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THE SHEEP AND THE SALTBUSH

The Utilization of Australia's Arid Lands

by

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INTRODUCTION

Even when addressing the distinguished participants in this conference, I am reluctant to assume any prior knowledge of the arid and semi-arid regions of Australia, apart from the general implications of that classification. It would be as difficult to deal briefly with the consequences of introducing stock into those vast areas, as it would be to answer the question I have come to expect whenever it emerges in conversation that I am an Australian - "And what is the weather like in Australia?"

The area of Australia is about the same as that of the U.S.A., and it extends through a wider range of latitudes. One third of the area receives less than 10 inches of rain annually, and is useless for present agricultural purposes. There is very great pressure to uphold and extend the well-known and remarkable Australian "Pastoral Industry", which utilizes much of this arid land for Merino wool production.

In order to get beyond meaningless generalities, I am going to confine my remarks to conditions and

developments within the State of South Australia, wherein I resided from 1962 until 1968. I shall further confine my remarks to the consequences of introducing sheep into regions getting 10 inches or less of annual rainfall. The effects of introducing sheep into arid regions in other States, and the effects of introducing beef cattle, will differ with regard to the actual plants eliminated, and kind of habitat destruction, but the general effects in South Australia provide a good guide to what has happened and is happening in other States as well.

Figure 1 shows the political boundaries of South Australia, and the position of the 10 inch isohyet, which marks the approximate northern boundary of the lands fit for agricultural use. The enormous proportion of this State receiving less than ten inches of rainfall annually amounts to 317,600 square miles out of the total area of 380,070, i.e. five sixths. This leads South Australians to refer to their home, with wry affection, as "the driest State in the driest Country on Earth". Pastoral Leases have been issued for about 190,000 square miles. The portion of this area protected by the Dog Fence, contains about two million sheep. It contains no permanent rivers, and the "annual" rainfall is notoriously unreliable.

It is necessary, at this point, to define the Australian concept of "drought". In Europe, a drought is a period, usually to be measured in weeks, during which no rain falls. In Australia, it has come to mean a period of months or years, during which the rainfall is inadequate and ineffective. During a prolonged drought all surface water disappears, much of the native vegetation dies, and the value of sheep falls below the cost of sending them to market. A bad drought extends into the southern agricultural areas as well, and affects the production of grain and feed. In the pastoral lands it is slowly becoming appreciated that drought is the normal condition, and "good" rains are abnormal. But as agriculture is pushed further to the North and West, drought becomes an increasingly important economic and political factor. An Australian State Government can fall, because it is unable to persuade the rain to fall.

The rainfall statistics for this type of country must be interpreted with regard for the actual times and amounts of precipitation. If slight falls occur when the soil is dry and dusty, they do not penetrate to the plant roots, and can be classified as ineffective. At other times three inches may fall within 24 hours, and most of it will run off.

South Australia's first settlers arrived in 1836. (Their ship, the "Buffalo," has become the sociological and social

equivalent of the "Mayflower".) Preliminary land sales had been conducted in London, and others were conducted in Adelaide in the following year. All of these dealt with land near the coast, for the most part under dense mallee or sclerophyllus forest, two plant communities dominated by various species of Eucalyptus. This coastal strip receives between 15 and 30 inches of rainfall annually.

In order to encourage rapid colonisation of the huge tracts of shrub-steppe country to the North, large holdings were offered at public auctions for lease, under the provisions of the first Pastoral Act. The Merino sheep had already demonstrated its remarkable suitability for arid Australian conditions in New South Wales, so settlers were encouraged to acquire large flocks from that colony. It was at this point, at the very birth of the colony, that the policy decisions were made which were to ensure the destruction of the shrub-steppe plant communities. The first lessees were required, upon pain of forfeiture, to stock their runs within three months of allotment with not less than 20 sheep to the square mile, and to increase this to 100 per square mile within five years. The present day obligatory stocking rate, maintained to prevent speculation in leases, is five sheep to the square mile.

