THE

ANNUAL REPORT

OF THE

SUPERINTENDENT OF GOVERNMENT FARMS,

(MADRAS PRESIDENCY)

FOR THE YEAR ENDING 31ST OF MARCH 1873.

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APPENDIX.

THE ANNUAL REPORT OF THE SUPERINTENDENT OF GOVERNMENT FARMS, FOR THE YEAR ENDING 31ST OF MARCH 1873.

1. *Season.*—The total rainfall of the year was 86·17 inches, or nearly double the average annual rainfall of the previous ten years, and not only was the fall exceedingly large, but the rain was precipitated in unusually heavy showers; thus, though so much rain fell, there were only 62 wet days during the whole year, so that on the average there was 1·38 inches of rain registered for each day on which there was rain. On examining the detailed registrations which appear in the appendix, it will be noticed that there were several days on which more than four inches of rain fell.

2. The following table shows the amount of rain that was registered for each month, and the number of days in each month, on which rain fell during the year, compared with the average monthly registrations, of a similar kind, for the preceding ten years :—

	1872-73.		Average of the previous 10 years.	
	Inches.	Wet Days.	Inches.	Wet Days.
April	...	...	·55	1·1
May	7·55	3	·16	1·2
June	1·41	2	2·96	8·7
July	2·95	6	4·72	11·6
August	6·46	9	5·12	13·1
September	4·96	7	3·71	10·0
October	18·26	10	9·15	11·1
November	31·13	16	11·10	13·9
December	7·22	5	5·62	7·2
January	...	...	1·28	1·3
February	6·23	4	·29	·8
March	...	...	·14	·6
Total ...	86·17	62	44·80	80·6

3. It is undoubtedly convenient to make up each month's rainfall separately, and perhaps in most European countries this is the best arrangement that can be adopted; but in no country, with a climate anything like that we have in Southern India, are monthly averages of rainfall of the least use to agriculture: the period is much too long; we may, in the space of a single month, suffer both from flood and from drought, though the rainfall of the month may even be above the usual average. In this country a week is, I think, a sufficiently long period for which to make up the rainfall returns. The table I have already given shows our rainfall registrations in the way such results are usually exhibited. The following table shows them as, I think, they ought to be exhibited :—

—	1872-73.		Average of the previous 10 years.		—	1872-73.		Average of the previous 10 years.	
	Inches	Wet Days	Inches	Wet Days		Inches	Wet Days	Inches	Wet Days
1t Week ...	...	...	...	...	28th Week ...	9·94	4	·31	1·1
2nd do. ...	...	...	·01	·1	29th do. ...	6·48	3	4·66	3·9
3rd do. ...	...	...	·20	·3	30th do. ...	1·20	2	1·90	3·2
4th do. ...	...	...	·35	·7	31st do. ...	...	...	2·36	2·9
5th do. ...	7·55	3	·01	·1	32nd do. ...	2·41	3	1·99	3·0
6th do. ...	...	...	·01	·3	33rd do. ...	2·44	2	1·93	3·0
7th do. ...	...	...	·06	·3	34th do. ...	15·69	7	2·76	3·8
8th do. ...	...	...	·09	·4	35th do. ...	10·59	4	3·60	3·2
9th do. ...	...	...	·16	·4	36th do. ...	3·58	2	3·74	2·3
10th do. ...	...	...	·67	1·1	37th do. ...	1·56	1	·93	1·6
11th do. ...	1·25	1	1·11	2·5	38th do. ...	2·08	2	·20	·9
12th do. ...	·16	1	·53	2·1	39th do. ...	...	...	·31	1·7
13th do. ...	...	...	·49	2·7	40th do. ...	...	...	·03	·4
14th do. ...	...	...	·40	2·0	41st do. ...	...	...	·00	·2
15th do. ...	·58	2	1·77	3·0	42nd do. ...	...	...	·58	·4
16th do. ...	·29	2	1·03	3·0	43rd do. ...	...	...	·48	·4
17th do. ..	...	...	1·07	2·7	44th do. ...	...	...	·20	·2
18th do. ...	2·76	3	1·22	2·6	45th do. ...	6·23	4	·08	·2
19th do. ...	3·86	4	1·45	3·5	46th do. ...	...	...	·02	·1
20th do. ...	·30	2	·61	3·0	47th do. ...	...	...	·12	·1
21st do. ...	·82	1	1·15	2·2	48th do. ...	...	...	·06	·1
22nd do. ...	1·25	2	1·16	2·9	49th do. ...	...	...	·09	·3
23rd do. ...	·12	1	·81	2·7	50th do. ...	...	...	·06	·3
24th do. ...	2·53	2	·70	2·4	51st do. ...	...	...	·00	...
25th do. ...	1·71	2	1·41	2·6	52nd do. ...	...	...	·00	...
26th do. ...	...	...	·70	1·9					
27th do. ...	·79	2	1·22	1·8	Total ...	86·17	62	44·80	80·6

4. On comparing the two tables it will be seen at a glance how differently the results are brought out. The first table affords no information whatever regarding the peculiar character of the season, beyond the information that the rainfall was more than usually excessive. From the monthly returns it might readily be supposed that during the first three or four months of the year the weather experienced was favorable to agriculture; but this was not so, as will be seen on referring to the other table; for during the first 14 weeks of the year there were only three weeks during which any rain fell, and the same may be observed on comparing the returns in each table for the last three or four months of the year. There is nothing in the monthly returns showing that the weather experienced was in any way unfavorable, yet on referring to the weekly returns for the same period, it will be observed that after the 38th week up to the end of the year, there was only one week in which any rain fell. I have frequently been surprised, on learning from reviews of ordinary meteorological registrations, that the weather experienced during a certain period was favorable to agricultural operations, when my own experience and knowledge of the country, convinced me that the very reverse was the case. If the average annual rainfall of a certain month is, say, 6 inches, and in that month a fall of 8 inches should be registered, it is at once concluded that the season experienced has been unusually favorable, whereas, the rain may all have fallen in the early part of the month, and the latter portion may have been characterized by a severe drought. Too much dependence is placed on the monthly rainfall in this country; if people will not take the trouble to investigate detailed registrations, then the only safe course is to make up the rainfall registrations weekly, instead of monthly.

5. Ordinary weather was experienced in April; and little was attempted in the way of cultivation. In the early part (first three days) of May a severe cyclone visited the district, and did a great amount of damage to buildings, trees, and crops on the Sydapet Farms. The trees injured were chiefly mangoes; some were torn up by the roots, while others lost many large branches; and the fruit crop, which was then on the trees, was entirely lost.

The cashew-nut crop was also destroyed. Several hundred plantains, just in bearing, on the Model Farm, were blown down and rendered worthless. During the three days over which the storm prevailed the rain gauge registered 7·55 inches, and the river Adyar was much flooded. The land having been thoroughly soaked, advantage was taken of the opportunity to resume ploughing operations which the long drought had stopped, and a large area of land was sown with cumboo for green crop; but, as there was no more rain in May, and only a couple of showers in June, nothing resulted from these sowings, and the greater portion of the land had again to be sown in July. The weather experienced in August and September was favorable to field work, and much progress was made in getting ready the soil for the regular cold weather crops, and before the end of September a considerable area of land was sown with cotton, maize, sorghum, cholum, &c. During the period between the beginning of October and the middle of November the weather was very favorable for growing crops, so much so that they grew with great luxuriance; but, unfortunately, this luxuriance of growth was all against them during the heavy storms of rain and wind which occurred between the 16th and the end of the month, in which period the amount of rain registered was 28½ inches. Had these storms occurred about the end of October, the usual season for them, little damage would have been done to growing crops, especially to cholum, maize, &c., which would have been only a few inches above ground; but when the heaviest part of the monsoon broke over the district these crops had reached several feet in height, and were in a state peculiarly liable to damage from wind, &c., to which their succulent rapidly-grown stems could offer no resistance. From the causes just noticed a large proportion of our most promising crops were rendered unproductive, and most of the crop experiments that were in progress were thus abruptly ended without any result having been obtained. The late sown crops, which of course had suffered less from the stormy weather in the end of November, produced but indifferently, as, after the 19th of December until the end of March, there were but four days on which rain fell.

6. I am now fully convinced that to secure average results in farming in this country, which suffers alternately from floods and from drought, we must both subsoil-drain, and irrigate; it is only by these means that we can produce anything like an equilibrium in the results of our farming operations. It may be said that both are expensive means to set in operation, and undoubtedly they are, if judged only from the value of the results obtained, during the next two or three years after their first employment; but, if the results secured over a lengthened period are carefully estimated and valued, it will be ascertained beyond all doubt that capital so invested is most advantageously employed.

7. *Tours and Inspections.*—At the request of the Chief Commissioner of Mysore, I was directed, in Government Order No. 956, dated the 21st of June, to proceed to Mysore, to advise in the selection of a site for a Government Farm in the Nundidroog Division. I left for Bangalore on the evening of the 4th of July, and reached Madras again on the morning of the 10th. I again left Madras on the 24th of the same month, under the instructions of the Board conveyed in their Proceedings No. 939, dated the 8th of June, to inspect a site near the village of Sirigoopa in the northern part of the Bellary District, which had been selected by the Collector for the District Farm. After performing this duty, I again returned to Madras, which I reached on the 28th. In a letter No. 729, dated September 24th, 1872, I reported to the Board my opinion regarding the suitability of the Sirigoopa site. I remained in Madras until the 2nd of October, when, under instructions conveyed in Board's Miscellaneous Proceedings No. 5,932, dated 27th of August 1872, I left Madras for Ootacamund to complete my inspection of the Neilgherry District, in view to the preparation of the report called for in Government Order No. 1,658, dated September 22nd, 1871. Having performed this duty as far as the little time at my disposal and the state of the weather permitted, I again returned to Madras, which I reached on the evening of the 4th of December. On my way up to the Neilgherries I stopped at Coimbatore and inspected two blocks of land which had been recommended as suited for the requirements of the projected Central Farm of this district. In my letter to the Board, No. 176, dated the 7th

of March, I reported my opinion regarding the fitness of the land for use in the way suggested.

8. *Office Work.*—In my last report I directed attention to the large increase in the office work of this department, consequent on certain changes made during the year then under review, in its position and duties. Not only was this increase maintained throughout the past year, but the character of the work has so materially changed, that it demands much greater personal attention from me, being now chiefly official correspondence, no inconsiderable portion of which is with the Board of Revenue. The difficulty of keeping pace with these extra demands on my time, was greatly increased by my frequent absence from Madras on duty, as I had no one competent to carry on the more important work of my office during my absence; the result is, that arrears of office work have accumulated, which it will be impossible to clear off, until I have an assistant competent to aid me and able to conduct my office work when I am absent on duty. The late submission of this report is, I regret, one result of this unsatisfactory state of affairs. Much credit is due to my Head Clerk, P. Valoyutha Naicker, for the very satisfactory manner in which he carried on the routine work of my office, during the periods I was absent on tour, work of an unusually responsible and troublesome nature, from the frequent references that had, through him, to be made to me, for instructions on all sorts of matters connected with the management of the farms at Sydapet, &c., &c., and from he being the channel through whom these instructions were conveyed to those concerned.

9. *Educational Work.*—Nearly the whole of the work of this department during the past year might fairly be reviewed under the above heading, as it was undertaken chiefly with the view of promoting agricultural knowledge; but in the remarks that will follow I intend to refer only to our direct educational work in training agricultural apprentices.

10. There are now at the Sydapet Farms two classes of apprentices. The longest established of these classes includes only Sydapet Farm Apprentices; of these there are six, each in the receipt of a monthly allowance varying in amount from Rupees 15 to Rupees 20 with free quarters on the farm. This class was begun some years ago, but no formal sanction having been obtained for the expenditure of money in its maintenance, it became necessary that sanction should be obtained, and this was given in Government Order No. 1,041, dated the 13th of June 1871. Under the terms of this order, the entertainment of 6 apprentices at Rupees 15 per mensem, with a yearly increase of Rupees 2½ (on condition of good behaviour) for four years, rising to Rupees 25 per mensem in the fourth year was sanctioned. There are both Eurasians and Hindus in this class, usually three of each; the former are generally the sons of old soldiers who have taken up their residence at St. Thomas' Mount or in Palaveram. These youths are, generally, active and intelligent, and they are in most instances fairly educated. A few lads, of a similar class, were obtained from the Military Orphan Asylum in Madras, however, with the exception of one, they remained at the farm but a short time. This result is to be attributed rather to the injudicious interference and advice of their relatives than to any defects in the capabilities of the lads. The Hindu youths are obtained from the villages in the neighbourhood of the Sydapet Farms. In most instances they are lads who have obtained their education in the Hindu High School, which is situated in the neighbourhood of the Experimental Farm, and they are generally the sons of ryots. There are always many applications for any vacancy that may occur in this class. In selecting young men for employment as Sydapet Farm Apprentices, it is usual to choose those who appear to possess the best physique, and who produce the most favorable testimonials as regards character, &c., and then to subject those thus selected to a competitive examination in writing from dictation and elementary arithmetic. All the youths in this class are regularly employed in the ordinary work of the farm. During the first and second year in this class they are engaged in manual employment in the same way as the regular field hands; but if before the expiration of the second year, any lad is found to possess the

necessary qualifications, his services are at once utilized. Those who have thus been in the class for two years, and those who are found competent, are employed each with a gang of field laborers, over whom they exercise a limited control under the Overseers, who in the morning lays off the work to be done during the day, and in the evening inspects what has been done, thus the apprentices have the means of ascertaining practically, what constitutes a fair day's work in the different employments on which field hands are usually engaged. These apprentices, employed with field hands, are expected to take part in the work, whatever be its nature, on which the men are engaged. The more advanced apprentices usually take it in turns to be Store-keeper at the Experimental Farm, and the youth so engaged, is thus afforded an opportunity of making himself familiar with the different matters that engage attention at the farm buildings, and with the work that is being done in the Implement Workshops. Though the young men in this class have thus ample opportunities of seeing and taking part in all that is done on the farms, they have not generally availed themselves of these advantages to the extent that is desirable. They certainly learn to copy what they see done on the Sydapet Farms, and they will probably pick up during their apprenticeship enough information to enable them to conduct successfully a small farm of their own, if its circumstances are not unlike those of the farms at Sydapet; but the lads trained under such a system can never be usefully employed in the districts in spreading agricultural knowledge, or in conducting agricultural operations except those of the simplest kind. It is true that the Overseers in charge of both the Experimental, and the Model Farms at Sydapet, have been trained under the system I am condemning, and both are useful men in any position such as they now occupy, and under circumstances something similar to those in which they are now placed, but for each of the apprentices who have turned out fairly satisfactory, there were a dozen who have done otherwise. Mere field training will never fit a man to go into a new district to aid in introducing amongst its cultivators a better agricultural practice. Such training must be supplemented by theoretical teaching in the class-room and in the lecture-room; under a definite system which will test the progress made from month to month. Under the present arrangements as long as an apprentice in this clsss conducts himself moderately well, he is allowed to remain in the class, though possibly he is making little use of the opportunities he enjoys for gaining agricultural information.

11. The other class was begun in December last. It was established under Government Order No. 1,657, dated the 22nd of September 1871, and was intended to provide the necessary agency for carrying on the District Farms. Four apprenticeships were at first established, but the number was shortly afterwards increased to six; to each apprenticeship is attached a salary of Rupees 40 monthly, with a free residence on the Experimental Farm. The Order directed that the youths were to be selected from the Coimbatore, Bellary, and Tinnevelly Districts, in which collectorates it was then intended to begin the first District Farms; it further directed that the youths should be chosen from the ryot class, or from some other class connected with the land; that they should be of an age between 18 and 20 years; should be strong and healthy, should possess a colloquial knowledge of English, and should be willing to enter into an engagement to serve in the Agricultural Department should their services be needed.

