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Diet and dust in the desert

**Life in the early years of Oak Valley
community, Maralinga Lands,
South Australia**

Kingsley Palmer and Maggie Brady

Second edition, 2021



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South Australia**

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Front cover photograph: Breakfast at a hearth in Oak Valley consisting of tea, Weetbix, frankfurters, warming in the ashes and a red kangaroo placed on cardboard. Photo by Maggie Brady.

All photographs by Maggie Brady.

Foreword



An update: Diet and Dust in the Desert: Life in the early years of Oak Valley community, Maralinga Lands, South Australia

This report, first published in 1991, is based on fieldwork with Pitjantjatjara-speaking people at Oak Valley on the edge of the Great Victoria Desert of South Australia, originally an 'outstation' from Yalata. The research was undertaken in 1987 and 1988 as part of several Technical Assessment Group (TAG) studies following the 1985 Royal Commission into British Nuclear Tests in Australia, and was conducted by anthropologists Kingsley

Palmer and Maggie Brady on behalf of Maralinga Tjarutja. Since then, much has changed on the Maralinga Lands.

At the time of that research, the Lands had not been properly decontaminated and cleaned up, Maralinga was still designated a Commonwealth Prohibited Area, and Anangu did not have easy access to it. Small groups of people from Yalata had re-occupied the Maralinga Lands from around 1985, living in camps of semi-traditional wiltja at Oak Valley. Life was, however, somewhat tenuous, with irregular supplies of store food, a lack of sanitation, showers and drinking water, and the visiting health and education services were less than ideal. These resources were provided either from Yalata or from Maralinga Tjarutja in Ceduna – each many hours drive away. In the 1990s, a building program at Oak Valley meant that proper houses were constructed and roads were laid out.

Oak Valley (Maralinga) (OVM) with the support of a South Australian statutory authority (Maralinga Tjarutja), has been the key service provider in Oak Valley since its establishment in 1986. OVM successfully manages water, power, health, municipal services, the Community Development Program, Aged Care, Youth programs and the Oak Valley store. The Education Department manage the Oak Valley School.

In 2015, OVM transferred from an incorporated body under *South Australia's Associations Incorporation Act 1985* to the *Office of the Registrar of Indigenous Corporation Act (ORIC)*, ICN 8246. OVM must also operate under *South Australia's Maralinga Tjarutja Land Rights Act (MT Act) 1984* because the Oak Valley community, which OVM serves, is on land vested in the Maralinga Tjarutja body corporate. This means that OVM and its staff must comply with the MT Act in relation to matters such as obtaining permits for staff and consent to construct roads and buildings at Oak Valley, and follow by-laws made by Maralinga Tjarutja on matters such as alcohol restrictions. Importantly, operating under the MT Act has not been a barrier to OVM developing Oak Valley, as decision making is localised, drawing on members of both organisations.

All these services are now coordinated by Oak Valley (Maralinga) and Maralinga Tjarutja, the representative body for the traditional owners of the Maralinga Lands, which has offices in Ceduna and at Oak Valley itself.

As well as these developments in the infrastructure of the community, there have been some major achievements in terms of recognition of Aboriginal rights to the land. In 1991 title was granted to the old Ooldea reserve, including the historic Soak where Daisy Bates had camped (1919–1936) and where the United Aborigines' Mission had an outpost (1933–1952). A multi-million dollar remediation of the Maralinga contaminated areas was officially completed in 2000, and in 2009 a large section of the land was returned to the traditional owners. The final block of 3000 square kilometres of land at Maralinga, known as Section 400, was handed back to the traditional owners

in October 2014. This has enabled Maralinga Tjarutja to initiate a tourism project taking in the old Maralinga village site and supervised visits to other sites in Section 400. In this way, the traditional owners are able to welcome the interested public while maintaining control over their access to the Lands.

This report, then, is very much a historical record of a new community in the making, as people reclaimed a presence on land from which they had been excluded since 1952.

Jeremy LeBois

Chair

Maralinga Tjarutja, 2020



Contents

Foreword	iii
Acknowledgments	vii
A note on orthography	viii
Introduction	1
Chapter 1 Background to the study	5
Chapter 2 Living conditions in a desert outstation	16
Chapter 3 Diet: Bush foods	23
Chapter 4 Diet: Store foods	33
Chapter 5 Food distribution and allocation	50
Chapter 6 Diet, health and lifestyle	56
Conclusion	67
References	70
Author biographies	74

Tables

Table 1: Oak Valley population	9
Table 2: Bush vegetable foods known at Oak Valley	25
Table 3: Kangaroo meat consumed over four study periods	29
Table 4: Food intake from different food sources	35
Table 5: Daily consumption of bread and flour at Oak Valley	36
Table 6: Origin and consumption of individual foods at Oak Valley	39
Table 7: Origin of eggs consumed at Oak Valley	40
Table 8: Miscellaneous store foods consumed at Oak Valley	41
Table 9: Beverages consumed at Oak Valley	41

Table 10: Summary of food eaten at Oak Valley	42
Table 11: Meat consumed by comparable hunting and gathering societies	44
Table 12: Net weights of kangaroos brought into camp	45
Table 13: Consumption of flour and bread from all available sources	46
Table 14: Consumption of flour and bread over two study periods	46
Table 15: Comparison of some major food types	47
Table 16: Kilojoule and protein content of Oak Valley foods	48
Table 17: Theoretical kilojoule and protein intake for Oak Valley residents	49
Table 18: Distribution of various food types within hearth group	52
Table 19: Life expectancy for Aboriginal and non-Aboriginal people	56
Table 20: Births and deaths Yalata and Oak Valley	59
Table 21: Medical presentations at Oak Valley	64

Figures

Figure 1: Map of Yalata, Maralinga and Oak Valley	3
Figure 2: Oak Valley population, February 1988	10
Figure 3: Oak Valley population over study period	10
Figure 4: Kangaroo as proportion of other bush meat	43
Figure 5: Proportions of meat consumed (excluding kangaroo)	43
Figure 6: Selected diseases as reported at Oak Valley	59
Figure 7: Reports of respiratory disease made at Oak Valley	60
Figure 8: Reports of skin disease at Oak Valley	61
Figure 9: Reports of trauma at Oak Valley	61

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We also wish to thank the Australian Institute of Aboriginal and Torres Strait Islander Studies, Canberra. The Institute allowed Palmer to take the necessary time to conduct this work, and contributed enormously in a variety of practical ways. The Research Grants Section of the Commonwealth Department of Community Services and Health allowed Brady to take time from other research commitments. We thank Dr Jon Altman and Dr Colin Pardoe for their extensive and very helpful comments on earlier drafts of this report, and on particular methodological problems that we encountered. Mandy Lea at the Menzies School of Health Research in Darwin offered useful advice on our food survey data. Dr George Koteka was generous in his hospitality and his professional advice. We also wish to thank Max Giles of the Australian Nuclear Science and Technology Organisation (ANSTO) for cooperation in supplying data, and the field staff of ANSTO and the Federal Protection Agency staff at Maralinga for hot showers and fresh supplies during our periods of field work at Oak Valley.

Kingsley Palmer and Maggie Brady, 1991

A note on orthography

We have utilised the orthography favoured by teachers and organisations associated with the Pitjantjatjara. Pitjantjatjara uses seventeen consonants and six vowels. The plosives **p, k, t** and **tj** are unaspirated. The language has two sounds indicated by **r**; a rolled **r**, symbolised as **rr**; and a retroflexed **r**. We have not indicated these retroflexes in the text, but point out that the two words containing retroflexed **r** sounds used most frequently in this report are malu (red kangaroo), a retroflexed lateral; and aṅangu (Aboriginal person), a retroflexed nasal. There are three long vowel sounds, symbolised as **ii, aa** and **uu**; short vowels are **i** as in 'hit', **a** as in 'cut' and **u** as in 'put'. Consonants are pronounced as follows: **tj** as an unaspirated English 'j'; **ng** as in 'long'; **ny** as in 'canyon'; **ly** has no English equivalent; **w, y** and **m** are pronounced as in English. Although we have chosen to write Pitjantjatjara in full in keeping with convention, we stress that Yalata and Oak Valley people in fact pronounce this word Pitjantjara.

Introduction

Between 1953 and 1963 the British, in collaboration with the Australian Government, conducted atmospheric atomic tests and malfunction trials of uranium and plutonium based devices at two locations, Emu and Maralinga, in the Great Victoria Desert of South Australia. As a result of the tests quantities of radioactive debris, including americium and plutonium isotopes which are still present, were scattered over an area of several thousand square kilometres in the vicinity of the test sites.

Some of the worst contamination occurred at a site named Taranaki situated at Maralinga, but other test sites in the region are also badly contaminated with radioactive debris, as well as being the location for cemeteries of low level waste and contaminated machinery and materials used in the tests and trials. Plutonium was buried at Maralinga, and some of this was repatriated to England in 1979, amid great secrecy. However, the bulk of the plutonium imported into Maralinga remains there, either dispersed by the tests or buried in pits close to the test sites. As a result many of the test sites are not safe for casual visitation and some pose a serious health threat to anyone not properly equipped to enter the area. The effects on the vegetation, food chain, ground water and the degree of contamination in airborne dust was unknown and little studied. The Maralinga test sites remained within a Commonwealth Prohibited Area, and permission to enter the area had to be sought from the relevant authorities.

These lands were Aboriginal lands and had once been home to a group who are now generally identified as Pitjantjatjara. Years before the testing most of these people, or their immediate forebears, had moved into missions at Cundeelee in Western Australia or Ooldea in South Australia, a siding on the Trans-Australian Railway line (Gara et al. 1988). Others had travelled further afield: north to places like Ernabella; west to towns like Kalgoorlie; and south-east to Ceduna. Those Aboriginal people who stayed on settlements close to the railway line retained intimate knowledge and attachment to their lands. We know from the work of both Ronald and Catherine Berndt as well as that of Daisy Bates (all of whom worked at Ooldea) that Aboriginal people made visits back into their desert homelands up until the 1940s (RM Berndt 1941; Berndt and Berndt 1942–45; Bates 1938). The oral accounts we have collected from the people confirm this view.

Ooldea was closed in 1952 and the Aboriginal people encouraged to move to a new mission established by the Lutherans at what is now called Yalata (Brady 1987). Some went to Cundeelee, others attempted to go north to join kin living on settlements such as Ernabella, but were dissuaded from doing so by Walter MacDougall, who was a Native Patrol Officer for the Woomera Prohibited Area. It is evident that at this time (June 1952) the plans to set up a test site at Maralinga or Emu were not in place (Beadell 1987; Eames and Collett 1985). Nevertheless, it must have been something of a relief to those who were planning the site not to have had to contend with a sizable Aboriginal presence on the Trans-Australian Railway line at Ooldea, for these people would certainly have had to be moved had the mission remained in operation.

In the years that followed the desert people living at Yalata heard the bombs explode and felt the ground shake. One family walked through a test site and actually camped in a bomb crater. Others told tales of how, after one atomic explosion, a 'black mist' had engulfed their camps situated to the north near Wallatina and Welbourne Hill, pastoral properties with camps for their Aboriginal workers. Others, still living in the desert to the west, told how they had been ordered by a Patrol Officer to vacate the area and find refuge at Cundeelee. The stories were told informally, round the campfire or to inquisitive anthropologists or community workers. No one, apart from the Aboriginal people themselves, took much notice of these oral accounts.

Meanwhile, the lands were locked up, all access forbidden, so trips could not be made to nourish the land as had once been the custom. Young men grew up ignorant of the sites and the places of importance. But the stories and beliefs of the places did not die, nor did the enduring attachment to the land diminish. Eventually, in 1966, the Superintendent at Yalata, Barry Lindner, gained permission for brief visits to the Prohibited Area, and so enabled the process of repossessing the land to commence. However, there were many obstacles. A brief annual trip into the land was insufficient to look after all the sites and places of importance properly. The test sites themselves were still off limits and people were reluctant and fearful of the 'poison' they had been told lay in the ground. They believed that the Dreaming had been shattered at Maralinga, the rockholes contaminated and the integrity of the landscape violated.

The passing of the *Maralinga Tjarutja Land Rights Act* in 1984 resulted in the handing back of a significant portion of the Maralinga Prohibited Area as freehold land to the Pitjantjatjara people. The Aboriginal people reoccupied their lands and established an outstation at Oak Valley, 140 kilometres northwest of Maralinga (see Figure 1). The turning tide of the fortunes of the Maralinga people (as they now perceived themselves) was not limited to the long delayed honouring of promises by the South Australian Government to return the Maralinga lands to their rightful owners. In 1984, the Federal Labor Government commissioned an inquiry into the British nuclear tests in Australia, requiring that the Commissioners pay particular attention to the effects of the tests on the Aboriginal people of the region. At long last the stories of contamination, alienation and dispossession were aired and admitted as evidence to the Commission. The statements of the Aboriginal people were heard 'land-claim style', in the bush and in their own words. The Aboriginal people for the first time had the opportunity to tell their own stories in their own way.

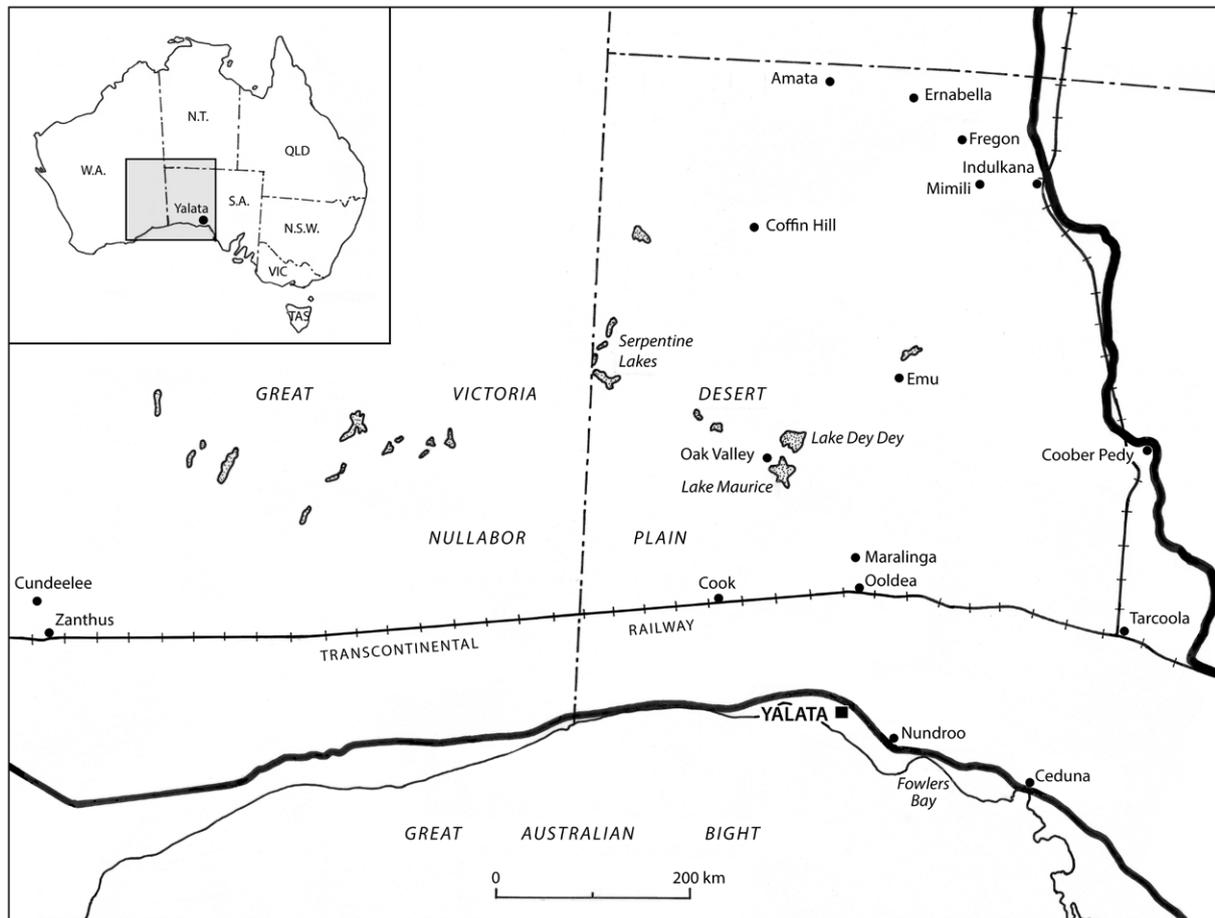
The Commission reported in 1985. One of its recommendations was that (McClelland et al. 1985: 31):

Action should be commenced immediately to effect a clean-up of Maralinga and Emu to the satisfaction of the Australian Government so that they are fit for unrestricted habitation by the traditional Aboriginal owners as soon as practicable.

Central to the recommendation was an understanding on the part of the Commissioners that the Maralinga lands were contaminated, that they belonged to Aboriginal people, and that it was the duty of the Australian and British Governments to clean them up so they could be repossessed by their original owners.

The Australian Government convened a Technical Assessment Group (TAG) to determine possible options for the future rehabilitation of the Maralinga lands (Department of Primary Industries and Energy 1990). It was agreed that an anthropological study was essential to provide information on the diet and lifestyle of the Aboriginal owners of Maralinga and Emu. If the Aboriginal owners of these lands were to return to occupy them on a permanent basis, information about their singular diet and lifestyle had to be collected. Clean-up options had too long been considered in terms of the diet and lifestyle of Europeans, living in houses and eating food bought from the supermarket and cooked on an electric or gas stove. Life for the Maralinga people was not like this, and their special circumstances required a specially designed study.

Figure 1: Map of Yalata, Maralinga and Oak Valley, South Australia.



This meant designing a research project that would allow for the detailed collection of data relevant to both the diet and the lifestyle of these people, living on non-contaminated lands but in a manner similar to that which they could be expected to adopt if (and when) they could return to the rehabilitated test sites. It is important to stress that the outstation at Oak Valley was not situated on land contaminated by the tests. Indeed it was well over 100 kilometres northwest of the test sites. The study reported here hypothesised that if the Aboriginal people were to return to the lands alienated for the tests, then their diet and lifestyle would be identical to that observed at Oak Valley.

The data collected were to be used to determine the levels of clean-up required to make the sites as safe as they had been prior to the testing program. The authors were not required to perform any complex calculations to determine so called 'safe' levels of contamination, nor is this report concerned with this aspect of the project. The field work was to collect data on types of food eaten, quantities consumed, methods of preparation and lifestyle factors affecting absorption, ingestion and inhalation of dust and ash, which could, in a contaminated environment, provide pathways for radioactive substances to enter the human body.

What follows here are the findings of this study which constitute a particular profile of the population of an outstation in remote Aboriginal Australia. While the data presented below may not be the same data that would be collected should the study be carried out at another location, there is little doubt that Aboriginal people living in desert regions share similar conditions and much the same overall diet. These findings will be of considerable interest to all those who are working with desert people, and hopefully provide some insights into health issues and have relevance to health delivery services and requirements in such communities.

This work was commissioned by Maralinga Tjarutja, the Aboriginal body responsible for the administration of the Maralinga lands, with funds provided by the Commonwealth Department of Resources and Energy. The methods, outcomes and findings were discussed over the research period with both Maralinga Tjarutja and the Oak Valley residents. Without their help, the following data could not have been collected.

The authors had already been working with the Maralinga people both at Yalata and Oak Valley, Brady since 1978 and Palmer since 1981, so they were both quite familiar with the people and their communities. Four field trips were undertaken over a 12 month period. These took place in May, August and November 1987 and in February 1988. Each field trip allowed for 12 consecutive days to be spent at Oak Valley and the same data was collected on each occasion. A fifth field trip was undertaken to provide feedback of information to the community and a sixth to undertake some dust monitoring which the Technical Assessment Group had requested as a matter of urgency. Finally, we remind the reader that this study documents life as it was at Oak Valley in 1987–1988.

1 Background to the study

Oak Valley is a small desert community situated in the south of the Great Victoria Desert in South Australia. We describe briefly some features of the settlement as they were when we undertook the field work. The use of the ethnographic present in what follows should not be taken to imply that no improvements in living conditions have been achieved since that time.