This stocking rate was not fixed solely because of false analogies with European situations; it was also due to the unfortunate circumstance that the preliminary surveys of

the northern country were carried out at the end of a series of good seasons. The lush plains of waving speargrass (Stipa) and healthy vigorous saltbush (Atriplex) and bluebush (Kochia) misled both government officials and ambitious citizens into accepting a disastrous policy. This initial overstocking was not due to the rapacity of a few wicked men, as some polemic conservationists would have us believe, but to ignorance about Australian weather. On the other hand, the apologists for the pastoralists lean too far in the other direction, when they disclaim all responsibility for the damage which has been done in the past hundred years. There is evidence from the report of the then Surveyer-general Goyder, in 1865, that the combination of drought and sheep had wrought great destruction less than thirty years after settlement: "The change from the country suffering from excessive drought to that where its effect has only been slightly experienced is palpable to the eye from the nature of the country itself, and may be described as bare ground, destitute of grass and herbage, the surface soil dried by the intense heat, in places broken and pulverized by the passage of stock, and forced by the action of the wind into miniature hummocks, surrounding the closely cropped stumps of salt, blue and other dwarf bushes, whilst those of greater elevation are denuded of their leaves and smaller branches as far as the stock can reach."

Evidence about habitat destruction is available from two little-known sources. First, there are the descriptive accounts of the country soon after settlement. As usual, these are of no value for making quantitative comparisons, but considered in the mass, they convey a convincing picture of better times. Even when the historic accounts are in general terms, certain localities and stations can be positively identified. The complete absence of vegetation where it is known to have been present can be connected with the introduction of stock which is known to eat and trample it. Evidence of this kind can be found in the reports of the two Royal Commissions which have investigated the pastoral industry in South Australia, as well as in the diaries of the early explorers.

Second, there is a comprehensive series of observations upon the regeneration of shrub-steppe plants, and the effects of grazing upon them, carried out by the Botany Department of Adelaide University. These studies have produced such a wealth of detailed information, that ignorance of the facts can no longer serve as an excuse for not taking a stand against the continuing habitat destruction.

THE EVIDENCE OF THE ROYAL COMMISSIONS

During the past hundred years, Australia has suffered at least seven major droughts, over areas

extending across most of the southern part of the continent. The most disastrous was the drought of 1895 - 1903, which reduced sheep numbers from over 100 million, to about 50 million. Prior to that drought there had been a series of good seasons, and the growing numbers of sheep were well distributed. As the surface waters disappeared, and the sheep congregated about the wells, the density of sheep close to water reached plague numbers. Many graziers were forced to walk off their holdings, losing their capital improvements as there were no buyers for their leases. The pastoral industry in South Australia seemed about to collapse, and the Royal Commission of 1898 was appointed to inquire into and report upon action to be taken "to induce the occupation and development of the pastoral lands of the province". The men giving evidence were the prominent graziers of the State. They or their fathers had opened up virgin country and attempted to maintain the stocking rates prescribed by the Crown. The following examples are representative of the evidence put before the Commissioners: Mr. Thompson of Talia Station had 33 square miles of country. Last year he could only muster 3,700 of the 8,500 sheep he had shorn the year before. This year he had only 2,800. Mr. Dearlove of Ketchowla had 50 square miles and had tried to carry 8,000 head. He realized after years of trouble that the most he should have carried was "80 to the mile . . . to do justice to the country". The saltbush had been killed,

he said, by the rabbits, but during his evidence he mentioned that the bush had got a "tremendous dressing" from his stock in the bad seasons.

Mr. Young of Netley Head Station had 150 miles. He stated that the bush was completely eaten out by overstocking before he went there. He had attempted to run 15,000 to 16,000, but now felt that the country would only carry 70 to the mile. The bush was now destroyed within a four-mile radius of the waters.

Mr. Scott of Port Lincoln had taken up 150 miles of country in the Gawler Ranges, and had suffered four bad seasons. The 10,000 to 11,000 sheep of the previous year had been reduced to 5,200, the rest having died or been killed. He thought the country would carry 70 per mile in a good season, but only 40-45 in a bad season.

