200 pipettes have been despatched from the laboratory, and the reports which have been received respecting their use have been of an exceptionally interesting and satisfactory character in proving the efficacy of the late M. Pasteur's original method of destroying rabbits.

At the request of the New Zealand Government I forwarded a supply of cultures (pipettes) of chicken cholera bacteria to Mr. J. A. Gilruth, the Government Bacteriologist, who was commissioned to carry out an extensive experiment on the destruction of rabbits living under natural conditions on a large estate near Otago. It is satisfactory to know that Mr. Gilruth has adopted the same method which I worked out at Dilltoppa, South Western Queensland, and in a Report published in the "Fifth Annual Report of the Department of Agriculture for New Zealand," Mr. Gilruth states that his results have been of a highly satisfactory character. He specially mentions that the process is—

1. Easy to carry out.
2. Not dangerous to human beings or sheep, goats, horses, and cattle.
3. If care is taken it is not dangerous to fowls.
4. The infected pollard is readily taken by rabbits during either summer or winter.
5. The disease is to a certain degree contagious among rabbits in closely inhabited warrens.
6. Death is practically painless, and so other rabbits are not frightened as with phosphorus or with trapping.

Experiments on the Destruction of Flying Foxes.

In December last Mr. Edgar Reid, of Samoa, was introduced to me by the Hon. A. J. Thynne, as having a specific for the destruction of flying foxes.

Although Mr. Reid stated that his process and the agent used was a secret known only to himself, it was subsequently proved that this agent was the bacillus typhi murium, which I have had growing in the laboratory for the past two years; moreover, I recommended its adoption in an experimental way about eighteen months ago.

Laboratory experiments were commenced in December last, and continued until the end of January. The results of these observations proved that with foxes kept in captivity, a number of healthy ones, living in company with others specially fed or inoculated, also became infected and died of the disease.

The experiments conducted under natural conditions in camps of flying foxes were, owing to unavoidable difficulties, not so successful.

As the results of the laboratory experiments were so promising, it is proposed to continue the investigations under natural conditions at an early date.

In consequence of the satisfactory results which Professor Loeffler states he has obtained with this micro-organism in the destruction of mice in cornfields and wheatstacks in Italy, Greece, and Southern Russia, I have commenced a series of experiments in the laboratory on mice, and at a later date I propose giving Loeffler's method a practical trial in some of the mice-infested cornstacks belonging to farmers on the Darling Downs, where I understand at certain times of the year the mice are a perfect pest; not only do they destroy a large quantity of wheat, but the grain which is not damaged is often tainted with that objectionable odour which is peculiar to mice.

Museum Collections.

During the past year a number of morbid specimens illustrative of the various manifestations of diseases in stock have been added to our already interesting and unique collection. A large number I have collected myself, but I have to thank the various veterinary inspectors attached to the meat export works and several stock-owners for forwarding some specially interesting specimens.

Each specimen is examined microscopically, and afterwards some are carefully mounted, preserved, and labelled for future reference, while a great many, although equally interesting, have to be stowed away in large storage tanks until such time when they can be properly mounted in suitable glass jars.

Pathological Work.

As usual, a large number of pathological specimens of animal diseases have been submitted for microscopical examination from stockowners, and as soon as convenient the results have been forwarded to the sender.

A number of cases of so-called swamp cancer in horses have been brought under notice. Hitherto the exact nature of this affection was unknown, but during the last year such progress has been made in the microscopical investigation, chiefly through the aid of special aniline dyes, as to lead to the discovery of the presence of the actinomyces fungus, thereby proving that this disease is true actinomycosis, and has nothing whatever to do with what is known pathologically as true cancer.

I have given special facilities to members of the medical profession in rendering every assistance possible, viz. :—

1. In preparing, cutting into sections, staining, mounting, and examining various pathological tissues.
2. The bacterioscopic examination of milk of animals, and expectoration of persons suspected to be suffering from tuberculosis.
3. Supplying culture tubes of nutrient Agar-Agar, and the examination of same after they have been inoculated from the throat of a patient suspected to be suffering from diphtheria.
4. Giving advice and information on matters pertaining to bacteriology, pathology, and general microscopy.