12. Some difficulty was experienced in meeting with young men for this class, possessed of the necessary qualifications. The salary offered was sufficiently attractive; but it was found that there were but few youths of the ryot class that were sufficiently well educated, in the districts from which the youths were to be selected. Had there been no limit as to district, there would have been no difficulty in securing a large number of suitable young men for the appointments, even at a salary only half the amount offered. I have arrived at this conclusion from the experience I have had when vacancies have occurred in Sydapet Farm Apprenticeships, for the youths that apply for these vacancies are in most instances as closely connected with the ryot class, are of as good a social

standing, and are frequently much more highly educated than the youths that now fill the District Farm Apprenticeships.

13. No suitable persons having been secured in Tinnevelly for the appointments, they were filled up from the following districts as follows; from Bellary 2, one a Mahomedan and the other a Hindu; from Coimbatore 3, all Hindus; from Ganjam 1, a Hindu; in addition to these, a young man from Vizagapatam sent by and paid by His Highness the Maharajah of Vizianagrum, K.C S.I., was received under similar regulations. All were appointed on probation; they joined their appointments during December and January. In February one of the Coimbatore men was allowed to resign his apprenticeship and return to his home, as the state of his health was so unsatisfactory while he resided at Sydapet: and another apprentice from the same district was sent home in March, as he was found quite unfitted for an agricultural training. There were thus at the close of the year only five in this class, including the youth from Vizagapatam.

14. The following table shows how these apprentices are employed on each working day:—

	A.M.		A.M.	
From	5-30	to	8	—Field work on the Experimental Farm.
From	8	to	9	—Breakfast.
From	9	to	11	—Studying in the reading-room.
			P.M.	
From	11	to	2	—Off duty, dinner, &c.
	P.M.			
From	2	to	3	—Field work on the Experimental Farm.
From	3	to	4	—Studying in the reading-room.
From	4	to	6	—Field work on the Model Farm.

Though these apprentices are not put to actual work like the Sydapet Farm Apprentices, they are expected to take part in what is going on at the farms, and to make themselves acquainted with the object with which the work is being done; they are also expected to be able to work any of the implements and machines used on the farms. Each has to keep a Farm Journal, in which he enters daily all the various employments on which the men and cattle are engaged. Examinations are occasionally held, in view to determine whether the apprentices are doing their duty. At the last examination the following paper was set:—

EXAMINATION HELD ON THE 22ND AND 24TH OF MARCH 1873.

Paper Examination.

Full Marks.

1. I paid a cooly in the month of January Rs. 2-12-11. His pay is Rs. 3 per month. For how many days did he receive pay? ... 15
2. I sowed on $2\frac{5}{6}$ acres of land 28 lbs. of indigo seed. How many pounds did I sow per acre? 15
3. A plough turns over a furrow slice 6 inches in width, the cattle travel at the rate of 2 miles per hour; tell me how many square yards of ground will be turned over during a working day of 8 hours, deducting 20 per cent. of the time for turnings? ... 15
4. The bucket at the whim contains 30 gallons of water, 60 buckets are raised per hour, the diameter of the bullock walk is 12 feet. The bullocks make 2 revolutions of the walk for each bucket raised. Tell me how many gallons of water are raised in a working day of 8 hours and what distance the bullock travels to perform this work? 15

Viva voce Examination.

	Full Marks.
1. A number of ordinary country grains to be named	10
2. Samples of wool. Information asked regarding the quality of each and how hair is recognized in a sample of wool?	10
3. Model of an improved plough and of a native plough. Information asked regarding the construction of each, and how this difference affects their working capabilities	10
4. Questions on Farm Map to ascertain apprentices' knowledge of the situation of different fields and of the boundaries of the estate	10
Total ...	100

The highest number of marks obtained was 63 and the lowest 51.

15. The general conduct of these young men while at the farm has been satisfactory, and they evince some interest in their duties, especially in those of a practical kind; all are able to work our English ploughs; indeed, two or three can plough very well. But the system is certainly not one that is calculated to train Superintendents to be placed in charge of the District Farms. These young men come here ignorant of the very A B C of agriculture, and agriculture can be taught, only in the way that any other profession is taught, by beginning first with systematic elementary instruction and grounding the student thoroughly as he proceeds in his education. The system under which these young men are supposed to be taught agriculture, is that under which agricultural pupils are placed on a farm in England. But little consideration is needed to enable one to see that such a system, even if beneficial in England, can only be so under conditions which are not met with in this country. In England young men who are placed for a time with a farmer to learn practical farming, generally spend a year or more at some institution devoted to the teaching of agriculture, or the sciences bearing on agriculture; and the superior practice which they are thus taught is a novelty, but in very few districts of the British Isles, so that they have generally in the locality in which they begin actual farming, one or more practical illustrations of what they want to achieve. How different will be the case with our District Farm Superintendents? They will have to introduce a practice which all their neighbours may at first be inclined to oppose with the utmost of their ability, which may even be opposed to the traditions in which they themselves have been trained. Some of these young men may in time, under the training under which they are now placed, become suited for employment as overseers under certain conditions, and might also under certain conditions make successful farmers, but they can never become what the District Farm Superintendents should be—local centres of agricultural information, local authorities on all relating to the agricultural practice of the districts, and the pioneers of agricultural reform.

16. *Distribution of Seeds.*—In the Proceedings of the Board of Revenue, No. 4,956, dated the 7th of December 1871, it was directed that, after the distribution of the Carolina paddy seed then in stock, that Collectors should pay the full market-value of any seed they required from the Experimental Farm, with the cost of packing, conveyance, &c., and the same regulations, slightly modified, were brought to bear on applications received for seeds from private persons. For these reasons, only the following small quantities of seeds were issued gratuitously during the past year:—

	Pounds.
Cotton Seeds	683
Carolina Paddy Seed	90
Sorghum Saccharatum Seed	402
Maize Seed	301
Yellow Cholum Seed	35
	1,501

17. *Ploughing Competition.*—A ploughing match was held on the Experimental Farm in December. As it was the first public competition of the kind ever held in this Presidency, it created a good deal of interest, especially amongst the cultivators that reside in the neighbourhood of Sydapet, who visited the farm in great numbers during the competition, and seemed to be much interested in what was going forward. Their Excellencies Lord and Lady Hobart, the Hon. J. D. Sim, C.S.I., and most of the influential gentlemen—Europeans and Natives—of the district were present to witness the competition.

The following gentlemen were good enough to act as Judges :—

Class A.	Class B.	Class C.
Dr. Bidie.	The Hon. Major Bourke.	Colonel Benson.
G. Thornhill, Esq.	J. C. Loch, Esq.	R. A. Dalyell, Esq.
Colonel J. P. Watts.	T. Pritchard, Esq.	Dr. Hunter.
M.R.Ry. T. Muthusawmi Iyer.	M.R.Ry. R. Ragoonatha Row.	The Hon. J. D. Sim, C.S.I.
M.R.Ry. T. Chentsal Row.	M.R.Ry. Hurry Row.	M.R.Ry. Vijia Ragavaloo Chetty.

Only iron ploughs were allowed to compete in Class A; ploughs made partly of wood and partly of iron and all descriptions of native ploughs competed in Class B; and Class C was open only to ploughs worked by Farm Apprentices. The competitors in each class had each to plough a plot of ground measuring 600 square yards. The soil was a free sandy loam. Four prizes were offered for competition in each class. The prizes were awarded for (1) depth, (2) regularity and straightness of furrow, and (3) speed in executing the work; perfection in each of these was valued at 25 points, and the prizes were given to the ploughmen in each class who obtained the highest aggregate of points. During the competition, besides the ploughmen only the judges were allowed to enter the field; as it was feared that, if strangers were permitted to go near the cattle while ploughing, the execution of the work would be imperfect from the cattle becoming unmanageable.

18. The results of the competition were as follows :—

Names of Competitors.	Time occupied in completing work.	Equal to work done in a day of 8 hours.
	Minutes.	Acres.
1. Muthoo	31	1·91
2. Cunthen...	45	1·32
3. Annamalay	45	1·32
4. Iyulu	50	1·19
Thosery...	52	1·14
Murugan	62	·95
Morry	Stopped; cattle unmanageable.	

The competitors in this class were all field laborers employed on the Government Farms. The winners of the first, the second, and the third prizes worked ploughs made by Messrs. Ransomes and Sims, of Ipswich, England; the man who gained the fourth prize also worked a plough of a similar kind, which had been made in this country; Murugan and Thosery worked ploughs made by Messrs. Howard and Co., of Bedford, England; the plough used by Morry was made in America by Messrs. Ames and Co., of Boston. I do not attach much importance to the fact that the men who used Messrs. Ransomes and Sims' ploughs stood highest in the competition, as I believe the ploughs used that were made by Messrs. Howard and Co. were as good as any in the field: the difference in the results obtained were, I think, due chiefly to the different capabilities of the men and their cattle. The whole of the work done by the competitors in this class was very fairly performed; the average depth of the ploughing was about 6 inches.

Of course the speed at which the ploughs were driven was beyond the speed at which they are usually worked, but the judges were present in the field during the whole time the competition was proceeding, and checked all attempts to over-drive the cattle.

19. There were a large number of competitors in Class B, the greater number being ryots from the adjoining district. The work done was generally poor in comparison with that performed by the iron ploughs; and neither was it completed so quickly, for nearly half the number of iron ploughs had finished their allotted task before a single plough in this class had finished. Three of the prizes in this class were carried off by men who used combined ploughs which had been made in the Implement Workshops at the Experimental Farm. The other prize, the third, was awarded to a cultivator from the neighbourhood of Guindy, who used a country plough of rather a better shape than that usually employed.

20. For the prizes in Class C there were six competitors—all Sydapet Farm Apprentices. The work done by them was not so good as I expected, but the judges and spectators expressed themselves highly pleased with what they did. They were certainly placed in very trying circumstances, as, until they came into the field to begin work, none knew what cattle or what plough it would fall to his lot to compete with, as both plough and cattle were drawn by lot. The two Hindu Apprentices who carried off the first and the second prizes, were both educated at the Sydapet High School, at which institution the winner of the first prize had taken a very creditable position. Apprentices McManus and Gale, the former of whom gained the third prize and the latter the fourth prize, did creditable work, but they did not manage their cattle well.

SYDAPET EXPERIMENTAL FARM.

Estate Improvements.

21. *Cottages.*—On a piece of waste land situated, a few hundred yards to the west of the Experimental Farm buildings, six cottages have just been erected for the occupation of the apprentices who are required to live on the farm; the situation of the cottages is convenient, being so near to the farm buildings and yet unconnected with them; thus, while a certain amount of privacy is secured to the occupants of the cottages, they are yet under proper supervision. Each cottage is provided with a cook-house and other conveniences, the whole being placed in an enclosed garden. The walls of all these buildings are made of well-burned bricks, the portion below ground consists of brick built in lime, and the portion above ground of brick built in mud, excepting about a foot in depth immediately under the roof, which consists of bricks built in lime. The roofs are all tiled on palmyra rafters and reepers. The walls are plastered inside and pointed on the outside, and the floors are paved with square bricks. The whole of the work has been done in a substantial manner. The materials were purchased; and the labor was performed under the following contract rates:—

Building brick walls in mud, 3 pies per cubic foot.
Do. in lime, 6 pies do.
Building brick arches, in lime, 1 anna do.
Roofing with pan-tiles and flat-tiles with plaster border, Rs. 1-4-0 per 100 square feet.
Plastering two coats, Rs. 1-6-0 per 100 square feet.
Pointing outside, „ 1-4-0 do.
Flooring with square tiles, Rs. 0-14-0 do.

These rates have been in force for some time on the Sydapet Farms, and they are, I think, reasonable considering the kind of materials the workmen have to work with in this part of India. I have tried the effect of giving to contractors the whole of the work instead of only labor; but I have not found this plan answer; it is I find decidedly the best way to

contract separately for labor, and for the materials required. Bricks and tiles I can usually purchase at a fair price in the neighbourhood and around Sydapet: the following are the rates paid:—

	Per Rupee.
Bricks (first and second sorts only)	371
Pan-tiles do.	514
Flat-tiles do.	543
Flooring tiles 8″ × 8″ (first sort only)	100

The foregoing are the rates at the kilns, which are situated about a mile from the Experimental Farm. Both bricks and tiles are very inferior in comparison with those that are made in England, while they are only about two-thirds the size. Chunam (shell lime) is supplied unslacked at about two parahs per one rupee, or slacked at about 3½ parahs per rupee, delivered in either case. The parah contains about 4,000 cubic inches. Palmyra rafters 10 feet long can usually be bought in Madras at the rate of eight for Rupees 3½, and reepers of the same wood at Rupees 6 per hundred of about 10 feet in length. Teak wood sawn varies from Rupees 2¼ to Rupees 3 per cubic foot; in the log it can be bought at from Rupees 2 to Rupees 2½ per cubic foot. I have given the foregoing details, as I am so frequently asked the cost of putting up farm buildings. It will be noticed that the cost of erecting farm buildings in this country is very high, in comparison with the cost that must be incurred in other countries, in which there are no white-ants to fear. The most serious item in the cost is teak wood, which is really necessary in some parts of the buildings, though its use is generally restricted as much as possible. On most English estates there is generally enough wood growing, of a kind suited for the requirements of any buildings that are to be erected, and it is not necessary in that country to pay from 5 shillings to 6 shillings per cubic foot for building timber. We sadly need a cheap description of wood that will resist the attacks of white-ants in the way teak does. We must secure a certain degree of permanency in our farm buildings. These quickly run up structures composed of bamboos, leaves, &c.; are a source of endless expense; their first cost may seem low, but, in the long run, when it is necessary that they should be kept up, they are most expensive structures.

22. *Poultry House.*—The poultry-house having been very inconveniently placed, it was taken down and was built on a site situated nearly in the centre of the Farm Steading. The materials in the old house were utilized in building the new one, the walls having been of brick in mud, the bricks were readily removed without damage. In re-building the house, the internal arrangements were rendered more suited for the accommodation of fowls undergoing gradual acclimatization.