The most articulate witness was Mr. Wooldridge, a retired grazier of vast experience. He gave evidence of his disenchantment with the pastoral industry:

". . . In 1876 I took up a large tract of country north-west of Port Augusta, which I named and is now known as Arcoona and Parakylia. I sent in 11,800 wethers across . . and in 1878 and 1879 I sent 7,000 more . . . I went into New South Wales, bought 25,000 there, and took them across . . . I put 100,000 sheep on the run from the time I went on it to 1884, and I sold 40,000 to 50,000 sheep. I lost through drought about 50,000 sheep."

(Commissioner: Were you able to sell at a profit?) "No; the Queensland Mortgage Company took away the station from me because I had a covenant in the mortgage to keep 50,000 sheep on the run. They foreclosed, thinking I had mismanaged the run, and were going to show me how to manage it. They have done it since to the tune of losing about £70,000 - £80,000."

(Commissioner: From your experience, do you think that run can be successfully occupied?) "I think so. When I first saw it I thought I had the finest run in Australia . . .. in all my travels I had never seen a finer looking tract of country. There were lakes, lagoons, waterholes, and canegrass swamps, with pelicans, swans, and ducks in millions. That was in 1876. I sent across my stock in 1878. At that time one could not walk five miles without coming across one of those beautiful lagoons or canegrass swamps . ."

(Commissioner: Have you ever known the country look so well since then?) "No. There were three lakes on the country. The best tracts were known as the Elizabeth, Phillips Ponds, and Lake Campbell, and I stripped off one bleak day, swam out 100 yards, and sang out to my man, 'You look out for me when I go down'. I went down and could not touch bottom. At the head station there were 15 feet of water . . . I stocked it with 50,000 sheep, 2,000 cattle, and 800 horses . . . I had to put down any amount of wells, build a new woolshed, etc., and then I sent up a boat to put on the lake, but soon afterwards there was no water there . . . in 1883 I filled 750 bales of wool at Arcoona and 210 in the West Coast. I had 960 bales that year. I had a boast that if I could fill 1,000 bales, I would take my wife for a tour; but I am sorry I had not, for if I had had forty bales more I should have cleared off half my stock. Next year I had 230 odd bales at Arcoona."

(Commissioner: Do you think there is any vitality in that country?) "If they got a few seasons again, like they had on the Elizabeth when I saw it first, there would be very great encouragement."

(Commissioner: What would you suggest as a means of tempting people to occupy it with advantage?) "The country just now really wants a rest. It has been eaten out. The rabbits have put the finishing touch on it, by ring=barking and killing all the edible bush."

(Commissioner: The pastoral country generally?) "Yes. Perhaps the squatters are to blame for stocking it too much."

The Commision concluded that the industry was, and had been for many years, "in an extremely depressed and unsatisfactory condition . . . this condition we attribute mainly to the following causes, viz:

(a) The want of length and security of tenure under the Pastoral Acts previous to 1893, which prevented the proper development of the country.

(b) The excessive rents promised at auctions by lessees.

(c) The sub-division of many runs into small blocks carrying heavy charges for improvements.

(d) The deterioration of pastoral country caused by the abnormal increase in rabbits, and the great loss of sheep consequent upon the ravages of wild dogs.

(e) The decline in the prices of wool and stock.

(f) The frequently occurring droughts and the unusually protracted one of the last four years."

Commissioner Downer expressed a dissenting opinion, that the disaster did not apply where a large capital had been available for development, and where the lessees "had held large tracts of country, and have thus been enabled to rest portions of their country, and lessen the effects of drought on parts of their runs by shifting stock to parts less seriously affected."

The Surveyer-general gave his views at length about the desirability of dividing the huge paddocks into smaller units in order that some control could be

exercised over the movements of stock. He stated that he "knew of numerous instances where country had been destroyed by overstocking around the waters." "No provision could be made in leases to prevent country around the waters from being eaten out."