Correspondence.

The number of recorded references made to this Institute for advice in matters relating to tick fever, tuberculosis, and the tuberculin test, anthrax, pleuro-pneumonia, chicken cholera, and kindred subjects has during the past year amounted to upwards of 1,400, which tends to show the recognition and appreciation which is being manifested by stockowners and others interested in the work of this Institute.

Inquiries for reports, specimens, and information on subjects generally appertaining to diseases in stock have been received from various parts of the world, including North and South America, Jamaica, South Africa, India, Ceylon, Siam, Japan, Batavia, New Guinea, England, Scotland, France, Germany, and other continental countries, and in every case the requirements, as far as practicable, have been complied with.

Necessity for more Suitable Premises for an Institute.

In previous Reports I have brought under notice the desirableness for better laboratory accommodation for carrying out the important work which is undertaken in connection with this Institute. Again I must point out that it is absolutely necessary that this matter receive prompt attention.

The present temporary premises in Turbot street, which have been occupied as a laboratory for the past four years, are in a very dilapidated condition. The rain beats through the roof and the outer walls, causing the latter to be covered with thick layers of various forms of mould fungi, the spores of which are blown about the rooms, thereby rendering some of our urgently required bacteriological investigations absolutely impossible to carry out. The gas fittings, which were only fixed

up in a temporary manner several years ago, are now in such an unsatisfactory condition that we are unable to use the incubators and sterilisers for the purposes they are specially intended. I wish also to draw attention to the fact that by reason of these imperfections there is a considerable risk from fire, in which case the losses would be of a very serious nature. It must not be overlooked that nearly all the more valuable apparatus in the laboratory, such as microscopes, lenses, &c., are my own personal property, and which are being used daily in our various investigations; it is therefore absolutely necessary that every care and precaution should be taken to preserve them, as well as the Government property, from any injury whatsoever.

More than two years ago Sir Horace Tozer visited the Institute with the members of the Stock Board, all of whom unanimously agreed that the present premises were unhealthy and totally unsuited for carrying on our valuable research work.

I trust, therefore, that you will urge that this very important matter will receive immediate consideration.

BRIEF SUMMARY OF THE RESULTS OF INVESTIGATIONS IN CONNECTION WITH THE PROTECTIVE INOCULATION OF CATTLE AGAINST TICK FEVER, BY DR. J. SIDNEY HUNT, GOVERNMENT PATHOLOGIST.

1. The theory of protective inoculation against "tick fever" is, I consider, based on the facts—(1) that cattle which have suffered from the disease in infected localities eventually become immune; (2) that the blood of such immune or other recovered animals is found capable of setting up a comparatively mild attack of the fever when injected into susceptible cattle; and (3) that immunity also follows the fever thus artificially produced.

2. The degree of immunity eventually attained by cattle in permanently infected areas is practically complete. The immunity attained by a single attack is probably not in all cases absolute. Second, and even third, attacks have been recorded, but are certainly not common; and, if the first attack has been of moderate intensity, are rarely fatal. The fever produced by the injection of blood of recovered animals generally suffices to protect from subsequent fatal attacks—or, at the least, to greatly diminish the percentage mortality.

3. The fever-producing power of the blood of recovered animals differs considerably; that of some produces high fever, that of others no discernible reaction. The power of the blood of any given animal in this respect can only be satisfactorily ascertained by observing its effects when injected into susceptible cattle. The information so gained is more reliable than that which can be obtained by microscopical examination of blood. Such trials may, therefore, advantageously be made before proceeding to the inoculation of a whole herd. It has appeared (but has not been definitely proved) that the blood of animals which have suffered from the disease, and have been subsequently subjected to constant reinoculation by virulent tick infestment, is generally more active than that of such as have recovered from a single mild attack. The blood of animals recovered from an artificially induced attack of moderate intensity is, however, in most cases sufficiently active for inoculation purposes.

There is some evidence to show that even when no reaction, discernible by clinical or thermometric tests, follows inoculation, there is still a certain amount of protection afforded, though it is very questionable if it is in any way comparable, in degree or duration, to that afforded when well-marked reaction occurs.