The settlement (sometimes referred to as an 'outstation') is serviced in part from Yalata, an Aboriginal community some 380 kilometres to the south-east, and situated on the Eyre Highway. Oak Valley is also serviced by Maralinga Tjarutja, which has its office in Ceduna, some 200 kilometres east of Yalata and approximately nine hours drive from the outstation. By road it is a six or seven hour journey from Yalata to Oak Valley over rough bush tracks. Maralinga is approximately one and half hours by road from Oak Valley on a reasonable bush track through desert country. Watson, a siding on the Trans-Australian Railway line is a two hour drive (160 kilometres). Facilities at Oak Valley are very limited. There are no houses, toilet facilities or other buildings for the Aboriginal people. The people camp in wiltja (bush shelters) in winter, or make use of windbreaks (yuu) in summer. Imported materials like polythene sheets are used for the wiltja, and occasionally people may use sheets of tin, tents, old car bodies and very occasionally a caravan. People camp in clusters, usually within a radius of 200 metres of a central point on one of the main tracks. Camps are vacated every ten days or so and occupants move to a fresh location close by. Periodically major moves take place and the whole population moves to a new site altogether – perhaps ten or fifteen kilometres from the former site.

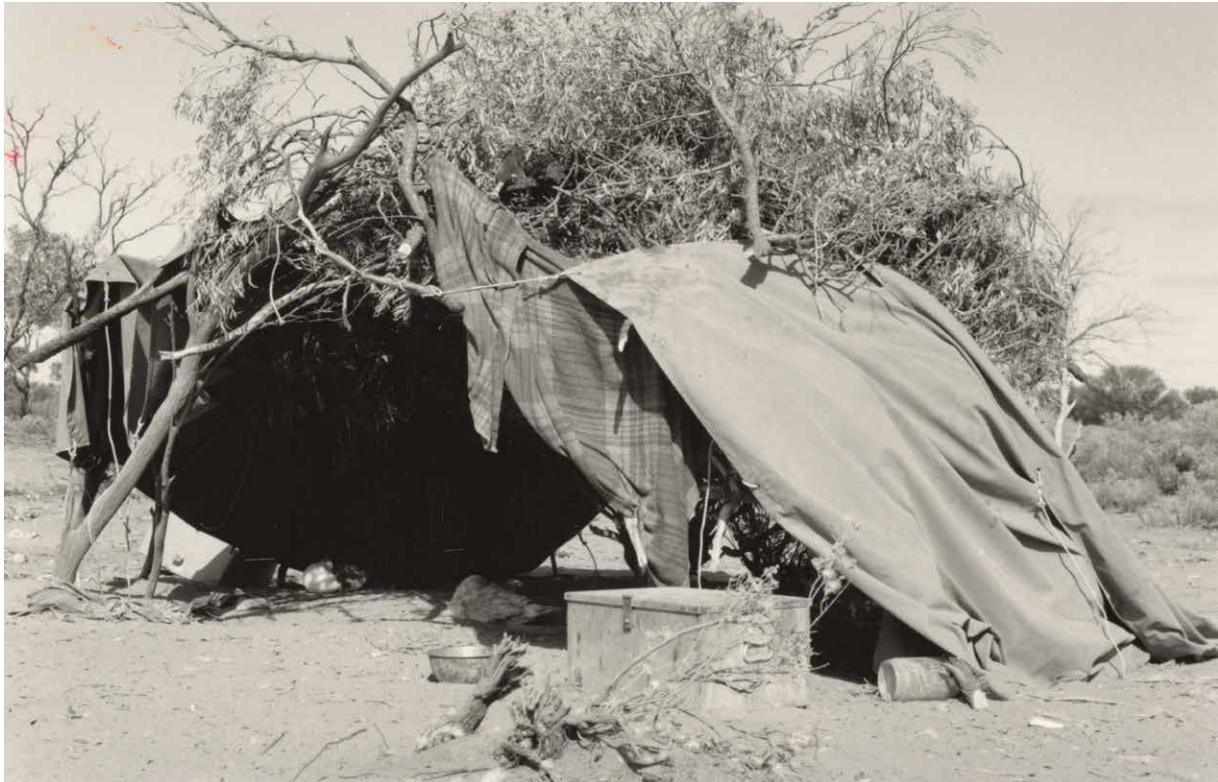
Water is delivered to the individual camps by a water truck and is stored in small mobile tanks having a capacity of approximately 1350 litres (300 gallons). Water is trucked from Watson where it is delivered by Australian National Railways in a tanker, which in turn is filled at Port Augusta. A system of water catchment tanks has also been created at Oak Valley. After rains these tanks provide a valuable additional source of water, but the Oak Valley community cannot be maintained at present levels of water consumption from these catchment tanks alone. One tank is enclosed for possible use as a future store, but at the time of writing was unfinished and unserviceable.

Diesel fuel is stored in an overhead tank close to a small garage shed situated near the central catchment tank. Fuel is not available to Aboriginal residents but is supplied to the water truck and community truck which is used for provisioning. There is no petrol available at Oak Valley and motorists must supply their own, or order it from Yalata with their stores.

Yalata-Maralinga Health Service operates a clinic at Oak Valley and a Health Sister is usually resident. Health care is normally administered from the back of the organisations Toyota since the camps are frequently beyond walking distance from the clinic. The Health Sister has caravan accommodation. Yalata School operates classes at Oak Valley two or three days a week, depending on the availability of staff. The teachers' accommodation is the only house at Oak Valley. During a part of the study period the community employed a non-Aboriginal advisor, who lived in caravan accommodation. However, this advisor left during the year and his position was taken by an Aboriginal employee who used his accommodation.

Responsibility for the Maralinga lands is vested in Maralinga Tjarutja. Resources, community administration and management are the responsibility of the community at Oak Valley through a Federally-funded organisation, Oak Valley Maralinga Incorporated, which is assisted by Maralinga Tjarutja. In day-to-day terms much responsibility falls on Maralinga Tjarutja to ensure that services are provided to the Oak Valley community. Stores are transported once a fortnight by truck from Yalata.

A system that permitted sale of goods at Oak Valley broke down during the study period and during two visits (November 1987 and February 1988) individuals were charged for a standard issue of rations from their salary or welfare cheques at Yalata.



A traditional shelter (wiltja) of branches and tarpaulins with a steel tuckerbox in the foreground, May 1987.

From these sketchy details it should be evident that, from a European-Australian point of view, life at Oak Valley is somewhat tenuous. Regular supplies of food and water cannot be assured. Vehicular breakdowns and mechanical failures are frequent, and the community lacks the basic skills to remedy anything except minor faults. The Health Service and teachers have radios, but the community radio was not operating for the majority of our time at Oak Valley. Because the community lacks even the basic facility of a radio hut, dust and abuse by children ensures the eventual failure of the radio. While people are able to obtain supplementary stores from the servicing train on the Trans-Australian Railway line (known locally as the 'Tea and Sugar'), there were periods when the Aboriginal people were short of food. Bush foods, and in particular kangaroo meat, are much sought and highly prized. Vegetable foods are however more difficult to obtain.

With a total lack of sanitation, serviceable showers, water for washing or any ablution facilities whatsoever, Oak Valley suffers from some serious health problems. Lifestyle is typified by ground living and moves to new camp locations are often occasioned by necessity when the dust becomes too oppressive and the garbage too dense. Despite these obvious disadvantages the Oak Valley people have chosen their present living site for emotional and spiritual, as well as practical reasons. The Southern Pitjantjatjara retain a strong culture through their language, religious beliefs and myths and ritual practices. Living at Oak Valley has meant a return to their traditional lands and a close physical presence on lands with which they have enduring religious ties. It is not the authors' intentions to detail either the nature or extent of these spiritual ties here, but it is certainly true that very few activities or decisions made by the Oak Valley people take place outside of the context of their religious beliefs. This means that the religious life is often considered to have a greater

importance than secular matters. In addition, it leads to a culture which is, overall, conservative and in which people stress traditional values rather than modern ones. Above all, it means that communication between this Aboriginal culture and other non-Aboriginal cultures is often difficult and fraught with misunderstandings and complications.

Climate and topography

The desert at Oak Valley is predominantly flat, with low undulating stony plains covered with native grasses, salt bush and acacia (*Acacia aneura*). Interspersing these plains are complex sand dunes which generally tend east to west. These dunes are well vegetated with spinifex *Triodia* species, and mallee eucalyptus (e.g. *Eucalyptus gracilis*, *Eucalyptus oleosa*). Groves of desert oaks (*Casuarina cristata*) also occur and Oak Valley derives its name from these trees. The region also has some large salt lakes, as well as smaller lakes and claypans, the latter holding drinkable water for short periods after rain. Ground water is generally very saline, although water useful for washing but not for drinking has been located some 25 kilometres west of Oak Valley. Fresh surface water is limited to a few soaks and rockholes which provide water for short periods after rain.

Oak Valley experiences a climate typified by extremes. Winters are generally marked by very cold nights with temperatures falling well below zero, and there are heavy frosts. Days tend to be bright and clear with noon-time temperatures in the range 16–20°C. Frontal systems may traverse the region as they approach the southern continent across the Great Australian Bight. Light winter rain in the form of drizzle is not uncommon. The transition to summer is often abrupt, with hot days and temperatures in the low 40°C having been recorded by the writers as early as September. Summer weather is marked by a succession of quite violent changes as frontal systems approach, often with high northeast to northwest winds gusting to gale force in temperatures over 40°C. The change in weather is usually accompanied by a sharp drop in temperature (15°–20°C is not uncommon) and some light rain. Summer thunderstorms also occur, and may result in heavy but localised rain.

High summer temperatures, dry ground, sparse and often denuded vegetation in the vicinity of the camp along with the extremely high winds permit massive dust storms in the region. For the Aboriginal people living in shelters or windbreaks these periods are extremely uncomfortable and make any activity almost impossible, including eating. Large quantities of airborne dust are inevitably inhaled. Should eating take place, all food and drink is immediately covered with wind-blown dust.

In the winter the cold ensures that people maximise the use of fires, often their only way of keeping warm. This means that for several months of the year (May to the beginning of September) people sit and sleep close to fires and inhale both the smoke and any blowing ash from these fires. Even in summer the night temperatures may drop to below 10°C. The Aboriginal people utilise fires for warmth throughout the year.

Research methods adopted and data collected

On each of the four field trips we camped with the Oak Valley residents. The research design accommodated the need for quantitative data on lifestyles and food consumption, as well as the need for qualitative data on daily activities. By living in the camp we were able to observe at first hand the activities relevant to our study. In addition, we were able to gain valuable insights from informed encounters with the people with whom we worked.



Dust storm at Oak Valley, November 1987.

Quantifiable data included a census conducted at the beginning and end of each study period. An account was also kept of all store food entering the community. This included stores brought up from Yalata and distributed, food sold through the Oak Valley store (when operative), stores brought from the 'Tea and Sugar', as well as food brought into the community by visitors from Yalata and elsewhere. Where possible consumption from the store was monitored over a seven day period so per capita amounts could be calculated on a daily basis. Visits to the 'Tea and Sugar' were monitored and goods noted as bought at the checkout. Accurate monitoring of food brought in to Oak Valley by visitors was not so easy as we had to rely on hearsay and observation. Fortunately, this accounted for only a very small proportion of the store food entering the community. We also noted all bush foods collected or hunted during the study period. The majority of this was meat in the form of kangaroos. Some catches were weighed, when this was possible, but net average weights were calculated from more accurate data available from other sources. Vegetable food was also monitored, but this contributed very little to the overall food consumed at the outstation.

At the commencement of each study period three family groups were selected for food recall. These groups consisted of an extended family group plus visitors and were chosen to be representative by age, sex and lifestyle of the camp as a whole. Each hearth group was visited twice daily and asked about the food eaten in the 12 hours preceding the visit. Where possible the same hearth groups were used throughout the study. However, as explained below, consistency was difficult to sustain. Data were collected each morning on the numbers of people in each hearth group, the activities of its members, dust levels and notes made on the camp location. Data collected on personnel present from these profiles was used to supplement census data to compile a total list of persons present at the outstation during the study periods.

The Yalata-Maralinga Health Service was asked to participate in the survey by administering a short questionnaire at Oak Valley. This was designed to establish the incidence of cuts, wounds, abrasions or burns which would permit injection of dust or other airborne particles into the body. Unfortunately due to administrative difficulties, only 83 questionnaires were completed and returned and 65 of these were completed by us during interviews with one nurse. While we knew the exact population at this time, the sample may not be typical of health patterns over a whole year.

Non-quantifiable data were collected on a wide range of daily activities including living conditions and how the people both prepared and consumed food. We also collected data on the present utilisation of the lands as well as noting people's expectations as they related to the future use of the land, especially the former test sites which remain a Prohibited Area. We also made a note of any other activities that might result in injection or absorption of dust or ash.

Population and demography

Census data collected during the study periods allowed us to come to an understanding of the patterning of population numbers over time, and the immense variation in the numbers of people living at Oak Valley. The largest number of people recorded on the census was 118, the smallest 11. Table 1 shows the population over the study period. In the February 1988 study period we kept a running tally of the daily population. Figure 2 indicates the fluctuations of the population as we noted it over a 10-day period and Figure 3 shows the variation in population over the whole study period.

Table 1: Oak Valley population during study period.

Date	M1	M2	M3	M4	M5	M6	F1	F2	F3	F4	F5	F6	M	F	Total
1 18.5.87	7	4	11	1	7	3	5	4	13	2	14	2	33	40	73
2 27.5.87	8	12	16	6	15	3	6	8	17	3	18	6	60	58	118
3 12.8.87	4	5	11	3	10	3	3	1	12	6	9	6	36	37	73
4 22.8.87	6	12	17	8	9	3	5	6	13	8	17	3	55	52	107
5 19.11.87	3	1	1	0	2	0	3	1	0	0	0	0	7	4	11
6 29.11.87	5	2	4	2	4	2	5	1	7	1	5	2	19	21	40
7 18.2.88	1	4	8	10	2	2	1	2	7	5	1	2	27	18	45
8 28.2.88	3	10	17	3	5	4	2	5	20	5	9	2	42	43	85

M = male, F = female.

1 = <3 years, 2 = 3–11 years, 3 = 12–19 years, 4 = 20–39 years, 5 = 40–60 years, 6 = >60 years.

Mean population = 69, Median population = 73, Standard deviation = 35.69.

Figure 2: Oak Valley population, February 1988.

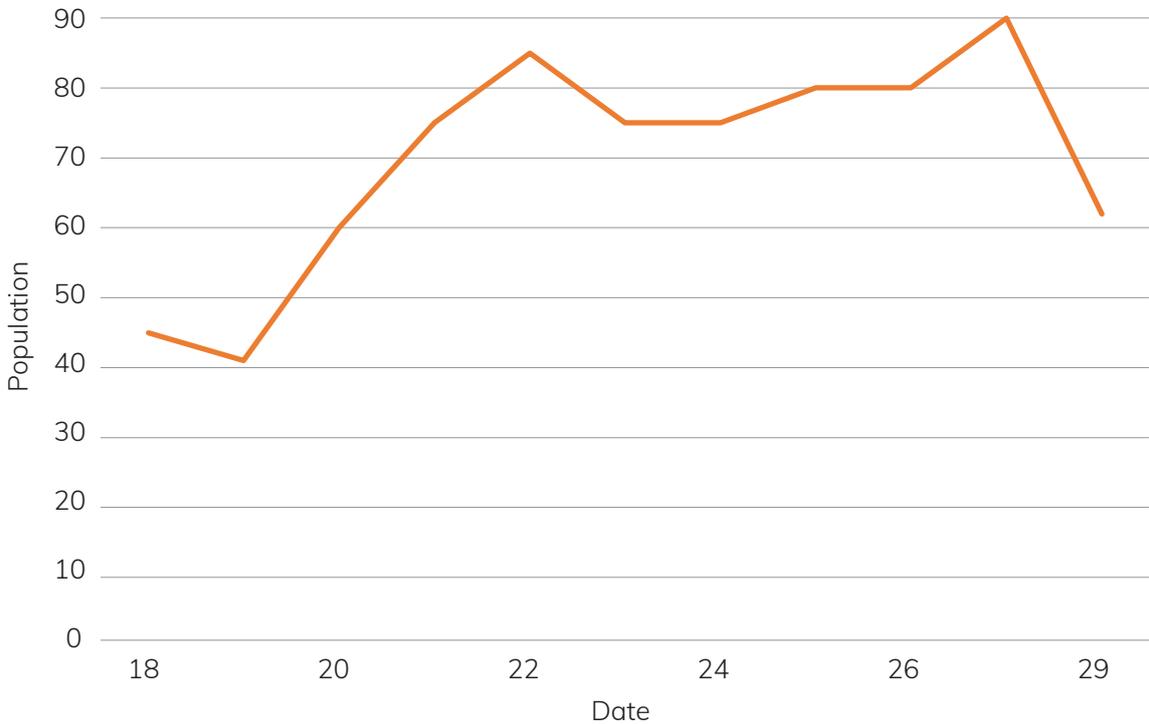
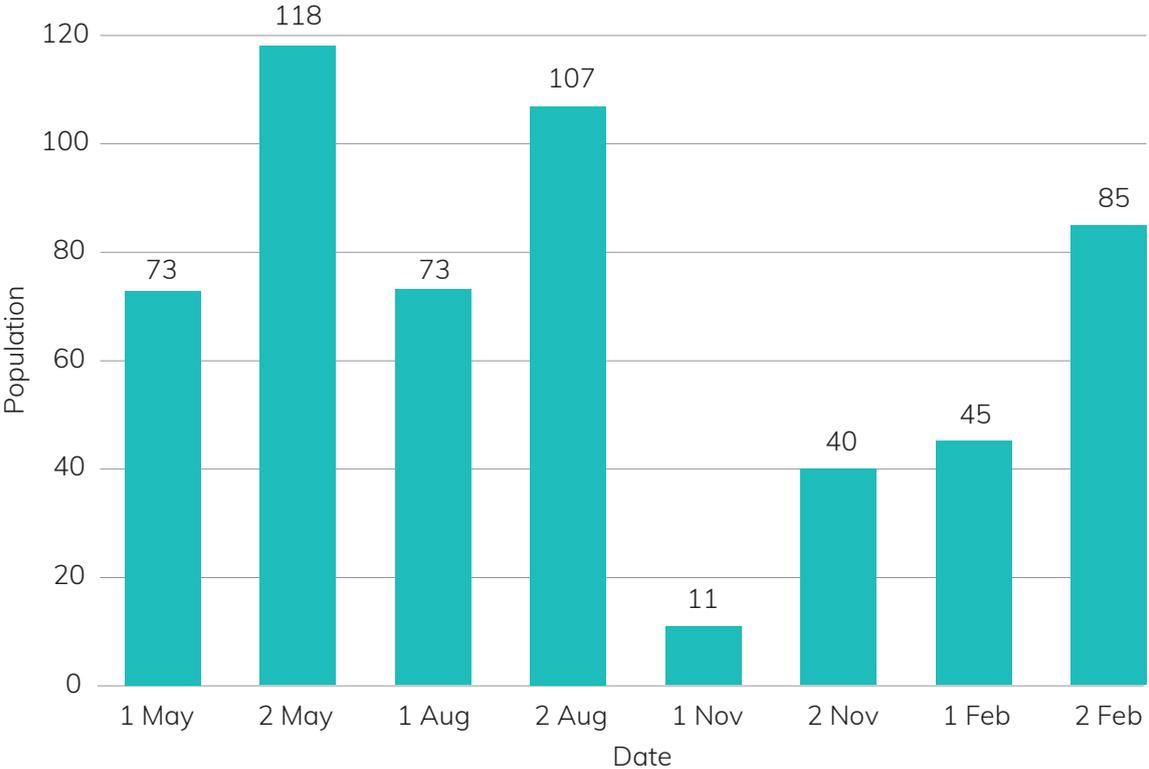


Figure 3: Oak Valley population over study period.



We had heard it said that the population of Oak Valley was largely made up of 'old people'. This argument had been used to suggest that putting money into Oak Valley was a waste of time. Indeed some of the Aboriginal people at Yalata had told us this, suggesting that Oak Valley was a kind of retirement village. Our data show that it is quite erroneous to conclude that Oak Valley is made up of old people, since younger men and women aged between 20 and 39 and children, particularly under the age of 13, make up a substantial part of the population. The sexes are well-matched in all groups. Overall, teenagers and babies under three years are least well represented, but both represent a small age bracket. Considering that those aged over 60 are so well represented, in relation to numbers estimated in the whole population¹ it is evident that Oak Valley is a favoured site for people of this group.