23. *Subsoil Draining.*—Before I had been twelve months in this country, I had become fully convinced that in the districts over which my observations extended, agriculture suffered far more from an excess of water than from a deficiency of water, and the experience I have since had in conducting the operations of the Sydapet Farms, and the observations I have made during my tours over the Presidency, fully confirm the opinions then formed. I have refrained until now from bringing this matter forward in a prominent way, from a desire to gain as much information as possible regarding the influence of seasons of various characters. I am not unaware of the unmerited ridicule with which the advice of a distinguished agriculturist was received some years ago in this Presidency, when he ventured to advise our ryots to drain their paddy fields. Speaking generally, that advice was perfectly sound, and I have not the least doubt but that, had it been generally adopted, the country would have been richer by some millions of rupees than it now is. Irrigation and drainage must proceed together; the vast expenditure the State has incurred on irrigation works will never produce a fair return, until the districts so watered are properly drained. The almost perfect irrigation arrangements of some districts is, under present circumstances, so much against these districts. The command of an abundant supply of water throughout the year is the very reason why, in the neighbourhood of some of our best irrigation

works, there is now so much, otherwise valuable, land abandoned. When the old-fashioned and imperfect means of irrigation only existed, with but a four or six months' supply of water, the land had annually from six to eight months, during which it might recover from the ill-effects of swamp cultivation. The irrigation works in many parts of the Presidency are too far ahead of the intelligence of our ryots, who will not utilize the advantages they possess, by *moderately* irrigating their land, but will persist in inundating it, and in so doing converting it into a marsh fit only for the production of indigenous paddy, and of low type crops with a semi-aquatic habit of growth, and with these crops the land is sown again and again, until it is rendered unfit even for their growth, when it is abandoned and turned over to the State. Thus the very advantages which we are so anxious to place at the disposal of the ryot are used by him, from want of judgment, in such a way as to produce disease and death in his neighbourhood, his own bankruptcy, and a great financial loss to the country. If it is the duty of the State to provide its tenants with the means of irrigating the land they occupy, it is equally its duty to see that proper drainage arrangements are made, so that the irrigation water they provide, may not collect and stagnate in the soil to its injury, and to the injury of the health of the people who reside in the neighbourhood of land so irrigated. But, while a large tract of country has thus been rendered unproductive, by the abuse of irrigation in the absence of proper drainage, there is still in this Presidency a far wider area of country that is injured by natural means, through an excess of water from rain-fall or other causes. Not only does such water on retentive soils, greatly retard field operations at the season when such work yields the largest returns, but it prevents the free use of superior field implements, renders it impossible to adopt superior methods of cultivation, and confines the cropping of the land to the lower class of crops. How frequently it happens, during September and October, when it is so important that every hour should be utilized for getting in the cold weather crops, that a heavy fall of rain puts an entire stop for days to all field operations on our retentive soils, by making the land unfit to carry cattle and implements, until by evaporation it is again rendered sufficiently firm for the cultivating operations to be proceeded with, from this cause. I have frequently been obliged, when in the midst of work, to abandon further preparations and leave the land uncropped until after the rains, in this way frequently losing something like 10 rupees per acre, the difference between the probable value of a crop produced from seed sown after the rains, and of a crop sown under proper conditions before the rains. The great desire of the intelligent cultivator is to commence operations on his soil, as soon as possible after the rains first begin, and to get it cultivated and sown without loss of time, in order to secure the full advantage of the growing weather for starting his crops. On a good deal of the stiff land of this Presidency, nothing can be done in working the soil until a week or more after a heavy fall of rain, and frequently by the time that the land is in a state fit for being worked, the weather has undergone a complete change, the air has become dry, and the sky clear and cloudless, conditions anything but favorable for the success of newly-sown crops. On the other hand, similar land when properly drained will generally be fit for undergoing preparation within a day or two after a heavy fall of rain. Not only does an excess of water in a soil of a retentive character, prevent the cultivators of such soils from taking full advantage of seasonable rains for getting in their crops, thus delaying and putting out of season all subsequent operations, but a large proportion of the seed sown under such conditions invariably perishes, and another considerable proportion yields only undersized sickly plants, while the plants produced by the remainder yield but very poor returns; they have so much to contend with during growth from weeds, which the wetness of the ground, prevents being regularly removed by the bullock-hoe or hand-hoe; from the absence of aëration in the surrounding soil, from inability to work the cultivators satisfactorily in a wet soil; from the attacks of insects, and from fungoid diseases, mildew, rust, &c., which delight to feed on crops that are growing under unfavorable conditions. In pointing out the evil consequences of an excess of water in an arable soil, I do not forget that, in this country, much loss often results from the contrary condition—a deficiency of moisture in our soils—but as an agriculturist I should

much prefer to be the cultivator of land, on which the crops occasionally suffered from drought, than to be the cultivator of land liable to be injured by an excess of stagnant water. However, it is possible to meet with a soil that suffers occasionally from both these extremes; indeed, this is a very usual experience with retentive undrained soils. During a drought, the crops on the undrained soils are far more likely to suffer from the drought, than the crops on a similar soil that has been properly subsoil-drained. At such a time undrained soils are caked over, are hide-bound, and full of cracks, while the drained soils are loose and friable, conditions suited for the absorption of dew and watery vapor during night, while the whole body of the tilled soil being more or less porous, it holds water readily in mechanical suspension; and, as the roots of the plants growing on such a soil meet with no obstacle to their free passage, but rather encouragement to their growth, they naturally grow deeper into the soil, and are thus better protected from the hurtful influence of a scorching sun. While this much is certain, there yet remains a wide field for investigation in connexion with subsoil drainage in this country, as we have here to contend with conditions so widely different from those met with in those parts of Europe where yet only subsoil drainage has been tried on an extensive scale. The matter is one which needs to be examined from various stand-points, and one that well deserves our most serious attention; experiment should be instituted under all the various conditions met with in the cultivation of arable land in this country, and the results should be carefully recorded and compared. I have just begun a small experiment in subsoil drainage, but it was commenced so recently that I can now do little more than describe the preliminary operations and indicate the direction in which it seeks for information. The field selected for the experiment measures 3·80 acres; it is divided by a water channel nearly in two equal-sized portions. The soil is a stiffish loam, of a sour soapy character, resting on a subsoil of a similar nature, and it has been almost quite unproductive during the five years I have been acquainted with it. The land was formerly (before it became the property of Government) used for growing paddy, under the repeated cultivation of which it had become injured. When heavily seeded, there was generally a fair covering of plant up to the time the crop was about one-third grown, and the plants looked well as long as their roots were confined to the few inches of the healthy surface soil; but after this, when the roots got into the sour soil, there was little further growth, the plants became yellow and stunted, and gradually red from the attacks of the fungoid disease, "Rust," and but an exceedingly small yield of inferior grain was obtained. It mattered not what crop was tried, the result was generally the same. It is intended that one portion of the field shall be drained with stone-drains, and the other portion with pipe-drains, each portion being separately provided with a main drain and an outfall. On both plots the parallel drains will be 3½ feet deep, and the main drain four feet deep, while the distance between each parallel drain will be 24 feet. The cutting of the parallel drains has been let to a contractor at 3½ rupees per 200 running yards; he merely makes the cutting and throws the earth on the sides of the drain; each drain will be 18 inches wide at the top and nine inches wide at the bottom; this is, of course, much wider than is necessary and much wider than I intended; but I found, after a day's experience, that the laborers here could not work the ordinary English draining tools, and no choice was left to me but to allow the contractor to excavate the drains in his own way by means of the ordinary crowbar, mamuttee, and basket, hence the necessity of cutting the drains so wide. Our laborers have not the muscular power necessary to admit of their using ordinary drain tools; however, it is, I think, possible to prepare tools specially suited to them, with which they may cut drains without having to make the excavation so wide as is necessary with the tools now used. The stones needed for the stone-drains are being quarried on the Experimental Farm; for raising them and breaking them to a size sufficient to pass through a ring with a diameter of three inches, the cost is about four pice per parah (4,000 cubic inches) of broken stones; these stones will be laid in the parallel drains to the depth of one foot, and in the main drain to the depth of about one and a half feet. It is possible that, with further experience as the work proceeds,

we may be able to reduce these charges; but, taking them as a basis for calculating the probable cost of draining with stone-drains, the cost per acre will be as follows:—

	RS.	A.	P.
Cost of cutting parallel drains, say, 580 running yards, at 3½ rupees per 200 running yards	10	2	5
Cost of cutting, say, 58 running yards of main drain, building outlet, and providing a grate...	4	8	0
Cost of broken stones for 580 running yards of parallel drain.	13	11	4
Cost of broken stones for 58 yards of main drain	2	5	4
Cost of carting broken stones from quarry to field, 8 days for 1 cart and driver, at Annas 12 per day...	6	0	0
Cost of putting stones in drain, filling in earth, &c.	5	0	0
Total...	41	11	1

It is not so easy to estimate the cost of pipe-draining, as in this country there has not as yet been any attempt to make pipes for agricultural use, and it is exceedingly difficult to get natives to begin any new industry. I have tried our local tile-burners again and again, but they will not undertake the manufacture of pipes excepting at a price that quite prohibits their use for field draining. We must, therefore, manufacture them ourselves on the Experimental Farm; this I intend doing, and at present I see nothing to prevent us making good two-inch pipes at, say, Rupees 12 per 1,000. This rate is above the average price in England; the difference is due to the extra cost of fuel in this country. If we can but get coals delivered at something like the cost of coals in most English tile-yards, we could manufacture pipes at a lower price than they cost in England. Taking Rupees 12 as the probable cost per thousand, the expense of draining an acre of land here with two-inch pipes would be something as follows:—

	RS.	A.	P.
Cost of cutting parallel drains, say 580 running yards, at 3½ Rupees per 200 running yards	10	2	5
Cost of cutting, say, 58 running yards of main drain, building, outlet, and providing a grate	4	8	0
Cost of pipes for main and parallel drains, say, 1,700, at Rupees 12 per 1,000	20	6	4
Cost of carting pipes	1	0	0
Cost of laying pipes and filling in earth	4	0	0
	40	0	9

From these estimates it would appear that the probable cost of draining land by pipes and by stones would not differ greatly in this district. However, I strongly believe that when the manufacture of pipes is begun on an extensive scale, it will be found possible to supply two-inch pipes, at a price, at the least, 25 per cent. below the price that appears in my estimates. But I certainly greatly prefer pipes to stones even at equal cost; the pipes appear in every way to be better suited for this country. The experiment now being instituted will be carefully watched, and the observations made from time to time will be duly reported.

24. Persons who are unacquainted with agriculture, as practised in this country, can form no idea of the enormous losses that the cultivators of badly-drained land suffer in an unusually wet season. The money expended in draining an acre of land is soon recovered, indeed, on many soils I have no doubt but that the entire cost, with interest on capital, will be recovered in from 8 to 10 years. Probably the ryot could not raise the needful capital, but then the ryot is not expected to raise the capital for developing irrigation

schemes; as the State provides the capital needed for establishing the means of irrigation, so should it provide capital for draining the land, charging the ryot a fair interest on the sum so expended. I see no reason why the annual rent charge on land drained by the State should exceed Rupees 2 per acre, a charge the ryot can well afford to pay from the larger and more uniform returns he will obtain from his land after it has been properly drained. The estimates I have given of the cost of subsoil draining can, of course, be reduced by increasing the distance between each drain and increasing their depth, which with some soils may be desirable, while in some instances two or three drains cut judiciously as regards depth and direction might be sufficient to drain a plot of several acres in extent, the cost per acre for the subsoil—draining in this case not being probably one-fourth the sum mentioned in the estimates. I advocate the merits of no particular system of draining; the system to be adopted, the number of drains per acre, the depth of these drains, must each be determined by the peculiarities of the land to be drained. Though I have suggested that the State might drain the land and charge an annual rent charge, there is no reason why the ryot should not do the draining himself; the expenditure that is incurred for draining is almost entirely laid out on labor, and he, if he chooses, might himself earn the money so spent. It must be understood that in these suggestions I advise only the drainage of land which rests on a retentive subsoil, in which water collects and stagnates. There is undoubtedly a large area of arable soil in this country, on which subsoil-drainage could have no useful effect.

25. *Reading-room.*—A room in one of the sheds at the Farm buildings was fitted up as a Reading-room for the use of the apprentices and others connected with these Farms. It is well supplied with books, periodicals, and newspapers relating to agriculture. It contains a small collection of agricultural seeds, feeding stuffs, artificial manures, soils, &c., and a few models of water-lifts, implements, &c. The room is open daily from morning until dark. The apprentices are allowed to remove the books for reading under certain conditions, but they are not allowed to remove from the room the periodicals and newspapers. A list of the books, &c., added to the library during the past year appears in the appendix.

26. *Irrigation Channel.*—To provide the means for irrigating the land situated on the eastern side of the Experimental Farm, a deep channel was dug in connection with the River Adyar. The floor of the channel is about 3 feet below the surface of the river when at its average height, that is, level with the crest of the anicut. The water thus flows by gravitation to the portion of the Farm on which it is needed, where it will be lifted for use. The height of the lift varies in different parts of the channel from 9 feet to 12 feet. In excavating this channel a large quantity of black alluvial earth was obtained; indeed, we raised such a quantity of this valuable deposit that its value reduced very considerably the cost of making the channel. Some difficulty was at first experienced in protecting the banks from cutting, during heavy rains, but by planting them with guinea-grass this difficulty has almost been overcome. When first planted the grass did not thrive, as it was planted in the raw unaërated soil, but now that the soil has been weathered and mellowed by exposure, the grass readily takes root. Some time must necessarily elapse before the grass covers the banks uniformly, but when once covered little damage will be done by heavy rains, and the slopes of the channel will be usefully employed in growing fodder. I had intended to continue this channel further over the Farm, and to provide it with several branches, but the scheme now under consideration, which proposes to give the whole estate a channel connected with the Chembrambaukum Tank, renders this unnecessary; a scheme which, I hope, will be approved, as it will give both Farms a full command of water throughout the year. At present we are frequently greatly inconvenienced from not having a supply of water wherever needed when a drought suddenly sets in; valuable experiments in operation are thus suddenly stopped, and the time and money spent on them are lost. Besides, with a perennial supply of water under command over the whole of the estate, field experiments could be conducted during any part of the year, or even over a series of years if necessary. Under present arrangements, field experiments can only be conducted

during the rainy season, and it frequently happens that from the weather experienced at such times, the whole of the results of a number of experiments are rendered useless.

Live Stock.

27. *Cattle.*—The disease known as epizootic aptha, or foot and mouth disease, appeared amongst the working cattle in February last. It had prevailed for some time previously, amongst the cattle belonging to the district in which the farm is situated, and it is probable that it found its way amongst the farm cattle by some one of them having been in contact with one of the animals suffering from the disease. Sixteen animals were attacked and the whole recovered. The disease appeared in rather a mild form; the symptoms in most of the cases were hot mouth and horns, vesicular eruptions on the upper part of the hoof and between the toes; in a few instances there was in addition vesicular eruptions on the tongue and in the inner side of the mouth. There was very little fever in any of the cases. The animals, except those with sore mouths, did not appear to suffer much pain, though all had diminished appetites and got out of condition. In the treatment of the diseased animals the first object was to get them removed entirely away from the healthy stock; they were then placed under the care of a man set apart for the special duty, who, of course, was not allowed to go near the healthy cattle. Every care was taken to place the animals under as comfortable conditions as circumstances would allow; they were fed on succulent green fodder and soft nutritious food, such as steeped oil-cake, &c. They were frequently washed, and special care was taken to keep their feet clean. After washing, the feet of all, the animals were regularly dressed with a preparation, of which the following is the composition:—

Tar	... 1	half-pint.
Sulphate of Copper	... 2	ounces.
Turpentine	... ½	a fluid drachm.

This was applied over the surface of the hoof and between the toes, a piece of thin, soft rope being used to work the preparation thoroughly into the crevices in the hoof. For bathing the ulcerated parts in the inner side of the mouth the following astringent wash was used:—

1 pound of alum.
2½ quarts of water.

The solution was prepared by dissolving the alum powder in the water, which had been heated to about 100 degrees. Three of the animals were unwell for about three weeks, but the majority of those attacked recovered in about a fortnight. Under good treatment the animals soon regained the condition they were in, previous to the outbreak of the disease. Every care was taken by removing the bedding of the stalls, &c., to prevent the disease from extending, and the result was so far satisfactory that no further cases occurred, while the cattle on the Model Farm altogether escaped being attacked.