The relative activity of the blood of different classes of recovered cattle—*e.g.*, bulls, calves, heifers, &c.—has not yet been ascertained.

The repeated abstraction of blood from a recovered animal has not been found to have any noticeable effect on the pyrogenic qualities of its blood.

4. The danger of inoculating different classes of cattle is generally proportionate to their natural susceptibility; aged bulls are highly susceptible, very young stock slightly so. The differences in this respect amongst other classes of cattle are not great. The danger is somewhat greater in fat cattle than in stores. The losses that have resulted from the direct effect of inoculation have varied greatly in different instances. The average losses in aged cattle do not probably exceed 5 per cent., and in young stock should be very much less, indeed insignificant. The risk of inoculation is greater when the surrounding circumstances are unfavourable to the hygienic condition of the animals operated upon, or when they are freshly removed from their own pastures. The risk is also greater in cows that are in calf; abortion frequently follows inoculation when considerable fever occurs. In milking cows the secretion of milk is much diminished, or suppressed, if the reaction is severe. The secretion

is generally re-established, however, on the subsidence of the fever. This result appears to be favoured by removing any milk secreted throughout the whole period of the inoculation fever.

5. The quantity of blood injected has not been clearly proved to affect the amount of reaction produced. Experience and experimental observations on this matter have yielded somewhat contradictory results. Reason and analogy suggest the advisability of using the smallest dose that will effect the desired object. In the inoculation of such valuable and highly susceptible animals as adult stud bulls, a preliminary inoculation, with half to one cube centimetre of recovered blood, has given satisfactory results. A subsequent inoculation with 10 cc. can be given with safety. Such a secondary inoculation with large doses of blood, whether necessary or not, may, in the present state of our knowledge, be regarded as a safe, and at least unobjectionable, precautionary measure. For the general run of herd cattle 5 cc. of blood has given satisfactory results. The collective evidence of the generally protective efficacy of such inoculation is now very voluminous and convincing. The possibility of introducing inoculated bulls into infected country is shown by the fact that two adult imported bulls so treated have now been exposed to ticks in infected country for nine months without showing any sign of the disease. The importation of very young inoculated bulls would probably be a safer measure.

6. The period of incubation of the inoculation fever—from inoculation to the first appearance of fever—is from ten to seventeen days. The fever lasts as a rule from three to seven days. Cattle injected with virulent blood—*i.e.*, from an animal suffering from the acute disease—develop fever somewhat earlier, frequently on the sixth day, and the fever is, as a rule, more intense, and lasts about seven days. A temperature of 105 degrees Fahr. after inoculation indicates, in the absence of all excitement or other disturbing influence, a mild attack of the fever; 106 degrees, a moderate attack; 107 degrees, a severe attack; 108 degrees and upwards, a very severe and, frequently, fatal attack.

7. Methods of inoculation based on the assumption that an anti-toxic property is present in the blood of recovered cattle have not proved satisfactory. The injection of 40 cc. of sterilised "recovered blood" a week before, together with, or a week after inoculation with fresh recovered blood, has not been observed to appreciably modify the usual course of the reaction. Cattle inoculated with 10 cc. and with 40 cc. of "recovered blood" sterilised with camphor, carbolic acid, or other agents, have not been permanently protected thereby. If any protection is conferred by sterilised "recovered blood," it is probably of a passive kind and very evanescent.

8. The cattle ticks in some localities do not carry the micro-organism of tick fever, and are therefore—as regards that disease—not pathogenic. The blood of cattle infested by such ticks has no protective value when used for inoculation purposes. Moreover, prolonged and gross infestment by such ticks affords no protection against tick fever. It therefore appears important to ascertain how or whence such uncontaminated ticks acquire the specific contagium, with a view to the possibility of limiting the distribution of the disease, even though it should be found impossible to prevent the spread of the ticks. To this question I am now addressing myself.

In the uncertain state of our knowledge in regard to the question just mentioned, and in view of the facts referred to, it appears to me questionable whether the inoculation of cattle should not for the present be restricted to such as are actually threatened by the near approach of the disease, or are intended to be transported into infected areas.