The Royal Commission of 1927 was requested by "a deputation of persons prominently interested in the pastoral industry and representing the Stockowners' Association of South Australia." There was still a strong body of opinion in the community, and within the State Public Service, that the big leasehold properties, with their low fixed rentals, which had resulted from the Royal Commission of 1898, should be subdivided. The "big" graziers maintained, as had Commissioner Downer in 1898, that only they had the resources to see them through a series of bad seasons, and to rest sections of the country as required.

The witnesses were men of a later generation, but they were predominantly members of the same families. They were now sufficiently removed from the pioneer days to be able to admit to the destruction wrought by their fathers and grandfathers, and a recurring phrase in the evidence was, "I do not believe in overstocking". They had more modest ideas about the carrying capacity of saltbush. The new tenant of Arcoona, for example, where 100 head to the

mile was formerly considered a permissable stocking rate, now replied that he carried "about 18 or 19. That is what we have averaged since we went there. The highest number we have shorn is 34,000, the lowest 16,000".

(Do you know of any of our country which will carry 100 sheep per mile when properly improved?) "No, I do not, not below an 8 inch rainfall."

(When country is eaten out will not the bush come back?) "In the majority of country once it is eaten out it will never return."

(How long does it take to kill the bush?) "One bad year will do it."

Chief spokesman for the large companies was Mr. Brooks, in charge of Clifton Hills Station on the Diamantina (5,100 square miles) and of Kanowna on the Cooper (5,333 miles) the two properties adjoining.

"Some of these large holdings are of great benefit to the State; they produce an enormous amount of wealth, and employ a large number of people directly and indirectly, which would be curtailed if they were subdivided. I have Ned's Corner Station in mind. It was producing an enormous amount of wealth under one management. It was cut up, and the result was chaos. When things reached a climax they held a meeting, and decided to throw the whole lot into one concern, and appoint a general manager, since when the station has gone ahead as it did before . ."

(You said that the bush had disappeared on these small holdings. Is it not your experience that the bush disappears while it is in big holdings?) "In some cases, pests, like caterpillars, have killed the bush".

(Do you not think that in some cases the bush was killed through having big waters?) "Yes; before they knew that underground water existed. They put 10,000 sheep on one well, and naturally all that country was killed out".

(There has been no inducement to sacrifice the sheep to save the bush?) "Yes, the sheep were the main factor, not the country."

(You suggest that the country was eaten out intentionally?) "No, through ignorance."

(Even in these days, if it was freehold, do you think they have sufficient knowledge of the country not to eat it out?) "No, I would not say so, but they would think twice before knocking the country out."

(It seems hard to understand that after 10 or 15 years occupation that a man would not know something about the carrying capacity of the country?) "He should, but the seasons are a great factor. He might carry his sheep for five, six or eight years, but as soon as a dry season sets in he is in trouble . . . ."

The big leases were not subdivided, and longer terms of tenure were granted. A Pastoral Board was set up within the State Department of Lands, one member of which was to be a person with experience in the pastoral industry. This Board would inspect the leasehold properties regularly, report upon the state of the country, and recommend reductions in sheep numbers if thought desirable.

Before we consider the practicality of those control measures, and the present state of affairs, let us examine the studies of the Adelaide University Botany Department. They provide the corroborative detail to support the observations of the graziers themselves.

THE BOTANICAL EVIDENCE

The difficulty of getting reliable information about the effects of stock on native vegetation at a time when no systematic observations were possible, leads us to rely "on inferences from changes which are occurring now under the changed conditions" (Griffiths 1910). The effects of grazing upon the South Australian shrub-steppe plant community have been exceptionally well documented. Very little of the evidence has been published, but a massive photographic record and detailed documentation of the regeneration of an overstocked range is available in the records of the Botany Department of Adelaide University.