The eight censuses revealed that there were 286 different people who made up the population of Oak Valley. These figures indicate a very high degree of mobility among the population. The majority of people (133) were only present on one occasion, and none were present more than six times. Only 12.93 per cent were present four or more times. The average age for those present six times was 42.6 years, for those five times 48.1 years, four times 23.23 years, three times 31.46 years, twice 24.49 years, and once 20.94 years. This indicates that older people are perhaps more likely to remain at Oak Valley for longer periods than younger people.

In attempting to come to an understanding of what constituted an 'average' population for per capita consumption calculation we were mindful that averages mask extremes (indicated by a high standard deviation figure). Because of the extreme fluctuations in population, the median figure may give a better idea of typical Oak Valley population. Figures taken over a 10 day period (February 1988) show a range of 42–85, and a mean of 64.6 and median of 65 and a standard deviation of 14.78. In this report we base our per capita consumption figures on a population figure of 65, which we call the 'standard population'. This made further allowance for any under-reportage and, from our observations, reflected the likely camp population at any one time.

Problems with implementing the methodology and sustaining consistent research

It is often assumed that so-called scientific research can be carried out with ease in Aboriginal communities with strict adherence to a research methodology. We found that this was certainly not the case and include the following comments to illustrate the problems of carrying out research in the sometimes difficult and ever-changing conditions that we experienced at Oak Valley. No doubt our experiences could also be the same as others attempting to undertake research which involves the daily lives of people.

At the beginning of the first study period (May 1987) we selected three hearth groups. We chose one family made up of an elderly man (aged 64), his wife and family who were generally conservative in lifestyle and eating habits. We also chose a middle-aged man who had two wives and a young baby and another family noted for the extended nature of its hearth group. However, one of the chosen families was absent for the first two days of the first study period, so we selected an additional family comprising two adults in their early thirties and their three young children. During the first two days of the study the three hearth groups were made up of 16 and then 18 individuals. On the third day, the fourth family arrived at Oak Valley and our group then comprised 32 members. On the next day, however, two families left Oak Valley and the group members were reduced to 13 in number. On the next day, one family returned and the total for the group was 30. For the next four days there were four families in the survey, then three and finally two.

On subsequent visits we hoped to use the same hearth groups for consistency. However, this was not always possible. One family group remained in the survey on all four visits, but was not present every day. On some visits, families we had used previously had moved away and we were forced to recruit others to take their place. Apart from considerations concerning representativeness, we also had to consider whether or not a family was likely to remain at Oak Valley for the study period. There were therefore major fluctuations in the constitution of the hearth groups over the study period. This was also the case, in broader terms, of the population of the whole of Oak Valley.

There were other difficulties in ensuring the accuracy of data collected. Food consumption is a group affair at Oak Valley and calculations of per capita consumption require consideration of a number of variables. These include distribution within the community, differing appetites, levels of wastage, discard and dog consumption. Nevertheless, we were able to monitor total food imported into the community accurately so we have good data on gross quantities available. In the following accounts we discuss at some length the variables relevant to per capita food consumption and how these were accommodated within our calculations. The result is the derivation of an ideal pattern of consumption which, like all ideals, is modelled after reality rather than being the mirror of reality.

Quantification of food and informant recall

A major study of food intake for Aboriginal people was undertaken by Jon Altman in Western Arnhem Land in 1979–80 (296 consecutive days). This very detailed study (Altman 1982) encountered some of the same problems that we faced, as well as some that were rather different. Altman either accompanied people on foraging trips and recorded what was taken, or utilised helpers to record what was taken in his absence when more than one production team left the outstation where he was working (Altman 1982: 56). He also reconstructed weights of whole cooked game from parts by determining their percentage of total body weight. Altman relied, as we have, on reportage by outstation residents and concludes that reportage may have omitted up to 10 per cent of vegetable and meat actually taken.

We did not attempt to monitor all foraging parties. Given the circumstances we did not consider this a viable option. We lacked helpers who could have accurately reported weights and quantities by use of scales. Moreover, hunting and foraging trips took place unannounced and often without our knowledge. Meat was often hunted serendipitously during other declared activity: visits to the supply train, fetching water, trips to Yalata and return. We did rely on reportage on return to camp, and made it our business to inquire about the quantity of game brought in, usually the previous night.

Our study also differed from Altman's in that we were dealing with only one major type of hunted game, kangaroo. Although rabbits, and to some extent, turkeys, were also important, they did not occur in the same quantities and with the same frequency as kangaroo. Kangaroo cooked on the perimeter of the camp are obvious to the observer (a large fire is required initially), so we could see if animals were being cooked. Moreover, because we usually camped at a location where we could observe traffic in and out of the camp, we could keep a fair record of comings and goings, and therefore of potential meat-carrying vehicles. Finally, but most importantly, our food schedules, which at times monitored up to half the camp's daily eating habits, alerted us to the presence of fresh meat in the camp and prompted us to discover its source.



In not allowing for under-reportage of bush meat, we may underestimate amounts consumed. However, as we later discuss, the equation to determine available edible tissue is a complex one, and in allowing for only five per cent wastage factor of total available tissue (when it may be much higher) we balance any under-reportage of carcasses brought into the camp.

Store food was monitored at point of entry through sales at the store. Unfortunately the store operated sporadically and, as we have already noted, at times people had to rely on 'rations' sent up every two weeks from Yalata or occasional mercy dashes by the Yalata store person when food at the outstation was diminished. We did monitor the check-out at the 'Tea and Sugar', providing accurate reports of actual stores purchased. However, it was not possible to account for all stores brought into the community on a casual basis. Altman, writing of the tropical north, allows for a 20 per cent loss of store food due to 'wastage in preparation of foods, via ruination by weather and through theft by dogs' (Altman 1982: 58). While wastage and theft may be relevant at Oak Valley, ruination is not often a consequence of poor weather. Since, unlike Altman, our store food does not represent maximum amounts, we allow no wastage in consumption to compensate for an under-reporting that inevitably took place.

The role of the food schedules was not meant to provide any indication of the quantity of food consumed. Rather, the food schedules are provided to indicate the frequency of consumption, and hopefully an indication of what sort of people eat what type of food. Quantities of food are mostly derived from total amounts noted entering the community. We adopted this method because we considered the level of accuracy of reportage of quantities to be unacceptably low given the rather vague Pitjantjatjara notion about quantity. Moreover, we did not feel that it was appropriate to attempt to weigh hearth group meals prior to consumption, as this would have been extremely intrusive and not altogether practical. Nor did we feel that the use of food models produced as examples would have been particularly helpful (cf Commonwealth Department of Health 1986: 91).

We discuss below the percentage of kangaroo and other bush meat that is available for human consumption. Anthropologists have addressed this issue before (Gould 1967: 59; Hamilton 1979: 208; Altman 1982: 59; Altman 1987; Meehan 1975, 1977a, 1977b). Our figures for kangaroo fall between Hamilton's and Gould's (50 per cent) and Altman's and Meehan's (70 per cent), and are calculated from data supplied by ANSTO, whose researchers, as a part of a related study, calculated edible tissue as a percentage of whole body weight by excluding skin, bones and gut content. Because of the problems of reportage we standardise the weight of a kangaroo, rather than rely on specific weights of individual carcasses. Despite these differences, it is interesting to note that at Mimili in 1971, Hamilton reports on average 0.46 pounds of hunted meat per person per day, which is approximately 198.4 grams, being less than one-third of our figure. Altman gives an average of 280 grams per person per day, calculated from his data for January and February 1980 in western Arnhem Land, which is still less than half of the amount for the Southern Pitjantjatjara according to our calculations.

The Oak Valley residents do have access to vehicles and seemingly abundant supplies of game. Although our figures are high, we anticipate that similar studies in similar regions would provide comparable results.

Our presence at Oak Valley inevitably influenced food procurement and consumption. However, we minimised the effect of our stay on the study in the following ways. We resisted requests to go out hunting, whenever possible. Although we did participate on several occasions we limited vehicle use to the minimum. Visitors to Oak Valley are not unknown, and they are often commandeered for hunting trips. The limited use of our vehicle did not significantly add to the game taken.

The major exception was probably in trips to collect edible grubs. Because vehicles, when available, are utilised for kangaroo hunting, the women who usually initiate grub foraging expeditions invariably find themselves without transport to visit preferred areas to collect edible grubs. Such visits allowed us also to collect additional data on bush medicines and other, less well-known vegetable foods. Consequently, during our time at Oak Valley the availability of edible grubs may have increased above that normally experienced. However, as we note below, edible grubs form a very small portion of the diet, so our influence is not significant to the overall pattern of food consumption.

Over the years we have been associated with Oak Valley residents we have established an independence from other hearth groups, and a reputation for not readily supplying large quantities of store food. We have always resisted requests for food unless they have been genuine emergencies or shortages. During the research reported here we continued to resist demands for stores whenever possible, or made such gifts at the end of the study period when our questionnaires were complete. In this manner we attempted to minimise the influence that our stay had on the consumption of store food in the camp.

Diet, lifestyle and health

The data presented below cover three interrelated areas; lifestyle, diet and health. While there have been some studies of the diet and health of Aboriginal people living in remote communities, there have been few recent studies which have looked specifically at lifestyle. Unpublished material by White provides one exception (White 1978), but this work was carried out in northeast Arnhem Land which represents an environment very different to that described here. Sibthorpe (1988) describes diet and lifestyle factors as they affect a rural community in northern New South Wales, while Beck (1985) describes the environmental factors affecting the health of town camp dwellers in central Australia (see also Thomson and Merrifield 1988: 71–74). The most useful work on the relationship between lifestyle, the environment, diet and health of desert Aboriginal people has been undertaken in the Pitjantjatjara lands in northwest South Australia. The Nganampa Health Council, in conjunction with the South Australian Health Commission and the Aboriginal Health Organisation of South Australia published their extensive review of environmental and public health issues on the lands in 1987 (Nganampa Health Council 1987). As in our own study, this review considered factors such as dust, dogs and nutrition while providing additional detail on the provision of services and hardware such as housing, ablution facilities and water supply.

Diet has received more attention (see Thomson and Merrifield 1988: 97ff), but again studies centre on Arnhem Land (e.g. Altman 1987; Meehan 1975; O’Dea, White and Sinclair 1986), Central Australia (e.g. Hetzel and Frith 1978) or the Kimberley (Gracey et al. 1983), regions all distinctly different from the one reported here. The relationship between diet and health has been examined by several writers including Bryce (1983), Gracey and Spargo (1987), Harrison (1986), Thomson (1983 and 1984) and the Nganampa Health Council (1987). Issues concerning both the type of diet and the manner of consumption (food distribution as well as preparation) have not generally been systematically addressed, although the allocation of meat within a community has received some attention and we refer to the relevant literature below.

The findings of the study reported here represent an account of the lifestyle, diet and health of a group of people living in one of the most extreme environments encountered in central desert Australia. The community is also relatively poorly developed in terms of resources and facilities. The data were collected by first-hand observation and measurement over an extended period of time and represent an attempt to compile a holistic view of the community in terms of its diet and way of living. Comments on the health of the Aboriginal residents are extrapolated from these



findings and supported with data collected from other sources. By incorporating materials relevant to diet, lifestyle and health in the one report and considering them as combining to characterise the Aboriginal life experience we hope to make the totality of that experience more meaningful. While the parameters of this study were designed to aid identification of lifestyle factors which could increase the ingestion, absorption or inhalation of extraneous environmental materials, we gathered data which we believe have relevance to both public and environmental health and nutrition in Aboriginal Australia.

Note

- 1 The population pool from which Oak Valley residents are drawn, defined from our field work periods, is 286. Only 23, or 8.04 per cent of the population, are over 60 years of age.

2 Living conditions in a desert outstation

As a part of the study we were asked to comment on the living conditions experienced by the Oak Valley people. While the focus of our research was on how these conditions might affect people's health if they were to live in a previously contaminated area, the study also had other implications. Aboriginal health is generally acknowledged to be well below a standard acceptable to Australians. There is no doubt that some of the problems arise from living conditions. For desert dwellers the chief environmental enemies are dust and lack of domestic facilities. In the following pages we outline some of our observations as they affect the health status of the people with whom we worked.

At Oak Valley dust, sand and ash is everywhere. We were both struck by its pervasiveness in our own, and everybody else's, food. Unlike many of our Aboriginal helpers, we attempted to prevent dust and ash from adhering to our cooking and eating implements and from getting in our food as it cooked. These attempts were usually in vain. However careful we were, living conditions close to the ground at Oak Valley were extremely dusty. This was exacerbated by the absence of washing facilities for utensils and limited water supplies. If the wind freshens, people construct windbreaks (yuu) on each side of their dwelling (wiltja) from branches of acacia bushes or trees. Although these provide shelter from the wind, they also cause eddies of air within the sheltered area including the campfire itself. We found that in windy conditions, large amounts of fire ash were stirred up and inevitably inhaled.

Most Oak Valley residents make their camp fires immediately outside their dwellings, and some people with large tents make their fires actually inside the tent if the weather is cold. Ash accumulates in the main cooking hearth and is seldom removed. There is often more than one ash heap in the vicinity of a dwelling (fires having been lit for warmth) and there may be three or four old ash heaps close by, for example from old kangaroo cooking fires. People sometimes allow whole logs to burn down their lengths from a fireplace, creating a two to three metre long ash bed immediately outside their dwelling. A standing tree desired as firewood is sometimes felled by the lighting of a fire at the base, which can create a large ash bed. These factors (the circulation of ash in the air, and the presence of large or numerous ash beds) mean that while sitting around their hearths, and particularly while sleeping, Oak Valley residents inhale large amounts of ash particles. This would be so particularly in the winter months when people may retire for the night at 8pm, keep fires burning all night, and rise at 8 or 9am.

Oak Valley residents may sit, lie or stand deliberately on warm ashes from a dead fire in order to keep warm in winter. For example, someone may rake a few warm ashes from a nearby fire and then stand on them in bare feet. Warm ashes may be sprinkled on a burn to assist rapid healing and drying up of the wound.

Ash may also be eaten directly: dampers are cooked in the ashes, as are small portions of meat. Ash blows into billies of tea (which never have lids), or may be kicked into food on the fire by dogs, that like to lie close to the fire in winter. Although damper and meat may be lightly dusted off with a small branch before eating, people must inevitably consume fine ash particles when eating and drinking. Ash from local wood may also be ingested as a result of being mixed with chewing tobacco; however, for the most part, ash for this purpose is imported from Yalata as this is considered a superior product for the purpose.



In addition to the ash from fires, we observed high levels of dust in the camp. Children, of course, play on the ground and some of their games involve the deliberate creation of dust, as described later in this chapter. Such games usually involve several children. Dogs become excited at such activity and join in, rolling in the sand and racing around the camp.



A campfire or hearth, showing cooking utensils, water container, mug, food items and a dog, May 1987.

We noticed that large numbers of children (virtually all of them) suffered from copious nasal discharge which forces them to breathe through their mouths. Many adults also suffer from respiratory ailments which also result in breathing through the mouth, rather than the nose.

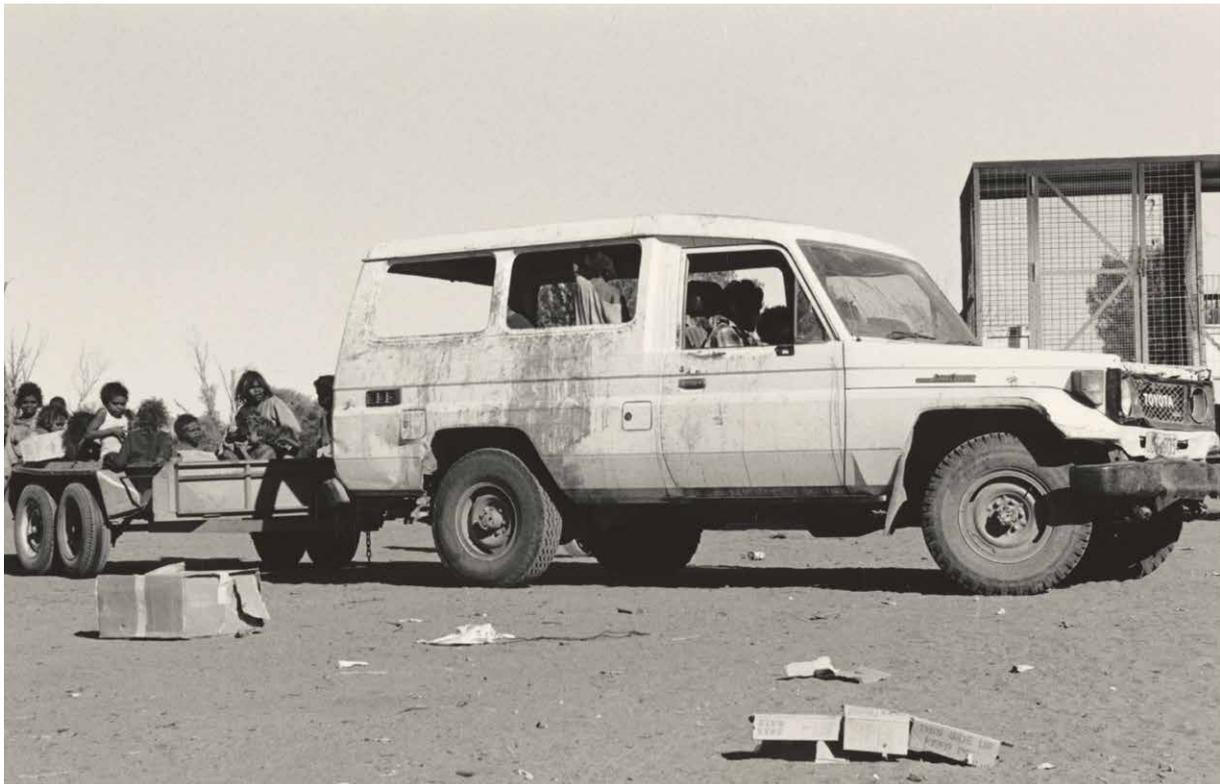
During our August 1987 field trip there were three extremely windy days at Oak Valley. Wind gusts were severe and large quantities of dust circulated particularly along the main road through the camp and along the minor vehicle tracks in between the dwellings. In November 1987 there were several extremely windy days, particularly on 28 November when a violent duststorm lasted all day in 40°C heat and obliterated the sun entirely. On these days people found it virtually impossible to prepare food. We were forced to eat in the cab of our vehicle with the air conditioner on in an attempt to keep grit out of our food.

Apart from the regularity of high winds in the region, there are numerous willy-willies (known as kupi-kupi), which are rapidly circulating funnels of wind sucking up quantities of loose sand and soil. If a willy-willy goes through a camp, it can lift blankets and tarpaulins and distribute litter and sand debris in its wake.

There are only on average three or four vehicles in use at Oak Valley at any one time, but these generate considerable quantities of dust which is inhaled by both passengers and bystanders. For example, the water truck usually makes daily visits to fill small water tanks around the camp. This means that the truck must venture off the hard surface of the main track, onto deeper sand around camps.

It often becomes bogged in the sand. At present, most transport to Oak Valley is accomplished in the community truck which is a large open-sided vehicle with wire mesh at the sides. It can accommodate up to 30 people. Travel in the truck is inevitably dusty and bumpy. Local transport for hunting, visits to the Clinic or to Watson is generally provided by saloons. Windows are wound down, and sometimes windows and windscreens maybe entirely lacking. For example, an old Landcruiser was renovated and adapted for hunting by having all its windows removed (including those in the back doors) so that people, and dead animals, could be accommodated.

Food storage is difficult at Oak Valley because of the heat in summer, the dogs, and the total absence of housing. Most hearth groups possess a steel trunk in which they store food. However, half-eaten portions of kangaroo are most commonly stored in trees or on the roof of people's wiltja out of the reach of dogs. We observed food (both kangaroo portions and billies) placed on the roofs of vehicles. Flour bags were usually kept in the fork of a tree. On many occasions, however, we observed newly purchased stores lying on the ground at camps which were often unattended. The absence of refrigeration and the difficulties of storage resulted in the quick consumption of new foodstuffs, especially perishable ones. Kangaroo joints kept for several days in the winter months. In the summer, if the weather was hot, kangaroo had to be consumed within 24 hours or else it became inedible.