Supposed New Disease.

During the year some mortality occurred in cattle in the Mackenzie River district from a disease hitherto unknown in the district. Mr. A. W. Barnes, M.R.C.V.S., was instructed to visit the district and report on the subject. His report is as follows:—

"I beg to inform you that I visited the Blackwater and Mackenzie River districts, as instructed in your letter of the 23rd November, and have now the honour to send you my report upon the cattle disease which exists there.

"The disease which I have investigated may, I think, be correctly a 'new disease,' as I am not aware that the conditions noticed have been recorded before as existing in cattle in an enzootic form. It is a form of wasting or pernicious anæmia, and the result of lesions due to parasites known as the *Strongylus contortus* (Curtice) and *Oesophagostoma Columbianum* (Curtice on parasites). Both worms are known to exist in sheep in this district, the latter causing the condition known

as the nodular disease in sheep. The whole extent of the intestines of the cattle are studded with nodules similar in appearance to the nodules on the intestines of sheep infested by this parasite.

"The general symptoms are simply those of wasting, and may easily be mistaken for tuberculosis. The marasmus is so marked that the disease is referred to in the district as the wasting disease.

"In the acute stages of the disease, which corresponds to the period when the parasites are most numerous, and setting up inflammatory action in the fourth stomach and intestines, the cattle show indications that they are suffering pain, and appear uneasy, and run about. Diarrhœa is present, and chronic diarrhœa exists also in cattle which have been long badly infested, and such cattle seldom improve in condition, and the stomach and intestines never regain their normal state. An œdematous swelling is frequently present under the jaws.

"*Post mortem* examination revealed an anæmic condition of all the tissues, and inflammatory patches upon the mucous membrane of the fourth stomach and intestines in varying degrees of intensity, depending no doubt upon the number of parasites present.

"In some instances the mucous membrane of the abomasum was acutely inflamed and much thickened, the thickened portions when cut having a gelatinous appearance, and several nodules were found underneath small dark ulcers on the mucous membrane of the stomach, caused by the larval form of the *Oesophagostoma Columbianum*.

"The *Strongylus contortus* was also found in varying numbers in the stomachs examined.

"The mucous membranes of all the intestines showed inflammatory patches, and this was specially marked in portions of the small intestines, which could be recognised by their discoloured appearance as being inflamed before being opened for inspection. These patches on the intestines are located where the nodules are most numerous. The difference between the nodules in sheep and cattle is that in sheep the nodules are more prominent and closer to the serous surface of the bowels than they were in cattle which I examined. In the latter most of the nodules are immediately below the mucous membrane, consequently sheep suffering from the nodular disease have more of the coats of the bowels destroyed than these cattle have, yet the irritation and its consequences are so much more serious in cattle. The liver and kidneys showed indications of having participated in the inflammation caused by the parasites. The intensity, extent, and duration of the inflammation which had existed was also indicated by the adhesions which had taken place between the abdominal walls, bowels, and other viscera.

"This disease has been observed in the district visited for about five years, although it is easy to imagine that it may have existed without being recognised as a distinct disease for many years previous.

"The infested country has not been stocked with sheep, Mr. Peberdy informs me, for nearly thirty years, and I favour the supposition that the big floods of recent years have carried the ova and parasites from sheep runs in the Springsure district and deposited them along the banks of the Mackenzie River.

"It is very probable that these parasites will be found in cattle on the river frontages for long distances along the course of the Mackenzie and Comet rivers. The best means of fighting this trouble would be to fence as much of the low-lying country on the banks of the rivers as possible; in fact, to keep the cattle during the wet season back from the river. The ova of these parasites are most likely to exist in stagnant and muddy waterholes near the river.

"Cattle observed to be suffering from the disease should be kept together in paddocks set apart for this purpose. By this means the cattle could be treated for the disease, and its spread prevented. The medical treatment I would suggest would be in the form of a lick composed of salt, sulphur, and sulphate of iron, well mixed together, and placed in protected places all over the runs."

RE ABOVE REPORT.