28. The oil-cake made from the groundnut, to which I directed attention in my last report, formed the chief food of the working cattle during the past year; a daily allowance of four pounds per head, with a full supply of fodder, has sufficed to keep the animals in good working condition. In proof that the work performed by the Farm cattle is not light, I place on record here the following facts:—Sundays excepted, the Farm cattle work daily in the cold season 9 hours, and in the hot season 8½ hours, that is, in the cold season they begin work at 6 A.M. and work until 10 A.M., when they are put into their stalls to feed and rest until 1 P.M., at which hour they are again yoked; they are employed until 6 A. M., when the labor of the day ceases; the animals are then placed in their stalls, where they remain until the following morning. In the hot season their working hours are somewhat different; thus, instead of beginning work in the morning at 6, they then begin work at 5-30, and in the afternoon instead of beginning at 1, they do not begin until 2 o'clock. These hours are shorter than is usual in this part of

India, though for a hot climate they are sufficiently long for both the cattle and their drivers. Before I adopted these regulations the working day on the Experimental Farm for the draught cattle was about 10 hours in length throughout the whole year; however it was seldom that the animals performed 10 hours' work; for, though they might be in the fields or on the roads for 10 hours, they were not actually employed during the whole time, and it is better in every way that they should be comfortably lying in their stalls during the extra hour or hour and-a-half of leisure, which the present regulations afford them, than be standing for a similar length of time on the roadside or on the head-lands. The changes made in the working hours of the cattle have proved satisfactory; the cattle are now in their sheds during the hottest part of the day, and they now perform more work in a day than under the old system, for *they are kept at work during the hours set apart for work.* The amount of labor performed in a day by a pair of these cattle with European implements is—

	Acres.
In ploughing stubble land 4 to 6 inches deep	½
In ploughing fallow land 4 to 6 inches deep...	¾
In harrowing, with a set of iron seed harrows, once over ...	5
In harrowing, with an iron drag harrow, once over	3
In rolling, with a wooden roller, once over	5

In carting, the cattle are expected to travel about two miles an hour when drawing loads of from 1,000 to 1,200 pounds.

When working the bullock powers either "under" or "overhead" in raising water, cutting chaff, &c., they are made to travel about two miles per hour throughout both yokings, the actual draught per bullock varying, according to the nature of the work, from 50 to 100 pounds. This evidence is, I think, sufficiently conclusive as to the value of groundnut oil-cake as a food for draught cattle, and it fully confirms the good opinion formed of the cake from the results of its analysis. Unfortunately for those who have to purchase the cake, its price has been considerably increased during the last few months; thus, in our own case, during the past year we were supplied under a contract at the rate of Rupees 5-8-0 per 500 pounds delivered; but in contracting for a supply for another year, I have been obliged to agree to give Rupees 6-12-0 per 500 pounds, as we purchase 120,000 pounds per annum, this represents an increased annual expenditure of Rupees 300 for cattle food. I protested against this increase in the price, advertised for offers in all the cake-producing districts, and did my utmost to effect a contract on the old terms, but was unsuccessful. The cake manufacturers said that the demand for the cake had so greatly increased that they could readily sell at a good price to retail dealers in Madras all they could manufacture, and they had an impression that its price would still further increase. I would direct special attention to these facts; it is for reasons such as these that an experimental farmer, employed in the service of the public, never can, from a commercial point of view, be successful, for, all results his experiments bring to light, which may cost much time and money, are public property, and at once appropriated. I have again and again directed attention to the value of groundnut oil-cake, and what has been the results to the Sydapet Farms? Simply that the price of the cake has steadily increased, step by step, from about Rupees 4½ to Rupees 6¾ per 500 pounds, representing an increase of something like Rupees 500 per annum in the expenditure on account of these two Farms, equal to about Rupees 2 per acre. A commercial farmer would not have acted so, and would have pocketed these 2 Rupees per acre per annum. Being unable to effect a new contract in Madras, or in the districts around, on reasonable terms, I accepted the tender of a firm in Bangalore, and made a contract with them for a supply at the rate of 10,000 pounds per month, at Rupees 6-12-0 per 500 pounds delivered at Sydapet. Though the cake has thus increased in price, it is still by far the cheapest food for farm stock procurable in this part of India. In proof of this I give below the cost per day, on the Experimental Farm, of a pair of draught cattle fed on groundnut oil-cake.

	RS.	A.	P.
Fodder throughout the year at the rate of 100 pounds per pair per day, valued at 400 pounds per rupee	91	4	0
Cake throughout the year at the rate of 8 pounds per pair per day, valued at Rupees 7 per 500 pounds	40	14	0
Interest on probable value of the pair of cattle, say, Rupees 150, at 5 per cent.	7	8	0
Deterioration, say, at 10 per cent. per annum, on Rupees 150, the value of the cattle	15	0	0
Shoeing throughout the year twelve times, at Annas 12 ...	9	0	0
Contingencies	6	6	0
	170	0	0

The total cost, Rupees 170, divided by 313, the number of working days in the year, gives a sum per day amounting to Annas 8 Pies 8 as the actual daily cost of a pair of these draught cattle.

29. For the reasons referred to in paragraphs 10, 11, 12, and 13 of my last report, very little was done during the past year in fattening cattle; and, until some of the difficulties noticed in these paragraphs are removed, I see little hope that farmers will find it worth their time to engage in fattening cattle for the market. A few feeding experiments were, however, made; from these I select the following: two small bullocks were put up to fatten; they were allowed daily six pounds of groundnut oil-cake and as much fodder as they chose to eat, which amounted to about 50 pounds daily. When this special feeding begun, the animals weighed together 690 pounds; they were weighed at the end of each week as the experiment progressed. The following are the weighings:—

	Weight of the two Animals. lbs.		Weight of the two Animals. lbs.
1st week	695	9th week	704
2nd do.	702	10th do.	710
3rd do.	728	11th do.	692
4th do.	719	12th do.	721
5th do.	...	13th do.	757
6th do.	...	14th do.	780
7th do.	...	15th do.	783
8th do.	701	16th do.	800

This experiment was spoilt by one of the animals having been attacked by the disease known as epizootic aptha, an outbreak of which amongst the draught cattle I have already noticed; though not a dangerous disease, it has a serious effect on the cattle it attacks, in causing them to lose flesh and get out of condition in a very short time. The weighings from the 4th to the 12th week were influenced by the cause just noticed; it will be observed that, after the animal had recovered, the weekly weighings showed a very satisfactory increase; thus, starting from the lowest weight recorded, that determined at the end of the 11th week, the results obtained are worth special notice:—

	Weight of the Animals. lbs.
11th week	692
12th do.	721
13th do.	757
14th do.	780
15th do.	783
16th do.	800

or, in 35 days an increase of 108 lbs. in the weight of the two animals ; estimating that this increase in their live weight would yield about 42 per cent. of beef, the proportion I have usually found the cattle of this country yield when fairly fattened, for each one hundred pounds of their live weight, the increase will represent about 45 pounds of beef, which at Annas 4 per pound, will be worth Rupees 11-4-0 : against the value of this increase we have the cost of feeding :—

	Rs.	A.	P.
Groundnut oil-cake for 35 days, at 6 lbs. per day, valued at 7 rupees per 500 lbs.	2	15	0
Fodder for 35 days, at 50 lbs. per day, valued at 1 rupee for 400 pounds	4	6	0
Attendance, &c.	0	11	0
Total ...	8	0	0

The value of the manure will more than equal the cost of the straw required for bedding, the value of the accommodation, &c. It would thus appear that during the last five weeks over which the experiment extended, a profit of about 40 per cent. on the cost of feeding, was obtained. But if the cost be estimated for the whole 16 weeks from the beginning to the end of the experiment, it will be found that the result was a very considerable loss. And thus it is, in farming, we cannot reduce the results of the operations we conduct, to the accuracy and exactness that is usual in ordinary trade or commerce ; it matters not how carefully we may plan, or with what skill we conduct the duties of our vocation, something is constantly stepping in the way to mar our prospects ; hence it so frequently happens that actual experience, produces results so much at variance with theoretical calculations, it is seldom that a large percentage over a series of years can be obtained on the capital employed in agriculture, for losses by disease, &c., are of such frequent occurrence, that the average result is reduced to but a small percentage on the capital ; however, there are pleasures met with in the pursuit of agriculture that go a long way towards compensating for the small profits it affords.

30. Suitable animals for fattening are difficult to procure in the districts around Madras, at anything like a price that will admit of a profit being made in fattening them for the market. In Mysore, Salem, and Nellore animals well suited for the purpose can readily be obtained ; but the rail charge for bringing them to Madras would in many instances add from 25 to 50 per cent. to their first cost, and the long drive from Nellore is attended with too many risks, to justify the feeder in himself making the venture. If there was a demand for suitable animals, I have no doubt but that dealers would soon appear, who would visit these districts, buy up the cattle, and drive them in large droves into the locality where the demand existed. Therefore, at present the person in this neighbourhood who would fatten stock for the market must, as a rule, content himself with old, worn-out draught bullocks or barren cows. A young healthy bullock weighing, say, 500 lbs., will sell readily as a draught bullock for Rupees 50, while for fattening it would not be worth more than Rupees 25, and even at that price the lean beef would be bought at the rate of $2\frac{1}{2}$ annas per pound, rather a large price when it is remembered that for the beef when fat the feeder can only expect to get 4 annas per pound even when he himself acts as butcher and retails the beef ; a margin of only $1\frac{1}{2}$ anna per pound with which to meet the cost of feeding the animal during four or five months, to stand against all the risks that attend the keeping of cattle in this country, and to pay expenses of retailing the meat. To show how the results of fattening vary with the kind of animal selected for fattening, I would direct attention to the following experiment. Two bullocks were selected ; they were very similar in general appearance. Both animals were similarly fed ; the daily food of each consisted of 3 pounds of horse-gram and as much fodder as it could consume, about 30 pounds ; the animals were weighed at the end of each week as the experiment progressed, with the following results :—

	Bullock No. 1. lbs.	Bullock No. 2. lbs.
1st Week	378	390
2nd do.	388	408
3rd do.	396	402
4th do.	416	390
5th do.	396	378
6th do.	406	395
7th do.	420	398
8th do.	413	395
9th do.	419	390
10th do.	427	399
11th do.	429	395
12th do.	456	396
13th do.	470	397
14th do.	473	...
15th do.	478	...
16th do.	503	...

It will be noticed that during the sixteen weeks' feeding, No. 1 made an increase in its live weight amounting to 125 lbs., equal to about 52 lbs. of beef, which, at annas 4 per pound, would represent Rupees 13.

The cost of producing this increase was—

	RS.	A.	P.
Gram, 3 lbs. per day, for 112 days, value at 36 lbs. per rupee ...	9	5	4
Fodder, 30 lbs. per day, for 112 days	8	6	4
Attendance, &c.	2	0	0
	19	11	8

The cost of producing this increase was, therefore, Rupees 6-11-8 in excess of its value, a result in harmony with what I have before experienced in similar experiments that I have made in feeding on gram. The special feeding of animal No. 2 was discontinued after the 13th week, as it was evident that it would not improve. These experiments are instructive, in showing how differently two animals will progress and lay on flesh, even when fed on exactly the same food and under exactly similar conditions. This fact is well known to feeders in England, who will frequently readily give from ten shillings to one pound per head more for cattle from one part of the country than for those from another part, though the cattle for which this high price is given may in no respect look better than those less appreciated. Unfortunately I know nothing of the previous history of these animals; but I should suppose that No. 1 came from one of the good grazing districts and had always enjoyed a sufficiency of food, while No. 2, I should imagine, was bred and reared in this district, and had passed through the various stages of fasting and over-feeding which characterise the management of cattle owned by our ryots.

31. During the past 12 months there has been but little demand for the services of the bulls kept at the Experimental Farm; however in the value of the work they have done in carting, ploughing &c., we have more than recovered the cost of their keep, &c. The bulls are all too large for the cows kept by the ryots who reside in the neighbourhood of the farm; the live weight of these cows varies from 200 to 400 lbs., while the lightest of the bulls at the farm will weigh over 800 pounds; the result is, that it is quite useless to put the bulls with at least 75 per cent. of the cows that are sent to them. It is a great mistake to expect to obtain a good cross between bulls of the large Nellore breed and the undersized, degenerated breeds of these districts. To improve the breeds of this district we must obtain a medium-sized bull of some breed known as suited for the dairy, perhaps a bull of the Aden breed would be the most suitable that can be procured.

32. *Sheep.*—The sheep-breeding experiment progresses steadily, and continues to yield

encouraging results. The last lambing season was again a satisfactory one; there were very few deaths, and the lambs generally were strong and healthy. The breeding sheep were managed in the same way as in the previous two seasons. Rams of both the Sydapet varieties were used; nearly the same number of ewes were given to the rams of each variety. As far as can be judged in the present state of the experiment, the sheep got by the rams of the brown variety are better flesh-producers than those got by the rams of the white variety; this is especially apparent in the lambs; thus, last season I selected 11 of the best lambs of each variety of about the same age (four months) and had them weighed; the results were as follows :—

	lbs.
11 lambs, 4 months old, white variety	350
11 lambs, 4 months old, brown variety	444

Thus, while the former gave an average of only 31·81 pounds per head, the latter averaged 40·36 pounds per head. However, as wool-producers, the sheep of the brown variety are much inferior to those of the white variety. I had not previously attached much importance to the wool-producing capabilities of the sheep of this variety, as the wool yielded by them sold at such a very low price (annas 1½ per pound) in the district; but recently I was enabled, through the kindness of Messrs. Walker and Co., of Madras, to submit a sample from some of the best fleeces for the professional valuation of a London wool broker, and was favored with the following gratifying report :—

"The two samples of wool sent to us for valuation are 'fair;' 'East Indian Yellows' worth here from 11*d.* to 11½*d.* per 'pound'". There is thus a wide margin between the local price, 2½*d.* per pound, and the London price, 11½*d.* per pound, with which to meet the cost of sending the wool to England. If we can succeed in raising the average quality of our wool to the quality of that submitted for valuation, it may after all become worth while to engage in wool raising even in this hot country. In comparison with the value of the wool produced in the colonies, this wool is certainly not a valuable kind, still the difference in value is not so great as might have been expected; thus, when this wool was valued, the following rates were quoted in the London Wool Market Report :—

	Ordinary per lb. s.	d.
Queensland and New South Wales	1	2
Victoria	1	3
Tasmania	1	3
New Zealand	1	2

The best colonial wool in unbroken fleeces was then selling at from two shillings and four pence to three shillings per pound. The rates quoted above are for wools classed as "broken pieces and locks," to which class the wool submitted for valuation belonged. If we can cross together the two varieties of the Sydapet breed, we may be able to produce an animal that will be valuable both for its wool and its flesh; it is, of course, exceedingly difficult, if not impossible, to produce a race of sheep that will excel both as mutton and as wool producers; but it is quite easy, by judicious crossing, to produce a variety that will yield fair returns of both. A few sheep of the Sydapet breed, which in size and form had not fully realised the expectations formed concerning them, were killed for mutton; the following were the results :—

——	No. 1.	No. 2.	No. 3.	Average.
	Pounds.	Pounds.	Pounds.	Pounds.
Legs	11	10½	10½	10·66
Loins	16	15	15	15·33
Shoulder, neck, and breast	20½	17½	14½	17·50
Total weight of mutton ...	47½	43	40	43·49
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Cash realised by the sale of mutton, skin, &c. ...	11 0 6	9 8 6	9 3 6	9 14 10

None of these sheep had been specially fattened; they had been fed along with the store sheep, and received no different treatment than they. They were in good average condition. Their mutton was well mixed with fat, and was tender. These weights are not great, indeed, they could have been greatly increased had this been desirable; neither were the joints unusually heavy; the mutton was worthy of notice rather for its fine grain, its fair proportion of fat and lean, its flavor, and the large proportion of flesh to bone, than for anything else.

