F.A.O. will continue to examine the immediate problems of food and agriculture and to plan what may be done to solve them with the resources at the disposal of member nations. Its technical workers, its nutritional experts, its economists and scientists are already actively engaged in many countries. With their assistance, F.A.O. will labour to help Europe, Asia and other areas short of food, in their present difficulties, and also to find a solution for the greater problems which may well mean life or death to coming generations.

J. B. MAYNE,
Economics Research Officer.

THE FIRST FIFTY YEARS OF AGRICULTURE IN NEW SOUTH WALES.

By

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7. FACTORS INTERFERING WITH A DEPENDABLE AGRICULTURE—THE HAZARDS AND PESTS OF EARLY FARMING.

THE PROBLEM: FLOODS AND STORMS: DROUGHTS: WINTER NUTRITIONAL SHORTAGES: FIRES: PESTS: PLANT DISEASES: STOCK DISEASES: CONCLUSIONS.

Problem.

Overhanging like a pall every enterprise of an agricultural or stock-raising character in the early colony was a dread of the elements—the periodic droughts, storms and floods, which, overnight or after days or weeks of fore-shadowing, destroyed stock, homes and crops. The droughts were "blights," the floods "inundations." The very words, nowadays, have a foreboding significance, more ominous than the expressions which we customarily use. They conjure up a picture and presentiment of overwhelming disaster, of death, disease and misery. Not since the days of first settlement, have they had proportionately such an important influence for the Australian community. If agriculture was at the best of times hazardous in the early Colony, the dangers were immeasurably increased because of the location of the farming. The valleys of the Hawkesbury and Nepean, the South Creek and the other tributaries of these rivers were the principal agricultural districts. They were closely settled, for nowhere else was the soil so good, and the farmers preferred to risk the floods, rather than

attempt to cultivate the poorer, deficient lands away from the rivers. Every few years there was a serious flood, and the damage caused was immense. In their paths, the floods swept growing crops, the wheaten stacks of the year before, stock, tools, buildings and the hopes of the industrious, leaving behind in their wake, silt, weeds, destruction and even sand, which sometimes turned a good farm into a useless field. Lives were lost, men were ruined, and the whole population brought face to face with a recurring threat of famine. The droughts were more insidious, their onset never so sudden. There would be weeks without rain, the grass and crops gradually shrivelled, waterholes dried up and the stock died. Sometimes even, hot devastating winds cut off the growing crops in a day—the blight hit with such sudden and terrifying effect. The incidence of the droughts varied in the later years of the Colony, for by then settlement was more extensive. In the early years, however, whilst effective settlement was entirely concentrated within the boundaries of the County of Cumberland, the main bulk of the farms and grazing lands were peculiarly affected by the vagaries of the seasons, and the incidence of subnormal rainfall. The land was poor, seriously lacking in humus, deficient, never properly tilled and cultivated. Without rain, it caked almost as hard as the very stone from which it was derived, and nothing would grow. The threat of famine was often prone at such times to endanger the colony and its inhabitants. The quietly sleeping continent, brooding in its immensity, was sometimes feared like some strange pagan deity. It was felt to be an enemy to the petty outpost of settlement, precariously poised on its edge. Its beauties were untrustworthy, its seasons unpredictable, its nature unknown. Farmers and stockowners, caught up in the cogs of its vagaries, were left powerless, defenceless and at times utterly dismayed.

The floods and droughts were the most serious things with which the early farmers were forced to contend, but they had other troubles as well. In times of drought, the danger of fire was increased. Much damage was, indeed, occasionally caused through carelessness in burning off grass and stubble, the Governors finding it necessary to issue regulations to try and prevent the careless use of fire. Nothing, however, could be done with the storms. Their distribution was fortunately never general, however, and their effects were localised upon the farms of individual unhappy settlers.

If it was not the elements, it was the pests which destroyed. The caterpillars, or "grubs" as they were variously described, came like the locusts of Egypt, whence, no man knew. They devoured all before them, and the land was left sickened for a time. There were, in addition, the "oat grubs," the rusts, smuts and weevils, which ruined the crops, and destroyed the stacks or stored grain; the "drake" (*Lolium temulentum*), which sometimes caused illness in man; the "rot" which killed sheep and cattle and, finally, the "scab", one of the worst pests of all, in the days when sheep were roaming the eastern half of the continent. There were, of course, always the weeds which proved so difficult to handle, once they had established a firm foothold. Control of all these pests was difficult, science unknown, treatment and prevention uncertain, empirical and most often worse than useless.

These all added up to make the Australian environment, with its topsy-turvy "climate," its strange plant life and stranger animals. Phillip was forced to contend with ants—"strange insects from the smallest known in Europe to the size an inch long"—troublesome mosquitoes, blowflies which made it difficult to keep food, field mice which devoured the grain when it was planted, and trees from the "size of a man's arm to twenty-eight feet in circumference. . . . but (all) so very crooked, or rent or so rotten in the heart that we could scarcely get one sound or serviceable in a dozen." ([1]) Nature in Australia was in most things that mattered inclined to be eccentric. The settlers in Macquarie times had, through many harrowing experiences, to become used to this environment, and to learn the chances and gambles of the seasons, the hazards of the country they were attempting to subdue, the pests which multiplied their difficulties. It was all just a case of strange lands, stranger problems.

There should be no need to enter into any full description of these hazards and pests. Such things are scarcely matters for discussion. They are the inevitables of agriculture in almost any country, even though they may have had a particular significance in the early New South Wales Colony. It is necessary, however, to note their presence in the first fifty years of settlement, and to attempt a brief appreciation of their importance, for, otherwise, it might be difficult to understand the effects which they did have in disturbing the equilibrium of the of the primitive agriculture, and in precipitating alternations of gluts and scarcities, which were very nearly the most considerable problems in the first years of Australian settlement.

The Floods.

The floods were clearly the worst hazard with which the settlers of Macquarie times and before were forced to contend. The most serious were probably those of 1806 and 1809 which, in devastating the highly productive Hawkesbury district, brought the colony almost to a standstill, paralysing its activities, ruining many of the farmers, and destroying both the harvest reserves of the year before and the crops in the fields. Wentworth ([2]) has left the best account of what one of these floods was like, that of the year 1809: "The chaos of confusion and distress, that presents itself on these occasions, cannot be easily conceived by anyone who has not been a witness of its horrors. An immense expanse of water, of which the eye cannot in many directions discover the limits, everywhere interspersed with growing timber, and crowded with poultry, pigs, horses, cattle, stacks and houses, frequently men, women and children clinging to them for protection, and shrieking out in an agony of despair for assistance. Such are the principal objects by which these scenes of death and destruction are characterised." Writing in 1820, he thought that they had happened on an average about once in every four years. Most had come in March, though they were irregular in their occurrence. There had been no fewer than four floods between 1818 and 1820, one of which had been nearly as high as the great flood of 1809, whilst in the six years preceding, there had not been one of any significance.

It is necessary to realise that, whilst settlement was scattered in Macquarie times, by far the most productive farming districts were the Hawkesbury and its tributaries, which constituted the main preserve of the small farmers, with here and there, a big estate like "Clarendon" or "Regentsville." A brief appreciation has been given of the efforts that had been made by Bligh in 1806, to relieve the farmers of some of their distresses. Credits had been given, and an undertaking entered into to purchase all the wheat from the farmers at the following harvest, at a fixed price of 10s. per bushel. The districts did recover, particularly when the harvest of 1806-7 proved bountiful. There was similar distress in 1809: "This disaster, happening at a time when most of the settlers had cropped their grounds, the Lieutenant-Governor immediately ordered every assistance from the other settlements to facilitate the clearing and sowing of the ground anew . . . 120 working hands were despatched from Sydney for the purpose of relieving the sufferers . . . Losses have been 1,769 bushels of wheat, 785 of maize, 212 of barley, 233 acres of maize, 264 pigs and a few sheep and goats." (*S.G.* 4-6-1809.) Shortly afterwards, a further flood came, involving, in addition, the district of Georges River: "A further flood at Hawkesbury, Georges River, Richmond Hill, Portland Hill, Toongabbie . . . a Mr. Benn on the river, amongst the principal sufferers, lost upwards of 300 head of swine, 100 sheep, about 1,000 bushels of wheat, threshed or in stack, and a stack of barley, besides a valuable property of 1 ton of sugar and 2 chests of tea." (*S.G.* 6-8-1809.)