In my Annual Report for the year 1892, I published a report by Dr. T. L. Bancroft on some diseases in stock, in which he states that he found in Brisbane, Dunwich, Deception Bay, and Port Curtis district the worm now recognised by Mr. Barnes as the *Oesophagostoma Columbianum*, which causes a nodular or tubercular condition of the intestines. In Port Curtis district Dr. Bancroft's investigations were conducted principally at Torilla and near Rockhampton.—P. R. G.

ABSTRACT FROM REPORTS OF THE INSPECTORS UNDER "*THE LIVE STOCK AND MEAT EXPORT ACT OF* 1895."

BRISBANE.

W. C. Quinnell, M.R.C.V.S., Inspector.

EAGLE FARM WORKS.

(Queensland Meat Export and Agency Company.)

Stock.	Slaughtered.	Condemned for—	Bodies.	Quarters.	Per cent.
Bullocks ...	30,336	Tuberculosis ...	95	447 forequarters from 335 bodies	1.416
Ditto ...	...	Other diseases ...	...	9 hindquarters	0·002
Cows ...	3,153	Tuberculosis ...	56	49 forequarters from 37 bodies	2·949
Ditto ...	...	Other diseases ...	4	...	0·010
Sheep ...	25,046	Abscesses ...	5	...	0·019

The above works closed down on 31st August, 1897, and did not resume operations until 14th December, 1897.

QUEENSPORT WORKS.

(Graziers' Meat Export Company.)

Stock.	Slaughtered.	Condemned for—	Bodies.	Quarters.	Per cent.
Bullocks ...	27,974	Tuberculosis ...	61	324 forequarters from 243 bodies	1·085
		Other diseases ...	2	8 hindquarters	0·040
Cows ...	9,624	Tuberculosis ...	128	283 forequarters from 212 bodies	3·532
		Other diseases ...	11	2 hindquarters and 1 forequarter	0·134
Sheep ...	43,951	Unfitness ...	12	...	0 028
Pigs ...	2,317	Tuberculosis ...	4	17 forequarters from 12 bodies	0·691
Calves ...	320				

This table includes stock slaughtered and inspected for the company's town supply.

OAKEY CREEK WORKS.

(Hogarth Australian Meat Preserving Company, Limited.)

The number of sheep operated on for preserving from 10th May to 17th July, 1897, at these works was 52,772.

None being condemned for actual disease, but a few were sent to the pots as unfit owing to want of condition.

REDBANK WORKS.

(Queensland Chilling and Extract Company, Limited.)

Stock.	Slaughtered.	Condemned for—	Bodies.	Quarters.	Per cent.
Bullocks	1,162	Tuberculosis	10	18	2·513
		Unfitness	2	...	0·180
Cows	96	Tuberculosis	2	...	2·083
Sheep	20,356	Abscesses and unfitness	23	...	0·112
Pigs	8				

The company commenced operations on 27th February by slaughtering sheep only, and, after extensive alterations, treated cattle from 4th May, 1898.

Daily auction sales of meat by the company at the Musgrave Wharf Market, South Brisbane, were commenced on the 17th May, 1898. All meat exposed at the market being killed at Redbank, is under our supervision and inspection.

BULIMBA.

(Messrs. Geddes, Birt, & Co., Ltd.)

AND

MOUNT GRAVATT.

(Pastoral Butchering Company.)

Although registered under "*The Live Stock and Meat Export Act of* 1895," these places have not been in operation for the past twelve months.

On notifying the Department that an export trade in bacon was being carried on, the two factories undermentioned were registered under the Act.

OXLEY.

(Messrs Howes Brothers.)

Pigs Slaughtered.	Condemned for—	Bodies	Quarters.	Per cent.
886	Tuberculosis ...	3	...	0·338
	Abscesses	...	3 hindquarters from 3 bodies	0·338

Inspection commenced at these works from 4th April, 1898.

ZILLMERE.

(J. C. Hutton.)

Pigs Slaughtered.	Condemned for—	Bodies.	Quarters.	Per cent.
6,619	Tuberculosis ...	29	...	0·437
	Other diseases ...	...	3 hindquarters, 1 forequarter	0·005

Inspection commenced at these works since 18th April, 1898.