When the second Royal Commission was sitting Professor T.G.B. Osborn, then Professor of Botany at Adelaide University, gave evidence before the Commissioners, in the form of an illustrated lecture. He informed them of the commencement of long-term studies in regeneration upon one of the eaten-out properties. Those studies have continued until the present day, although in recent years they have been relegated to a relict activity, rather than the main research interest of the Department. Professor Osborn's lecture provides a succinct summary of the problem.

"Dense mallee is the type of vegetation that will develop on a 15 inch to 18 inch rainfall. The undergrowth consists of many hard-leaved shrubs, and after suitable rains, grasses . . . With diminishing rainfall we notice a radical change in the undergrowth. It changes to various soft-leaved hairy shrubs, the salt bushes and blue bushes. The change occurs somewhere about the 10 inch rainfall line. Beneath the mallees the ground cover consists of salt or blue bushes . . . Going further north the density of the mallees lessen, until they are finally lost altogether . . . There may be such trees as mulgas, black oak or sandalwood, but tree growth is limited and usually scrubby . . . Going still further north, the salt and blue bushes, which we first noticed as undergrowth beneath trees, are the only really important ground covering over huge areas."

"In a 'good season' there may be an abundance of grass and herbage . .., but in the same place during a bad season there will be none . . . Annuals have no value as permanent ground covering . . . But in the salt bushes we have a perennial ground covering . . . that is marvellously suited to the peculiar droughty conditions...

The work of Professors Wood and Osborn and their co-workers was carried out on Koonamore Station in north-eastern South Australia. In the main experimental paddock the saltbush (Atriplex) had been eaten out, but there were a few bluebush plants (Kochia). The main ground cover was the "bindyi" (Bassia) which usually replaces the saltbush and is not liked by stock. There were some scattered trees of the genera Acacia, Casuarina, and Myoporum and some lower shrubs, including a little Mallee (Eucalyptus spp.)

The relationships between the saltbush and the bluebush have been investigated (Carrodus and Specht 1965). In many places they appear to be in a dynamic "balance" with major changes in dominance occurring over long

periods, depending upon the soil and the weather. The bluebush is deeper rooted and its presence is usually correlated with the depth to which the soil is wetted by the "normal" rainfall; it is usually on soils which can be wetted to two inches and more. The saltbush is very shallow rooted, but seeds better when a drought breaks. Both plants defoliate under drought, and to the same extent, but the saltbush can reduce the soil moisture to a significantly lower level under drought. Its ability to absorb moisture from air containing more than 85% humidity appears to account for its success, for there are usually times during the night, even during a drought, when the air humidity exceeds that proportion.

After six years' exclusion of sheep from the Koonamore Reserve, the bare areas, especially the sheep pads, sunken a centimeter or two below the surface, still remained devoid of any vegetation even after good rains, (Osborn and others 1934). Few new saltbush plants appeared. The bluebush, which at enclosure had been all broken down to woody stumps, had recovered in part, in spite of a drought during 1929. There had been no flowering, and no reseeding had been possible from outside, because trampling and wind erosion had removed the surface soil. The most alarming evidence, at this

stage, was of the destructive effects of the rabbits upon tree regrowth. In one hectare quadrat, it was known that 18 one-year-old mulgas (Acacia aneura) were destroyed in one night by one rabbit.

The large saltbush paddocks on other parts of Koonamore provided an opportunity to observe the progressive effects of grazing upon the saltbush. The paddocks were so large, and the waters so few, that some parts many miles from water remained free from sheep, while other regions, especially those around the waters and along the fences which crossed the prevailing winds, were heavily overgrazed and trampled. Osborn and his co-workers (1932) were thus able to deduce by observations and plant counts at selected points and quadrats, how the degeneration of the plant community would progress in any one overgrazed locality.