After such floods there was the threat of famine. It was the same thing when there was a drought. Thus, after the floods of June and August, 1809, there is this notice by Paterson: "As a distressing scarcity of grain must inevitably ensue from the late inundations of the Hawkesbury and Georges River, which there is reason to believe have been more extensively destructive than on any former occasion, the Lieutenant-Governor most earnestly informs every person possessed of a garden to raise as great a quantity of vegetables as possible, by which means the consumption of bread will be much reduced, and the evils to be apprehended from the dreadful calamities by which we have twice in the space of two months been visited be thereby considerably relieved." (*S.G.*, 13th August, 1809.) At such times, again, there were the further fears of monopoly rigging and of prices sky-rocketing, both of which in fact, almost always, did occur. Means usually taken to relieve the situation were to cut down the rations, to send abroad for food, to tighten the controls over the bakers and to "prohibit the export or shipping of bread, flour or wheat or any other kind of grain whatever." (*S.G.*, 20th August, 1809.) It is interesting to note, also, that, in August, 1809, the threat of such a famine led to the disbanding of the Volunteer militia: "Discontinuance of any further issue of Provisions to the Sydney and Parramatta Volunteer Associations, whose attendance for drill and other duties will be dispensed with until further orders." (*S.G.*, 27th August, 1809.) Any and all measures were on such occasions necessary to husband limited food supplies.

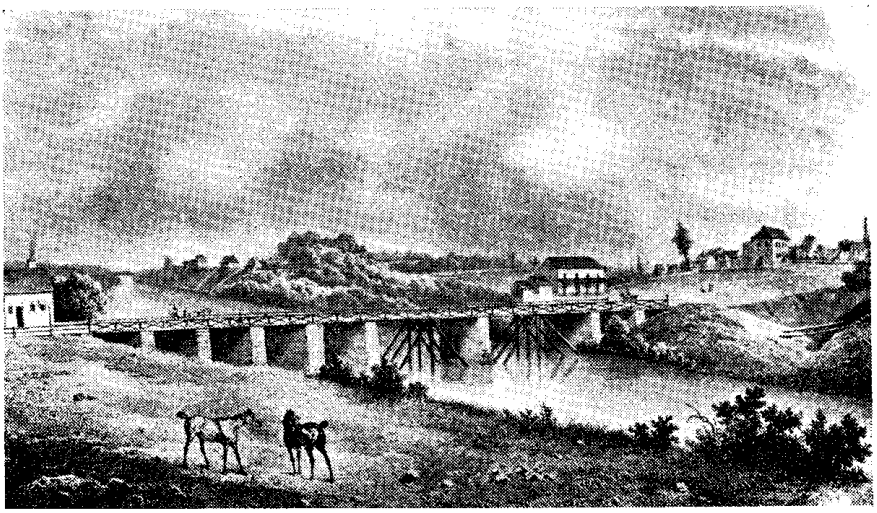
When, after such floods, assistance was given by Government, it was never gratuitous. On one occasion, after the Hawkesbury had been flooded and Macquarie had given some assistance to the distressed settlers, Lord Bathurst replied tartly to the Governor's memorandum on this subject, inquiring whether arrangements had been made for the settlers to repay to the Government the help he had given them ([8]). Benevolence was unknown, probably not even thought of. Charity was not in any case a common virtue of early 19th century England. An instance of this continual harping on the assistance of Government and of obligations now resting on the farmers, may be taken from notices appearing in the *Gazette* at the end of 1809: "Reminder to settlers of the Hawkesbury of the liberal assistance and relief afforded them in re-cropping their ground after the late flood . . . Government . . . expects they will now cheerfully come forward in supplying H.M. . . . stores with such surplus grain as they may have to spare . . . Reminds settlers in general of the help given the settlers to get their crops into the ground after the heavy rains in August, which He trusts will induce them to furnish the stores with the quantity of wheat required for the weekly consumption of those persons victualled by Government . . . Particularly calls upon those persons who borrowed wheat for seed from Government immediately to re-pay their respective quantities into the stores, from whence they were supplied . . . H.M. stores now open . . . no higher price than 10s. per bushel at Sydney." There is to be seen in this—it has been emphasised elsewhere in this study—that a man losing a crop in one year was given no chance to make up the loss in a following season. Prices were fixed to the grower, assistance was niggardly, loans were hard bargains, and credits were never more than half-way affairs. Things were hard in the little world of the times, and the emancipist settlers stood no risks of being ruined by kindness. Their redemption was to be effected by other means. Administration would appear to have been guided by a moral, not an economic philosophy. A man was a criminal who tempted Providence by keeping a stack for any length of time in reach of the flood, in the hope of benefiting by a later rise in price. (*S.G.*, 24th December, 1809.)

Some of the *Gazette's* and Macquarie's most eloquent notices were those in which the settlers on the rivers were importuned to remove their stock, grain and homes to the high banks of the rivers, and thus out of reach of the floods, and to thresh out their stacks quickly, instead of leaving them lying exposed to the risk of total loss. There was no flood in 1810, though a rise in the river did occur. The threat had, however, been ominous: "A report of a severe flood at the Hawkesbury having generally prevailed at the early part of the week, we feel much satisfaction in being able to contradict the rumour . . . a flood at the present juncture must have had a most dreadful operation, owing to the immense quantity of grain that still remains at Hawkesbury, on which our whole dependence rests. Let us gratefully acknowledge our obligation to that Power Who has been mercifully pleased to defend us from the evil, while those to whose charge he has committed great quantities of grain for the use and benefit

of all, have still the opportunity of showing their inclination to benefit the common interest with their own, by removing their property beyond the reach of future dangers . . . From a respectable source of information we are acquainted that, upon a moderate estimate, the quantities of grain exposed to loss, if a high flood had unfortunately taken place, could not have aggregated less than seventy to eighty thousand bushels." (*S.G.*, 14th July, 1810.) In the following year there is a further appeal, in the first week of March, to the settlers to thresh out and prepare their wheat for delivery "lest their grain should be destroyed by the rains, which may now be expected to fall after so long a drought." (*S.G.*, 2nd May, 1811.) A small flood did come, but the effects were not devastating: "The rains at the latter end of last month had nearly been attended with the most distressing consequences to the Colony; but by the mercy of Providence, the threatened danger has been happily averted, and the widely extended settlement of the Hawkesbury happily rescued from a deluge, the most dreadful apprehension from which had been excited in the minds of many whose properties were threatened . . . Saturday, 23rd February, the waters started to rise almost to the same heights as at the beginning of 1801 . . . The corn fields in low situations have been in consequence laid waste and as the long preceding drought had left no prospect of any being produced in the more elevated grounds, all hopes of a maize crop on the banks of the Hawkesbury for the present year are nearly extinct . . . Mr. Marsden, Mrs. Williamson, Mr. Lock all lost horses; Mr. Samuel Croft has lost from four to five hundred bushels of wheat. His farm is between Windsor and Cornwallis Place, in one of the lowliest situations on the banks of the river. The wheat was contained in a stack, which did not float away, but sank and went to pieces, owing to its becoming top heavy. (Messrs.) Clark and Martin suffered a similar disaster, and these, we lament to add, are poor industrious men with large families." (*S.G.*, 30th March, 1811.)

There had been, thus, losses in 1809, 1810 and again in the early part of 1811, and Macquarie felt called upon to remedy the position: "The providential subsiding of the late flood in the Hawkesbury and South Creek which has taken place without serious consequence when compared to the destruction of grain and property of every kind which has of late years been attendant on the frequent inundation of those Rivers and of the Nepean, induces His Excellency to admonish the settlers contiguous to those Rivers in the most earnest manner to beware of the recurrence of those calamities which have for many years past exposed the country at large to the imminent risque of a total destruction of grain and animal food . . . and as the only effectual way of guarding against those risques is the removing of the stock-yards and residences of the settlers from their present insecure situations, His Excellency most strongly recommends to the settlers on the banks of those Rivers to remove from thence to the high grounds in the several townships lately marked out for the respective districts, under the influence of those floods. Those settlers who will avail themselves immediately of this salutory admonition by removing their

residences, stock and farmyard to the allotted townships, may depend on His Excellency extending to them every reasonable assistance and indulgence in his power; whilst, on the contrary, such persons as will obstinately persevere in exposing themselves, their families and their property to the destruction necessarily attendant on their residing within the influence of the inundations of those Rivers, having themselves totally to blame for any misfortunes of that nature which may attend them, need not look to Government for relief, after being thus called upon to adopt the necessary means of guarding against them . . . As the season for sowing wheat for the next harvest will be over in the course of the month of June, the settlers will then have leisure from



"PARRAMATTA BRIDGE."