A matter deserving of notice is the fact that the manager of this firm voluntarily requested that all pigs slaughtered, whether for export or local trade, be examined by us.

REMARKS.

Cattle.—Tuberculosis shows signs of increase. The generalised form more evident in cows.

The condemnation of ox-tongues from this disease has increased considerably, but the percentage from tubercular and actinomycotic causes, as given in my last Report, has not altered to any appreciable extent.

Sheep.—No special existence of disease to be noted. A large proportion were not in such good condition as is usual. In some few instances sheep were found to be in such an emaciated condition that it was necessary to consign them to the pots.

Pigs.—On referring to pigs in my last Report, I stated "that they may be said to be practically free from disease of any serious nature." This applied to the pigs only inspected that year—viz., at Queensport, and bred by the company; but since this company, like the bacon factories, have obtained their supplies from miscellaneous places, the condemnation of pigs for tuberculosis is most marked; and it is a noticeable fact that in the majority affected from this disease the lesions were most pronounced in the neighbourhood of the throat and the organs in the abdominal cavity. This localisation of tuberculosis in the digestive tract of pigs clearly indicates the fact that the disease was transmitted by the ingestion of tuberculous meat or milk, the latter, in my opinion, being the most frequent and dangerous source.

I draw attention to this feature to demonstrate the need of legislative measures or precautions against the communication of tubercular disease to human beings from consumption of the local supply of meat and milk, and also to reduce the disease amongst the animals themselves.

Inspection.—Each of the assistant inspectors assigned to the various works submits a daily return, and, as frequently as possible, the works are visited by me.

During the past year I furnished a Report on the peculiar unsoundness of beef known as "bone taint" or "septic change in beef"; and at the same time dealt on the unsanitary conditions and objectionable practices existing at the various works under my supervision, and steps taken to remedy same. The subsequent action of the Department of issuing copies of this Report to each of the works in question had, I am gratified to say, the desired effect, and beneficial results have since accrued.

LAKE'S CREEK.

A. W. Barnes, M.R.C.V S., Inspector.

The average percentage of cattle condemned for human food at these works during 1897 was 3½ per cent.; of these, 2½ per cent. were condemned for tuberculosis, and 1 per cent. for other diseases, such as actinomycosis, cancer, bad bruises, abscesses, purulent-pneumonia, extreme jaundice, and tick fever. Several herds of tick-infested cattle have been sent to the works and operated on, mostly as boilers, which are not included in the percentage of cattle condemned for food. About 1,000 sheep were condemned; cancer or the consequences of parasitic infestation being the diseases for which they were condemned.

ROSS RIVER.

C. A. Calvert, Member and Hon. Associate R.C.V.S.

Of 30,372 cattle slaughtered at these works, only 0·00510 were condemned for disease, and no sheep were condemned. The diseases present were tuberculosis, pleuro-pneumonia, acute tick fever, and cancer.

BOWEN.

Ben. O. Meek, M.R.C.V.S., Inspector.

Condemned for—	
Tuberculosis	2·75 per cent.
Tick fever in various stages	1·2 ,,
Cancer, hydatids, old pleuro, bruises, &c. ...	1·33 ,,

GLADSTONE.

John Riordan, Inspector.

Of 10,809 cattle slaughtered, the following were condemned for—

Tuberculosis	176 bodies.
Abscesses	4 ,,
Pleuro-pneumonia	38 ,,
Jaundice	2 ,,
Tumour	2 ,,

Twenty-four thousand nine hundred and eighty sheep were slaughtered, of which 3,034 were condemned, principally for being too poor for treatment.

BROADSOUND.

G. R. Holt, Inspector.

No stock treated for export during the year.

SELLHEIM.

H. H. M. Croft, Inspector.

One thousand two hundred bodies condemned for—

Pleuro-pneumonia	33 per cent.
Pregnancy	25 ,,
Actinomycosis	9 ,,
Tuberculosis	9 ,,
Tick fever	12 ,,
Cancer, Pleurisy, and Abscesses	12 ,,

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