33. *Pigs.*—The experiments made in 1871 in fattening pigs having given such very satisfactory results, the greater number of the pigs bred during the past year, not needed for stock purposes, were fattened for pork, instead of being sold as sucking pigs, as was the usual custom; in this way a much larger money return is secured, for instead of getting Rupees 3 for the pig at a month or six weeks old, we can, by fattening it, obtain from Rupees 18 to Rupees 25 for it when nine or ten months old. Most of these pigs were transferred to the Model Farm, where they were slaughtered and sold. The following statement, which refers to four well fattened pigs, shows the proportion of each kind of joint that each pig afforded, and the price obtained for each of these pigs :—

——	No. 1.	No. 2.	No. 3.	No. 4.	Average.
	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.
Legs	20	19	16	23	19·50
Loins	40	35	40	44	39·75
Shoulder	18	17	16	24	18·75
Neck and breast	12½	10	14	9	11·37
Total Weight of Pork ...	90½	81	86	100	89·37
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Cash realised by sale of Pork ...	25 2 0	23 9 0	23 1 6	29 10 0	25 5 6

It will be observed, on consulting the column headed "Average," that the coarser and inferior parts of these pigs (neck, breast, &c.,) weigh less than 8 per cent. of the entire weight of pork yielded by each pig; this is very satisfactory, as it proves that the pig stock at the farm has not degenerated, though it is now many years since the original stock were brought from Europe.

34. *Poultry.*—The Brahma Dorking cross, noticed so fully in my last report, continues to merit the high opinions formed of it. The cross has proved to be eminently suited for Southern India; specimens of the cross may now be met with in almost every part of the Presidency, and generally doing remarkably well. But the birds of this cross are not now confined to this Presidency, for their eggs have been sent to distant places beyond its limits, the advantages offered by the banghy post having been utilized to effect this.

35. The experiment in improving the breed of poultry in the Wudder Village has not been attended with as good results during the past year as could be wished. The people cannot, or will not, separate the half-grown fowls from those that are fully grown; the consequence is that the young hens begin to lay before they ought, which is most effective in putting a stop to any further growth. Early breeding is the great difficulty. The results of the experiment are, however, so far satisfactory that a 6-months' old half-bred fowl is as heavy as a 12-months' old country fowl. To ascertain what had been done towards improving the breed of fowls in the village, the people were asked a few months ago to exhibit their half-bred poultry at the farm yard on the Experimental Farm, a promise having been made to them that a number of small prizes would be distributed to the owners of the best birds. There were 30 entries for the competition; these consisted of cocks

20, hens 27, chickens 20 ; total 67. Several of the birds shown were really very good. The people said that they would have been able to have exhibited a very much larger number of half-bred poultry, had not great numbers been stolen from the village during the few weeks previous, and they added that it was only by the exercise of great watchfulness on their part that they were able to keep any of their fowls of the improved breed, thieves were so frequently on the look out for them. They requested that they might be provided with a further supply of cocks of the European breed. As long as the people attach so much importance to early laying, we cannot effect any lasting improvement in the breed of poultry kept by them. At the time the poultry were being exhibited in competition for prizes, I was sorry to notice how anxious the people were to direct attention to what they considered valuable in the half-bred fowls, namely, their early laying propensities : one man seemed much disappointed because he did not get a prize for a fowl he exhibited, which he declared was only three months old, and yet had laid several eggs ; the hen was probably a little older than the age mentioned by its owner, still it was but a chicken, and was permanently spoiled by laying so early in life. The eggs exhibited of the half-bred fowls were not so good as I had expected to see ; indeed, they were but very little larger than the ordinary country eggs ; however the birds which laid them were all very young, and the size of the eggs will doubtless increase as the birds get older. In size and in quality the half-bred fowls were a very decided improvement on the fowls of the country breed previously kept in the village.

MANURE.

36. *Phospho-Guano.*—A small supply of this valuable manure was purchased in Madras for use in our field experiments. This manure has been long and favorably known in England and in Germany. Its high fertilising qualities have again and again been noticed by Liebig, Voelcker, and others. The manure contains, in round numbers, about 39 per cent. of soluble phosphate of lime, about 6 per cent. of insoluble Guano phosphates, nearly 4 per cent. of ready-formed ammonia as non-volatile ammonia, salts, and some potash. It was used on several experimental plots, but unfortunately, owing to the heavy rains immediately after the manure was applied, and the long drought which followed directly after, the manure did not meet with fair treatment ; the results, therefore, were not recorded. It was, however, ascertained that the manure is very efficacious as an application for preventing sugar-cane cuttings from being attacked by white-ants, and it must be remembered, it at the same time affords the food needed by the sugar-cane during its growth.

37. *Bassia-nut Cake.*—In paragraph 93 of my last report I alluded to the manural effects of an oil cake known in the Madras bazaar as "Ilpa" cake, and expressed regret that I was unable to ascertain the botanical name of the tree, that yielded the nut from which the cake was made. Since the publication of that report, I have been favored with several communications regarding this tree ; from one of these communications I make the following extract :—"The tree mentioned is the *Bassia longifolia ;* it grows plentifully here (Mayaveram) ; it emits a disagreeable smell in the beginning of the rains, a smell that somewhat resembles that met with on entering a very filthy stable. The Tamil name of the tree is "Illuppu ;" its Canarese name "Ippa" or "Ippi." The tree here is nearly as large as a mango tree, which it resembles very much in general appearance. . . . . The stem of the Bassia is more knotty, and its leaves shorter than those of the mango." I have not met with an analysis of the oil cake made from the nut of the *Bassia longifolia* but in the current Number of the Journal of the Royal Agricultural Society of England there appears an analysis of the oil cake made from the nut of the *Bassia latifolia* by Dr. Voelcker, which analysis may be accepted as indicating pretty closely the general character of Bassia-nut cake ; the analysis is as follows :—

		Per Cent.
	Moisture	13·54
(*a*)	Organic matter	80·79
	Phosphate...	1·43
	Magnesia, &c.	3·63
	Sand...	·61
		100·00
(*a*)	Containing nitrogen	2·73
	Equal to ammonia	3·31

38. *Alluvial Earth.*—A very large quantity of alluvial earth was raised in cutting the water channel to which I have previously referred. After full exposure for six months, this earth, which is raised in blocks, crumbles down to a fine powder, in which condition it makes an excellent surface-dressing for our poor sandy soils. Not only does such a dressing improve greatly the physical state of these soils, but it considerably increases their fertility, by supplying the food needed by crops. In addition to the ordinary constituents of alluvial soils, it was ascertained that this soil contains a very large percentage of sulphate of lime, chiefly as crystals of hydrated sulphate of lime, which greatly adds to its manural value. This alluvial deposit appears to underlie a considerable area of the Experimental Farm, as it has been recently met with in several places distant from each other where excavations have been made. It is met with at from 8 to 10 feet from the surface in a seam which varies from 5 to 10 feet in thickness. It is apparently a very old deposit, but it contains neither shells nor the remains of plants by which its probable age might be determined. Wherever it has been applied as a surface-dressing to sandy soils, there is a very marked improvement in the crops they afterwards produce.

39. *Caster-oil Cake.*—The very satisfactory results obtained in 1871 in the experiments made with oil cake as a manure, induced me to use it largely for a similar purpose last year On the two farms at Sydapet upwards of 50,000 pounds of oil cake was used in this way. The greater part of this was castor-oil cake, which for some time has been selling at a very moderate price, viz., Rupees 3½ per candy (500 lbs.), or about 15½ rupees per ton, delivered in Madras. The cake was generally used as a top-dressing after being first pulverized, applied at the rate of 200 pounds per acre. It was used on both dry crops and irrigated crops. On the latter the result was in most instances very satisfactory; but on the dry crops little effect was noticed; however, little else was to be expected; for in most instances no rain fell after the cake was applied; it consequently remained inert on the dry land, though still available as plant food when favorable conditions arise. I was induced to use castor-oil cake, because it could be procured at such a low price. I was not aware at the time I bought it that, as a manure, it is so much superior to most of the ordinary manural oil-cakes; but that this is the case is proved by an analysis recently made by Dr. Voelcker, F.R.S., and published in his paper on "Pure and Mixed Oil Cake" in the last Journal of the Royal Agricultural Society of England. He found the composition of castor-oil cake to be—

		Per Cent.
	Moisture	9·95
(*a*)	Organic matter	81·07
	Phosphate of lime and magnesia...	4·49
(*b*)	Alkaline salts	1·80
	Sand	2·69
		100·00
(*a*)	Containing nitrogen	8·69
	Equal to ammonia	10·55
(*b*)	Containing phosphoric acid	·06
	Equal to tribasic phosphate of lime	·13

It will be noticed that the cake is especially rich in nitrogen; it is, therefore, a powerful fertilizer. Its action is slow; but, when mixed with cattle manure, it becomes a great deal

more active and more fitted to meet the wants of quick-growing crops. For coffee and tea plantations a more useful auxiliary manure can scarcely be obtained, and it can in most parts of the Presidency be bought at a very moderate price.

40. *Poudrette.*—A large quantity of poudrette was made; it consisted of village ashes and the excrementitious matters collected daily from the village latrines. No special care was needed in the preparation of the manure; it was only necessary to guard against any of the decomposing matters being left uncovered. No smell was experienced after the ashes had been carefully thrown over all offensive matters. After remaining in heaps thus formed for 6 or 8 months, the manure became thoroughly deodorised and fit for use. In this state the coolies made no objection whatever to work with it; indeed, when thus deodorised, the character of the manure is so thoroughly changed, few persons could, from its appearance alone, determine the nature of its original ingredients. This poudrette was used with great success on maize, cotton, cholum, &c.; indeed, it is fitted for the wants of any of our cultivated crops.

CROPS.

41. *New Orleans Cotton.*—In my last report in paragraphs 70, 71, and 72, I noticed in detail, the results which had then been obtained from an experiment made with New Orleans cotton and maize, sown in alternate lines on a plot measuring 6,400 square yards. As the experiment with the cotton extended over two years, I was unable then to do more than notice the first year's results. I am now able to give the results of the whole experiment; but, to enable these to be understood, I must briefly notice again the facts mentioned in my last report. The cotton and maize were sown in September 1871. The land was prepared in the following way: first well ploughed, then harrowed, rolled, and weeded, &c.; afterwards ridged at distances about 24 inches apart, and in the furrows between these ridges, farmyard manure was applied at the rate of 20 cart-loads or 8 tons per acre; the ridges were then split through the centre by the plough, one-half of the raised earth being cast over the manure in the furrows on either side, thus raising new ridges with the manure under them; the newly-formed ridges were then harrowed by the chain-harrow to consolidate the soil; the maize and cotton were then sown alternately along the tops of the ridges, after which the chain-harrows followed along the line of the ridges and finished the work. When the crops were about 4 inches high, the various top-dressings were broadcasted over the surface of each plot, a showery morning having been selected on which to do this; the band-hoes and bullock-hoes when engaged in weeding worked the dressings into the soil. The following is an estimate of the cost per acre :—

	RS.	A.	P.
First Year.			
Ploughing, pulverizing, and cleaning the land	3	0	0
Ridging	0	8	0
Eight tons of manure	12	0	0
Carting and spreading manure	2	0	0
Splitting ridges	0	8	0
Chain-harrowing	0	2	0
Seed and sowing	1	0	0
Chain-harrowing	0	2	0
After Cultivation.			
Hand-hoeing and bullock-hoeing	10	0	0
Top-dressing and cost of application	18	8	0
Harvesting maize, including reaping, removal to yard, shelling, winnowing, &c.	4	10	0
Gathering cotton, ginning, &c.	10	0	0
Second Year.			
Ploughing between the rows of plants, hand-hoeing, bullock-hoeing, &c.	10	0	0
Gathering cotton, ginning, &c.	10	0	0
Total ...	82	6	0

RETURN PER ACRE.

First Year.

	RS.	A.	P.
661 lbs. of seed cotton = 189 lbs. clean cotton, at 120 rupees per candy	45	5	9
472 lbs. of cotton seed	4	0	0
1,793 lbs. of cobs = 750 lbs. of maize, at 45 lbs. per rupee	16	0	0
1,043 lbs. of cob stalks, skins,&c.	3	8	0
3,889 lbs. of straw	15	0	0

Second Year.

339 lbs. of seed cotton = 87 lbs. of clean cotton, at 120 rupees per candy	20	14	1
252 lbs. of cotton seed	2	0	0
Total ...	106	11	10

The commercial result of the experiment is a return amounting to Rupees 24-5-10 per acre in excess of the cost of production, which, with Rupees 5 per acre, the probable value of the manure yet unutilised in the soil, makes a gross return of Rupees 29-5-10 with which to pay rent, interest on capital employed, cost of supervision, &c. It is evident that a much better return would have been secured had I treated the cotton as an annual, and contented myself with the first crop instead of treating it as a biennial. The second crop only just repaid the cost incurred for weeding, gathering, &c., during the second year. From the results of this and other experiments that I have made, I would advise that, as a general rule, on light soils New Orleans cotton should not be treated otherwise than as an annual; still it may sometimes be advisable to leave the plants down a second year, for instance, in this district, when the north-east monsoon is so unusually early as to interfere with the late gatherings of cotton, or interfere with the preparation of land for the cold weather crops on the principle that "a bird in the hand is worth two in the bush."

42. The effect of the different top-dressings over the two years is worthy of special notice :—

No. of Plot.	Top-dressing applied.	Average yield per Plot.			
		First Year.			Second Year.
		Cotton in Seed.	Maize.		Cotton in Seed.
			Cobs.	Straw.	
		lbs.	lbs.	lbs.	lbs.
7—15	Not top-dressed	50·5	94	206	22·5
1— 9	Guano, 20 lbs.	52·5	179	415	31·2
2—10	Saltpetre, 30 ,, ...	55·5	147·5	365	29
3—11	Bone dust, 50 ,, ...	52·3	161·5	345	26·6
4—12	Animal charcoal, 50 ,, ...	56·1	126	244	25
5—13	Sulphate of lime, 228 ,, ...	52·5	122	270	27·8
6—14	Ilpa oil-cake, 200 ,, ...	60·	177	315	26·8
8—16	Carbonate of lime, 228 ,, ...	53·6	124·5	299	29·1
	Total yield of the 16 plots	866·0	2,263·0	4,918	436·0
	Total yield of 14 top-dressed plots ...	765·0	2,075·0	4,506	391·4
	Yield per acre of top-dressed land ...	661·1	1,793·3	3,889	338·8
	Yield per acre of undressed land ...	611·5	1,134·9	2,492	272·2
	Increase per acre due to top-dressings...	49·6	558·4	1,397	66·6

43. The following table shows the average produce per acre of the different experimental plots with the quantity of manure used per acre in producing the results :—

Manure and Top-dressing per Acre.	Yield per Acre.			
	First Year.			Second Year.
	Cotton in Seed.	Maize.		Cotton in Seed.
		Cobs.	Straw.	
	lbs.	lbs.	lbs.	lbs.
8 tons of farmyard manure only	611·5	1134·9	2,492	272·2
8 do. do. and 242 lbs. guano	635·2	2165·9	5,021	377·5
8 do. do. and 363 „ saltpetre ...	671·5	1,784	4,384	350·1
8 do. do. and 605 „ bone dust ...	632·8	1954·6	4,180	321·8
8 do. do. and 605 „ animal charccal...	678·8	1524·6	2,968	302·5
8 do. do. and 2,758 „ sulphate of lime...	635·5	1476·6	3,280	336·3
8 do. do. and 2,420 „ ilpa oil-cake ...	726	2141·9	3,820	324·2
8 do. do. and 2,758 „ carbonate of lime.	648·5	1506·4	3,628	352·1

44. *Egyptian Cotton.*—A plot, measuring about one acre, was sown with Egyptian cotton and maize in alternate lines. The cotton grew admirably ; indeed, it seems quite as well suited to our soils and climate as any variety that we have yet grown ; it has, however, one serious defect—its spreading habit of growth—instead of growing upright like other varieties of cotton, it spreads over the ground ; and, while a plant frequently covers with its branches a space measuring from four to six square yards, there are few plants whose branches are three feet in height ; the result is that it is exceedingly difficult to clean land that is under this crop—cattle, in working hoes and cultivators between the rows of plants, commit such havoc amongst the lateral branches ; and we cannot afford the amount of manual labor required to keep the land clean if bullock labor is not employed. The Egyptian cotton-plant produces large bolls, and its fibre is both longer and more soft and silky, than that of the New Orleans variety.