The photograph above, reproduced from a French album, shows the second of three bridges which were built across the river at Parramatta. The first bridge, which crossed the river at a spot now included in the present Park grounds, was rather a primitive affair and was washed away in the flood of 1795. *The second bridge, built of wood resting on stone piers, was a more solid structure, but in the flood of* 1820 *one pier of the bridge was carried away. Again in* 1826, *floodwaters damaged the bridge to such an extent as to render it impassable. On this occasion temporary repairs were effected by replacing the damaged piers with wooden piles.*

From Dumont D'Urville's account of "La voyage de la Corvette L'Astralabe" (1826-29), *we gather that during the stay of the vessel in Sydney Harbour, D'Urville was invited by friends to visit Parramatta on* 11*th December,* 1826. *Among others, he visited the Reverend Mr. Marsden and walked with him around the countryside; that evening he dined at the house of Mr. Scott who was then architect at Parramatta. No doubt, over dinner, Mr. Scott regaled D'Urville with an account of the recent damage to the bridge and informed him of the plans for its replacement. It would be on the occasion of this visit to Parramatta that the sketch from which this photograph was taken would have been designed.*

In 1835 *Mr. Percy Simpson, then assistant surveyor at Parramatta, reported upon the insecure state of the bridge, and when the report was confirmed by David Lennox, it was decided to build a new single arch stone bridge to the west of the one shown above. Work was commenced upon it in* 1836 *and completed during* 1839. *It was named Lennox Bridge in* 1867.

(Cf. "The Story of Parramatta," by J. Jarvis, A.S.T.C.—by courtesy of the Mitchell Library, Sydney.)

their farming avocations to employ themselves in the erection of suitable buildings for their future residences in the new townships; and His Excellency trusts and expects, that they will avail themselves of that opportunity to place themselves and their families in those situations of comfort and security which it has been His Excellency's most anxious wish to provide for them, and to which they are now for the last time required to repair with all convenient expedition." (*S.G.*, 6th April, 1811.)

In the following few years it is a drought which hangs over the small community. Then, in June, 1816, a further flood causes damage: "Great quantities of maize were washed away, and it is feared the destruction of the whole of the wheat crop that had been sown is thoroughly completed." (*S.G.* 29/6/1816.) Macquarie, again, importunes his little flock: "His Excellency has observed with great concern and regret that settlers on the banks of the Nepean and Hawkesbury have been again seriously threatened with being involved in misery and distress in consequence of the late inundations . . . but when he reflects on the repeated cautions and admonitions they have from time to time received from him, and the pains he has taken in marking out and erecting townships in situations out of the reach of these inundations . . . His Excellency cannot forbear ascribing their recent losses and misfortunes in a great degree to their own imprudence and indolence in not having availed themselves of the advantages which would have resulted . . . Although it should seem that no further exhortation was necessary to induce the inhabitants to entertain a just sense of their own interest and the duty they owe to their families, yet His Excellency still anxious from motives of humanity again most earnestly exhorts them to lose no time further in removing to the towns provided, with a view to save themselves from the utter ruin and distress which by remaining in their present insecure situations on the banks of those rivers must inevitably be their lot, in the event of another inundation taking place and which the present state of the weather seems to threaten. . . . In whatever instances the humanity of Government may be exercised towards the relief of the settlers in their present distress it is to be understood that it will be extended to them only for their temporary assistance and that repayment will be required in due course. . . . The magistrates are informed to use their personal influence and authority with the settlers in these districts." (*S.G.* 13th July, 1816). As a last instance may be quoted the notice issued, when, in the following year, a further flood came: "The inundation of the Hawkesbury is one of the most serious disasters—the flood of March, 1806, excepted—that has ever befallen this Colony. We except the flood of 1806 because of the disastrous consequences that followed it, owing to the impoverished state of the Colony and the general distress which came little short of famine. . . . So dreadful a visitation, however, as were the consequences of that flood might certainly have made an impression. . . . In no part of the world are the versatilities of the chances more evident than here. . . . The accounts of the floods are serious . . . all the wheat stacks upon the low ground have been swept away, as (have been)

stock of all kinds in great quantity. . . . The quantity of cattle and other stock lost is reported to be prodigious. Whole acres of land are said to be entirely annihilated. . . . Mr. Fitzgerald lost nearly 500 sheep. Mr. Gilberthorpe lost property and stock to the value of £700 to £800. . . . Flood not so generally felt as formerly, because that the Colony is much better provided than formerly." (*S.G.* 8th March, 1817).

One serious effect of the floods, apart from the loss of stock and grain, or the damage done to residences and other property, was the spoiling of the good lands, from weeds. An insight into such effects is to be seen in an article in the *Gazette* in February, 1817, considering reasons for the poor crops on the Hawkesbury: "We much regret the general understanding of a less productive harvest than from early appearances we had been led to flatter ourselves with, and therefore wish by every aid we can obtain to trace and detect the causes that have more especially led to a comparative failure in our late crop. The principal cause has been the foulness of the sown land, which is in general so infected with the wild oat and tare, as not only to render difficult the process of reaping but to considerably stunt the grain and render its separation from the spontaneous growths in many instances impracticable. . . . The wild oat may possibly be indigenous; the profuse scattering of the tare throughout the Hawkesbury is attributed to a plantation of that seed which by way of experiment a gentleman put in practice fifteen or sixteen years ago near Windsor. The drake which was once obnoxious to the Hawkesbury farmers has of late years considerably declined but finds a dangerous successor in the wild mustard seed and in many places with the wild cotton bush. all or either of which, wherever they make their appearance tend to the injury of the cultivated crop. . . . In the present season a farm upon the banks at Richmond, one of the most favoured settlements of the Colony, was so overgrown with tares and vetches as that a number of acres were not worth the trouble and expenses of reaping. All these consequences are the effect of floods, which, while they enrich and renovate the soil yet require every exertion of human art to counteract the too great aptness of the growth upwards." (*S.G.*, 15th February, 1817). Atkinson, 1826, gives, also, a very good description of these secondary consequences of the floods: "Notwithstanding the fertility of the soil upon the banks of the Hawkesbury and Nepean, the farmers there run much greater risks in cropping their lands than in any other part of the Colony. . . . If the season proves wet, the wheat, in consequence of the richness of the soil, grows so rank in the straw, that it is liable to be laid by the winds and rain, and to rot upon the ground; and where it is not laid it is very light in the ear. In very hot seasons . . . the soil in some parts binds so hard that the roots of the wheat cannot tiller and spread, and in other places, where there is much sand, it is burnt up . . . but when the season proves favourable the crops are immense. . . . The farmers upon these banks also run very great risks from the floods, which do not return at any stated intervals, and therefore the crops are liable to be destroyed by

inundation in every stage of their growth. If the land is overflowed when the wheat or other grain is just sown, it generally swells and bursts, or rots; and in all the low grounds it is totally destroyed, as the water is some time before it runs off, or is absorbed by the earth. If there should be no flood before the plant has begun to spindle, or is in blossom, or nearly ripe, and the waters should then overflow the banks, or rise above the upper part of the straw, a mortification will immediately take place at the bottom of the pipe or stem that supports the ear, close to the point. The end of the stem when drawn out of the sheath will appear white for two or three inches, with a small point like a needle, and smell very offensive. A field of green wheat in full ear after the blossom has gone off, will appear, when the flood subsides, as if it had sustained no injury from the water; the ear for a time will continue green and full, and flatter the unfortunate farmer with the hope of a crop, but, upon minute examination, all communication will be found to be cut off at the upper joint between the stem and the root, the grain in the ear can receive no further nourishment, so, whether the crop is in spindle, in blossom or in full ear, it is totally destroyed." (4)

There was always a dilemma in the early Colony concerning farming on the rivers. On the one hand, the advantages accruing from, normally, an easy cultivation and the returns of a comparatively rich soil; on the other, the risks of flood damage, and of weed and other spoilation, following each submergence of the soil under flood waters. Quite a fanciful, impracticable and purely hypothetical analysis of this dilemma is given in an 1818 article in the *Gazette,* putting forward arguments for and against; "The rains we are sorry to say have had their usual operation upon the banks of the South Creek, some of which are so very low as to render their cultivation as a matter of surprise. It is the maize that this particular line of ground mostly suffers in; and as the rains at the end of February and during March may be calculated upon with almost equal precision to the hurricane or monsoon rains, and a day or two of hard rain is almost certain of destroying the farmer's labours with his hopes, an expression of astonishment must at least be pardonable with the oldest sufferers upon those banks at the perseverance with which their losses are courted and the presumed patience with which they are borne from year to year. It is known that the lower situations are cultivated in preference to the higher, in the same vicinity—nay, in the same ascending field; and if it be urged that the flooded grounds are the less laborious in cultivating, yet they are always disposed to be more foul and require upon the whole a greater proportion of labour to keep the crop clear as it grows, than the first difference of breaking up a hard ground could be at all compared with, and, again, if it shall be urged that the upper sorts are less productive than the lower, still it may be answered that these are secure and the others not and, besides, would it be less advisable here than in other countries to bestow a little pains in enriching the grounds, which in the cases we allude to would require much less labour than in other