The community Landcruiser, adapted for hunting with its windows removed, transports people on its trailer, May 1987.



Food and belongings scattered at a camp, August 1987.



Kangaroo and utensils stored on a car roof, August 1987.

Utensils are minimal: most hearth groups possess one or two billies and a saucepan, perhaps a frying pan or cooking tray in which to cook chops and eggs. Few camps possess plates or cutlery. If plates are required they are improvised from egg cartons, or cardboard. Twigs or sticks are used for eating tinned food. Axes are used instead of tin openers. Saucepans and billies are stored in trees, or were inverted on the ground when their contents were finished. Knives are often stored by sticking them, blade down, into the ground. Women were observed on occasions scrubbing out pans with wire wool; some attempted to wash up using an enamel bowl. But overall, water supplies are so meagre as to prevent any large-scale practice of washing dishes.

Most people possess a foam mattress upon which to sleep and several blankets. These are never washed, but are hung on bushes to air from time to time and shaken out. When they become too dirty and old, new ones are purchased. One hearth group owned a double bed frame which was kept outside. They slept on it in the summer outside and owned a caravan which was used for food storage and for sleeping in the winter. People sleep close together, and sometimes with dogs, for warmth. In the winter months, fires are made with slow-burning roots and are replenished throughout the night. In the summer, people sleep outside on their mattresses with just a windbreak against the prevailing wind. By day, a sheet or blanket may be spread near the fire or the entrance to the wiltja for sitting.



Washing up in difficult circumstances, August 1987.

Young infants are held constantly in someone's lap or are laid down usually on a blanket or mattress, keeping clean and relatively free of dust and sand. Infants are passed from hand to hand to be held by quite young children (usually siblings), who may kiss them profusely on the face and mouth, sometimes until they cry. Once babies are able to crawl they are allowed freely to explore their environment, although adults are watchful of infants crawling near the fire. It is usual to spread a sheet or blanket on the ground when people are sitting playing cards, or just talking, and infants do spend time protected in this way from direct contact with the ground.

Children of 12–24 months are carried or dragged around by their older brothers and sisters, or trail along after them, sometimes alone. It is not uncommon to see a small toddler off on their own around the camp. If the child becomes distressed, someone will pick them up and return them to their camp. However, children are often left to cry without anyone taking any notice. This freedom of movement and behaviour is not neglect, it constitutes a form of 'independence training' common to Aboriginal socialisation practices in other parts of Australia (cf Harris 1984). Women often carry young babies on their backs in a sling made of a blanket, particularly if they are on a gathering expedition and need to have their hands free. Men and women often carry children on their shoulders once the child can sit unsupported. The child hangs on by the hair.

Children at Oak Valley, like all children, pick up objects and soil and place them in their mouths. If unsupervised, which may well be the case if adults are engrossed in their own activities, and for the reasons of independence noted above, a child may ingest sand, dirt or any interesting object. As their mobility increases, toddlers are increasingly vulnerable to infections. A one-year-old male infant was noted by the nursing sister at Oak Valley to have a chronic chest infection, a discharging nose with a piece of glass up one nostril and dirt in his mouth. We have observed mothers dissuading crawling infants from placing objects in their mouths, by making growling noises or moving the child away. However, it is safe to say that a Pitjantjatjara child on all fours at Oak Valley is exposed to a considerably higher level of contamination from dirt and unhygienic matter than a city child of the same age crawling on grass or in a house.

Few children at Oak Valley wear nappies. A young child may defecate on blankets or near the hearth itself with no rebuke from his mother, who will clean the child with any available material, the corner of a sheet, a leaf, or sand, without comment. The faeces will be covered by heaping sand on them. Once a child can crawl and moves off the sheet or blanket close to his mother, he is exposed to frequent contact with the ground, and is likely to be naked. Any sores or skin erosions on a child's buttocks would therefore be exposed to dust, ash and to the licks of dogs.

By the age of two an Oak Valley child is playing with their peer group away from the hearth and is allowed to roam the camp freely. In summer, children are often to be seen playing in the damp mud underneath dripping water tanks, where it is cool and where dogs gather to obtain water.

Such children play a variety of games in and on the ground. Some of their games involve the deliberate creation of dust, throwing it at each other and scooping it up in their hands. They sit in it, burrow in it and draw in it. Their toy 'trucks' are made of wheel rims or large tins filled with damp mud. These are pushed or pulled with handles made of wire (or in one case, with knotted bandages). This favourite game involves doing 'wheelies' with the tyre rim (propelled with a forked stick held by the 'driver'), with sudden stops and sharp turns. Sometimes whole gangs of children with trucks and rollers have races around the camp in the dust or along the main Oak Valley track. The children thus inhale fine particles of dust kicked up by their own toys. Children also play a variety other games, including marbles and spinning coins into holes in the ground. They make pretend camps and wiltja of leaves and twigs. Since they sit and lie on the ground as they play, all these activities involve exposure to large quantities of dust.



Dust created by a child rolling a tyre rim, a favourite game, May 1987.



Oak Valley children storytelling in the sand, May 1987.



3 Diet: Bush foods

Data collected during the study periods quantified the amount of food consumed by the Oak Valley residents. Broadly a distinction was made between 'bush' food (that derived from the local environment) and 'store' food (that which was imported into the community). We were also interested to report the way in which food was both prepared and eaten, as this would influence the dust and ash loading of a particular food type. In the following pages we restrict our data to the absolute quantities of food consumed and how this constituted the diet of the Oak Valley people. While it is true to say that all food consumed contained considerable quantities of both dust and ash (at least by western non-Aboriginal standards) quantification of these loadings is beyond the scope of this report.

Vegetable food

Vegetable foods form an unimportant part of the diet of the Oak Valley residents. A few vegetables are collected opportunistically and eaten, but very few were noted on our daily food schedules, and none constituted meals. Our informants did know the names of several vegetable foods which had been eaten in the past, along with the names for some seeds used to make flour for damper (unleavened bread). This practice is now completely discontinued. The vegetable foods known by the Oak Valley people are listed in Table 2.

Of all those listed, only *Leichhardtia australis* occurs in the food schedules. However, we calculate that annual consumption is less than 50 grams per person per year. In short, bush vegetables are almost entirely absent from the diet of the Oak Valley people.

The following are brief notes on other bush foods that are eaten occasionally by the Oak Valley residents:

Quandong, (*Santalum acuminatum*). In Pitjantjatjara these are known as wayanu. They are usually eaten straight from the tree. Bolam (1978: 50) noted that the fruits were dried and eaten at Ooldea. We documented ripe quandongs being available at several locations on the Maralinga Lands but the fruit was not consumed at all during the study periods.

***Solanum* spp.** Several species of *Solanum* were found during our field work and subsequently identified by the Botanic Gardens of Adelaide and State Herbarium. They are: *Solanum ellipticum* R. Br. (Pitj: wanki), (possibly *S. coactiliferum*. The bitter seeds are discarded and the raw rind is eaten); *Solanum orbiculatum* Dun. (Pitj: nyumil); *Solanum centrale* (Pitj: kampurrarpa) was often mentioned by our older helpers, who said it grows in the north, but that it was too dry for it in the Oak Valley region.

Edible roots. Several plants were found which have edible roots. All were extremely small and it is unlikely that they would be consumed today other than in exceptional circumstances. They include *Portulaca oleracea* (Pitj. wakati) which was found near Yatina rockhole. The roots are thin, and are cooked before eating. Its common name is inland pigweed (cf Goddard and Kalotas 1985: 116). These authors and Elphinstone (1958) document the use of the seeds of this plant for making seed cake. *Boerhavia dominii* (Pitj. puun) was found at the site of water bores 25 kilometres southwest of Oak Valley. The roots were said to grow much larger than specimens found (cf Goddard and Kalotas 1985, 148; Clarke 1988 lists both these roots). Tjunku-tjunku is another juicy edible root which we have seen consumed in the Yalata region.

A root by the same name was tentatively identified by Johnston and Cleland (1942: 95) as *Thysanotus exiliflorus*. Bates (1938) documented it in the Ooldea region, so it may grow at Oak Valley; however, none were found and it was not sought by our helpers.



A specimen of the edible root of *Portulaca oleracea* found near Yatina rockhole, August 1987.

Other vegetable foods. A creeper with long ribbon-like pods containing seeds is edible when the pods are green. This was identified from our sample as *Rhyncharrhena linearis*, and is known as the bush bean or wintjulanypa to our helpers. The pods are cooked and eaten.

Truffle or fungus. This was mentioned by several elderly helpers, but we were unable to locate any. The names were given in Pitjantjatjara as muyunya and wintjinara. Johnston and Cleland (1942: 102) have winji-na as a 'general' term for mushroom. Neither of these relate to the witita of the neighbouring language group, the Yankunytjatjara, noted by Goddard and Kalotas (1985: 122) as being the 'native truffle' *Choiromyces aboriginus*, but there are often several names for items in different Western Desert languages. Clarke (1988: 69) notes a species of edible fungus *Polyporus mylittae* for which the common names are native truffle, or 'Blackfellows bread' but considers that it is found in southern districts of South Australia. Another fungus mentioned by our helpers was a small white mushroom called panapuru which was said to grow on sandhills after rain. This was cooked in the ashes and eaten. We were unable to locate any specimens. Johnston and Cleland (1942) recorded several names for fungi at Ooldea.

Table 2: Bush vegetable foods known at Oak Valley.

Latin name	Common name	Pitjantjatjara name	Comment
<i>Santalum acuminatum</i>	Quandong	wayanu	Eaten sometimes
<i>Solanum</i> sp.	Bush tomato	wanki, nyumil	Eaten sometimes, varieties <i>ellipticum</i> and <i>orbiculatum</i> identified
<i>Solanum centrale</i>		kampurrarpa	Older informants knew of <i>centrale</i> but it was not found in Oak Valley area
<i>Portulaca oleracea</i>	Pigweed	wakati	Thin root cooked before eating, located once
<i>Boerhavia dominii</i>		puun	Thin root
<i>Rhyncharrhena linearis</i>	Bush bean	wintjulanypa	Pods cooked and eaten. Not observed.
<i>Leichardtia australis</i>	Bush banana	kalkula	Eaten raw, seeds discarded

Although mentioned in the literature, and referred to as past practice by our helpers, no one at Oak Valley mentioned consuming the nectar of blossoms, or eating the sugary lerp from leaves.

Cooked meat

The following animals were taken for consumption during the study periods:

- Blue-tongued lizard (*Tiliqua multifasciata*)
- Goanna (*Varanus gouldii*)
- Red kangaroo (*Macropus rufus*)
- Rabbits (*Oryctolagus cuniculus*)
- Turkey (*Ardeotis australis*)
- Edible grubs (*Xyleutes leucomochla*).

Emus are also occasionally eaten by the Oak Valley people, but no emus were consumed in the study period. The animal is regarded as an infrequent visitor to the region, but is not unknown. Echidna (*Tachyglossus aculeatus*) is also occasionally eaten. However, the most important meat is the red kangaroo, and this forms a staple component in the diet.



Digging up the roots of *Grevillea nematophylla* with Alice Cox in order to obtain water, November 1987.



Kangaroo

Kangaroo meat, particularly the meat of red kangaroo, has an important place in the lives of Pitjantjatjara people. The animal has Dreaming or mythological associations and is a highly prized food item. Red kangaroo are hunted in large numbers by the members of the Oak Valley community. Grey kangaroo (*Macropus fuliginosus*) are also hunted, particularly in areas closer to Yalata, but are generally regarded as being inferior to the red kangaroo which is common on the open plains south and east of Oak Valley, and on the Nullarbor Plain.

Kangaroo are hunted by groups of men (and sometimes women) travelling in a vehicle, either on the road to a specific destination, or on purpose-specific expeditions into territory known to be favoured by the animals. On several earlier occasions (before this study commenced) we have known women to hunt kangaroo on foot, with dogs. Game is shot using .22 calibre rifles and may be pursued over some distance by vehicle if wounded. Tracking on foot is sometimes undertaken over shorter distances. Female kangaroos are the preferred meat, and joeys are also enjoyed as food.

Once a kangaroo is immobilised, a hunter will kill it with a sharp blow to the head, usually with a rock or stout stick. Gutting must be executed within an hour or two of the animal's death. This usually means that the operation is performed at the site of the kill. If a party is to return forthwith to the camp, which is not too far distant, gutting may be delayed until return to the cooking place. Usually, however, gutting takes place at once.

The kangaroo is laid on its back with its hind legs splayed out. These hind legs are then broken at the knee joints, the forearm of the hunter's left arm being placed behind the kangaroo's thigh and pressure applied on the kangaroo's lower leg with the right hand. If the kangaroo is particularly big two hunters will be required to break the legs. The broken legs are then pushed outwards, revealing the stomach clear of the legs. Bushes or small leafy branches are collected and placed on the left-hand side of the kangaroo and close to it (viewed from the tail, looking towards the head). A short incision, some 60–100 millimetres, is then made down the length of the lower stomach and the intestines are pulled out and heaped onto the bushes. The lower intestine is pulled clear and a length of approximately 500 millimetres detached from the rectum. The excrement in the form of pellets is expelled from the intestine by squeezing it between the finger and thumb. The stomach is opened and the contents (digested grass, worms) emptied out away from the leaves, and the tripe roughly cleaned with the fingers. The heart, lungs and other organs usually remain inside the carcass.

A short stick approximately 120 millimetres in length is cut from a bush or tree. It is peeled of its bark and sharpened at both ends. Leaving the stomach outside the carcass and lying on the leaves, the stick is inserted into the sides of the stomach incision to form a suture which stitches the cut together. The piece of lower intestine is then wrapped round the stick in a figure eight, four or five times, to tie up the stick and stomach incision. The end is then impaled on one end of the sharpened stick, which prevents it from becoming unwound. A traditional prohibition is strictly adhered to, which forbids the washing off of the blood of red kangaroo. This rule is maintained, whether it be the hands of the individual who has gutted the animal, or the back of a vehicle where the dead animal is placed.

The stomach is lifted with the carcass into the vehicle, the bushes being placed alongside the animal so the tripe can rest on them for the journey back to camp. Sometimes the stomach and other organs like the liver are cooked in the ashes of a fire made by the hunters at the site of the kill, if it is thought a convenient place for a rest and a meal. In this case these organs are consumed at once and are not distributed in the camp.

A small pit is prepared in the vicinity of the camp, but usually 20 or 30 metres from the closest hearth. The pit is approximately the size of the kangaroo, and about 40 centimetres deep. A large quantity of firewood is piled up over the pit, usually to the height of about one metre. This is lit, and when burning well, the kangaroo, with stomach detached, is placed on top of the conflagration and turned over several times, usually by means of the tail or protruding legs. This continues until all the fur is singed off. The kangaroo is pulled clear of the fire and remains on the sand close by until the fire has burnt down to a hot bed of ashes. The tail is cut off the carcass with an axe after the animal has been singed.

The ashes are then excavated and the kangaroo (and detached tail) buried, on its back with legs upper-most, in the hot sand and ashes of the pit, with sand and then ashes piled up over it so the rear legs and front paws protrude a little from the pit. The animal is cooked in this fashion for approximately one hour. When the meat is considered cooked the whole carcass is pulled out of the pit and again laid on its back. Surplus ash is beaten off the carcass using leafy branches. More bushes are brought and the animal is butchered by use of an axe and sometimes a large knife if available. Some items, like the fore-legs and hind-legs are torn from the body after preliminary cutting, though this is often difficult because the whole thing is very hot. The main parts are the head, back, ribs (sometimes attached to the back), fore-legs, hind-legs and tail. The liver, heart, kidneys and other internal organs are also removed, although these may be removed earlier and cooked in the ashes at an individual's own hearth. The lungs are cooked inside with the ribs; they are eaten, but it was also mentioned that they may be given to the dogs, indicating that lungs are not a favoured part of the animal.

The bones are broken up and the marrow sucked out. Marrow was said to be 'like egg' and was given to children as a special treat, although this does not mean that only children eat the marrow.

Joeys are cooked whole, usually at an individual's hearth. They are also often cooked and eaten by the hunters at their temporary camp during the hunt. Cooked meat is often reheated, after storage in a tree, by being placed on hot coals.

Kangaroo weights

Net gutted weight in relation to total weight according to our figures represents a loss through gutting of 6.13 per cent. Figures supplied by Max Giles of Australian Nuclear Science and Technology Organisation (ANSTO) in August 1988 give 6.4 per cent loss for discarded gut from their larger sample of 10 females and 11 males which figure we adopt.¹

Our average gutted weight for the kangaroo was 23 kilograms (n = 7). ANSTO's samples provided a median gutted weight of 26.8 kilograms (n = 21) compared with our sample gutted median weight of 26 kilograms (mean 23 kilograms). We adopted the higher median figure (26 kilograms) for our calculations because the bulk of kangaroos taken were females, with juveniles in the pouch (the joeys) ranging in our sample from 600 grams to three kilograms. These joeys were often omitted in the reportage. Allowing for a 6.4 per cent loss through discarded gut, the gross weight of a kangaroo is calculated at 27.778 kilograms.

Max Giles of ANSTO also indicated in 1988 that the percentage of all edible tissue (including those parts of the gut commonly eaten) to total ungutted body weight is 61.3 per cent (+ 12 per cent). This figure allows for the loss of bone, skin and other non-edible parts. This gives an available meat weight from an average kangaroo of 17.028 kilograms per animal. This figure makes no allowance for loss through wastage, or consumption by dogs. The dogs scavenge and are generally in very poor condition and are therefore voraciously hungry. With a camp dog population of over 40 some



food must be consumed by them, even if their subsistence level requires little food, and not all of this is kangaroo meat. Dogs certainly eat bones, skin and, when available, other discarded organs. However, some meat is deliberately discarded, either because of the arrival of newer, fresher supplies, or because it becomes too old for human consumption. We estimate that 5 per cent of available meat remains uneaten. Of the 17.028 kilograms edible tissue for each animal taken, we base our calculation on an additional 5 per cent loss of edible tissue, giving available meat per animal of 16.177 kilograms. Calculations of per capita intake are based on this figure which represents 58.237 per cent of gross kangaroo body weight. This figure falls between that estimated by Hamilton and Gould (Gould 1967: 59; Hamilton 1979: 208) who suggest a figure of 50 per cent and Altman and Meehan (Altman 1982: 59; Meehan 1975, 1977a, 1977b) who suggest 75 per cent of total carcass weight.

During the study periods 1 714.762 kilograms of edible kangaroo meat from 106 animals were consumed by Oak Valley residents. Allowing for the fact that the data were collected over four 12 day periods for an average population of 65, this amounts to a daily camp consumption of 35.724 kilograms or 549 grams per person per day. From these figures it can be postulated that 806 kangaroos are taken in a year yielding 13 038.662 kilograms of available meat.

Table 3 shows the variation in grams of weights of kangaroos taken over the study periods.

Table 3: Kangaroo meat consumed over four study periods.

Period	Amount in grams
May 1987 (12 days)	388 248
August 1987 (12 days)	744 142
November 1987 (12 days)	323 540
February 1988 (12 days)	258 832
Total (Average 428 690.5 grams per 12 days)	1 714 762

Rabbit

Rabbits are obtained from two sources. The workers on the Trans-Australian Railway line act as agents, selling rabbits that have been trapped or shot by non-Aboriginal rabbit catchers. Oak Valley residents also take rabbits themselves, the men shooting them from a vehicle, the women digging them out of their warrens. When the community is camped close to the Nullarbor Plain these rabbit shooting or catching expeditions are quite frequent, but when the community is camped further north and away from the Plain most rabbits are purchased from the railway workers.