45. *Yca Valley Cotton.*—The small plantation of this variety of cotton has been unfortunate during the past year, having been two or three times attacked by a borer, which, beginning at the tips of the branches, works down the pith into the hard wood, destroying all as it proceeds. The only effective plan of checking the depredations of this insect, was to cut off the affected branches a few inches below the portion injured, and to collect and burn them ; still the good result of this was only temporary, for, a month or two after each of these prunings, the plants were again in as bad a condition as before ; but, by persisting in cutting away injured parts of the plant, I hope eventually to get rid of the pest, though many fine plants will, in the meantime, be sacrificed in spite of every care. The insect appeared in the Yca valley plants in all the plots, though these were at a considerable distance from each other : no other variety of cotton was attacked by it, though in one or two instances the plots of Yca valley plants were quite surrounded by cotton plants of other varieties.

46. *Coimbatore Cotton.*—A piece of land, measuring about half an acre, was sown with Coimbatore cotton, and was manured and treated in the same way as the ordinary crops of New Orleans cotton. The result was very unsatisfactory ; gigantic plants, heavily covered by leaves, were produced, but the yield of cotton was exceedingly small ; the result is, however, quite in harmony with my previous experience, not only with native cotton, but with all indigenous crops ; an application of manure which would prove highly beneficial to any crop of a kind that is generally well cultivated, will produce disastrous consequences on a low-type indigenous crop that for generations has been used to a semi-starvation diet. If indigenous crops are ever to be subjected to high cultivation, this must be arrived at in slow and gradual stages.

47. *Sugar-cane.*—A small plot, measuring about 2,000 square yards, was planted with sugar-cane in February 1872. The experiment was instituted merely to ascertain whether

sugar-cane could be grown profitably on the ordinary soils of the Experimental Farm. The crop was manured with blood manure only, the preparation made on the Farm, which consists of slaughter-house refuse and village ashes. The following are the results of the experiment :—

Estimated Cost of Production.

	RS.	A.	P.
500 canes	15	0	0
16 cart-loads of manure...	16	0	0
Ploughing, &c., ...	1	8	0
Digging trenches	5	0	0
Manuring, &c., ...	2	0	0
Planting	2	0	0
Hoeing, &c.	8	0	0
114 waterings, at Annas 8 each...	57	0	0
	106	8	0

The crop was planted during the first week in February, and was harvested at about the same period in the following year. The cane was planted in lines about 3½ feet apart; there were 35 lines; of these, 24 were sold to bazaarmen for Rupees 69-8-9, and the remaining 11 lines which were the best, and were valued at Rupees 4 per line, were kept for farm use to provide cuttings for planting another crop. The total return was thus, say, Rupees 113-8-9 against an expenditure amounting to Rupees 106-8-0. However, in the case of a ryot who, instead of hiring all the necessary labour, works his land himself with the aid of an occasional laborer, the *actual* expenditure would have been very small, and the return obtained from the crop would have been ample to compensate him. If, instead of allowing the cane to mature, I had cut it down for fodder, a larger return would have been secured. An average row of canes was cut down in November; the canes weighed 1,162 pounds and the toppings 392 pounds, or together 1,554 pounds, which multiplied by 35, the number of rows of cane on the plot, gives a total weight of fodder amounting to 54,390 pounds, which at, say, 300 pounds per rupee, a very low price for such excellent fodder, would be worth Rupees 181-4-10, instead of Rupees 113-8-9, the price realised by the cane; while, if the crop had been cut for fodder at the time the single row of canes was harvested, there would have been a large saving in the cost of watering and weeding, and a large second crop would have been obtained. There can be no doubt but that sugar-cane as a fodder-producer is unequalled by any crop. Our Municipalities, with their abundant supplies of manure, might find it worthwhile to grow sugar cane as a fodder crop. They might produce it in all favorable localities at Rupees 5 per ton, at which price it should meet with a large demand for feeding milch cows and draught cattle.

48. *Elephant Grass.*—About a couple of years ago a tall, upright grass was noticed growing on the Experimental Farm amongst some paddy that had been raised from purchased seed. The grass had evidently been introduced from some distant part of the Presidency, as it was quite unknown to the people of the district around Sydapet. In habit of growth and in general appearance it resembles Shamay (Panicum Miliare), but its seed is much smaller than Shamay, and more like Cumboo seed. People from Bellary recognise the grass as the "Elephant Grass" of that district. An "Elephant Grass" is mentioned in Drury's Useful Plants of India, but it is apparently quite another grass. As the grass appeared to be a large producer, while the fodder seemed to possess some merits, I had a lot of the seed collected, and had it carefully sown on a plot of land measuring 624 square yards. The following are the results :—

Area of Plot.	No. of times ploughed.	Quantity of Manure used.	Date sown.	Quantity of Seed sown.	Date when germinated.	No. of times weeded.	No. of Waterings.	Date of 1st Cutting.	Weight of 1st Cutting.	Average Height.	Date of 2nd Cutting.	Weight of 2nd Cutting.
624 square yards.	Ploughed in puddle three times.	About 16 cart-loads of foldyard manure.	14th of March 1873.	9 lbs. of seed broadcast.	20th of March 1873.	Four times.	25	5th June 1873.	1,576 lbs.	3 feet.	25th of September 1873.	1,132 lbs.

49. *Yellow Cholum.*—As it is so exceedingly difficult to obtain a sample of yellow cholum seed free from rust, an experiment was made in order to test whether, when the seed has been dressed with sulphate of copper, the crop produced by it would be protected from rust, as is the case in England with crops raised from similarly dressed seed. The cholum seed was dressed in the following manner:—for each 50 pounds of seed 4 pounds of sulphate of copper was taken and was dissolved in 1 quart of hot water; this solution, when quite cold, was carefully poured over the seed, with which it was thoroughly mixed, and, when quite dry, the seed was sown in the ordinary way. The result was not what was anticipated; there was quite as much rust amongst the crops raised from the seed that had been dressed, as amongst those produced from undressed seed. The experiment needs to be repeated; I cannot believe that a process which in Europe is uniformly attended with good results, can be altogether useless here.

50. *Fodder Crops.*—A large quantity of fodder was produced; this was chiefly cholum and horse-gram. The greater part was consumed by the live stock on the Farm, the flock of sheep having been entirely fed at home, instead of being sent to graze in Guindy Park as was usually the custom. Not only was the Farm able to grow enough fodder to support its own large stock, but it sold during the year 80,000 lbs. of fodder to the Commissariat Department for feeding camels, elephants, &c., for which use gram fodder was generally preferred.

Implements, Machines, Tools, &c.

Ploughs.

51. During the past four or five years I have conducted a large number of experiments with ploughs of various kinds, some made entirely of iron, others made of wood and iron, and some made entirely of wood; and the result of these experiments, combined with the experience I have had in the working of the Sydapet Farms, convinces me that the best plough for general use is one constructed entirely of iron. It is true that an iron plough must always cost more than a plough that is made partly of iron and partly of wood, or than one made of wood; but in its extra durability, and in its greater efficiency, the iron plough possesses advantages which are cheaply purchased at the difference between the price that must be paid for it, and the price at which a plough made of other materials can be bought. The combined plough we make up in our workshops is certainly a good and useful implement, and one of these will cost only a little more than half the sum that an iron plough would cost; but, if I was engaged in farming on my own account, I should certainly much prefer to pay Rupees 33 for an iron plough, than to pay Rupees 18 only for a combined plough. I have recommended these combined ploughs, and would still recommend them; they are good ploughs, and perform their work much more efficiently than any ordinary plough now used by the ryot, while they do the work at a less cost; and, as they are more like the country plough in shape, the ryot takes to them more readily than he does to the iron plough. They are useful also in introducing the iron plough; where a combined

plough has been in use for some time; the introduction of the iron plough is easy, the cattle will have become trained, and the cultivator will have learned to appreciate the advantage of getting his soil well turned over and thoroughly cultivated. These combined ploughs are employed on the Farms at Sydapet, where they are found useful for ploughing free arable land, or for turning over fallow ground that has previously been ploughed; they are also used for ploughing the spaces between the rows of cotton plants, &c.; for preparing land for paddy, especially in small beds, they have been found very useful, as they can be turned much more quickly and on a less space of ground than any of the ordinary iron ploughs. On most farms of a moderate size there is work specially suited to both an iron plough and to a combined plough; but where, from the small area of the holding, only one plough can be kept, which must be worked by the cultivator himself, an iron plough should be selected if the means can be commanded with which to purchase it. In the districts there would be no more difficulty in making up an iron plough than in making up one of the ordinary combined ploughs when once there is a demand for them sufficient to induce village smiths to learn the details of manufacture. I have experienced no difficulty in obtaining smiths who readily learn how to make an iron plough, and I do not think that any difficulty would be experienced by others if they will only hold out an inducement in the shape of a little extra pay.

52. The question for the consideration of the ryot when about to buy a plough is not so much the price that must be paid for it, *as the cost of the work that the implement will perform:* thus, if he can with an iron plough, making every allowance for labor, keep of cattle, for wear and tear, interest, &c., turn over his soil at the rate of 60 cubic yards for an anna, while with his country plough the cost of doing the same work would not be less than two annas, it is evident that the extra cost of the iron plough will be recovered in a very little time on a farm of moderate size; indeed, the ryot who cultivates a holding with but 20 acres of arable land can, by substituting an iron plough for his native plough, save, in a single season, a sum equal to its first cost, and it will, with ordinary care, last many years.

53. While I am thus convinced that the cost of the work done by an implement is the test by which the implement should be judged, I have not lost sight of the fact that in this Presidency there are a vast number of cultivators who have not the means with which to provide themselves with a good plough, even at the low cost at which the combined ploughs can be made. I have, therefore, during the past year, devoted some attention to the improvement of the ordinary native plough, chiefly with the view of lessening its draught, as though the weight of this so-called plough is less than that of any plough with which I am acquainted; its draught is exceedingly heavy from the very defective plan on which it is constructed. The following are some of the experiments that were made:—

1. An ordinary native plough, the dead weight of which was only 32 pounds, needed a force equal to 390 pounds to drag it through the soil when working.
2. An ordinary native plough, with some slight improvements, the chief of which was the removal of the upright flat surface behind the share by cutting down both sides. The dead weight of the plough was 36½ pounds, and the force needed to drag it when working was 336 pounds.
3. An ordinary native plough, improved as in No. 2 experiment, and fitted with a wooden mould-board. The dead weight of this plough was 57 pounds, but for dragging it when working a force equal to 280 pounds only was required.

In these experiments all the three ploughs were doing the same amount of work, from two cubic yards of earth, moved in each 100 yards of furrow, and they were all dragged in an uniform way by coolies. It will be observed that the improvements made, materially lessened the draught; it is also worthy of notice that the heaviest plough did its work with

an expenditure of nearly 30 per cent. less force, than the plough which was only about half its weight.

54. The American ploughs recently obtained from Boston, were used with great effect in the early part of last dry season, before the ground had become so hard as it usually becomes as the hot season advances. When the land is in this condition, it is almost useless to attempt to plough at all with any ordinary English plough; but these American ploughs did their work in a very satisfactory way in spite of the hardness of the soil. They are very clumsy-looking implements, and they are certainly transported over the farm with difficulty, but their working parts are admirably adapted for contending with rough work. If their working parts could be fitted to an ordinary English plough, a very useful implement would be produced; at present I see nothing to prevent this being done; at any rate I will have the experiment tried, as it is a serious drawback to our farming operations not being able to plough in the dry season. I certainly do not expect that we will ever get an implement that will turn over in the middle of the dry season, soil that has not been disturbed for some months previously; all I expect is to get an implement that will perform fair work, when the soil is a little too hard to be worked by any ordinary plough, for when the land is regularly hard, in the state in which when undisturbed it usually is, during the dry season in this part of India, it would be impossible to turn it over even with a steam plough. One or two experiments were made with the American ploughs. The following are the results of one of these experiments:—

——	Dead Weight.	Draught.	Work done.		
			Depth of Furrow.	Width of Furrow.	Earth turned over in 100 yards of Furrow.
	Pounds.	Pounds.	Inches.	Inches.	C. yards.
Complete	90	336	6	11	5·09
Without a wheel ..	80	392	6	11	5·09

For comparison with these results, I give below the results obtained with other ploughs tested at the same time, on the same ground, and under exactly similar circumstances:—

——	Dead Weight.	Draught.	Work done.		
			Depth of Furrow.	Width of Furrow.	Earth turned over in 100 yards of Furrow.
Description of Plough.	Pounds.	Pounds.	Inches.	Inches.	C. yards.
Ransomes and Sims' pony plough, complete ..	92	280	5	9	3·47
Ransomes and Sims', without a wheel ..	85	448	7½	9½	5·49
A Madras-made iron plough, with wheel ..	89	280	5½	9	3·81
Do. do. without a wheel.	80	364	6	9	4·16
A combined plough	67	290	5½	8	3·39
Howard's iron pony plough	86	336	7	8	4·32

55. *The Double Mhote.*—This is one of the best water-lifts that we possess. It was introduced on the Experimental Farm some time ago, and its capabilities were noticed at the time in a memorandum I prepared on "Water-lifts;" but now that I have had a more lengthened experience, I find that I have considerably under-estimated the amount of work that the machine is capable of performing, and have consequently over-estimated the cost at which the work is done. The following may be accepted as a fair estimate of the capabilities of the machine as now ascertained:—

Cost per day.