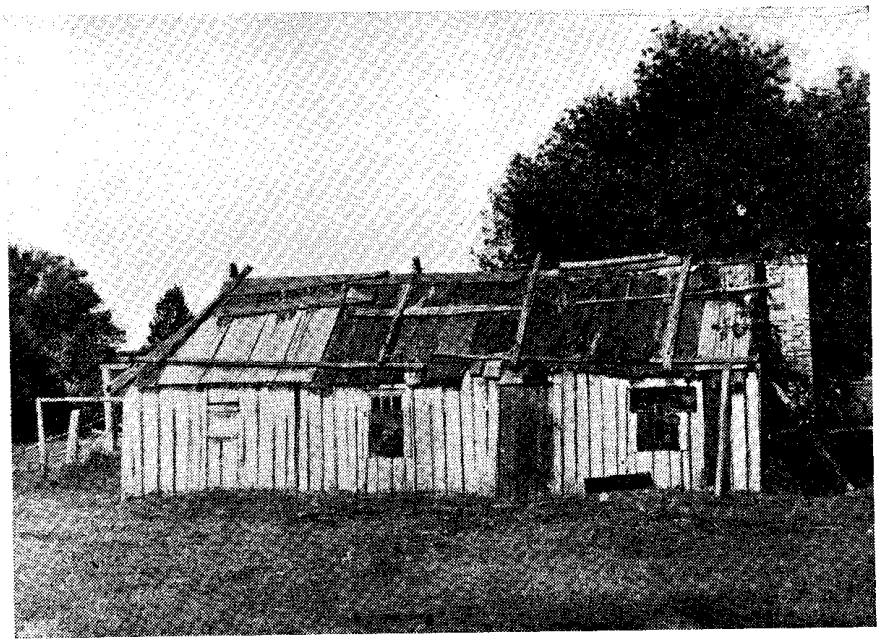
situations can be expected. If after all or some of the floodings that may be very nearly said to be of usual occurrence, a quantity of the sediment which is considered to form the productive surface were to be removed and incorporated with the harder earths, is it not probable that an advantage would accrue from it? In England, and doubtless everywhere else where manure can be obtained, carts and waggons are employed to convey it many miles, and first to purchase the manure itself. It may be said that those farmers have it more in their power to perform these necessary processes than ours have, but is not labour the most material part of the farmer's stock in trade? It must form at least three or four-fifths of his dependence, and ought not the poor farmer to be to the full as attentive to his welfare as the rich one? If this enriching sediment then were to be cleansed, and then taken away to safer soils that require such aid, it may not be doubted that the farmer would in a short time find his advantage in bestowing this labour on his ground, and then, if desolaton was spread around him, he would pity the distress of his neighbours, feel gratitude to the Providence that had taught him to secure himself and his little household from penury and want; and thank the Power that had enabled him to a certain extent to relieve the sufferings of his less fortunate fellow creatures." (*S.G.*, 7th March, 1818.) The conclusion apparently reached, by 1819, was that "A flood on the Hawkesbury . . . a good deal of maize lost . . . Poverty is stark in the district. It is surprising that supineness still prevails against the vicissitudes of many years' experience . . . There is an entire carelessness in the plan of cultivation upon the lower banks of the South Creek. A settler who begins to cultivate without a farthing in his pocket must patiently submit to labour under privations which he may feel without regret so long as the prospect before him is such as to animate and give a spur to industry—better would it be that the settler should not build at all than build on a foundation so intensely fragile . . . a single drop of rain falls not from the skies to cherish the hope and improve the fortunes of others that does not lay him under a perturbation of mind." (*S.G.*, 27th February, 1819.)

It is abundantly clear that the first farmers in New South Wales were subjected to the most violent of hardships, and that the pivot upon which, in the long run, small-scale emancipist settlement depended was a slender reed. The country could hardly have given a harsher treatment to the beginnings of farming. In the settled areas of the Cumberland area, the land was mostly poor. The soil was good only on the rivers. All might have been well if it had not been for the floods which over the early years recurred with devastating frequency. A flood or two over the first thirty years—which would be something of an average for some other river flat lands—could have been withstanded, but the unfortunate thing was that the Hawkesbury, of all rivers, was one of the most precarious.

Even in years when the river did not flood, there were threats of floods and some washing of the more lowly situated properties. Consider this description, for example, of a simple hailstorm, bringing with it a threat of a further flood: "Severe hail storm . . . On Mr. Throsby's farm, 85 acres of growing wheat were

totally destroyed and a quantity of small stock killed. Mr. Gruse also had 20 acres destroyed and 110 head of poultry killed, also, by the hail . . . The hail lay six inches on the ground and remained several days unthawed . . . There is a threat of floods at Hawkesbury, Windsor, Toongabbee and Georges River, of the South Creek at Cabramatta . . . Mr. Martin Surgeon lost 130 sheep drowned. Mr. Connell of Pitt St. lost 10 head of horned cattle. Hugh Burn has lost five head of cattle and other losses are apprehended . . . Wheat was damaged by the winds and rains, and the thickest and fullest crops suffered most injury." (*S.G.*, 21st November, 1812.)

Under the circumstances the farming was a lottery, a matter of chance. Security was missing, encouragement and hope absent. Such a fact could not fail to have depressed the pioneering cultivators, to have created a state of mind in which worry, uncertainty and a living for the moment were uppermost. It seems an extraordinary thing that Macquarie never quite realised the reasons for this depression. At least there is nothing to show any particular indications of such understanding on his part. He built townships at Richmond, Windsor, Wilberforce, Pitt Town and Castlereagh and provided allotments of land upon which a settler could build both a home and whatever yards he might need for his stock. He told the farmers to remove their possessions to the higher lands, threatening that if they did not do so, they could expect no further assistance from him. Some of the settlers did move for, by 1818, there is this reference to the fact: "It is a happiness to learn that the remonstrances of Government have at length had considerable effect in inducing the settlers of the districts most exposed to the fatal consequences of floods, to remove their grains to places of security from the rains of March which have so repeatedly proved the scourge of apathy and indifference to the security of the crops after they had gone through their whole expensive process. Little, we are happy to state from the representations of experienced farmers, is now to be apprehended unless it be from the loss that may yet possibly accrue in the later maize crop." (28th February, 1818.) The facts were, nevertheless, that the crops could not be bodily transplanted. But it is in vain that one looks for anything in particular being done by the Governor or suggested, to provide for investigation of the affairs of particularly badly-hit settlers, to make special provision by credit or grants or labour to re-establish their positions. Grain only was given; now and again, stock, but the bargains were that the loans required to be repaid. Yet, it must have been next to impossible for a farmer without capital and placed on a few small acres in an uncertain location, to weather his losses of a week or two of flood damage. No more than a single crop of maize and a single crop of wheat could be taken off a farm in a year, and how could a man obtain subsistence whilst he awaited over a virtually twelve months' period the ripening and threshing of a harvest? Moreover, there was no variation of government prices to speak of. The prices were fixed, probably on their lowest levels, and in any case guarantees were lacking that all the produce would be purchased. The farmers had therefore to bear all the commercial risks of their industry.



"BARK HUT."

Writing his account of "The state of agriculture in New South Wales," which he published in 1826, James Atkinson had this to say on the type of shelter which settlers erected when they took possession of land:

> *"Many persons on first taking possession of a grant of land, content themselves with the shelter afforded by a bark hut, while they put in their first crop, or carry on their first and most important operations; and many having once accustomed themselves to living in this way will rest content with no better habitation for perhaps several years until compelled by the advancing state of the population around them to think of erecting a better. But although in cases where the settler's capital is limited, and it is necessary to apply every shilling to the purchase of livestock and improvements of his land, living in a bark hut may be necessary and praiseworthy line of conduct, yet those persons who have been accustomed to all the comforts and conveniences of a good house, and especially such as have families, might by submitting to such privation, become disgusted with the hardships of their situation, and it is certainly a prudent step for everyone, as early as possible, to construct himself a decent dwelling, remembering always that comfort and convenience are the only requisites to be studied, and that grandeur and ornament must be left out of sight . . ."*

Later, in formulating his opinions upon the buildings needed by the settler, Atkinson sets out his further views:

> *"Comfortable huts for the men should by no means be neglected; many people suffer them to live in dirty and comfortless bark huts, but it is certainly to the interest of every settler to get his men comfortably lodged as soon as possible. The best and cheapest of huts are built of logs, plastered within or without, with a bark or shingle roof, and stone chimneys; 14 feet long by 12 feet wide will be found large enough to accommodate three men, and it is better not to put too many together into the one hut."*

The picture reproduced above is possibly one such "make-do" bark and log hut erected by a settler for his family until he could "erect a decent dwelling." Alternatively, it may have been one of the "dirty and comfortless bark huts" which were used by settlers to house their hands, though the brick chimney to be seen on the right of the hut seems to indicate that a degree of comfort was to be had inside such huts. This is no actual record of when the hut here shown was erected. That is of no particular interest. The illustration serves the purpose otherwise of indicating the primitive conditions under which pioneer farmers whether in the early or later Colony had no option but to live.