Edible portions of the rabbits were calculated using the following formula.²

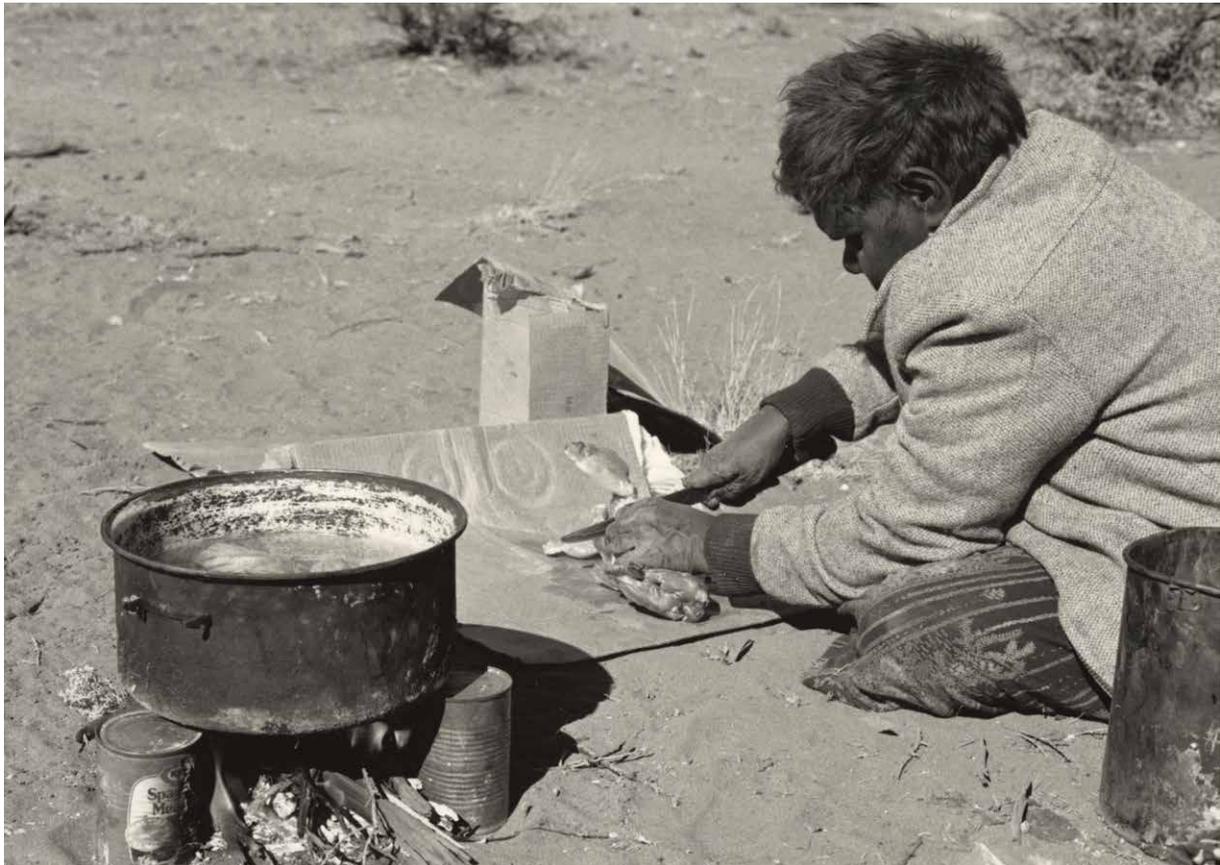
Whole body weight	1.306 kgs	100 per cent
Whole body less gut	1.044 kgs	80 per cent
Edible tissue	0.639 kgs	49 per cent

Edible tissue excludes skin, bones, head and gut. Since rabbits are relatively small and are eaten immediately they are cooked, we calculate wastage of edible tissue to be minimal.

Eighty-seven rabbits yielded 55.593 kilograms of edible tissue. This was consumed over a period of 24 days (2.316 kilograms/day) by 65 people, giving a daily per capita intake of 35.64 grams. This may be a considerable underestimation, and from our own observations it seems likely that people might eat up to one rabbit per two weeks (45.643 grams/day) on average.

Turkey

Turkey (*Ardeotis australis*) is much favoured meat, but is not often shot, being an infrequent visitor to the region. There were only nine turkeys shot during the study periods. We weighed one at 5.5 kilograms, upon which consumption weights are calculated.³ Gross weight for the study periods is 49.50 kilograms. We have no accurate figures as to percentage edible tissue to whole body weight. Altman (1987: 44) allows 70 per cent of whole body weight as edible tissue for birds, a figure we consider to be too high. We base the following calculations on tissue consumed being approximately 60 per cent of total carcass weight. Since turkey is highly prized and not common, wastage is minimal. Working from these figures we calculate available tissue as meat at 29.700 kilograms for 48 days. This represents only 619 grams per day for the whole camp, or 3.47 kilograms per person per year.



May Day cutting up skinned rabbits from Watson, on cardboard, to go into a stew, August 1987.

Edible grubs

Maku ('witchetty' grubs, *Xyleutes leucomochla*) form a small but important part of the diet at Oak Valley, since they can be gathered opportunistically almost anywhere that suitable shrubs are found, and are highly prized as food. They fill an intermediate role between vegetable food (mayi) and meat (kuka), being classified in a category of their own as maku. Strictly speaking they are a form of meat, and are usually cooked lightly in hot sand, often at the place where they have been collected.

Because maku are often consumed as a snack, rather than as a main meal, estimating the numbers consumed is very difficult. We noted uprooted bushes at new camp locations, indicating that people had exploited new territory for maku as it was convenient. We accompanied both women and men on expeditions and monitored the time required to gather quantities of the grubs. The task of gathering maku is generally considered to be women's work, though men are not disinclined to join in.

From the figures we collected, an average maku in this region weighs 10.97 grams. We recorded 297 collected overall and postulate a share factor of at least 20 persons which gives a consumption rate of $297 \times 10.97/20$ per person within three study periods (36 days). This amounts to a total of 162.9 grams per person per 36 days or 1.65017 kilograms.

Other meat (goanna and lizard)

Small goannas and lizards (*Varanus gouldii* and *Tiliqua multifasciata*) are collected and eaten, but form an insignificant part of the diet. We noted five occurrences within the two warmer periods of field work, indicating that the reptiles are not likely to be eaten in winter. (Oak Valley people say that they 'sleep' in the winter.) Four goannas were taken, three of which came from the plain near Watson. ANSTO's figures for *Varanus gouldii* were 235 grams whole body weight. We weighed one called in Pitjantjatjara milparli at 599 grams, which was not considered a particularly large specimen. We also noted a kalamira (Centralian blue-tongued lizard, *Tiliqua multifasciata*) which was weighed at 250 grams. Taking maximum weights, this provides a gross meat weight of 4.25 kilograms for the 48-day period, for although reptiles are not taken in winter, yearly average must be calculated over the whole of the study periods. Wastage is minimal, though Altman (1987: 44) gives 70 per cent available meat for reptiles, giving available tissue at 2.97 kilograms per 48 days or 22.57 kilograms per year for the whole camp (.340 kilograms per year per person).

Reptile meat is found only once on our food schedules (in February 1988). Because the reptiles are generally rather small, it may be that they either get eaten before return to camp and so are not widely distributed, or are not considered a proper meal but rather a snack and were overlooked in reportage. Since total per capita consumption is so small, a frequency of one in 254 may not be an unreasonable measurement of occurrence in the diet.

Lizards and goannas have their lower gut extracted by squeezing the abdomen between the thumb and forefinger. The whole animal is then cooked lightly in the ashes, the skin and feet discarded and the flesh and some of the gut eaten.

Notes

- 1 There has been some discussion in the literature on the percentage wastage of kangaroo and other native animals. See Gould 1967: 59; Hamilton 1979: 208; Altman 1982: 59; Meehan 1975, 1977a, 1977b.
- 2 Information provided by Max Giles of ANSTO in August 1988.
- 3 The Australian Bush Turkey is protected by law but may be taken and eaten by Aboriginal people. ANSTO researchers did not take any samples of this bird or calculate percentages of edible tissue out of respect for this endangered species.



Digging out grubs from the roots of *Acacia kempeana*, November 1987.



Witchetty grubs (Maku) after cooking in hot sand, August 1987.

4 Diet: Store foods

Like bush foods, store foods are eaten within a comparatively short time of arrival at camp. Oak Valley residents do not generate a surplus of supplies, and when store foods are procured surplus to immediate requirements, that surplus is soon diminished or consumed. The major exception to this rule is flour, which is obtained in 10 or 20 kilogram bags and which can be made to last for up to two weeks. This means that people usually can rely on having damper (unleavened bread made from flour) at all times, even when other stores are finished. Provided there is meat in the form of kangaroo, tea and sugar, people do not consider food to be in short supply. Some tinned food is also stored for several days at a time, usually in a steel tuckerbox.

Since most store food is eaten within a few days of supply, the figures we collected can be considered as representative of consumption over a longer period. However, in the analysis that follows we have divided store foods into the four fieldwork periods in order to evaluate the consumption periods in relation to the quantity of food noted. This is particularly important in the case of supplies from Yalata which, in some cases had to be consumed over a one week period, and others over two. Supplies bought from the 'Tea and Sugar' could be replenished every week. However, it was not always possible for people to visit the train due to lack of transport. The overall result is that people eat very well when food is available, but tend to fall back on meals with less variety and substance when stores are not available. In calculating per capita daily consumption we have attempted to allow for all these variables to avoid any underestimation of store food consumed.

Stores originated from four sources. The community store was replenished once every week from Yalata and operated from the back of a truck. As we noted earlier this system did not operate consistently during the research period, and at times stores were brought up from Yalata on special trips by Yalata staff. Generally speaking, though, stores were supplied this way at seven day intervals. However, in the latter periods of field work, stores were supplied by Yalata staff in pre-purchased boxes worth \$50 or \$100. Oak Valley residents had no choice about their contents, but had to take what arrived. These 'ration boxes' arrived every two weeks.

The 'Tea and Sugar' railway supply train arrives at Watson every Thursday. However, unless a vehicle is available, residents cannot travel to meet the train. Moreover, it is often delayed (arriving Friday or late Thursday night) and occasionally is early. Without radio contact with Watson or Port Augusta to determine the time of the train, catching it at Watson siding can mean an unrewarding wait of many hours, or a long drive to discover that it has already departed. We have noticed as many as six Oak Valley vehicles at Watson to meet the train and a correspondingly high level purchasing ensues. On other occasions, however, perhaps only two or three people buy from the train, and sometimes no one makes it. Trips were made to the 'Tea and Sugar' on three occasions during the study periods, which represents three visits over 48 days, or an average of 16 days between visits. We feel this may under-represent the use of the train as a source of food, so in the following calculations we allow fourteen days as the consumption period.

Finally, Oak Valley residents do bring food with them from Yalata; or perhaps from further afield when returning after an absence. Occasionally food may be given out by Maralinga Tjarutja after bush trips when stores, surplus to requirements, are allocated to community members. Food brought into the community in this way does not represent a large portion of stores consumed. We here average these amounts over the study period (48 days) to form the basis of our calculation.



Oak Valley people buy stores at the shed tank, May 1987.

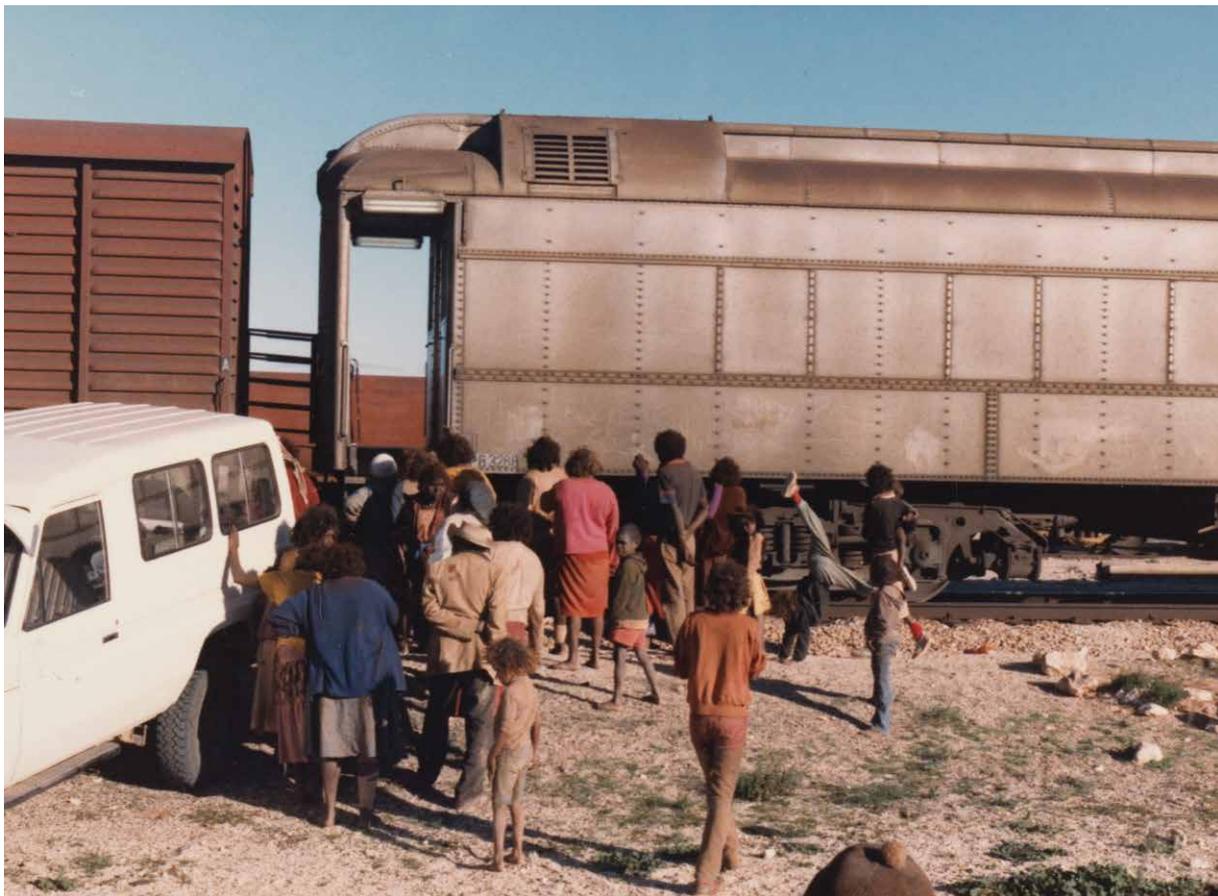
Since stores derived from different sources are treated in a slightly different way in the ensuing calculations, the calculation factors are summarised in Table 4. In short, food is derived from one or more of four sources (store, 'ration boxes', 'Tea and Sugar' or visitor imports). The consumption period for each source is derived from our observation. Per capita consumption is then a calculation based on the weight of food, divided by the number of days during which the food is estimated to have been consumed (i.e. consumption period multiplied by the number of consumption periods). When divided by 65 (standard population) the figure represents per capita per day consumption.

Bread and flour

Bread is eaten when it is available. Its popularity rests on the fact that it supplies relatively satisfying bulk food without any preparation and can be eaten with meat or any other food. In the absence of complementary food it is sometimes eaten by itself, dipped in tea. All bread is wrapped, sliced and white. Loaves do not travel very well, and if left exposed soon go stale and crisp in the dry desert air. Bread was derived from the following sources during the study period: the community store (139 kilograms); 'ration boxes' (45 kilograms); 'Tea and Sugar' (14 kilograms) and visitor imports (66 kilograms). Per capita consumption calculated from these figures amounts to 153 grams per person per day. The breakdown of this figure by source is set out together with that for flour in Table 5.

Table 4: Calculation of per capita food intake from different food sources.

Source	Consumption period	No. of consumption periods	Calculation per capita
Community store	7	3	n/21/65
'Ration boxes'	14	2	n/28/65
'Tea and Sugar'	14	3	n/42/65
Visitor imports	48	1	n/48/65



Waiting to shop from the store wagon of the 'Tea and Sugar' train at Watson, May 1987.

Table 5: Per capita daily consumption of bread and flour at Oak Valley.

Source	Consumption per capita per day	
	Bread	Flour
Community store	102 gms	209 gms
'Ration boxes'	25 gms	291 gms
'Tea and Sugar'	5 gms	0 gms
Visitor imports	21 gms	40 gms
Total	153 gms	540 gms

Note

All figures are given to the nearest whole number.

Oak Valley residents also eat considerable quantities of flour, made into damper. The flat round bread of flour and water made today by Aboriginal people in the bush is a transformation of the seed cake (nyuma) which was made from gathered and pounded seeds before introduced flour was available. Seeds were collected from the appropriate grasses and plants, and were then rubbed and winnowed in a wooden dish, then ground into a paste and baked.

Seed-grinding by women was probably one of the most arduous tasks associated with food productivity; one researcher estimated that in the desert it took six hours to produce enough food for one person per day (Cane and Stanley 1985: 188). Devitt, writing of another desert group of Aboriginal people, estimated that the introduction of processed flour relieved Aboriginal women of between five and 10 hours work per day (Devitt 1988: 159–60), and the practice was probably one of the first traditional domestic activities to be abandoned (R and C Berndt 1942 XII (4): 319; Devitt 1988: 147).

A large damper is made from approximately 2.5–3 kilograms of white flour. This is tipped onto an empty flour bag, piece of cardboard, or into a large bowl (if available) for mixing with water. The woman mixes and kneads the flour, baking powder and water with her hands, having prepared her fire in readiness. With a stick, she clears away the hot coals leaving a clean hot bed of sand and ash. She sprinkles the cooking area with flour before laying the dough down and pressing it out flat. She then carefully draws a layer of hot sand and ash back over the top of the damper with her stick. Hot sand acts to insulate the damper from being burned by direct contact with coals. After 20 minutes or so, the damper is lifted and turned over in the ashes. The damper is tested by being tapped with the knuckles. If it produces a hollow thudding sound, it is cooked. It is then retrieved from the fire, and any excess ash is removed by lightly beating the damper.

Damper is also eaten fried. A sloppy mixture of flour and water is made, sometimes in an empty plastic drink bottle. The mixture is slightly thicker than a pancake mix. Oil is heated in a frying pan, and the mixture poured in. The damper is fried on both sides.

Damper is eaten dry, dipped in tea, sprinkled with dry instant milk, or spread with margarine, jam or other spreads. Pieces of damper are taken on hunting trips or any trip out of the camp as an instant method of satisfying hunger. Pieces of damper are shared with others as a normal part of daily life, and dampers are made specially to supply food to men performing ritual. Most hearth groups in the camp made a damper each day.



During the study period flour was derived from the following sources: the community store (285 kilograms); 'ration boxes' (530 kilograms); visitor imports (125 kilograms). From these figures we calculated per capita daily consumption of flour at 540 grams per person per day. The breakdown of this figure by source is shown in Table 5.

Jams, spreads and honey

Oak Valley residents generally eat their bread and damper plain, or dipped in their tea. Some margarine, jam and honey is consumed, but quantities are quite small. Margarine tends to have a limited life since the plastic tubs are fragile and the margarine itself melts in the summer and becomes inedible. Per capita daily consumption amounts to 67 grams. Data on all types of spread are summarised in Table 6.

Fruit and vegetables

Vegetables were recorded in several forms: frozen, dried and fresh and amount to 111 grams per person per day. The bulk of fresh vegetables are purchased from the 'Tea and Sugar', though some potatoes were brought from Yalata. Potatoes are sometimes cooked in the ashes, then eaten with their skins removed. Most vegetables, however, are cooked in the form of stew, often with rabbit, or tinned meat. Data on the quantities of vegetables eaten is summarised in Table 6.

The 'Tea and Sugar' is the principal source of fresh fruit at Oak Valley. The ration boxes provided no fresh fruit, the store only 5.63 kilograms. Visitors brought in 2.6 kilograms. Overall the amount of fresh fruit available to the Oak Valley residents is very limited and averaged only 15 grams per person per day. This is surprising and unnecessary since fruit like apples and oranges would survive the journey from Yalata quite easily. The popularity of fresh fruit with the Oak Valley people when they visit the 'Tea and Sugar' is evidence that fruit would be consumed, if available. The quantities and sources of the fruit recorded during the study periods are summarised in Table 6.

Sugar, cereals, cakes and biscuits

Sugar is used almost exclusively in tea, although it is sprinkled on cereals occasionally. Sugar is mixed with tea in the billy prior to serving, along with milk powder (if available). The tea and sugar mix is then poured from one billy to another several times to ensure that the sugar is properly dissolved. Tea made in this fashion is generally very sweet as Oak Valley residents prefer it this way. Brown sugar is harder to dissolve, so there is a preference for white. Since mixing is quite thorough little, if any, sugar is wasted in the bottom of the billy which is generally drained by those eating a meal. Per capita consumption is quite high at 237 grams per person per day (see Table 6). Approximately 100 grams of cereals, cakes and biscuits are eaten on average by each person per day. All are eaten straight from the packet, and usually with very little time passing between the procurement of the food and its consumption. Cereals are often eaten dry (bowls and milk are not always available), though people do make porridge from oats and mix up instant milk to eat with Weetbix. These data are summarised in Table 6.