The long-term quadrat observations revealed that even in the absence of sheep, drought produces a high proportion of dead and defoliated plants. Light grazing, one or two miles from water, produced a significant increase in the mean number of bushes, and in the mean number of wilting bushes. In the zone of moderate grazing, which was defined as the main feeding

grounds up to a mile from water, there was a significant increase in the number of dead and defoliated plants, and also in the number of plants classified as healthy and vigorous. This was an unexpected result. In the region of heavy grazing around the waters, there was, of course, severe damage; the removal of all living saltbush, followed by the removal of the dead plants through trampling. In these regions, the debris and top-soil blew away, leaving a sterile waste.

The apparently beneficial results of light grazing, were explained as follows: "The first effects of grazing . . . consists in the mechanical removal of dead bushes. The second effect . . is in the marked improvement in the vigour of the bush . . due to pruning; the constant removal of the terminal buds stimulates development of lateral shoots so that more compact vigorous bushes result. These bushes stand in marked contrast to those of the ungrazed country which are sparse and twiggy" (Osborn and others 1932). The spasmodic activities of stock may also be beneficial in assisting in the mechanical planting of seed, if this seed has time to germinate and form established plants before the next stocking period. There was also some indication that heavy stocking for short periods might have a beneficial effect, in pruning bushes, trampling out weak ones, and mechanically

planting seed, which then has time to germinate and take hold before the next stocking period.

A study of one of the main fodder grasses (Stipa nitida) clearly showed the advantages of "spelling" the country for one or two years. In most years the speargrass germinates in March-April and is killed off by the heat of December. If it should become established by late rains just before the hot season starts (September), however, it may last through two years, and form substantial tussocks. As this is a palatable grass, it is soon eaten out, but as it soon dies in the absence of sheep, the detrimental effects of grazing relate to the potential for regrowth in the following season. The Koonamore observations show that Stipa disappears from an area mainly because of the mechanical effects of eating and trampling the dead plants, which provide the seed beds. When the dead tussocks are broken up and blown away, the accumulated little piles of sand and detritus blow away as well, leaving a hard soil and limestone nodules, swept free of awns by the wind. (Osborn and others 1931). The loss of speargrass is also correlated with the loss of the saltbush, as it too provides loci for accumulations of dust and detritus in which the awns can become entangled, and can germinate with the first summer rains.

THE FUTURE OF THE ARID LANDS

The pastoral industry continues to prosper in the patchily denuded country, because of low rentals, low capital investment, low labour costs, and high wool prices. The development of surface-laid water reticulation has moved the sheep into formerly inaccessible regions. This is, of course, a further "mining operation", the digging of subsidiary shafts after the main lode has been exhausted. Wool production thus continues to receive a subsidy through the depletion of the national capital of vegetation and top soil.

In theory, we now know sufficient about the ecology of the arid lands and about the upredictability of the weather, to be able to exploit the saltbush country without damaging it. We can even accept that light grazing can be beneficial, providing it is followed by an adequate resting period. This is the most powerful argument for the retention of large holdings. Unfortunately, events have proved that large landholders are not necessarily less hungry for profits or better informed than small ones. Numerous large holdings continue to be damaged by over-stocking.

In practice, stock is almost always moved in as soon as there is evidence of recovery. Stock is quickly moved into any paddock which takes on a green bloom after a thunderstorm, regardless of the composition of the vegetation. I know of stock being purchased and trucked hundreds of miles, in order to utilize the herbage resulting from a single thunderstorm; there was no question of waiting for the new growth to take hold and set seed. In time of drought, no man will kill his animals to save other people's plants. (In 1968, no less than in 1868, "the sheep were the first consideration, not the country".) This leads us to wonder whether a man might kill his animals to save his own plants.

Some conservationists believe that abolition of the present leasehold system, and sale of the land, would remove the old attitudes and lead to husbandry of natural resources. This proposed solution is unlikely to succeed for at least two different reasons. First, the present leasehold system does amount to virtual ownership, for leases can be handed down in the family (with Ministerial permission, which could not be withheld without a political furore), and tenure is assured for the best part of a Century. Second, the social effects on the offspring

of affluence in the parent generation tend to produce absentee landlords. The son of a grazier, after attending Geelong Grammar School and Oxford University, and making a successful marriage, is not inclined to bury himself in the outback for more than a few weeks each year. The manager he employs on a salary plus commission, has his eye more on the size of the wool cheque, than on the state of the saltbush. Neither man can be condemned for his choice, and his attitudes reflect the generally low cultural level of the Australian population in relation to conservation.