(By courtesy of the Mitchell Library, Sydney.)

To these misfortunes, the flood damage done to farms must be added. These trials were immense—some being even man made in causation, and spreading mischief everywhere. When rye was planted on the Hawkesbury as an experimental crop, it later proved a curse: "A gentleman on the banks of the South Creek had many years ago sowed a field of rye grass which has now intermingled with the growing grain all over the Hawkesbury and been found a very pernicious and ineradicable weed." (*S.G.*, 24th March, 1821.). The Governors should have felt the obligations resting upon them to bolster-up the river agriculture, for upon its production, self-sufficiency in the Colony in the last resort depended. Other than for pious hopes, it cannot be seen that they did do more than the minimum. One of two conclusions, only, can be drawn. Either adequate assistance was impossible in the circumstances, or else in line with a determined policy, help was withheld. True, the farmers were convicts, many of them dissolute, some of them hopeless, but it could not have been otherwise that the improvidence and bankruptcy of some of them were traceable to ruin not of their own making. Perhaps, after all, in the final analysis, neither Macquarie nor his subordinates could conceive how to rectify matters, for it must not be forgotten that ideas of bounties, subsidies, the financing of grants to depressed industries and sections of a population, are modern in their development.

In broad terms, it will be seen that agriculture, for practically the whole of the first fifty years of settlement, was tied to unsuitable lands, in Macquarie times to the unsafe Hawkesbury district and the poor lands of the County of Cumberland, whilst later the problem of the transport of perishables and costs of marketing prevented, for a considerable time, any worth while exploitation of the better wheat lands of the interior. It was fortunate that the opening up of the Hunter in 1822, did provide river country safer and just as good as the Hawkesbury, but its lands were not sufficient to provide, of itself, subsistence for the Colony. Moreover, it was settled in large grants, taken up by the immigrants who arrived in the early 1820's. Perhaps, had the Hunter been settled in the first instance, instead of the Hawkesbury, the story of early colonisation would have been different, but this is to enter a field of supposition in which no proof or evidence is offering.

Sufficient it is to note that by 1820, and in following years to 1842, it generally came to be recognised that wheat could not be successfully grown on the Hawkesbury, and that New South Wales wheat, grown in the settled districts, was definitely of an inferior quality, requiring imported Tasmanian or South American wheat to make the flour suitable for baking. Archibald Bell told Bigge in 1820 that, in his opinion, the land on the north side of the Hawkesbury, which was not subject to floods, was better adapted for agriculture. ([5]) Bell possessed 1,700 acres of land which he considered well calculated for either tillage or cultivation. The produce could be marketed either at Windsor or Sydney, along the waterways of the Hawkesbury or Hunter River: "The poorer description of settlers (had) not the means of converting their straw into dung from the want of cattle or of means of

grazing them. But the majority, or, I believe, the whole of them, are in possession of the flat, rich, alluvial lands which render manuring unnecessary." William Cox (6) gives this clear picture of the general conditions as they had been reached in 1820: "Nine-tenths of the lands near the Hawkesbury have had wheat successively from the period it has been first cleared. The High Lands during the same period were sooner exhausted and then left to go to waste . . . The average produce of the Hawkesbury was from 1804-1814 about 20-25 bushels per acre . . . Since that period from 15 to 20 . . . a great proportion of the lands in the district of Wilberforce and Pitt Town are so very foul from the floods and bad culture that they are scarcely worth cultivating except for maize, of which they yield very abundantly . . . still the whole of the district is under cultivation . . . Most certainly (however), they require a better system of husbandry to make them productive . . . if they were appropriated to the growth of maize, according to a new system lately and successfully adopted of ploughing for maize and cleaning it likewise with the plough, I think the crops of the Hawkesbury would still be very productive . . . A great majority of the settlers have sold their lands and are reduced to poverty . . . Many of them have removed their habitations altogether from the low lands of the Hawkesbury, and many also have stacked their wheat on the high lands without removing themselves, particularly in the districts of Richmond and Wilberforce . . . The wheat grown on the low lands of the district is not so good as that grown on the high lands, nor will it weigh so much to the bushel, but I conceive that the wheat on the high lands is equal to that grown on the other parts of the Colony . . . I have no doubt that the lands of the Hawkesbury district, if converted into pasturage, would be more profitably cultivated than in their present state if we could obtain grasses that could stand the force of the inundations (for) . . . I have seen those of 1806, 1809, 1817 and 1819." Part of the tragedy of early farming, it is very clear to see, was the fruitless attempt to grow wheat on lands peculiarly unfitted for it.

The Droughts.

Two forms of drought may be distinguished in the farming of the early years of settlement, first, the droughts following upon subnormal rainfall or an unfavourable incidence in the falls, next, a "winter nutritional drought" for stock, following upon overstocking on inferior pasturage. Both are, of course, problems of the present day, with much the same effects as were observed more than one hundred years ago.

There was a drought in Phillip's time, with later regular recurrences. The first drought in the Macquarie administration occurred in the summer of 1810-11. By the following March there is this note of prevailing conditions: "The long prevailing drought has destroyed every hope of a maize crop which is now, unfortunately, past recovery. A scarcity of water has also been the consequence, scarcely ever before witnessed. In Sydney the Tanks have been several weeks empty, and those who were in want of water were obliged to collect it from small cavities in the spring course above the Tanks, which has afterwards been sold at from

4d. to 6d. per pail. The month of March has, however, commenced and rains are, of course, to be expected." (*S.G.*, 2nd March, 1811.) Later in the same year: "From the best information we can collect so intense a drought at this time of the year has not been witnessed since the year 1789, when the new colonists suffered a parching thirst for several months." (*S.G.*, 26th October, 1811.) It was, however, the years of drought in 1813-1815 which were quite the worst in the history of the early colony. Indications were serious in August, 1813: "The prevailing drought has proved very destructive to the flocks and herds. From the want of pasturage ewes are unable to afford sufficient nourishment for their lambs, which have in consequence fallen off in excessive numbers; and many horned cattle have perished in the mud on the exhausted borders of their usual watering places. The cause that has produced so severe an effect is nevertheless nothing more than was to be calculated upon, as at this season droughts have always been prevalent in a greater or less degree." (*S.G.*, 28th August, 1813.) In the following month, conditions had further deteriorated: "His Excellency has learned with much concern that the unavoidable calamities (have resulted in) the unfortunate consequence that great numbers of cattle have already died from actual want of food, others have contracted disease which will probably terminate in their deaths also. . . exhibiting a most alarming prospect to the colony as a whole . . ." (*S.G.*, 25th September, 1813.) In the following January (1814), there is a reference to "The severe distress suffered by the settlers in general and most particularly by those in the middle and lower classes, from the late long-continued drought, which has alike injured the live stock, and rendered this present harvest much less productive than was hoped for and expected . . ." (S.G., 1st January, 1814.) In October of the same year: "The long abstracting droughts of the present season are very severely felt throughout the colony. The wheat fields are in a universal state of languor, while the grazing stock are hourly falling off from the poverty of the pastures." (*S.G.*, 8th October, 1814.) The harvest of the November following was a failure though, when Macquarie toured the district, in November, 1814, his observations were that "(he) was pleased with the general aspect of the country, the produce of the harvest promising considerably more than could have been possibly calculated upon from the long successive droughts." (*S.G.*, 24th December, 1814.) The following season was largely, also, unfavourable, the *Gazette* commenting, in December, 1815: "The general appearance of the harvest is by no means gratifying. The best lands are not expected to yield 20 bushels per acre, while others will scarcely be worth the reaping. The length of the droughts that have been so disastrous in their consequences is unprecedented, as we cannot recollect so totally uninterrupted a succession of dry weather to have ever before lasted beyond the middle or somewhere near the latter end of October." (*S.G.*, 2nd December, 1815.) Within a few further weeks and after the damage had been done, it is interesting to note Macquarie recommending to the settlers, in view of the experiences of the "repeated droughts of the last three seasons," to "sink large reservoirs or tanks for the recep-

tion of the occasional rains, whereby he is assured that much of the injury now sustained by the cattle for the want of water would be happily avoided," and strongly advising them "to make a certain proportion of hay annually for the use of their cattle when by means of the droughts the grass becomes insufficient for the animals they have to provide for." (*S.G.*, 16th December, 1815).