Mabel Queama with baked dampers prepared for men performing ritual, May 1987.

Table 6: Origin and consumption of individual foods at Oak Valley.

Item	Community store	'Ration boxes'	'Tea and Sugar'	Visitor	Total imports /gms/person
Jam, margarine, honey	26	38	2	1	67
Vegetables	1	86	18	6	111
Fresh fruit	4	0	10	1	15
Sugar	155	72	3	7	237
Cereals	32	17	0	3	52
Cakes, biscuits	46	0	3	1	50
'Shop' meat	34	24	13	3	74
Tinned meat	171	53	11	2	237
Tinned fruit	7	16	0	3	26
Tinned fish	7	3	0	0	10
Baked beans, spaghetti, tinned veg. etc	189	96	13	5	303

Fresh meat

Fresh store meat is obtainable at Oak Valley in a variety of forms, including bacon, chickens, chops and steak, as well as cooked meats like kabanos and fritz (processed sausage meat) which are bought from the 'Tea and Sugar' and eaten straight away without further processing. Most other meat is either cooked in a stew (chicken, chops), or is fried, either in a pan or directly on the coals. Most meat has a relatively high bone content, so absolute amounts are reduced by 30 per cent. A pork chop has 78.6 per cent edible tissue while chicken varies from wing (61.1 per cent) to breast (85.9 per cent)(see Commonwealth Department of Health 1986: 91).

Total weights of fresh store meat, their various sources and the calculation per capita per day are shown in Table 6. Oak Valley residents consume 74 grams of fresh meat per person per day. However, when this amount is added to the bush meat consumed and the tinned meat total, per capita meat consumption can be calculated and we discuss the implications of these figures later.

Tinned products

Tinned food forms a substantial and staple part of the Oak Valley diet. Most people keep tins for emergencies when fresh food is not available. Some people store tins of meat or fruit in their handbag, in an old suitcase at the back of their wiltja or windbreak, while others keep them in their steel tuckerbox. When food is short, people will obtain tins from friends or kin if their own supplies are diminished. The popularity of tins also rests on the ease with which processed tinned food can be eaten. Tinned meat is often warmed in the ashes once the top has been removed, usually with the aid of an axe. The contents of a tin can be conveyed to the mouth by means of a broad stick. Often several people will share a tin if insufficient are available for everyone to have one.

The figures show 237 grams of tinned meat are eaten per person per day, indicating that tinned meat provides a significant contribution to the Oak Valley diet. Tinned meat comes in a variety of forms. The most substantial is corned beef, sometimes mixed by the manufacturer with cereal. Other tinned meat products are mixtures of beef, vegetables and sauces, including Irish stew, steak and kidney pie (with pastry) and meatballs, sometimes with beans or spaghetti (see Table 6).

Tinned fish is eaten from the tin, but is not usually warmed in the fire. The most popular forms are tinned oysters and smoked mussels, all of which occur in small 110 gram tins. Quantities are small, amounting to only 10 grams per person per day. Oak Valley residents also eat, on average 26 grams per person per day of tinned fruit. This is generally eaten straight from the tin and is not prepared or heated in any way. Tins of spaghetti, baked beans, soup and vegetables were also noted in the food surveys, and amount to 303 grams per person per day. These tins are prepared in much the same way as tinned meat, but like tinned fish are regarded as relatively unimportant sources of food (see Table 6).

Eggs

Table 7 shows that, on average, Oak Valley residents eat an egg a day. These are usually fried or scrambled, and are considered a proper meal. Their attraction lies in the fact that they keep fairly well (even in hot weather) and are easy to prepare provided a frying pan is to hand. They are particularly popular with children.

Table 7: Origin of eggs consumed per person per day at Oak Valley.

Store	'Ration boxes'	'Tea and Sugar'	Total
0.8	0.2	0.1	1.1

Miscellaneous store foods

Other store foods can be divided into categories such as baby foods, chips, confectionery, instant foods, oils, powders (baking and curry), sauces and condiments, soups and stock powder. In addition there were very small amounts of pasta, pasties, sultanas and drinking cocoa (pasta, one kilogram from the 'Tea and Sugar'; pasties, 600 grams from the 'Tea and Sugar'; cocoa, 750 grams from the visitors; and sultanas, 6.25 kilograms in the 'ration boxes'). Data concerning per capita daily consumption of the other foods, with the exception of baby foods, are contained in Table 8.

Per capita baby food consumption was calculated using an average child population (less than three years) of 8.38. It is evident that processed baby food is a very minor part of an Oak Valley infant's diet since each baby only consumes, on average, six grams of the food per day.



Table 8: Miscellaneous store foods consumed at Oak Valley.

Food type	Gms/person/day
Chips	4
Confectionery	2
Instant potato	1
Cooking oil	20
Baking and curry powder	5
Sauces and condiments (liquids)	20
Sauces and condiments (solids)	19
Soup powders	15
Total	86

Beverages

As we have already noted water is delivered to the camps from a water truck and stored in small mobile tankers adjacent to people's living areas. There is high potential for pollution of this water source from air-blown dust, since the tanks are seldom covered. Moreover, taps on the tanks are usually inoperative, forcing people to dip billies or buckets into the water, permitting dust and sand from the bottoms of these containers to fall into the water tanks. Water is usually used for making tea (most sugar consumed is incorporated into tea), and in hot weather people drink quantities of water, usually straight from a billy can or bucket. Water is also mixed with cordial. Milk powder, when available, is added to tea.

Absolute quantities of water consumed as a beverage, either prepared as tea, cordial, milky tea or by itself is difficult to determine. Much water is wasted from the water tanks, since taps leak, are left running and children play with the water, particularly in hot weather. Our own water consumption for drinking only over a 12 day period was approximately 60 litres, or two and half litres per day, but this increased to almost double the amount in very hot weather.

Foods added to water include cordial, milk and tea. We recorded 24 millilitres of cordial consumed but only on average five millilitres of fresh or tinned milk per person per day (this figure included cream and ice-cream, which was very seldom included in the diet). The bulk of milk consumed (59 grams per person per day) was taken in the form of milk powder. However, nearly 29 grams of tea per person per day were consumed. The most important beverage apart from water is tinned or bottled carbonated drink, known collectively as 'cool drink'. These products are consumed in some quantities when available and per capita daily consumption amounts to 292 millilitres (see Table 9).

Table 9: Beverages consumed at Oak Valley.

Beverage	Person/day
Powdered milk	59 gms
Milk, liquid	5 mls
Soft drink	292 mls

Bush foods and store foods: discussion

Table 10 is a summary of both store and bush foods consumed at Oak Valley in descending order of quantity, omitting water, expressed as per capita daily consumption. Figures are in grams unless otherwise stated. In this section we discuss some of the implications of these figures and probe them for possible irregularities.

Meat

Evidently the Oak Valley residents are great meat eaters. Meat of all types (bush meat, tinned meat and frozen or fresh store meat) is represented by a per capita daily intake of nearly 907 grams per day. Bush meat amounts to some 600 grams all told (see Figures 4 and 5).

Table 10: Summary of foods eaten at Oak Valley (per person per day).

Food type	Average/person/day
Bush food: meat (kangaroo)	550
Store food: flour	540
Store food: tinned (misc)	303
Beverages: soft drink (mls)	292
Store food: meat (tinned)	237
Store food: sugar	237
Store food: bread	153
Store food: vegetables	111
Store food: miscellaneous items	86
Store food: meat	74
Store food: spreads	67
Store food: cereals	52
Store food: cakes and biscuits	50
Bush food: meat (rabbit)	36
Store food: fruit (tinned)	26
Store food: fresh fruit	15
Store food: fish (tinned)	10
Bush food: meat (turkey)	10
Bush food: maku	5
Store food: eggs (number)	1
Bush food: meat (reptiles)	1

Figure 4: Kangaroo as proportion of other bush meat.

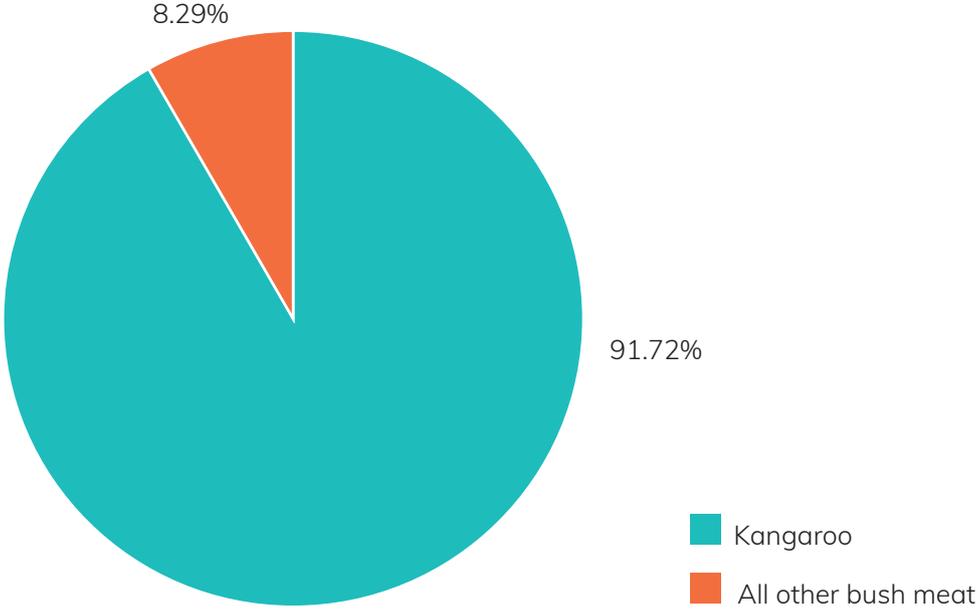
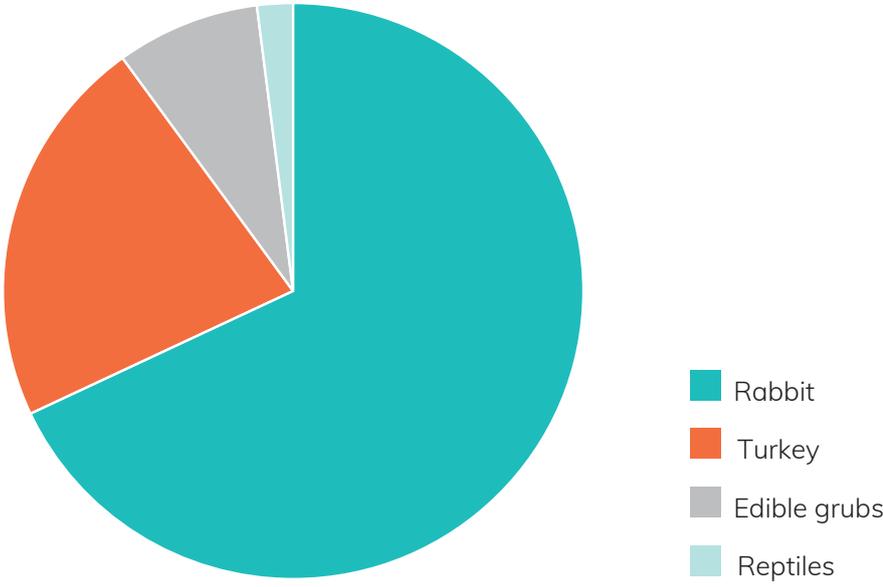


Figure 5: Proportions of meat consumed (excluding kangaroo).



In Table 11 we present some comparable figures:

Table 11: Meat consumed by comparable hunting and gathering societies and by Australians.

Location	Type	Source	Consumption/ person/day
Australia (meat consumption)	Meat and meat products	Commonwealth Dept of Health ¹	192 gms
North American Indian (British Columbia)	Meat (6 species)	Brody ²	454–907 gms
Australia (Western Desert)	Kangaroo/hunt	Gould ³	558 gms
Australia (Western Desert)	Kangaroo, Euro	Hamilton ⁴	159–227 gms
Australia (Arnhem Land)	Tinned meat, mammals, birds, fish, reptiles	Altman ⁵	250–290 gms
Australia (Oak Valley)	Bush meat	This study	600 gms

Notes

1 Commonwealth Department of Health 1986: 78 (average for men and women).

2 Brody 1981: 201.

3 Gould in Hamilton 1979: 206.

4 Hamilton 1979: 208.

5 Altman 1982, computed from data for months of October and November 1979 and April and May 1980.

Brody's figures are based on edible meat from six species, but he adjusts them down to these figures by eliminating one species altogether (bear) and halving beaver meat (Brody 1981: 201). Hamilton considers Gould's figures to represent meat available per hunt and per capita daily figures would have to be averaged according to the number of hunts per month. Hamilton's figures include only kangaroos and Euros (*Macropus robustus*), and do not include store meat or store food, but in estimating at only 50 per cent available meat per animal, these figures would have to be increased by approximately 20 per cent to be comparable with those we collected from Oak Valley.

Clearly the Oak Valley people have greater access to vehicles, rifles and open country suitable for hunting game than either Gould's Western Desert people, or Hamilton's Mimili people. Brody's figures indicate that other hunting societies also consume large quantities of meat (see also Stefansson 1946; Brody 1987). However, there may be occasions when consumption is considerably reduced due to wastage as a result of over-supply of game. We conclude that ample leisure time, access to vehicles, rifles and the prestige associated with hunting, particularly for the younger men (cf Sackett 1979) will inevitably result in more kangaroo meat being supplied than the camp really requires. There is no doubt that the Oak Valley residents eat kangaroo whenever it is available and then in considerable quantities. Like the supply of flour (see below), demand may not keep pace with supply. The data in Table 12 show the net weights of hunted kangaroo meat provided and the population in the camp over a 12 day period in February, 1988.

Table 12: Net weights of kangaroos brought into camp, February 1988.

Date	Kangaroo meat (kgs)	Population
18.2.88	16.2	45
19.2.88	00.0	42
20.2.88	00.0	60
21.2.88	80.9	85
22.2.88	32.4	50
23.2.88	00.0	65
24.2.88	00.0	65
25.2.88	16.2	68
26.2.88	00.0	68
27.2.88	64.7	79
28.2.88	00.0	85
29.2.88	48.5	63

In the period 18–20 February the average population was 49 over that three day period, allowing for an average consumption of 110 grams per person per day. Kangaroo meat was eaten on the 20th (the third day after it was hunted) as it appears on the food schedules. On 21 February the population rose to 85 and there was a massive increase in the meat supply (113 kilograms in two days), but then no more meat was brought in for the next two days. Kangaroo appears on the food schedules each day from the 21st to the 24th, during which time there was an average population of 66.25, giving an average daily per capita consumption for the four days of 427 grams. During the next two days (25 and 26 February), only 16.2 kilograms of meat was available (population = 68), but no kangaroo appears on the food schedules for the 26th, although three families were participating in the survey on that day. This indicates that all the meat was eaten on the day it was brought in, giving a per capita consumption on that day of 238 grams. Kangaroo was eaten on the 27 and 28 February, with an average population of 82, computing to 394 grams per person per day.

The February figures indicate a lower level of hunting than during the other field work periods (May 1987, 388 kilograms; August 1987, 744 kilograms; November 1987, 324 kilograms; February 1988, 259 kilograms), but in hot weather meat keeps less well. Overall we conclude that Oak Valley residents are opportunistic about eating hunted meat, and consumption patterns indicate that larger amounts may be consumed when available (cf O'Dea et al 1988: 178). Because supply has little to do with demand, periods of oversupply (e.g. August 1987) may result in some wastage if meat is discarded when fresher supplies enter the community. This indicates the danger of regarding a hunting and gathering economy without reference to cultural and social forces and arguing that optimal foraging (or optimal hunting) determines food procured. The Oak Valley people do not exercise choice over food procurement in a cultural or economic vacuum. Therefore food supply or procurement may not necessarily match needs (see O'Connell and Hawkes 1982: 107).

It is unlikely that such discarding of meat takes place frequently, however, because if we reduce daily meat intake by 50 per cent to generate a figure of 454 grams/person/ day (all meat) this would result in approximately 30 kilograms of meat per day being wasted. At Oak Valley meat not eaten by people is taken by the dogs. We have estimated that an average dog population is 43, and this would amount to 697 grams of meat per dog per day (excluding bones and offal which they get in any case). Even with the dog population of 80, each dog would receive 375 grams of meat per day. The condition of the dogs, even allowing for gross infestation by parasites, does not indicate this level of meat consumption.

Flour

Total consumption per capita per day of bread and flour amounts to 693 grams. This figure may be artificially high for two reasons. First, the 'ration' system was instigated because of the failure of the store and was not meant to complement it. However, on one field study period both 'ration boxes' and the community store were operating, effectively increasing the flour available to the community. Second, there is a significant difference between goods purchased from the store and the 'ration boxes'. Goods purchased from the store represent an indication of people's needs expressed as real purchases. The 'ration boxes' are presented to people with little or no consultation as to real requirements. Our conclusion is that the large amounts of flour included in the 'ration boxes' may bias our figures and the results may not represent a true picture of the amounts of flour consumed.

There are two ways to check these data. First, we calculate per capita daily consumption from the two periods when the 'ration boxes' were not available (May and August 1987). Second, we treat total bread and flour available as the amount available for 48 days, with no allowance for consumption periods. These calculations, for both bread and flour, are presented in Tables 13 and 14.

Table 13: Daily per capita consumption of flour and bread calculated as direct proportion of all available sources.

Type	Gms	Days	Persons
Bread	263 660	48	65
Flour	940 000	48	65
Total	1 203 660	48	65

Per capita consumption per day = 385.79 grams.

Table 14: Daily per capita consumption of flour and bread over two study periods (excluding 'ration boxes').

Type	Gms	Days	Persons
Bread	201 780	24	65
Flour	335 000	24	65
Total	536 780	24	65

Per capita consumption per day = 344.09 grams.



We noted earlier that no allowance for waste was made for store foods to compensate for under-reportage. We did not note any particular wastage of bread or damper. Some older women occasionally mix up flour and water to feed their dogs, but this is considered unusual and rather eccentric behaviour. It is true that the crusts of damper are often too hard to be easily eaten, but Oak Valley residents are good damper makers and hard crusts are not common. Damper is best when eaten fresh. Dampers we weighed were about 2.5 kilograms each, which were shared between an average 5.77 persons at each hearth at each meal, meaning an average consumption of 430 grams per damper.

Our alternative figures range from 344 grams per person per day to 693 grams per person per day. Altman (1982: 467, 471) gives per capita consumption for the periods December 1979–January 1980 of 170 grams per person per day and April to May 1980 of 160 grams per person per day. This allows for 20 per cent wastage, but the readjusted figures (212.5 grams and 200 grams) still place Oak Valley consumption well above that of the Gunwinggu of north-west Arnhem Land. O’Dea et al. (1988: 178), however, provide a figure of 240 grams of flour per day for individuals in north-east Arnhem Land. We conclude that per capita daily consumption falls somewhere between the minimum and maximum for figures which we have provided (median = 518.5 grams). Allowing for the possibility that there will continue to be an oversupply of flour a figure of approximately 500 grams per person per day is not unreasonable.

Other foods

For the sake of comparison we provide some indication of the Oak Valley consumption levels in relation to both the standard Australian consumption and that recorded by Altman (1982). Unfortunately, categories of foods chosen by other authors do not readily match our own, but the following table is instructive.

Table 15: Comparison of some major food types with other sources. Figures are in grams per person per year unless otherwise stated.

Food type	Australia ¹	Altman ²	Oak Valley
Soft drink	54.5 ml	8.8 ml	291.7 ml
Sugar and spreads ³	23.0	140.0	303.5
Vegetables	268.5	0.0	111.3
Cereal and cereal products (including bread)	232.5	120.0	754.8
Fresh and tinned fruit	178.0		40.5
Eggs ⁴	19.0	0.0	65.0

Notes

- 1 Commonwealth Department of Health 1986. Calculated as an average from figures for both men and women. Recent figures from the Bureau of Census and Statistics show consumption of carbonated drink to be 218 millilitres per person per day in the period 1987–88 (Adelaide Advertiser 21 September 1988: 3).
- 2 Altman, 1982 for the period October–November 1979.
- 3 Recent figures collected from Pipalyatjara give a total per capita of intake of 207 grams of sugar per day and from Amata 265 grams of sugar per day (Nganampa Health Council et al. 1987: 67).
- 4 1 egg = 65 grams.