	RS.	A.	P.
Hire for one bullock and driver for one day	0	8	0
Interest and wear and tear at 10 per cent. per annum on the capital invested, say, Rupees 100, charged over 300 working days	0	0	6
Cost of replacing buckets and ropes three times a year, say, Rupees 90, charged over 300 working days	0	4	9
Oil, &c.	0	1	0
	0	14	3

The cost per day is therefore Annas 14 Pies 3. When working at the ordinary speed 90 buckets are raised per hour; each bucket contains 30 gallons when brought to the delivery spout; the height to which the water is raised varies from 20 to 24 feet; thus, 2,700 gallons of water are brought to the surface and discharged in one hour, or 24,300 gallons during an ordinary working day of nine hours, rather more over an acre of land, than a rain-fall of one inch. Taking 22 feet as the average height of the lift, it would appear that the machine raises about 27,000 gallons to this height for 1 rupee. This result is a great improvement on that obtained when the machine was first introduced. As in some districts the machine may not be known, or, if known, not recognised by the name under which I have noticed it, the following observations regarding its working and construction may be of use :—The water is raised by two leather buckets, similar to those in ordinary use in most parts of this Presidency; to each of these buckets is attached a rope which is fastened to a drum; one of these is coiled and the other uncoiled, as one bucket ascends and the other descends; the drum is fixed on a rotating spindle, to which is fixed at right angles the draught bar to which the bullock is attached; the diameter and thickness of the drum varies with the depth of the well; as a general rule, for all ordinary lifts the diameter of the drum may be equal to about one-fifth the number of feet that the water must be raised; the drum is placed about six feet above the ground in order to allow the rope to pass over the head of the draught bullock; the spindle upon which the drum is placed is kept in its upright position by means of two beams, into which it is fixed, which cross each other at the middle, and are supported at the ends on posts placed opposite each other on the outer side of the bullock path. The bullock walks under the draught bar attached to a curved yoke, which turns on a swivel. In raising water the bullock travels round the upright spindle, thus turning the drum and winding one rope and unwinding the other. If the diameter of the drum is as suggested, 1½ circuits around the path will raise each bucket to the requisite height; the bullock is turned round, facing the opposite direction, while each bucket is being discharged; no longer time is required to do this than is needed for the bucket to discharge its contents. This water-lift displaced one of the sort very common in this Presidency, sometimes known as the Single Mhote, that in which, when at work the cattle must walk down an inclined plane as each bucket comes to the surface, and be backed up again to the mouth of the well as the bucket again descends. This machine, with a pair of cattle, raised only 12,600 gallons of water in a day, while the cattle were exceedingly hardworked in doing this; backing up an incline with a slope of about 45 degrees, about forty times per hour, is a most effective way of rendering cattle worthless. The cost of working this lift was as follows :—

Cost per day.

	RS.	A.	P.
Hire for a pair of bullocks and driver for one day	1	0	0
Interest and wear and tear at 10 per cent. per annum on the capital invested, say, Rupees 100, charged over 300 working days	0	0	6

	Rs.	A.	P.
Cost of replacing bucket and rope four times a year, say, Rupees 60, charged over 300 working days	0	3	2
Oil, &c.	0	0	4
	1	4	0

The cost, therefore, of raising 12,600 gallons by this lift was Rupees 1-4-0, or only 10,080 gallons for 1 rupee against 27,000 gallons for 1 rupee, the cost of doing similar work by the improved machine.

56. *Seed-drills.*—The English seed-drills made by Messrs. Garret & Co., of Suffolk, which were transferred to the Sydapet Farms about a couple of years ago, and which at one time I feared would be very unlikely to meet with useful employment, have proved of great use to us since our land has been levelled and brought under proper culture ; indeed, nearly the whole of last season's crops were sown by them, and the work was done efficiently, quickly, and at a very moderate cost, allowing for the quality of the work. In sowing cholum, cumboo, or any similar crop in lines from 9 to 15 inches apart, the machine will, in a field of an ordinary size, sow about 6 acres per day at the following cost :—

	Rs.	A.	P.
One pair of cattle with driver, one day	0	12	0
One man guiding the machine, one day	0	3	0
One man attending the machine, one day	0	3	0
Oil, &c.	0	1	0
	1	3	0

Or about Annas 3-2 per acre, a very low price for work of the quality done by the machine In the estimate I have excluded interest and wear and tear, but if we assume that during a single year the machine, on a farm of sufficient size to employ it, would sow, say, 300 acres, a debit of Annas 2 per acre will be enough to meet the charge for interest and on the capital invested in the machine, &c. It would thus appear that the cost of drilling with seed an acre of land by one of these machines, is about Annas 5-2, or about eight pence in English money.

The Model Farm.

57. The past year was an unfortunate one for the Model Farm. The cyclone in the beginning of the year and the floods in November, caused a great amount of damage ; several hundred plantain trees just beginning to bear were blown down and rendered useless, and the mango and cashewnut fruit crops were entirely destroyed ; and the effects of the floods in November were even more serious. The early rains in August and September had induced me to put down the paddy crop earlier than usual, and when the extraordinary floods came in November, about 20 acres of healthy crop, about one-third grown, were submerged and killed, and the portion of the plantain tope which had escaped the ill-effects of the cyclone was also destroyed. The loss from these two causes was great. Before the cyclone an offer of Rupees 400 for the plantain tope had been refused, and after the floods it was with difficulty that 20 rupees could be realized for it. The 20 acres of paddy destroyed would represent a loss of Rupees 400 at the least. Indeed, at a fair estimate, including the value of the fruit lost, the destruction of the plantain tope, and the loss of the 20 acres of paddy, &c., the total loss was certainly not under 1,000 rupees.

58. A considerable quantity of indigo was grown, and the results were generally satisfactory. Besides feeding its own live stock, the farm sold nearly 100,000 lbs. of green fodder. Fair crops of paddy were produced on the land that was re-sown after the floods, but when sold

the market rates were low, 112 Madras measures per 3½ rupees. The following result was obtained from a rather superior portion of this crop :—

Area of Plot.	Weight of Straw.	Measures of Paddy	
		When thrashed.	When dry.
Square yards. 468	lbs. 733	Measures. 76	Measures. 68

Return per Acre.

	Rs.	A.	P.
7,583 lbs. of straw, at Rupees 6 per ton	20	5	0
703 measures of dry paddy, at 112 measures for Rupees 3½ ...	21	15	6
	42	4	6

59. The expenditure during the year was as follows :—

	Rs.	A.	P.
Rent, rent charge, and interest	913	1	6
Labor, including Overseer's pay	1,969	14	0
Cattle	361	0	0
Pigs	103	8	0
Sheep	132	0	0
Poultry, rabbits, &c.	39	11	0
Implements, &c....	277	8	6
Seeds	153	9	2
Cattle food	506	3	11
Manure	185	2	7
Sundries	16	6	9
	4,658	1	5

60. The income was as follows :—

Advance from General Funds	1,772	2	2
Cattle	371	15	0
Sheep	237	2	6
Pigs	664	5	9
Poultry, rabbits, &c.	203	4	0
Fruits	409	0	0
Plantain and vegetables	35	1	6
Hay, grass, and straw	484	13	6
Grains	178	11	2
Sundries	301	9	10
	4,658	1	5

61. The following is the balance sheet on the 31st of March 1873 :—

Liabilities.

Loan from General Funds, 1870-71	2,776	9	10
Do. do. 1871-72	1,310	3	11
Do. do. 1872-73	1,772	2	2
Overseer's and laborers' pay due for March 1873 ...	157	6	8
	6,016	6	7

Assets.

Cattle.

18 Working cattle	1,350 0 0		
13 Fattening cattle	260 0 0		
		1,610	0 0

Sheep.

17 Ewes. 7 Wethers. 7 Gimmers.	186 0 0		
10 Lambs	15 0 0		
		201	0 0

Pigs.

4 Boars and geldings. 2 Sows.	120 0 0		
10 Young pigs	80 0 0		
		200	0 0

Poultry.

7 Brahma Dorking fowls and chickens. 13 Country fowls. 3 Geese and goslings. 37 Ducks and ducklings.	50 0 0		
Pigeons and rabbits	12 0 0		
		62	0 0

Implements.

Carts, tools, &c., as catalogued		732	12 6

Manures.

10,709 lbs. of manure cake	64 4 1		
100 Cartloads of fold-yard manure	75 0 0		
16 Cartloads of sulphate of lime and ashes ...	10 0 0		
¼ Cost of purchased manure bought in 1871-72.	17 8 0		
¼ Cost of cake purchased and consumed in 1871-72	100 0 0		
½ Cost of manure purchased in 1872-73 ...	60 7 3		
½ Cost of cake purchased and consumed in 1872-73	253 1 11		
Straw	70 0 0		
		650	5 3

Young Fruit Trees.

1,250 plantain trees	200 0 0		
Cocoanut and grafted mango trees	125 0 0		
		325	0 0

Growing Crops.

Guava. Mango and tamarind. Cashewnut, &c. Hay field. Indigo. Cotton. Brinjals.	660 0 0		
6 Acres of Carolina and kar paddy	150 0 0		

Guinea grass	100 0 0		
Fodder	350 0 0		
		1,260	0 0
Seeds, &c., in Granary.			
2,682 lbs. of chumba paddy	45 0 0		
55½ lbs. green gram	2 0 0		
25¼ lbs. cotton in seed	1 8 0		
44½ lbs. wool	5 0 0		
		53	8 0
Sundries	... ...	175	0 0
Uncollected bills	... ...	310	8 8
Cultivation done for the next season's crop	... ...	75	0 0
One-third of the value of thatch used in roofing cattle and pig styes, &c.	... ...	18	14 5
* Deficiency	... ...	342	5 9
	Total...	6,016	6 7

Establishment.

62. The general conduct of the overseers, clerks, and apprentices was satisfactory during the year under review.

IMPLEMENT WORKSHOPS.

63. Besides doing a large amount of repairs for the two Farms at Sydapet, and doing most of the carpentry work for the new cottages, these workshops supplied during the year two improved tilting-bodied carts, a dozen ploughs, two iron cultivators, one chaff-cutter, one maize sheller, 76 improved reaping knives, one seed drill, a number of plough shares, wheel-barrows, field tools, &c., and several working models of ploughs, &c. The following are the details of income and expenditure during the past year :—

Expenditure.	RS.	A.	P.
Plant	63	2	6
Labor	1,433	10	3
Materials, &c.	1,183	9	10
Interest on capital	65	0	0
Contingencies	23	10	0
	2,769	0	7

Income.			
Advance from General Funds	1,077	3	2
Labor, materials, &c.	870	2	1
Machines, implements and tools	821	11	4
	2,769	0	7

IMPLEMENT WORKSHOPS' Balance Sheet for the year ending 31st of March 1873.

Liabilities.			
Advance from General Fund for 1870-71	883	1	5
Do. do. 1871-72	213	1	2
Do. do. 1872-73	1,077	3	2
Laborers' pay due for March 1873	115	15	1
	2,289	4	10

* Since the Farm was commenced.

Assets.

Buildings	419	15	3
Plant	310	0	6
Materials	175	2	0
New implements, machines, &c., in stock	576	12	0
Outstanding bills	589	14	0
Deficiency	217	9	1
	2,289	4	10

There was, therefore, at the close of the year a debit, amounting to Rupees 217-9-0, against the workshops, that is, after paying every charge, interest on capital from their commencement, which sum will be debited in next year's account. I pointed out in paragraph 130 of my last report the great advantages that the Sydapet Farms gained from the conveniences afforded by these workshops, advantages of much greater value than the nominal deficit on the working of the institution during the 27 months it has been in operation.

(Signed) WILLIAM R. ROBERTSON, M.R.A.C.,
Superintendent of Government Farms

APPENDICES.

Rainfall registered at the Experimental Farm during the year ending 31st March 1873.

April 1872.	May 1872.	June 1872.	July 1872.	August 1872.	September 1872.	October 1872.	November 1872.	December 1872.	January 1873.	February 1873.	March 1873.
Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
1	1 ... 3·90	1	1	1	1 ... ·45	1	1	1	1	1	1 ... ...
2	2 ... 3·40	2	2	2 ... ·68	2	2	2	2	2	2	2 ... ...
3	3 ... ·25	3	3	3	3	3 ... ·64	3	3	3	3 ... 1·20	3 ... ...
4	4	4	4	4	4	4	4	4	4	4 ... 4·25	4 ... ...
5	5	5	5	5 ... ·37	5	5	5 ... 1·90	5	5	5 ... ·65	5 ... ...
6	6	6	6	6	6 ... ·12	6	6	6 ... 2·64	6	6 ... ·13	6 ... ...
7	7	7	7 ... 1·82	7	7	7 ... ·20	7 ... ·11	7 ... ·94	7	7	7 ... ...
8	8	8	8 ... 1·45	8	8	8	8	8	8	8	8 ... ...
9	9	9	9 ... ·15	9 ... ·22	9	9	9 ... ·40	9	9	9	9 ... ...
10	10	10	10	10	10	10	10	10	10	10	10 ... ...
11	11	11	11	11	11	11 ... ·67	11	11	11	11	11 ... ...
12	12	12	12 ... ·43	12 ... ·14	12	12 }	12	12 ... 1·56	12	12	12 ... ...
13	13	13 ... 1·25	13	13	13 ... 1·86	13 } 13·60	13	13	13	13	13 ... ...
14	14	14	14	14	14 ... ·67	14 }	14 ... ·69	14	14	14	14 ... ...
15	15	15	15 ... ·15	15 ... ·16	15	15	15	15	15	15	15 ... ...
16	16	16	16	16	16 ... 1·26	16 ... 1·20	16 ... 1·75	16	16	16	16 ... ...
17	17	17	17 ... ·14	17	17	17	17	17	17	17	17 ... ...
18	18	18 ... ·16	18	18	18	18	18 ... 1·88	18 ... 1·70	18	18	18 ... ...
19	19	19	19	19 ... ·82	19	19 ... ·75	19 ... 1·86	19 ... ·38	19	19	19 ... ...
20	20	20	20	20	20	20	20 ... ·63	20	20	20	20 ... ...
21	21	21	21	21	21 ... ·45	21 ... 1·10	21 ... ·22	21	21	21	21 ... ...
22	22	22	22	22	22	22	22 ... 1·00	22	22	22	22 ... ...
23	23	23	23	23	23 ... ·10	23 ... 4·70	23	23	23	23	23 ... ...
24	24	24	24	24	24	24	24 ... 5·40	24	24	24	24 ... ...
25	25	25	25	25	25	25	25 ... ·53	25	25	25	25 ... ...
26	26	26	26	26	26	26	26	26	26	26	26 ... ...
27	27	27	27	27	27	27	27 ... 2·78	27	27	27	27 ... ...
28	28	28	28	28	28	28	28 } 7·28	28	28	28	28 ... ...
29	29	29	29	29	29	29	29 }	29	29		29 ... ...
30	30	30	30 ... 1·68	30 ... ·80	30 ... ·15	30	30	30	30		30 ... ...
	31		31 ... ·40	31		31		31	31		31 ... ...
Total...None.	Total...7·55	Total...1·41	Total...2·95	Total...6·46	Total...4·96	Total...18·26	Total...31·13	Total...7·22	Total...None.	Total...6·23	Total.None.

Government Farms' Expenditure

	Rs.	A.	P.	Rs.	A.	P.
I. *General Supervision.*						
Establishment	9,486	15	8			
Stationery and contingencies	289	11	5			
Travelling expenses	1,530	3	4			
				11,306	14	5
II. *Sydapet Experimental Farm.*						
Establishment	911	2	2			
Cooly labor	3,031	9	8			
Implements and machines	394	5	2			
Live stock	338	1	0			
Seeds	306	8	6			
Food for live stock	1,281	3	8			
Manures...	382	11	8			
Despatching seeds	221	10	3			
Contingencies	346	14	9			
				7,214	2	10
III. *Estate Improvements of Permanent Character*				4,333	12	0
IV. *Sydapet Model Farm.*						
Establishment	600	0	0			
Cooly labor	1,369	14	0			
Manure	185	2	7			
Live stock	636	3	0			
Food for live stock	506	3	11			
Seeds	153	9	2			
Implements	277	8	6			
Rent and interest	913	1	6			
Contingencies	16	6	9			
				4,658	1	5
V. *Implement Workshops.*						
Carpenters, smiths, and filer	1,209	8	8			
Cooly labor	224	1	7			
Implements, machines, and materials...	1,246	12	4			
Rent and interest	65	0	0			
Contingencies	23	10	0			
				2,769	0	7
VI. *Special (Educational).*						
Apprentices and Schoolmaster	1,807	2	2			
Apprentices' quarters	3,019	11	9			
Books for agricultural library...	80	6	0			
Contingencies	56	0	2			
				4,963	4	1
Total ...				35,245	3	4

Government Farms' Receipts.