There is to be seen in the last of these references the beginnings of a problem which was of peculiar significance in the early settlement—overstocking and a winter nutritional drought; rendering expansion of settlement and thus the finding of better grasslands, or, alternatively, the growing of stock feeds, necessary. It was, in fact, the drought of 1813 which had much to do with Blaxland's expedition of 1813 to find a way over the Blue Mountains. No rain in that year had fallen in what was normally the wet season. "An alarming mortality" had occurred among the flocks and herds. It was, therefore, especially necessary to make an effort to find out whether there was fodder and water on the western side of the range. The route was found, Blaxland claiming with truth that his discovery had "changed the aspect of the Colony from a confined, insulated tract of land to a rich and extensive continent" (7).

Notwithstanding the opening of the plains of the interior to stock-raising, the cattle had still to be driven to Sydney for sale for slaughter, a disadvantage when compared with the raising of stock nearer the market. Overcrowding on limited and poor pastures must have taken a heavy toll, particularly in years of feed or water shortage. There is this description by Cunningham (1828) of the cattle customarily marketed at Sydney: "It must be confessed that the general run of the stock realises the dream of Pharaoh for indeed you might almost tie your handkerchief in a bow knot round the bellies of some—or detect a fellow picking a pocket, through the sides of others; into such delicate shapes have they been refined by the genteel fare upon which the poor beasts had so long previously subsisted" (8). By then the largest herds were being kept in the districts of Bathurst, Argyle and Hunter Rivers, some at a distance of 250 miles from Sydney. The fat cattle were driven down to the capital as wanted by the butcher. Most of the "old wealthy settlers," however, had homesteads not far from Sydney to which the cattle and fat sheep were brought for sale, obtaining by these means good prices from the butchers. On the other hand, those of the settlers not so fortunate were obliged to take what prices were offering, if cattle were brought down merely on speculation. It appeared to Cunningham, that what was required was "a class of dealers between the butchers and settlers," and he did not "know anything that would pay much better if a competent man took it up . . . (for) by leasing a large farm within thirty or forty miles of Sydney and cultivating it in the English mode . . . raising a sufficiency of hay and green crops for fattening . . . a certain mine of wealth would be opened to him while a most essential benefit would be conferred on distant settlers."

To the settler, possessed of neither an extensive homestead near the city nor a grazing right in the interior, the raising of stock was a serious matter, the winter being especially severe. There were no sown pastures, little, it would appear, in the way of winter crops. In consequence the condition of stock varied with the stage of growth of the natural grasses, which falling off sharply in nutritional value in the winter months, naturally caused the cattle to lose condition. Few of the considerable stock-owners in the settled Cumberland area had sufficient room for their cattle. Moreover, however remote their estates, by 1820, they were becoming surrounded by the blocks of small settlers. The need for new pastures was thus a reason for constant expansion of the periphery of settlement (9). In this regard it has to be realised that, until quite a late stage in colonial development, range husbandry was the system adopted in cattle keeping, fencing being practically unknown. The stock-owners "thus became the gradual explorers of the country," and, continues Wentworth, "it is to their efforts to avoid the contact of agriculture and thus the liability of trespass . . . that the discovery of the best districts yet known in the Colony are ascribable." An interesting note in the *Gazette* indirectly illustrates this point: "It having been represented to the Governor that some persons, settlers and others have been in the habit lately of sending their horned cattle, horses and sheep to graze on those lands to the westward of the River Nepean, commonly called the Cow Pastures, which have been specially reserved for the use of Government, and that some persons have even presumed to erect stock-yards thereon in direct violation of the Government and general orders issued on that subject on 11th April, 1812, and to the very great injury of the wild cattle belonging to the Crown, notice is given that all cattle of whatever description belonging to private persons found . . . after 15th September ensuing will be impounded and any person driving cattle upon . . . shall be prosecuted. . . . All stock-yards will be pulled down. The sheep farms of Messrs. Macarthur and Davidson are exempt, but all other parts of the said pastures . . . are reserved for the exclusive support of government wild cattle. . . . It having been also reported that great numbers of horned cattle, horses and sheep . . . belonging to persons residing in the district of Hunter Hill and Lane Cove are constantly found grazing on the Crown Lands of that district whereby the grass necessarily required for the working oxen is eaten down . . . they will be impounded and the persons responsible prosecuted." (*S.G.*, 26th August, 1815.) Complaints of trespassing by cattle and warnings constantly appear in the pages of the *Gazette* during the years, 1810-1820.

Further illustrative of these conclusions is this letter from "a settler" in the *Gazette* of 26th August, 1815 issue: "I cannot help expressing a considerable degree of astonishment when I reflect how little we seem to understand our real interests in this Colony. . . . Meat is at this time from 18d. to 20d. currency per lb., while a few months back 10d. and 1s. were the common prices. This is said to proceed from the general

poverty of the grazing stock arising from the scanty nourishment afforded by the fields at the present season, and this is no doubt the case so that from the want of cattle to kill we are obliged to depend chiefly upon our swine which cannot be reared without an expense far greater. . . . Imported meats of very inferior quality in consequence now produce a much better price than our best kinds did six or seven months ago, and to me it appears a very clear case that if we were to kill and salt our meat when the stock is in the best condition, this would be an advantage. . . . In the course of a month or five weeks after the spring our cattle in general are in fine condition, but if we cannot find immediate sale for all that are fit to kill, they are suffered to fall off again as the season declines and more especially in the winter months, if droughts have immediately preceded them. I have frequently seen herds of cattle in as fine condition as I ever saw them in any other part of the world and among them a number of as fine plump oxen as would if salted down in such order have insured to the owner a very good price; but on the contrary I have witnesed with regret their passing into decay, a great proportion perishing from poverty, and the survivors going on from season to season in the same way. . . . I hope that people will cure their meat when it is in the best condition."

These descriptions of drought conditions in the early Colony and the argument concerning over-stocking could be considerably further developed, but probably sufficient has been sketched to show their connection with the economy of the time.

Drought also brought with it considerable risks of fire damage. Wentworth, for instance, mentions that the burning-off of the long grasses was common: "The custom of setting fire to the grass is most prevalent in the months of August and January. It is absolutely unavoidable in those districts which are not sufficiently stocked; since cattle of every description refuse to taste the grass the moment it becomes withered" ([10]). The same practice, of course, was generally followed in burning off a stubble paddock, since few of the farmers possessed sheep enough to feed it off. A few illustrations of these risks may be given. There is this report from the *Gazette* in January, 1811: "Report of severe losses by fire on the Hawkesbury. Mr. William Hicks burning off his stubble, the fire spread to his stacks and destroyed the whole of his present year's produce and there are others too." (*S.G.*, 12th January, 1811.) There is this notice of November, 1810, preceding: "It may not be improper at the present hot and dry season to notice the necessity of a strict observance of the orders of Government intended to secure the settlers' property from fire, by requiring proper attention to that important object from those who are about their farms . . . The orders alluded to were found necessary in consequence of some serious disasters that had been consequent to carelessness and are as follows: 'The accidents that have lately occurred by fire, render it necessary for the Governor to recommend cultivators to take greater care of their stacks and property against the fires that are so prevalent in the country at this uncommon hot and dry season, and more

particularly to require an exact obedience of this order as well as that of October 15, 1801, viz.: No person whatever is to set fire to any stubble without giving his neighbour sufficient notice, and not then until every person is prepared by having their wheat stacks secured. Should any person neglect this necessary Regulation, and any property be destroyed thereby, they will on conviction be obliged to make good all losses sustained by such neglect. No persons whatever are to smoke pipes or light fires near any wheat stacks public or private.'" (*S.G.*, 24th November, 1810.) From the *Gazette*, 27th February, 1813: "Loss of fire of several stacks of wheat belonging to Mr. Thomas Kenna nearly opposite to Cornwallis Place. Extent of damage is estimated at 800 bushels . . . This is a melancholy occasion, melancholy in the extreme to so industrious a family whose fields are their only support."