Clearly Oak Valley residents consume large quantities of meat, bread, sugar and spreads. They eat few vegetables and either fresh or tinned fruit, but more eggs than most Australians.

In terms of kilojoules (kJ), calculations can be determined by the equivalence set out in Table 16. We include both kilojoule calculation and protein indication so that some evaluation of the total diet can be made.

Table 16: Kilojoules and protein content of Oak Valley foods (Source: Thomas and Corden 1977).

Food type	Net weight/ person/day	Kilojoules/ 100 gms	Protein/ 100 gms
Meat (fresh, lean)	670	628	21.3
Meat (tinned, canned pie)	237	712	11.8
Damper	500	1507	11.0
Bread (white)	152	1017	7.8
Soft drink	292 mls	184	0.0
Fresh vegetables (carrots)	111	126	0.8
Biscuits and cereals (cornflakes)	102	1549	8.6
Spreads (jam)	67	1235	8.3
Tinned fruit (peaches, sweetened)	26	285	0.4
Tinned fish (sardines)	10	1193	20.9
Miscellaneous (as dried mushroom soup)	86	1608	9.6
Fresh fruit (oranges)	15	188	0.9
Miscellaneous tinned (steak and onions)	237	741	14.0
Sugar	236	1633	0.0
Eggs (fried)	65	942	11.7

Figures are taken for a specific type of food since the Oak Valley samples represent many varieties. These specific food types are noted in brackets in the above Table. Meat is calculated on the figures for lean beef, since kangaroo meat is quite lean. Store meat has more fat but represents only a small part of total meat intake. Miscellaneous foods are calculated as dried packet mushroom soup, although this category represents several different food types. Maku are excluded as being too few to be of consequence. Table 17 shows the theoretical kilojoule and protein intake for an Oak Valley resident per day, based on the figures in Tables 10 and 16.



Table 17: Theoretical kilojoule and protein intake for Oak Valley resident per day.

Food type	Kilojoules	Protein
Meat (fresh, lean)	4207.00	142.71
Meat (tinned)	1687.00	27.96
Damper	7535.00	55.00
Bread (white)	1545.84	11.85
Soft drink	537.28	0.00
Fresh vegetables	139.86	0.88
Biscuits and cereals	1579.98	8.77
Spreads	827.45	5.56
Tinned fruit	74.10	0.10
Tinned fish	119.30	2.09
Miscellaneous	1382.88	8.26
Fresh fruit	28.20	0.13
Miscellaneous tinned	1756.17	33.00
Sugar	3853.88	0.00
Eggs (fried)	612.30	7.60
Totals	25 886.22	303.91

The mean intake per person per day for Australians is 11 010 kJ (for men) and 106 grams of protein (for men). Altman, who calculates his data in kilocalories, provides per capita figures in the range 2692 to 3190¹ and protein 88.2 to 155.8 (Altman 1982: 66). No attempt is made here to tackle the difficult questions of variable intake across the population. 'Benchmark' figures for populations are equally difficult to calculate, Altman giving a 'theoretical' benchmark of 65.5 grams of protein per person per day, and approximately 3000 kilocalories (12 570 kJ) depending on age, weight and activity. There is no doubt that the figures we present here are high, indicating a high energy protein diet, lacking balance, particularly that provided by fresh fruit and vegetables. The only comparable figures available for a similar area of Australia (Nganampa Health Council et al. 1987) provide per capita energy in calories for the Western Desert community of Amata of 4128 (17 296.32 kJ), which is still well below our figures. However, the Amata people described in that study were not able to obtain the large quantities of kangaroo meat or the excessive quantities of flour available at Oak Valley. While we must always entertain the possibility that wastage at certain times is higher than we have allowed for, there is no doubt that there are periods in which the Oak Valley people have large quantities of food available. During glut periods it is possible that wastage occurs since accumulation and perpetuation of a surplus is not culturally attractive.

Note

1 Kilocalories are converted to kilojoules by multiplying by 4.19. Altman's range is therefore 11 279.48 to 13 366.10 kilojoules.

5 Food distribution and allocation

Food is not allocated evenly within a population so distribution varies. Moreover, some people eat less than others (small babies eat less than young men) and some people choose different types of food to others. It is very difficult to determine the exact extent of the distribution within a varied population without studying individual consumption. The figures developed in the previous chapter represent ideal average per capita intake. In this chapter we attempt to characterise the sorts of choices people make about the food they eat.

Typical meals

We chose our hearth groups in order to represent as wide a range of types of family as possible. To this end we selected an elderly couple whose children were mostly grown up, a middle-aged couple with some younger children and a young couple with a baby. Due to the problems of consistency with respect to the hearth groups, we were forced to change groups from time to time. However, an example of menus for three of the hearth groups that participated most frequently (identified as B1, D1 and M1) gives a good general idea of food consumption at Oak Valley by different types of family. Broadly, these family groups can be described as follows:

B1 An elderly couple with their offspring and unmarried sons.

D1 Middle-aged man with a wife, a young wife and a baby.

M1 Middle-aged couple plus several dependent children.

All three hearth groups had a number of additional members who were either directly related or who had other close bonds resulting in them sharing the same food.



Breakfast at a hearth consists of frankfurters, tea, Weetbix and a piece of red kangaroo placed on cardboard, May 1987.

Typical menus for these three families are as follows:

Day One

	B1	D1	M1
Breakfast	Kangaroo tail, tea, sugar (between 9)	Bread, butter, biscuits tea, sugar (between 5)	Bread, tinned meat, tea, sugar (between 5)
Lunch	Damper, kangaroo, potatoes and chicken stew, water (between 9)	Biscuits, tinned meat, tea, sugar (between 2)	Soup from chops, potatoes, tea, sugar, bread (between 5)
Dinner	Damper, kangaroo, tea, sugar (between 9)	Biscuits, chops, pancake, tea, sugar (between 5)	Soup (from lunch), tea, damper, sugar (between 5)

Day Two

	B1	D1	M1
Breakfast	6 eggs, tea, sugar, bread (between 5)	Bread, damper, tea, tinned meat (between 8)	Damper and tea (between 10)
Lunch	Bread, tea, 2 rabbits, orange (between 5)	Rabbit stew, tea, damper (between 5)	Tea, damper, tinned meat (between 10)
Dinner	Damper, rabbit, tea, sugar (between 5)	Bread, margarine, damper, kangaroo, tea (between 7)	Damper, kangaroo, tea (between 9)

Overall these three families show little variation in food consumption. Family B1 perhaps tended to prepare less elaborate food and eat more kangaroo and damper. Some of the younger families ate more complex meals involving a greater variety of food and more preparation. However, we feel the lists given above are typical for the general Oak Valley population. It is also evident that Oak Valley people eat three substantial meals a day.

We measured variation in occurrence of food types in each hearth group by counting the number of times various foods were reported as having been eaten. On average kangaroo then is eaten 43 per cent of the time, while damper occurs 63 per cent of the time; tinned meat over 19 per cent, rabbit only 10.6 per cent. These figures again confirm the high consumption of kangaroo meat and of flour as damper. These figures are summarised in Table 18.

Table 18: Distribution of various food types within hearth groups.

Family	No. of times participated	Kangaroo		Rabbits		Damper		Tinned meat	
B1	67	41	(61.19)	5	(7.46)	53	(79.10)	7	(10.44)
D1	62	21	(33.87)	10	(16.12)	39	(62.90)	17	(27.41)
M1	61	20	(32.78)	9	(14.75)	36	(59.01)	20	(32.78)
C1	24	13	(54.16)	4	(16.66)	13	(54.16)	5	(20.83)
Q1	24	9	(37.50)	2	(8.33)	19	(79.16)	3	(12.50)
Q2	16	6	(37.50)	0	(0.00)	7	(43.75)	2	(12.50)

Feeding the children

Pitjantjatjara babies at Oak Valley are breastfed for up to three years, although supplementary food is usually introduced at about eight months as recommended by doctors (cf Bryce 1983: 5). The arrival of another baby does not necessarily mean that the older baby is instantly weaned, and may still be given breast milk if it so desires. Many women suckle other women's children if they are lactating. Breastfeeding is demand feeding and Aboriginal children are expected to actively seek out the breast when hungry. In fact, the extent of feeding seems to depend on the degree to which the child demands food. The absence of demand by a baby (such as a sickly baby) may result in underfeeding (cf Harrison 1986).

Babies were seen to drink cold tea from bottles filled at the camp and also to drink from commercially produced bottles filled with fruit juice. A health sister remarked that the use of cold tea and juice in this way was a valuable protection against dehydration in the summer months. A baby of two months in mother's arms was fed in this way and children who can sit unaided were seen drinking from bottles. Breastfeeding is encouraged because of the known advantages of mother's milk and the problem of cleanliness with bottles and teats. However, although breast milk has some protective effect, it cannot prevent infections in a grossly contaminated environment (Gracey et al. 1983). Although a suckling infant may ingest any dust or sand on the mother's breast (and women do not wash their nipples before allowing an infant to suckle), it is clear that there is more chance of ingestion and resultant infection in bottle-feeding, as teats and bottles are difficult to keep clean and are never sterilised.

Babies who become apathetic as a result of repeated infection are less likely to respond enthusiastically to food, and less likely to seek it out, as Harrison remarks (1986: 79). Mothers are sometimes unwilling to persist in efforts to encourage an unwilling baby to consume.

Solid food

Supplementary food for young babies takes the form of Farex (baby porridge) and commercially produced baby food in tins. For example, one child of seven months was fed breast milk, Farex and tinned strained prunes. A mother described for us what she fed her one-year old child. This consisted of powdered instant milk (mixed with water), Farex, canned rice cream, canned baby food and pre-chewed chops (lamb chops from the store which mothers may chew before giving to their infants). It was noted that the Yalata store kept a special shelf of baby foods appropriately labelled.

Children of this age eat scrambled eggs. A mother was also seen preparing roast potatoes for her 18 month old child. The potatoes were roasted whole in the hot coals, the burnt skins peeled and the potato placed in a large tin mug and mashed with a spoon before being given to the child. This child also ate kangaroo tail. A two-year-old was seen eating cooked goanna. Turkey wing is favoured by some children because it is 'juicy'.

There is no pressure upon children to eat bush foods (as opposed to store foods). Adults do not try to tempt children to try a taste of something from the bush which is unfamiliar to them. We were surprised to discover, for example, that although maku (grubs) are considered a delicacy given especially to children and the elderly, not all children had tasted one. A woman of 20, who accompanied us on a grub-digging expedition (and who dug as energetically as everyone else) had never eaten one herself. A child of eight in one of our hearth groups had never tasted turkey or goanna (maku). A child who has not tasted a particular bush food is said to be ignorant, unknowing (ngurpa), rather than knowledgeable (nyinti).

The practice of agreeing to children's demands for food, rather than initiating the offer of food to a child is a pervasive aspect of child-rearing among the Pitjantjatjara (and indeed among other Aboriginal groups). In general children are accorded an autonomy of behaviour and decision-making 'which may have unfortunate nutritional consequences for some', as Harrison points out in her study of the Tiwi of northern Australia (1986: 69).

Children at Oak Valley eat considerable quantities of damper and other filling foods such as Twisties and chips (potato or corn-based snack food) if they are available. A child old enough to walk and talk will ask for money to go to the store and then proceed to buy such items with no intervention from its mother. However, in contrast to the Yalata Store where a variety of such treats are available, the Oak Valley Store is understocked with these items. Children accompanying adults to the 'Tea and Sugar', train however, emerge clutching cool drinks, chocolates, sweets and ice-cream.

By the time a child is mobile and independent, he or she may eat whatever food is available to the hearth group, and may receive food from other hearths simply by arriving at an opportune moment. They may also help themselves to food lying around at the camp. For example we observed an eight-year-old boy take an orange, find an axe that was lying on the ground, cut the orange open with the axe and then consume the orange. A teenage boy took a tin of steak and vegetables from his mother's tin tuckbox, opened it uncooked with an axe, emptied it into an enamel bowl, poured tomato sauce onto it and ate it with a twig.

Allocation of kangaroo

There are some popular misconceptions about the allocation of kangaroo, resulting in the erroneous conclusion that such allocation could be used to predict eventual distribution. Certainly, some writers (Gould 1967; White 1972: 203; Altman 1982: 233–35; Hamilton 1979: 204–6) note that certain categories of person received specific cuts of kangaroo meat. However, rules of distribution are not uniform across Aboriginal Australia. Moreover, initial rules of allocation cannot be used to conclude that people consistently received the same cuts of meat since allocation in these societies was (to some extent) determined by kinship relations. Since different hunters may be involved over time, patterns of allocation, influenced by kin relations, would necessarily also vary.

Oak Valley residents do observe rules in the allocation of kangaroo, and the cooked meat is always divided according to traditional practice. The cook, who is usually a young man, receives the tail. The hunter receives the head, kidney and heart, though a hunter may also receive a thigh. The cook may choose to give the tail (or parts of it) to children, and all organs may be reallocated by the prime recipient on return to his or her own hearth. The tripe is removed when the animal is gutted and carried outside the carcass. If the animal is cooked in the bush, as is often the case, members of the hunting party will often cook the tripe on the ashes and eat it straight away. Other organs are cooked with the animal and are shared with the major cuts which are the two thighs (tjunta), rump and pelvis (ankulpa), lower back-bone (witupi), head, ribs and shoulders (kurltu) and tail (wipu). The head is sometimes cut from the kurltu below the neck, this whole piece (head and neck) being called kataraka. The head alone is kata. The liver (yalu) is divided with the lower back (witupi) and the kidney (munari) and heart (kututu) with the kurltu. While the kidney and heart go to the hunter with the head, the liver can be given to anyone. These organs are usually recooked in the ashes prior to eating. Lungs are divided with the kurltu but are not particularly prized and may be given to the dogs.

Allocation of meat is a matter of circumstance and it is hard to predict that any one sort of meat will predominantly go to one section of the population. For example, a hunting party of young men may eat the offal in the bush while cooking an animal, and so these tender parts may not get distributed in the camp. On one occasion we observed the butcher, who was also the cook, eating the kidney as he butchered the animal. Moreover, subsequent reallocation among the hearth group members may mean that the parts of a kangaroo that first went to one member of the community may, in fact, end up being eaten by someone completely different. Overall, perhaps, there may be a tendency for the hunters (young men) and older people, along with children, to receive the soft, tasty pieces (heart, liver, kidney and tail), while other cuts go to those not directly involved in the hunt, or who are not within these groups.

Family B1 ate kangaroo twice as often as M1 and D1 and considerably more often than Q1 and Q2. The senior member of B1 was physically quite incapacitated, but he kept a rifle and a supply of bullets, commodities that were always hard to find in the camp. As a result he was able to sponsor hunting trips and received, as a consequence, as much kangaroo as he wanted. He also expressed a distaste for tinned meat which he described as being 'rotten' (una) and his hearth group in fact ate less of this tinned meat than any other group.

Damper

There is also considerable variation in the amounts of damper eaten by different groups, though the reasons are more difficult to determine. Both B1 and Q1 had a high frequency of consumption of damper, and both were constituted of predominantly older people. Q2, as a younger family, preferred bread, and had access to bread more often than the other groups because of increased mobility enabling purchase directly from the Yalata store where sliced wrapped bread was readily available.

The variables involved in food distribution are complex and change over time. It is difficult to predict with any certainty food consumption across the Oak Valley population. A single change of circumstance (the loss of a gun, acquisition of a vehicle by a hearth group with a good hunter and good equipment) would change the status quo completely. While we spent some time discussing kangaroo allocation with the Oak Valley residents, we were not able to conclude that it was possible to predict with any certainty that one sector of the population would receive one particular cut more frequently than another. We concur with Altman (1982: 226) that such 'patterns of sharing are often determined by a number of complex and often – interdependent factors'. Predicting food allocation and distribution is a hazardous and difficult (if not impossible) task.

6 Diet, health and lifestyle

The relationship between diet and personal health of Oak Valley residents is complex because the diet may vary over time and residence is seldom continuous. The long-term effects of a high protein, high calorie diet are not easily monitored in the circumstances. Measurement of health status was beyond the scope of this study. However, the lifestyle evident at Oak Valley did have a number of health implications and these were evident to the researchers. Moreover, since Oak Valley was used as a retreat, to some extent, for heavy drinkers, some health problems showed up at Oak Valley that were a result of alcohol abuse elsewhere. Overall, the living conditions at Oak Valley for young and old alike were not conducive to good health, because of lack of water, sanitation, garbage disposal, unhealthy dogs and a general ignorance of personal hygiene practices.

An overview of Aboriginal health

Studies of the health status of the Aboriginal population show that the infant mortality rate (IMR) has been reduced over the last decade although the crude death rate has remained at the same level. The reduction in the IMR is due to a decline in deaths occurring in post-neonates (i.e. 28 days–12 months). However, Aboriginal infant mortality rates are still two to four times the non-Aboriginal Australian rate (Thomson 1983; Gracey and Spargo 1987; Commonwealth of Australia 1988: 86).

Aboriginal children in Australia are up to five times more likely to be hospitalised than non-Aboriginal children. Serious lung complaints among Aboriginal males are five times more frequent than the white Australian rate, and among females are 5.6 times the white rate. Fifty-eight per cent of Aboriginal children hospitalised in Western Australia are in hospital for gastroenteritis. Perforated eardrums, hearing loss, blindness, leprosy, tuberculosis, exposure to hepatitis B, Sexually Transmitted Disease (STD) notifications and diabetes mellitus are all more common in the Aboriginal than in the non-Aboriginal population of Australia (1986 Census data; Northern Territory Department of Health 1986).

A recent Commonwealth publication commented that the poor growth rate for Aboriginal children is influenced by the higher percentage of low birth weight babies (ten per cent, compared with five per cent for other Australians). It also noted that communicable diseases such as respiratory tract and middle ear infections, diarrhoeal disease and trachoma are all significant causes of morbidity among Aboriginal people (Commonwealth of Australia 1988: 87).

Table 19: Life expectancy Aboriginal and non-Aboriginal people.
(Source: Nganampa Health Council 1986: 32).

Sex	Aboriginal people	Non-Aboriginal people
Male	48.7 years	70.9 years
Female	56.3 years	77.9 years



Other Pitjantjatjara communities

The Nganampa Health Service established in 1983 in Alice Springs is responsible for the health care of 2000 eastern Pitjantjatjara and Yankunytjatjara people in South Australia. It covers nine large communities and approximately 40 homeland communities. The annual health reports compiled by Nganampa provide detailed data on morbidity and mortality in the region (i.e. north of Oak Valley on the Pitjantjatjara Lands). Although many of the patients reside in large settlements with housing and ablution facilities, the lifestyle at some outstations in the north approximates to that at Oak Valley, although weather conditions, topography and water supplies are very different. Health issues relevant to this study are briefly outlined in some data from Nganampa health reports.

Respiratory disease is a major cause of morbidity among Pitjantjatjara people in the Nganampa region, with chest infections (including pneumonia) being the most common reason for emergency evacuation in 1985. Four patients were treated for TB in 1984 and, over a 12-month period, 377 presentations were counted at clinics for respiratory illness (Nganampa Health Council 1986: 43). Over fifty per cent of hospital admissions for Aboriginal people in South Australia were for respiratory disease in the under twelve months and over 50 years age groups.

Diarrhoeal disease is the most common reason for the evacuation of children. The report states:

As in other areas it is common to see a fall of initially good weight gain around six-nine months as inappropriate or insufficient solids are introduced...Diarrhoea disease exacerbates this problem (Nganampa Health Council 1986: 46).

Skin disease is very common: boils, sores, scabies and impetigo. Serious illness can result from streptococcal infections which may originate as skin infections (Nganampa Health Council 1986: 47).