The alternative solution, that sheep should be banned altogether from the arid country, seems startling, until one appreciates the relative unimportance of the pastoral industry. There are ten times as many sheep, and 100 times as many human dependents upon them, in the narrow belt of country receiving more than ten inches of rain. Further, this country, with greater development, could support many more sheep than it does at present. This drastic solution cannot come about in the present political climate, and most people cherish the erroneous belief that the pastoral industry in the outback is the economic mainstay of the State. The pastoralists control very few

votes, but they have them in the right places.

The Australian pastoral industry, in general, has expanded in recent years, stimulated by capital from Britain and the U.S.A. In South Australia, however, expansion is held up by lack of water. The southern region of the enormous Nullarbor Plain has rich reserves of sheep country, but there is no stock water. A study conducted by one-time owners of Nullarbor Station, which at that time carried 1500 sheep on 450 of its 900 square miles, showed that stock water could be distilled from the underground waters, but that the factor preventing the expansion of the flocks from becoming profitable was the cost of transporting the fuel for the distillation plant. This narrow margin might be closed in the near future by the development of cheaper distillation plants, or of cheaper sources of energy. The Pastoral Board has prepared plans for opening up a further 50,000 square miles as soon as water becomes available. The land will be offered on the leasehold system. A proposal from the National Parks Commission, to set aside 3,000 square miles of this country for recreational use, was opposed by the Chairman of the Pastoral Board on the grounds that it would "emasculate" his scheme for expanding the industry.

There appears to be no possibility whatsoever that damage to the arid country will be stopped until the damage is so severe that sheep cannot be economically supported there. This has already happened in parts of New South Wales, and has led to some of the denuded land being offered to the National Parks authority. If funds become available, it might be possible to reconstitute samples of the original plant communities. In certain regions natural regeneration might occur if the country was kept free of rabbits for several decades. An unpredictable factor is the speed with which the growth of the artifical fibre industry can match the growth of the world demand for fabric fibres. The demand for Merino wool is constantly being expanded by an active advertising program.

I have not touched upon the possibilities of utilizing the arid country for protein production by exploiting the kangaroo, but this is a matter we should deal with in discussion. The obstacles are almost precisely the same as those encountered by Dasmann and Mossman, in their efforts to market game meat in Rhodesia. These obstacles are mainly due to the attitudes of the stockowners, and to those of the Public Servants who serve them.

The power of the State Pastoral Board to prevent overstocking is made impotent by social factors which, as in other contexts, often frustrate the best intentions of legislators who are not in intimate touch with the practical situation. In theory, the Inspector regularly visits the leasehold properties, pronounces upon the state of the country, and sets the stocking rates. Even if we assume that it is physically possible to inspect thousands of square miles of vegetation from an automobile, we cannot expect the man to behave officiously as if he had come from City Hall to inspect the drains. For the Inspector probably attended Scotch College with the man who manages the property, and as the homestead is some hundreds of miles from the nearest town, he comes as an overnight guest. After dinner, he broaches the subject of overgrazing thus; "Don't you think, Jim . . ." He pauses to take a sip from his third free Scotch and water. "Don't you think they are a bit too thick in the South-west Paddock?" His host, who has been telling him about the performance of his racehorse, replies: "Yeah. Still a bit of green pick in the watercourses though." He pauses, and then continues enthusiastically, "Gawd! You should have seen how that little filly headed for home!"

The moment has passed. And after all, it may rain tomorrow or next week. The Inspector hopes that it will not rain tonight, for he has to drive to another station tomorrow.