Sometimes again, grass fires, ill-advisedly made, caused damage, the Governor noting, in September, 1813, that the unavoidable calamities which had arisen from the unusual drought of the season had been increased by the improvident conduct of several of the settlers and landholders in "setting fire to and thereby totally destroying the old grass, before any prospect of change in the weather could warrant the expectation of a fresh growth springing up to supply its place . . ." (*S.G.*, 25th September, 1813.)

The Pests.

From the foregoing extracts of contemporary records, it can be readily appreciated how much the elements did cause trouble to the first farmers in New South Wales. Their vagaries constituted, together, probably the most considerable hurdle to the success of the early agriculture. Pests were a further source of unexpected trouble, as if the former were not enough. Entomologically, the Colony was rich and well endowed—this adding to its "versatilities" and "eccentricities." Disease and pests, even in modern times and particularly in backward countries, destroy a significant proportion of the world's foodstuffs annually produced, and it is one of the principal concerns of modern governments, using the scientific resources available, to reduce this wastage and promote conservation. But, whilst Governor Macquarie and the early colonial administrators felt a similar responsibility, they were quite unable to suggest the appropriate remedies. The utter helplessness of the small farmer settler in New South Wales, again, if we are to come to grips with his position, may perhaps be best compared to that of an illiterate, slipshod gardener, living in an isolated community of fellow illiterates, bewildered by the thrips, aphids, flies, mites, slugs, scales, smuts and pests, blights and virus diseases, working havoc in his garden, and unable because of his inability to read or intelligently converse, to take advantage of the proven treatments offering and thus left to experiment on his own or to try other things told him by unreliable associates. It is not long since that such isolated communities and individual farmers were to be found in New South Wales. Superstition, ignorance, isolation and backwardness are the normal custodians of death, disease and plagues, and it should be quite obvious that all these were present in full abundance in the early settlement of Australia.

It is not to be overlooked, however, for the facts in this general situation have previously been stressed, that what there was of science was extremely primitive at the stage at which inaugural development was taking place. The effective control of various plant diseases and pests in most instances have only been worked out in comparatively recent years. Perspective is best retained if these facts are kept constantly in mind in surveying the early agriculture.

Caterpillar plagues find many a reference in the issues of the *Gazette* over the years 1810-1821. There is this note from an issue in September, 1810: "Much injury is reported to have been done within the last few days to the fields and gardens at and about the Hawkesbury by a small caterpillar, commonly called the grub, which made its appearance about ten days or twelve days since and has had a very numerous and alarming increase. Whole acres of wheat and barley are already stated to have been devoured by these insects, and in many of the gardens most of the vegetables destroyed. With such unaccountable rapidity do they lay waste whatever they attack and so excessive is their increase, as to render hopeless any effort to destroy them . . . Suggestion is offered of a spray of sulphur, soap, mushrooms and water." (*S.G.*, 29th September, 1818.) Later, in 1812: "With the late rains which set in about the 22nd February, innumerable swarms of caterpillars have made their appearance. The roads in many cases have been nearly covered with them. Their depredation has been confined to the grass and other spontaneous herbage, the maize being probably in too forward a state to admit of injury from their attack. Those who have their grounds in readiness have delayed sowing, from the dread of these insects which begin obviously however to diminish in number; and a succession of hot weather will, it is hoped, effectually destroy them. They are generally above one inch in length, the colour of the back a dark brown, approaching to a black, and the belly streaked with yellow." (*S.G.*, 2nd March, 1812.)* In the following month, April, 1812: "The grubs or caterpillars have in many places totally disappeared from what cause seems to be as much a matter of conjecture as the causes that first produced them . . . we seldom escape a year without being more or less annoyed by these insects, yet no comparison in point of numbers can be admitted between those of any former season and the present . . . whole fields of grass are totally cut down . . . an opulent farmer assures us that out of a field of barley grown for stock, not a single blade has escaped, such are the ravages of this unaccountable insect which comes we know not how and goes we know not where . . . Thirty turkies were turned into an infested field and the caterpillars disappeared . . . another, a poor farmer, who had little or no poultry of his own, contrived to have a number of ducks belonging to his different neighbours driven on to his barley field which was thereby cleansed . . . the owners of the ducks were considerable sufferers for want of the precaution." (*S.G.*, 4th April, 1812.) In the Spring following, 1812: "The

* It is not possible to positively identify this pest from the contemporary descriptions here given. It may have been the "Army worm."

verdure of Spring begins again to decorate the fields, which the devastation occasioned by the grub, immediately before the present winter, had in many places totally laid waste. The flocks and herds will benefit by the change, as those that were wholly dependent on the spontaneous gifts of nature have long found but scanty pasturage." (*S.G.*, 12th September, 1812.) Apparently the pest was not seen for the following few years but, in 1814, there is a recurrence: "Several settlers on the banks of the Hawkesbury complain of considerable damage to the growing maize crops from the grub caterpillars which have appeared in considerable numbers . . . somewhat similar to the outbreak of March, 1811, which set in with the rain." (*S.G.*, 2nd April, 1814.) Later in September of the same year: "The long subsisting droughts of the present season are very severely felt throughout the country . . . The wheat fields are in a universal state of languor; while the grazing stock are hourly falling off from the poverty of the pastures. The early-sown wheat has much the advantage in appearance of the later. The grub caterpillar is also very much complained of. In many fields of wheat it appears in prodigious numbers, but we trust will vanish with the first heavy shower that shall visit us." (*S.G.*, 8th October, 1814.) In 1819 there is this further reference: "The grub is now desolating the fields and leaving flocks and herds devoid of their natural food . . . I fear the caterpillar will cause more real and general injury to the Colony than the most severe flood it has ever been visited with. Every inch between this and the Cow Pastures is covered with them and they are devouring every blade of grass before them. As I recollect a much more partial attack by the same insect about five years since, the season immediately preceding the fatal dry seasons that the stock, etc., suffered so much by, I dread the effect of the present attack being much more general from a perfect recollection that at any time wherever they ate the grass in patches, it has never to this moment recovered . . . Destroying every blade of young wheat . . . I have some acres that had been up a week, every inch of which is now totally destroyed. (From the letter of an extensive farmer whose education and observation are in general esteem we derive this interesting information on the subject of the grub which now desolates the fields)." (*S.G.*, 3rd April, 1819.) Apparently the destruction was considerable, for there are following references to the visitation of the plague. In January, 1820, in a notice regulating an alteration to the ration, one of the reasons put forward for the reduction is given as: "The difficulty of procuring animal food at this time for the supply of H.M. Stores owing chiefly to the unfitness of the cattle for slaughter in consequence of the injury some time since done to the pasturage by the destructive progress of the caterpillar through the country . . ." (*S.G.*, 1st January, 1820.) In a general reference in the following March, 1821, there is this further note: "The grub . . . has disappeared from natural causes . . . Last year the little poaching insect of a grub was as direful as the flight of locusts to the Egyptians; and if we had been devoid of other dependence, it would have left us no other subsistence than the wild honey . . ." (*S.G.*, 24th March, 1821.)

No similar full descriptions can be found of other pests and the damage which they caused. Smut and rust in wheat, the weevil destruction of grain receive brief mentions, and there are occasionally references to the treatment of grain before sowing. It would seem that everybody was familiar with these troubles, and so it was pointless to describe them. From an issue of the *Sydney Herald,* 12th November, 1832, in the later Colony, there is this brief reference to rust in wheat: "Wheat: The harvest will commence in a few days on some well-situated farms in the interior, and in a few weeks it will be general. The crops of the season are not so extremely heavy as in former years but are remarkably clean being free from weeds, blight and rust. The latter is the greatest enemy the farmer has to encounter. In two days it will ruin his prospects, and reduce him from opulence to poverty. It may be due to (a) time seed is sown, (b) rich low grounds where the fogs of the morning are frequent and heavy and the sun in meridian strength beats with comparative violence on the large ears of grain." There is this letter from Henry Howey, a settler at Goulburn Plains, concerning smut: "The causes of smut in wheat are put down to bad seed, by others to bad seasons, by others, again, to soil, aspect, early or late sowing . . . I recommend strong urine immersion for 1½ minutes, then it is to be mixed in wet state with lime burnt from stone slacked into a fine powder . . . then (it is to be) immediately sown . . . Some others recommend salt water instead of urine, some urine and good ashes (but) neither is effective." (*S.G.,* 2nd January, 1832.) This may be compared with an earlier suggestion concerning the control of smut in wheat: "To prevent this, the means are simple, being no other than immersing the seed in pure water, and repeatedly scouring it therein just before it is sown or dibbled in . . . Thus purified the subsequent crop will be perfect in itself, and seed successively so likewise, if there be no adjacent fields from which this contamination may be wafted. The addition of any alkaline or earthy salt or perhaps a strong, clear ley will also prove of advantage in floating off the unsound grains; and after the seed is washed, it should be dried immediately by rubbing it with newly-slacked lime." (*S.G.,* 11th November, 1815.) These plant diseases must have been very common, judging from the references that quite often are made in the notices of the Commissary in regard to the rejection of infected and unclean wheat. Consider, for instance, this notice of 1820: "A very considerable inconvenience both to the public service and to those individuals who bring wheat in a clean condition arises from permitting others whose grain is not sufficiently clean to screen it into the stores. This practice will not be allowed in the future and all samples judged not to be in a storeable state will be immediately rejected. Smutty wheat will from the very black flour it produces be equally rejected." (*S.G.,* 29th January, 1820.)