	Rs.	A.	P.	Rs.	A.	P.
I. *Sydapet Experimental Farm.*						
Rents (including fruit rents)	1,375	9	5			
Cattle	256	3	10			
Sheep	213	10	3			
Pigs	147	0	0			
Poultry, rabbits, &c.	79	4	6			
Feeding grains, seeds, and cattle food	639	10	9			
Machines, &c.	442	10	0			
Hay, fodder, sugar-cane, and cotton	1,122	8	2			
Sundries	94	5	9			
				4,370	14	3

	Rs.	A.	P.	Rs.	A.	P.
II. *Sydapet Model Farm.*						
Cattle	371	15	0			
Sheep	237	2	6			
Pigs	664	5	9			
Poultry, rabbits, &c.	203	4	0			
Fruits, plantains, and vegetables	444	1	6			
Hay, green fodder, &c.	484	13	6			
Grains	178	11	2			
Sundries	301	9	10			
				2,885	15	3
III. *Implement Workshops.*						
Machines, &c.	821	11	4			
Materials and labor	870	2	1			
				1,691	13	5
Total				8,948	11	4

VALUATION of Live and Dead Stock on the Experimental Farm on the 31st of March 1873.

	Rs.	A.	P.	Rs.	A.	P.
Cattle—						
3 Bulls, 23 Working cattle, 5 Feeding cattle	1,600	0	0			
Sheep—						
20 Rams, 65 Ewes, 21 Gimmers, 55 Lambs	800	0	0			
Pigs—						
2 Boars, 14 Sows, 23 Young pigs	400	0	0			
Poultry	55	0	0			
				2,855	0	0
Manures.						
Guano, bones, charcoal						
Fold-yard and other manures	...	...	...	350	0	0
Growing Crops.						
Fodder (of sorts)	500	0	0			
Plantains, &c.	250	0	0			
Guinea grass	200	0	0			
Cotton	150	0	0			
				1,100	0	0
Farm Seeds.						
900 lbs. of horse gram	23	0	0			
221½ „ of indigo seed	8	0	0			
222½ „ of castor-oil seed	7	0	0			
50 „ gingelly	3	0	0			
194 „ corkapilly seed	10	0	0			
1,072 „ of shamay	43	0	0			
864 „ of cotton seed	22	0	0			
245 „ sumba paddy	6	0	0			
333 „ Carolina paddy	11	0	0			
626 „ yellow cholum	16	0	0			
				149	0	0
Cattle Food.						
203 lbs. ground-nut cake	...	...	...	2	0	0
Implements.						
Implements and tools as catalogued in Inventory	...	...	...	6,000	0	0
Total				10,456	0	0

Catalogue of Machines, Implements, Tools, &c., belonging to the Experimental Farm on the 1st of April 1873.

1 Portable steam engine, 8-horse power, by Ransomes and Sims.
1 Set of steam ploughing and cultivating apparatus, tackle, windlass, porters, &c., by Fowler and Co.
Chaff-cutter and universal mill, with bullock-power, by Ransomes and Sims.
1 Threshing machine with a bullock-power, by Emery Brothers.
1 Threshing machine, by Dray Taylor and Co.
1 Threshing machine, with bullock gear and carriage, by Ransomes and Sims.
1 Threshing machine with bullock gear and carriage, by Garret and Co.
2 Winnowing machines, by Garret and Co.
1 Winnowing machine, by Ransomes and Sims.
1 Winnowing machine, by R. T. Smith.
1 Winnowing machine, by Hornsby and Sons.
3 Reaping machines by Samuelson and Co.
1 Drill sowing machine, 8 rows, by Garret and Co.
1 Cylindrical corn screw, by Ransomes and Co.
2 Ploughs, by Ames and Co., Boston.
1 Turn-wrest plough and yoke, by Ransomes and Co.
1 Stone roller.
2 Drill sowing machines, 13 rows, by Garret and Co.
1 Wood drag-harrow, by Experimental Farm.
2 Iron chain harrows.
1 Combined grubber.
3 Bullock hoes.
2 Bullock ploughs, by Howard and Co.
1 Bullock plough, by School of Arts.
2 Bullock ploughs, by Mint.
2 Bullock ploughs, by Ransomes and Sims.
1 Double mould-board plough.
1 Large plough, with 2 wheels, by Ransomes and Sims.
1 Swing-plough, by Roorkee Workshop.
1 Mould-board country plough, by Experimental Farm.
1 Wood swing-plough, by Ransomes and Sims.
1 Wet-land plough, by Experimental Farm.
1 Country drill, by Experimental Farm.
1 Wooden roller.
1 4-wheel waggon.
1 Stone trolley.
1 Root-pulper, by Ransomes and Sims.
3 Country carts.
1 Water cart.
1 Sewage cart, by Gun Carriage Works.
1 Maize-sheller, by Ainsworth and Co.
1 Corn drill.
1 Barrow drill, by Experimental Farm.
1 Rain gauge.
1 Water elevator, by Burges and Key.
1 Water elevator, by Mint.
1 English ladder.
1 Norton's tube-well with a rotary motion.
1 English grind stone.
1 Farm bell.
2 Wheel hand-hoes.
8 Cattle yokes.
2 Single bullock carts.
1 Overhead, bullock-power, with shafts and gearing.
1 Sugar-cane mill.
1 Californian pump.
1 Archimedian pump.
1 Cake-crusher.
1 2-wheel plough with cultivator, by Ransomes and Sims.
1 Pump, by Roorkee Workshop.
1 Chaff-cutter, manual-power.
1 Combined mill and oil-cake breaker, by Ransomes and Sims.
1 Chain pump, manual-power.
1 Chain pump, bullock-power.
1 Large platform weighing machine.
1 Large beam and scales.
1 Cotton gin, by Gordon and Co.
1 Cotton gin, by Donlop.
1 Cotton gin, by Platt Brothers.
1 Country cotton gin.
8 Cottage cotton gins.
2 Cotton gins, by Burges and Key.
1 Hand broad-cast sowing machine.
5 English carts.
1 Malabar spoon bale.
2 Waterproof cart-covers.
1 Sack-barrow.
1 Portable scale with weights.
6 Piccottah buckets.
2 Leather buckets with ropes and gearing for double mhote.
1 Large wheel-barrow.
15 Wheel-barrows.
3 Hay frames for carts.
1 Farm clock.
3 Tables.
5 Chairs.

1 Writing desk.
2 Almyrahs.
1 Iron cash-chest.
1 Dynamometer.
1 Surveying level with stand-staves, &c.
1 Set of bottle levels.
Chemical apparatus, mortars and pestles, glass-beakers, &c.
26 Feeding tubs.
5 Metal feeding troughs.
1 Scythe.
1 Manure drag.
2 Bengal picks.
2 Dutch hoes.
2 Bengal hoes.
8 Hand hoes.
6 Forks of sorts.
8 Iron rakes.
25 Mamooties.
3 Hatchets.
3 Jumpers.
17 Crowbars.
17 Picks.
3 Mattocks.
2 Hedge shears.
2 Billhooks.
1 Iron reel.
8 Grass knives.
3 Manure forks.
15 Digging forks.
6 Shovels.
4 Sets of bullock harness.
2 Surveying chains with pins.
1 Iron cistern.
A quantity of wire, rope, and a large number of details belonging to steam plough.
35 Specimen seed bottles.
2 Hedge knives.
3 Pairs of thorn pincers.
1 Ear punch for marking sheep.
1 Branding iron for marking sheep.
1 Marcal, one half-marcal, and one measure.
2 Weeding spuds.
3 Pairs of sheep shears.
7 Planters' hoes.
1 Fork hoe.
1 Pruning knife.
1 Dibble.
1 Pick hoe.
1 Billhook.
1 Lactometer.
1 Levelling board.
1 Single barrel fowling piece.
1 Pair of pan scales.
1 Theodolite.

Implements, Machines, Tools, &c., belonging to the Model Farm on the 1st of April 1873.

2 Iron ploughs.
4 Combined ploughs.
1 Set of iron harrows with swingletree.
2 Country carts.
1 Box cart.
6 Reaping hooks.
6 Hand hoes.
8 Picottah buckets.
1 Chopper.
21 Feeding tubs.
1 Levelling board.
2 Spades.
3 Small wheel-barrows.
1 Clock.
6 Digging forks.
7 Yokes.
8 Planters' hoes.
1 Tub for well.
1 Scythe.
1 Weeding spud.
1 Tarpaulin.
1 Measure.
1 Half-marcal.
1 Scale triangle, weights, &c.
1 Large beam and cattle-weighing scale.
9 Fifty-six pound weights.
4 Plough shares.
1 Table.
2 Hand hoes.
1 Knife.
1 Hay fork.
1 Mamoty.
1 Pair pincers.
1 Hammer.
1 Turn-screw.
1 Chisel.
1 Gimlet.
1 Bell.
1 Water-cask.

List of Tools, &c., in the Implement Workshop on the 1st of April 1873.

2 Large anvils.
1 Circular anvil.
1 Small anvil.
18 Tongs.

2 Bellows.
2 Screw plates.
4 Sledge hammers.
6 Small hammers.
6 Chisels, "Smith's."
6 Punches.
1 Counter-sinking punch.
4 Dies or flat chisels.
1 Pair calipers.
1 Iron square.
6 Round files.
2 Half-round files.
3 Flat files.
1 Small square file.
3 Large files.
2 Three-cornered files for saw.
16 Taps for screw plates.
1 Iron brace and 5 bits.
1 Filer's hammer.
1 Filer's cold chisel.
2 Hand vices.
7 Spanners.
1 Bench with 2 vices.
3 Hand saws.
1 Pit saw.
1 Cross-cut saw.
7 Augurs.
2 Jack planes.
1 Spoke shove.
1 Spirit level.
1 Shoeing rasp.
1 Pincer.
1 Compass.
9 Carpenters' chisels.
1 Cold chisel.
2 Set squares.
1 Angle square.
6 Gimlets.
1 Brace, with 36 bits.
2 Adzes.
1 Hammer.
1 Turn screw.
1 Plummet.
5 Saw files.
4 Rasps for wood.
2 English pattern bellows.
2 Bits for planes.

List of Books added to the Apprentices' Library during the year 1872-73.

Letters on Modern Agriculture by Von Liebig.
Morton's Veterinary Pharmacy, 1868.
Horses—The Gentleman's guide for choice, treatment, and management of saddle, carriage, gig and cart horses, by James Mills, M.V.C.S.
Cotton Hand-book for Bengal, 1862, by J. G. Medlicott, B.A.
The Neilgherry Tea Planter, 1870, by James McPherson.
New American Farm Book originally by R. L. Allen, 1871, revised and enlarged by Lewis F. Allen.
How Crops Grow, 1869, by S. W. Johnson, M.A.
Elements of Agricultural Chemistry and Geology, 1871, by J. F. W. Johnston, M.A., F.R.S.S.L., &c., E.
An Elementary Hand-book of Physics, 1871, by William Rossiter, F.R.A.S., &c.
The South of India Observer Almanac and Neilgherry Guide and Directory, 1872.
The Reason Why, Physical Geography and Geology, 1863.
The Gardener's and Farmer's Reason Why, 1860.
The Asylum Press Almanac, 1873, by William Thomas.
The Coffee Planter's Manual, 1872, by Alex. Brown, Kandy.
S. Holman's Illustrated Catalogue of Machinery and Tools.
The Elements of Mechanism, containing a familiar explanation of the construction of various kinds of machinery, &c., 1859, by Thomas Tate.
Farm Implements and Machinery, Vol. I., 1869.
Cotton Culture, 1868, by Joseph B. Lyman.
The Journal of the Royal Agricultural Society of England, part I., vol. VIII., 1872.
The Commissariat Code, 1872, by Major H. P. Hawkes.
A Treatise on Sheep, 1853, by Ambrose Blacklock.
An Elementary Introduction to Mineralogy, 1837, by William Phillips, F.L.S., &c.
The Indian Economist, 1872.

The Country Gentleman's Magazine, Vol. III.
A Book of Catalogues and Pamphlets.
The Indian Economist, Agricultural Gazette of India, and the Statistical Reporter, 1870.
Manual of the Bellary District, 1872, by John Kelsall.
Zoology, Vol. II., 1848, by William B. Carpenter, M.D., F.R.S., &c.
Popular Mineralogy, 1850, by Henry Sowerby.
Rudiments of Zoology, 1855, by Chambers.
The Forest Trees of Britain, Vol. II., 1849, by Rev. C. A. Johns, B.A., F.L.S.
A Treatise on the External, Chemical, and Physical Characters of Minerals, 1817, by Robert Jameson.
Practical Mineralogy, 1843, by Edward J. Chapman.
On the use of Lime in Agriculture, 1849, by James F. W. Johnston, M.A., F.R.S.S., &c.
The Zoologist's Text-book, Vol. II., 1832, by Captain Thomas Brown.
Cassell's Outlines of Botany, 1860, by Dr. J. Scoffern, M.B.
Introductory Text-book of Geology, 1855, by David Page, F.G.S.
Chemistry in its applications to Agriculture and Physiology, 1853, by Justus Liebig, M.D., &c.
Contributions to Scientific Agriculture, 1849, by James F. W. Johnston, M.A., F.R.S.S., &c.
Zoology, Vol. I., 1848, by William B. Carpenter, M.D., F.R.S., &c.
Practical Mineralogy, Assaying and Mining, 1851, by Frederick Overman, Mining Engineer.
Commercial Hand-book of Chemical Analysis, 1850, by A. Normandy.
Elements of Agricultural Chemistry and Geology, 1852, by James F. W. Johnston, M.A., F.R.S.S., &c.
Advanced Text-Book of Geology, 1861, by David Page, F.G.S.
A Manual of Elementary Geology, 1851, by Sir Charles Lyell, M.A.
Useful Knowledge of British Husbandry, Vol. I., 1834.
Do. do. Vol. II., 1837.
The Farmer's Encyclopædia, by Cuthbert W. Johnson, Esq., F.R.S.
Cotton Hand-book for Bengal, 1862, by J. G. Medlicott, B.A.
The Farmer's Companion, by R. W. Dickson, M.D.
The Mechanic's Library or Book of Trades, by C. F. Partington.
Manual of Botany, 1849, by John Hutton Balfour, M.D., F.L.S., &c.
Chemistry of the Four Seasons, 1846, by Thomas Griffiths.
Catechism of Practical Agriculture, 1845, by Henry Stephens, F.R.S.E.
Instructions for the Analysis of Soils, Limestones, and Manures, 1845, by James F. W. Johnston, M.A.
Catechism of Agricultural Chemistry and Geology, 1844, by James F. W. Johnston, M.A., &c.
A Treatise on Botany, 1851, by Richard D. Hoblyn, A.M.
Hints to Amateur Gardeners of Southern India, 1860, by Andrew Thomas Jaffrey.
Indian Hand-Book of Gardening, 1840, by G. F. Frederic Speede.
Rudiments of Geology, 1845, by David Page.
Researches on the Chemistry of Food, 1847, by Justus Liebig, M.D.
Cattle, their Breeds, Management and Diseases, 1860, by W. C. L. Martin.
Rural Economy, 1860, by Martin Doyle.