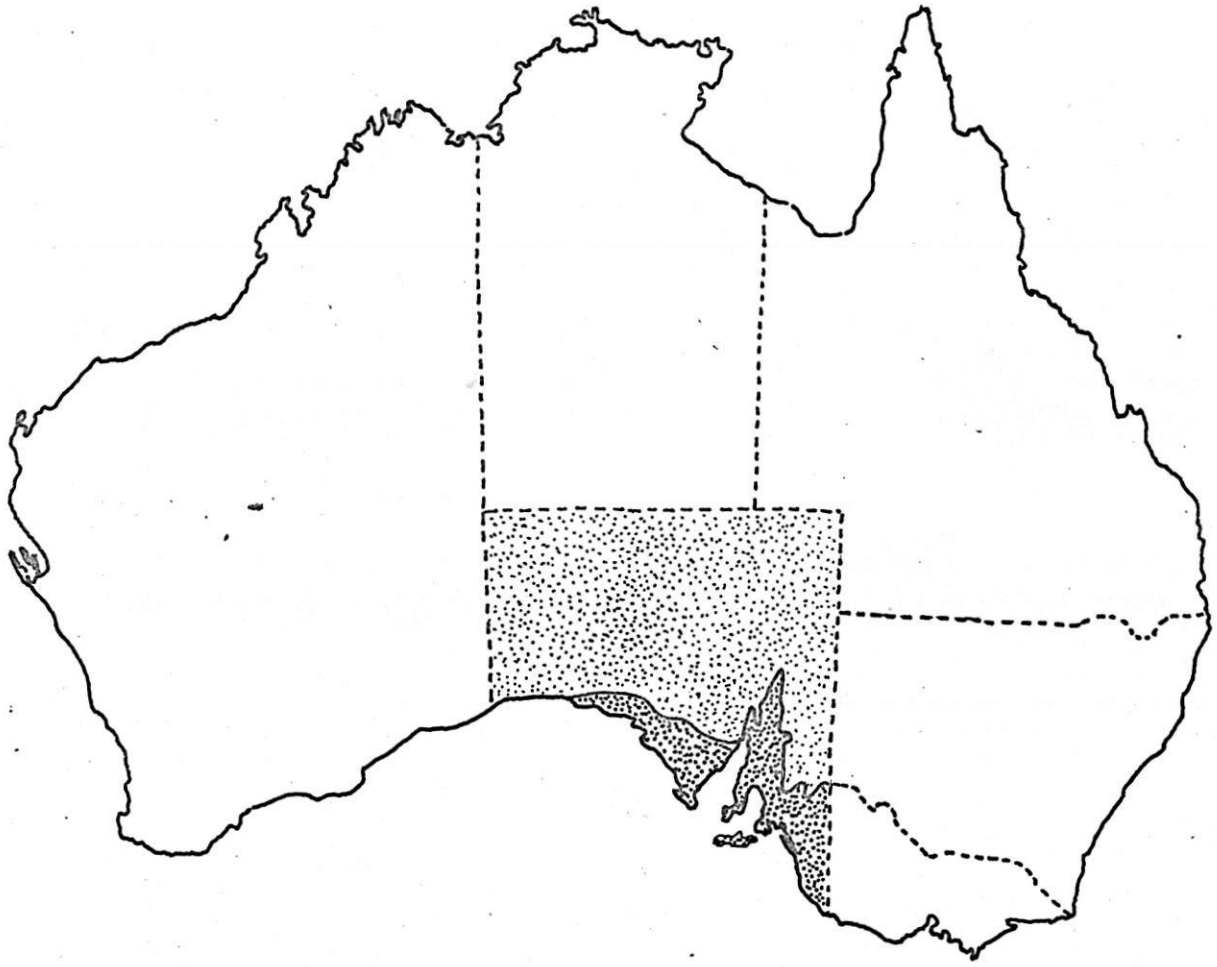

Figure 1. Outline of Australia indicating rainfall within South Australia. Broken lines show State boundaries. Light stippling shows part of S.A. with less than 10 inches of annual rainfall.

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