It is scarcely necessary to labour this question of plant diseases further. One of the main reasons for a high incidence, if present —it is impossible to measure with any accuracy the degree of incidence—was traceable to the fact that wheat was being grown

under unsuitable conditions, and to the difficulty of obtaining pure seed. The fact that by 1820 it was generally realised that the New South Wales grain from the older districts was inferior to the Tasmanian or southern districts wheat, is a sufficient indiccation of the condition of the locally cultivated article. From the very beginning of settlement, disease troubles of this nature had caused damage. The vines planted out in the early days of King's administration almost all died from a blight, whilst in the same administration, wheat that had been harvested in 1804 and stacked, was discovered to have been severely attacked by a fly moth (probably Wolf Moth—*Tinea granella*), when it came to be examined in the following August, 1805. ([11]). This had destroyed a third of the wheat in store. Unfortunately, in the October, 1805, following, the crops of wheat in the ground were badly attacked by "the blights and lightning," later the grain being found infested by smut and rust. The drake, a species of *Lolium,* long known as poison rye-grass in Europe, was another weed, often infesting wheat crops and causing damage, proportionate to the effects of disease, since it, too, spoiled the cleanness of the grain ([12]). Weevils were then a menace just as they would be to-day, if precautions are not taken against the pest. Oats were susceptible to their specific diseases as were most other plants, a reference to an oaten parasitic grub appearing in a *Gazette* issue in 1818: "The Oat Grub: This comes into existence towards the end of October and towards the end of February recommences its devastations . . . It appears every year but chiefly in wet seasons . . . No better method of destroying them has been discovered than to clear every hedge and ditch of all coarse, rough weeds and herbage, for as the latter afford shelter to the insect during the winter, they annually send forth a fresh stock which neither fallowing nor any attention can exterminate." (*S.G.,* 10th January, 1818.)

It would probably not be very difficult to prepare from the references made in the early records, an imposing catalogue of the diseases and pests which affected stock, but such would scarcely have any worthwhile significance, relative to the general argument being followed in this survey, for it must be again noted that agriculture and stock raising were for the most part divorced from one another in the early Colony. Then also, whilst being irritating, no doubt, the plagues which affected animals yet did not prevent extraordinary developments in stock raising and fine wool growing within a few short years, from 1820 onwards. There were the Rots, Liver Disease, perhaps Anthrax as "Cumberland disease," Foot Rot, Skin diseases, including Scab, Catarrh and possibly even Foot and Mouth Disease. Probably there were at times considerable mortalities from such causes, but these losses could have been no more than a fraction of those which followed the droughts. To appreciate the atmosphere of the times, however, a few illustrations may not be out of place. Thus, from the *Sydney Herald* of issue 17th September, 1832: "I regret to say that by every report from the interior, we may apprehend a considerable defalcation in the annual produce of our fleeces in the ensuing season, from the sad havoc of that superficial, yet insidious and destructive disease, the

Scab, which has been scattered over the country and propagated from farm to farm, and flock to flock by the careless, if not more mischievous neglect of both masters and shepherds." A few years later in the same newspaper, there is this interesting letter: "The approaching season for travelling with stock to that beautiful country, Port Phillip, which no doubt many sheep-owners will take advantage of, induces me, with your permission to call the serious attention and active exertions of the magistrates at Yass to endeavour, by all possible means, to suppress that dangerous and ruinous disease, the Scab, by fining to the utmost farthing the penalty attached by the law to persons so offending. . . . Port Philip is the best sheep country ever yet discovered in New South Wales, and it would appear the most abused. The major part of the flocks at present there are eaten up with this baneful distemper. This is bad management certainly, yet, if the roads are ridded of diseased sheep, persons may perhaps manage to avoid the curse in a district where it is known to exist." (*S.H.*, 19th October, 1837).

If Scab was probably the worst stock disease of the early settlement, a disease called Catarrh was also a source of continual worry. (Actual recognition of this disease cannot be made with any degree of certainty). In the 29th December, 1834, issue of the *Sydney Herald,* there appears a leading article on deaths in sheep in Western Australia in which this disease was thought to be implicated, whilst in the following year there appears a report in the same paper of an investigation upon "Epidemic Catarrh or Influenza prevailing among the sheep in the Colony of New South Wales in 1835," under the signatures of George Bennet, Esq., Andrew Gibson, Esq. and William Sherwin, Esq. (*S.H.*, 12th November, 1835). Considerable problems, otherwise, both in regard to the diseases and management of sheep, were met with, a letter to the Editor, requesting the preparation of a treatise on sheep appearing in the *Sydney Herald,* 29th January, 1838. There is, however, no need to further trace out the subject. In some of the manuscripts, for example, the Gardner Mss. (1856, N.E., University Coll.), there is a whole series of references to stock diseases: "Many of the runs (situated on the range to the north of Armidale) are unsound, producing inferior grass and herbage. . . . From this cause disease in the sheep appears in various forms. Catarrh, also Liver Disease, Foot Rot, thin out the flocks and dishearten the stock-owner. . . . During the winter on the Tableland of New England . . . catarrh diseases are destructive among the flocks." There are other references to "Fluke" and a liver disease known as "Battle," the worry of "March Flies," and suggested reasons for their appearance, and recommendations for the alleviation of the conditions, by the removal of stock to more suitable districts. Then further, in the account by Dawson, the first agent of the Australian Agricultural Company, there are repeated references to the "rotten" sheep sold him by the Macarthur family, to the losses experienced on the harsh country to the north of Port Stephens and to the beneficial effects of turning sheep on to saline marshes ([13]). It is sufficient

at all events to conclude that stock raising in the early Colony was no more dissociated from pest troubles than were the early attempts at agriculture. These, however, are more the problems of the pastoral expansion which ensued, following the drive to the interior which developed after 1835, than of the earlier period of the Colony's history.

Conclusions.

In the following chapter of this survey an attempt will be made to demonstrate that alternations of gluts and scarcities constituted probably the most serious economic and trade problem of early agriculture in New South Wales. A vicious cycle was thereby caused which for long afterwards left its mark on the pattern of succeeding development. In a word, it was the lack of dependability on local production which caused successive importations of grain and animal foodstuffs from abroad, resulting in a glutting of markets, and, thus, crisis for the farmers in seasons when production was good. The causes of this uneven production were many. Poor farming, lack of suitable labour, exhaustion of lands, depressed markets, poor prices all played their part, but if one cause, above all else, stands out in all clearness it is that the damage and losses occasioned by the floods, the storms, the droughts and the pests rendered a certain production in all years an impossibility.

References.

(1) Hunter—"Historical Journal of the Transactions at Port Jackson and Norfolk Island" p. 70; White, "Journal of a Voyage to New South Wales" p. 70, cf., Barnard Eldershaw "Phillip of Australia" pp. 30-60.

(2) Wentworth "A Statistical, historical and political description of the Colony . . ." (2nd edition, 1820) p. 34.

(3) Barnard: Macquarie's World, p. 42.

(4) Atkinson (1826): An account of the state of Agriculture and Grazing in New South Wales, pp. 9-10.

(5) Bigge: Transcripts of Evidence. Examination of Archibald Bell (Mitchell Library).

(6) Ibid.: Examination of William Cox.

(7) C.H.B.E. Scott, Vol. III. p. 110.

(8) P. Cunningham R.N. (1828), "Two Years in Australia", Vol. 1. Chap. IV. p. 80.

(9) Cf. Wentworth, op. cit. pp. 127-131.

(10) Cf. ibid. p. 133.

(11) Campbell: From Colony to Commonwealth. "Agricultural Gazette of New South Wales." January, 1901.

(12) Ibid. p. 52.

(13) R. Dawson: Statement of Services as Chief Agent of the Australian Agricultural Company (1829), (Mitchell Library).