Rheumatic heart disease is present, unsurprisingly, as its precursors are the upper respiratory tract infections which are 'everyday occurrences' in the Nganampa communities (Nganampa Health Council 1986: 51). Syphilis, gonorrhoea, donovanosis, pelvic inflammatory disease and hepatitis B are also significant causes of morbidity. Twenty-six per cent of the population are possibly infectious with hepatitis B. Trachoma, almost unknown in the non-Aboriginal population, is widespread. It is the major cause of blindness among Aboriginal people and is found only where hygiene conditions and water sources are poor.

Nutritional data show that 23.9 per cent of children under four are undernourished. As a result, infants and children are poorly equipped to resist and recover from the 'ever threatening host of infectious diseases' (Nganampa Health Council 1986: 82). For adults, obesity, hyperlipidaemia, hypertension, diabetes mellitus and cardio-vascular diseases signify the presence of nutritional problems. Nganampa's 1987 Environmental and Public Health Review stated that the diet of Aboriginal people in their area was high in energy, very high in refined carbohydrate, high in fat and salt and very low in dietary fibre. This pattern, they state, is consistent with obesity and associated symptoms (Nganampa Health Council 1987: 64). Clearly, from the data we present above, these comments would apply equally well to the Oak Valley experience.

The health status of Oak Valley residents

The Yalata-Maralinga Health Service provides a nurse to Oak Valley on a two-weekly roster. One or two Aboriginal Health Workers (AHWs) are generally employed at Oak Valley, however, the turnover of AHWs is high. The Royal Flying Doctor Service aircraft lands at the Maralinga airstrip and is available to evacuate any emergency cases.



The nursing sister treats people from his vehicle, February 1988.

The Health Service Director (Yalata-Maralinga Health Service 1988: 11–12) notes overall that the two populations are unhealthy, but that this is:

Not surprising in view of the poor hygiene and living conditions; poor nutrition, abuse of alcohol and volatile substances, lack of understanding and acceptance of some of the causes of diseases and their methods of prevention and control. These contributing factors to ill health could be overcome provided there is community determination and a will to improve.

Births and deaths for the two populations from 1984 to 1987 are shown in Table 20.

Table 20: Births and deaths Yalata and Oak Valley 1984–1987.

	Births	Adult deaths	Infant deaths	Total deaths
1984	15	11		11
1985	12	8	2	10
1986	10	16	2	18
1987	12	8		8
Totals	49	43	4	47

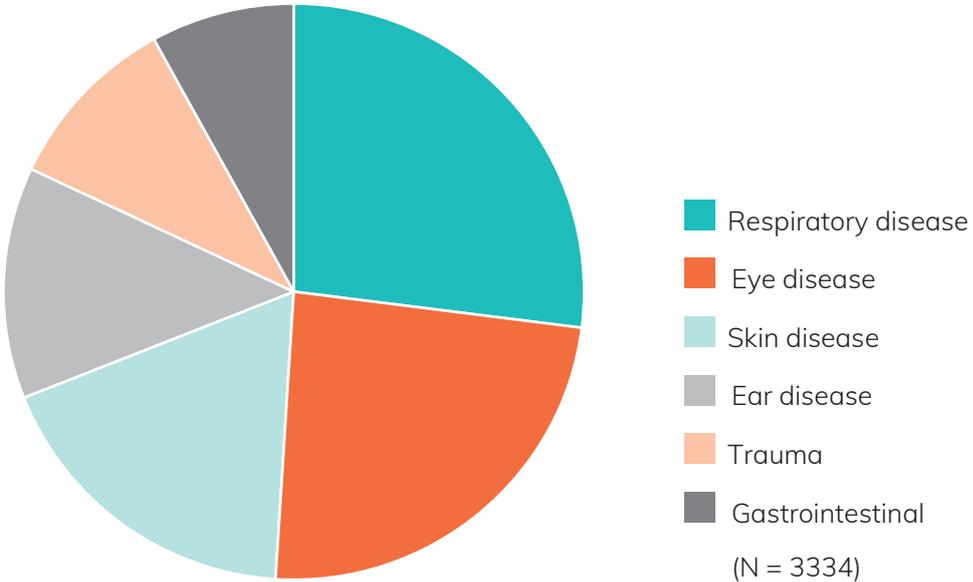
Over the six months, July-December 1987, a total of twelve ante-natal cases attended the Yalata clinic, despite the ‘reluctance of pregnant women to report voluntarily for ante natal supervision’ (Yalata-Maralinga Health Service 1988: 8). Breastfeeding is encouraged in all cases and supplementary and weaning foods for babies are encouraged from about six months of age. The Health Service Activities Report notes that mothers face great difficulties in maintaining a high standard of hygiene in the preparation of weaning and supplementary feeds, and this is reflected in a low weight percentile of infants during the weaning period (Yalata-Maralinga Health Service 1988: 9).

Most common medical complaints

According to Dr George Koteka of the Yalata-Maralinga Health Service, among Yalata and Oak Valley people the following medical conditions are common: upper and lower respiratory tract infections, diarrhoeal disease, skin disease, eye and ear disease, diabetes, hypertensive heart disease, obesity and childhood malnutrition.

Ranking them in order, the five most common reported conditions at Yalata are: skin disease, respiratory disease, trauma, eye disease and gastrointestinal disease, while at Oak Valley they are: respiratory disease, eye disease, skin disease, ear disease, trauma and gastrointestinal disease (see Figure 6).

Figure 6: Selected diseases as reported at Oak Valley, July 1987–June 1988.



It is significant that respiratory disease appears to be more common at Oak Valley than at Yalata since the desert outstation is certainly a dustier environment in which to live. However, the two populations intermingle at the different locations. For this reason, we can assume that the ill-health noted at Yalata is also prevalent at Oak Valley. In a six-month period at Yalata, there were 4379 consultations at the clinic, which, with an average population of 250, indicates an average attendance at the clinic of 17.5 times for every child and adult in the community (Yalata-Maralinga Health Service 1988: 5).

Figure 7 gives a picture over twelve months of the reporting of selected diseases at Oak Valley: trauma, respiratory disease, ear disease, eye disease, skin disease and gastrointestinal disease. Out of 3334 reports over the twelve months, we can see that respiratory disease was most commonly reported (910 cases, 27 per cent).

Figure 7: Reports of respiratory disease made at Oak Valley, July 1987–June 1988.

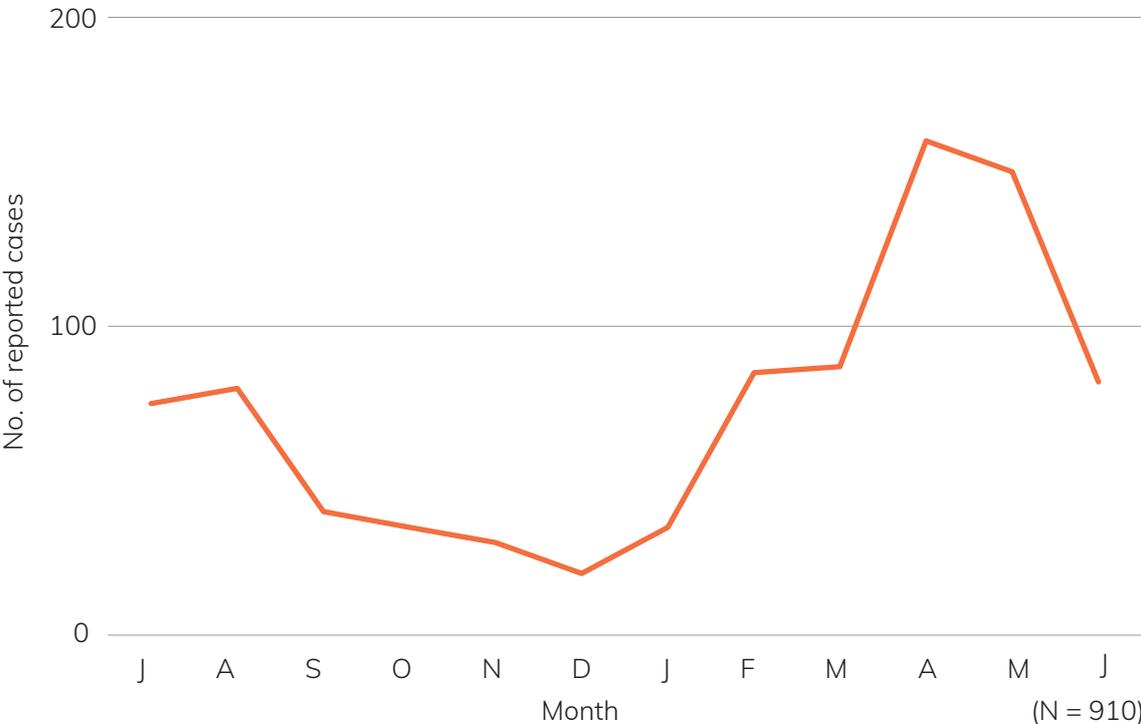


Figure 8: Reports of skin disease made at Oak Valley, July 1987–June 1988.

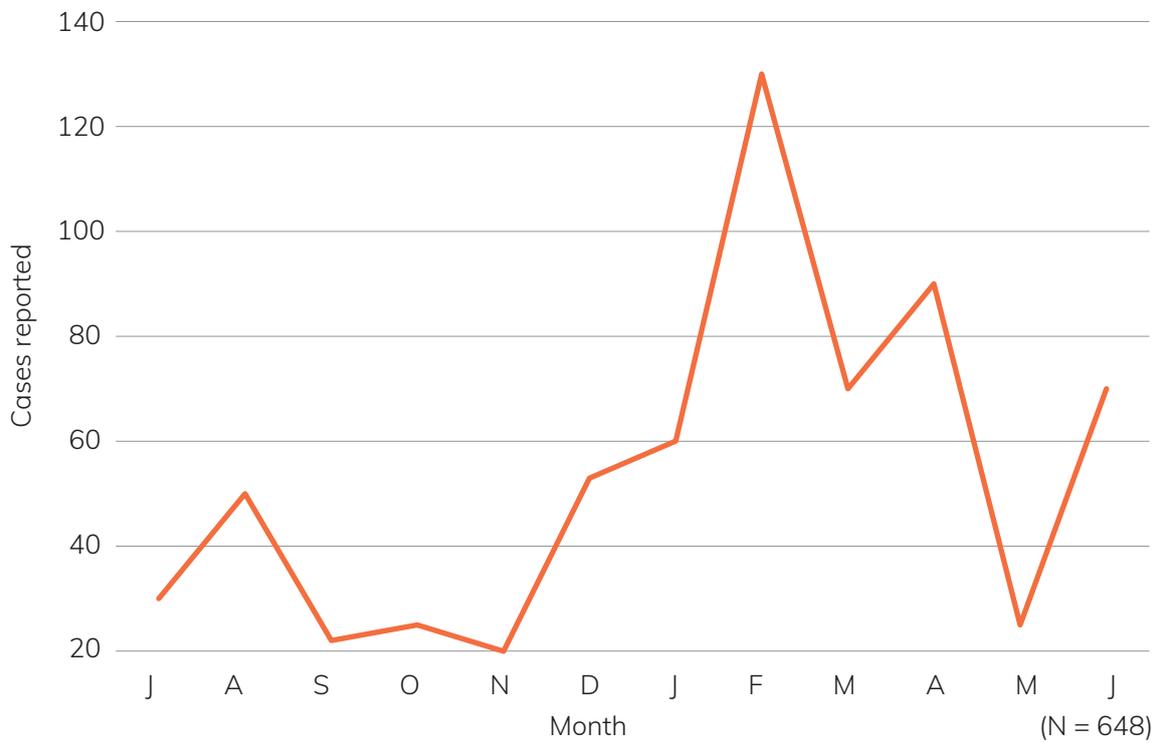
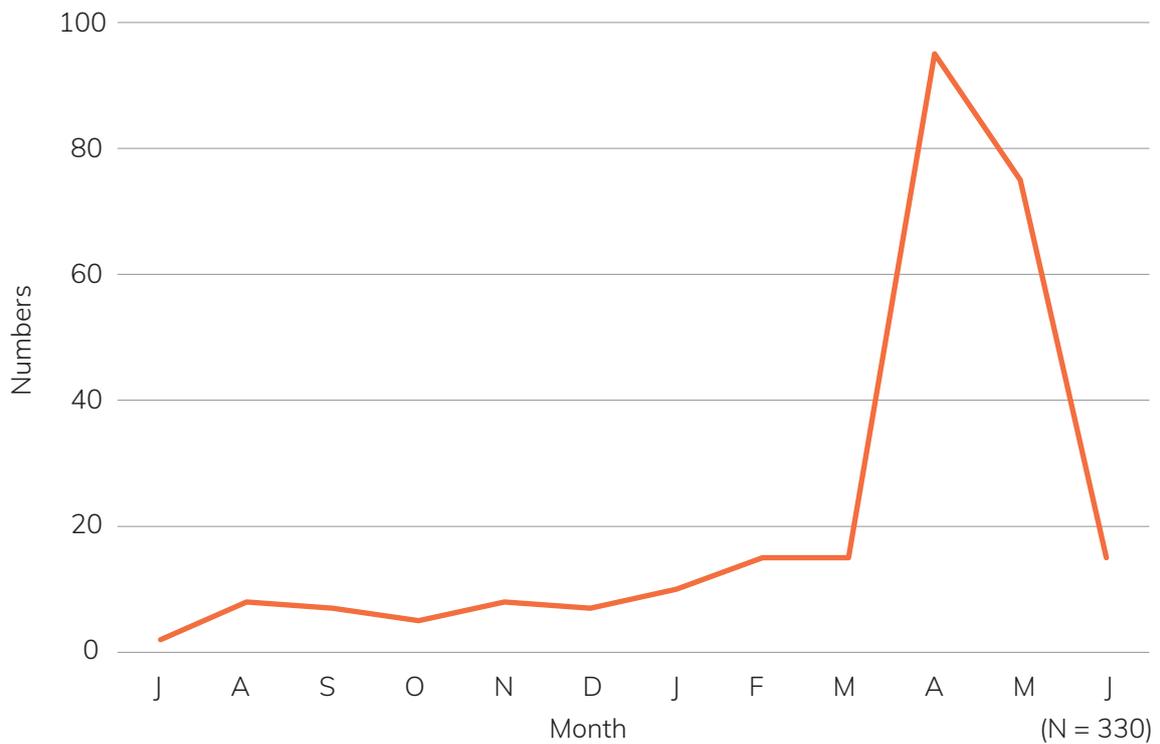


Figure 9: Reports of trauma (cuts, lacerations) at Oak Valley, July 1987–June 1988.



Figures 7, 8 and 9 provide a month by month account of reported cases of respiratory disease, skin disease and trauma at Oak Valley over twelve months. The notable increases in reporting for trauma in April and May 1988 are due to an increased population at Oak Valley during a period of intense ritual activity. These data show that when the population rises, so too does the notification of these health problems, thus putting a larger group of people at risk from inhalation and absorption of contaminants.

Infections

Sisters commented that most wounds become septic, and thus someone may be on a course of antibiotics for a small ailment such as a cut toe. Approximately 80 per cent of cuts become septic. If a person sustains a deep cut, he or she usually attends the clinic and is stitched up immediately. However, smaller cuts are often ignored until they become infected. Scabies also become infected and quickly become weeping sores. Again the quickest treatment is antibiotics.

Boils and infected sores are common at Oak Valley, and the legs, feet, hands, elbows and knees are mostly the affected parts of the body. Sisters treat boils with magnoplasm, which draws out fluids; the Oak Valley sister remarked that bandages are usually intact the following day, but are usually dirty. Boils tend to recur and do not heal rapidly.

Headlice are endemic and nursing staff remarked that children are particularly prone to scratching headlice and causing open headsores as a result. Up to 70 per cent of a child's scalp may be covered in dirt-encrusted sores as a result of lice. This means that dirt and dust may be directly absorbed through the scalp.

Sisters also noted that the majority of children have a nasal discharge and therefore tend to breathe through their mouths. Children with colds receive a solution of zinc and vitamin C, as an alternative to treatment with antibiotics. This is partly because courses of antibiotics are rarely completed and because of fears of liver damage. With such a high level of mobility among the population, between Oak Valley and Yalata, as well as between Oak Valley and other locations (Cundeelee, Warburton, etc.), clinic staff are unable to closely monitor such courses of treatment. Generally, however, children from the age of one month to their teenage years are on courses of antibiotics at an average of four courses per year. Broad spectrum strong antibiotics such as Erythromycin and Bactrin are used.

Trachoma

In May 1988, Dr H S Newland, Senior Staff Specialist in Ophthalmology at Flinders Medical Centre (Adelaide), visited Oak Valley and Yalata. He examined 29 children under ten years of age, 22 at Yalata and seven at Oak Valley. Twenty-four of the 29 children examined had follicular trachoma. Of the 22 examined at Yalata, 12 had follicular trachoma and two had sicatricial trachoma. Dr Newland commented:

The prevalences are obviously extremely high and I would not consider the difference between the two locations to be of any meaning. Both places are extremely hot, dry and dusty and Oak Valley has limited water, it being trucked from the railway line. By definition trachoma is associated with a messy, often purulent, discharge, which certainly does encourage dust and foreign matter to adhere to the eye and adnexae. I am not an expert on absorption through mucosal or squamous epithelium but inflamed or infected epithelium may well permit greater absorption. As anyone who has worked in these areas will know, the living conditions inevitably result in a high level of contamination with dust and dirt.

Health sisters said that ash and dust in the air frequently exacerbate eye infections, which tend to persist because of constant irritation from wind-borne dust.



Mineral and vitamin levels

Pregnant women receive iron supplements, infants receive vitamin A and D supplements, and children are given 1000 milligrams per day vitamin C as well as a cod-liver oil preparation (vitamin A and D). Some children receive an iron and zinc sulphate mix supplement.

Studies by Professor Donald B Cheek (University of Adelaide Medical School), Dr Graeme McIntosh (CSIRO) and others were undertaken at Yalata in 1986 to investigate plasma concentrations of vitamins, trace elements and iron stores among 26 children from six to 13.5 years. These researchers collected data from three rural Aboriginal settlements and one rural Caucasian school in South Australia. Yalata Aboriginal children had the greatest reduction in body weight and of intracellular water for age. There was reduction in both height and weight of the Yalata children relative to the other communities studied. Their plasma, zinc, iron, tocopherol (vitamin E), B-carotene (pro-vitamin A), and retinal (vitamin A) concentrations were lower than normally grown Aboriginal children at another rural community.

Plasma zinc concentrations were significantly lower as were plasma iron values. Pro-vitamin A concentrations were dramatically lower than in other South Australian Aboriginal children. The researchers noted that the desert environment of Yalata prevents hookworm but allows a higher incidence of Giardiasis. Giardiasis 'causes significant damage to the upper small intestine with flattening of villi and a histological appearance identical to that of coeliac disease'. Giardia is capable of inhibiting the absorption of zinc and vitamins including vitamin E (Cheek et al. 1989).

The role of zinc in Aboriginal nutrition has been summarised by Thomson (1984) who comments that zinc requirements are increased in cases of pregnancy, lactation, rapid growth and recovery from malnutrition. Low zinc concentrations are associated with, but not necessarily the only factor in, mild or moderate growth retardation among Aboriginal children. Although some Oak Valley and Yalata children receive zinc supplements, Gracey and Spargo report that 200 children they studied in Western Australia showed no response to dietary supplementation with zinc, in spite of the fact that they were deficient. They concluded that their nutrient deficiencies were complicated by repeated chronic infections (Gracey and Spargo 1987: 201).

Certain food preparation practices have negative effects on the nutritional content of food. Factors relevant to Oak Valley residents (Walker 1979) are peeling vegetables, boiling for long periods, the use of baking powder (which destroys thiamine), food storage at high temperatures, cutting and chopping of vegetables and alcohol use.

Canned meat contains less thiamine than fresh meat. We were unable to obtain any indication of vitamin C levels in the Oak Valley population. Whenever possible, children are given 1000 milligram vitamin C tablets by health staff. There is also documentation in the literature that raw or lightly cooked meat contains vitamin C (Brody 1987: 61; Stefansson 1946) and that the levels of vitamin C are high in the livers of both domestic and bush animals (Naughton and O'Dea 1983). Naughton and O'Dea (1983: 2) report that the vitamin C content of three raw kangaroo livers analysed contained between 18 and 23 mg per 100 grams. They also note that vitamin C in liver is in a 'particularly stable form which is well maintained in storage and during preparation and cooking'. Liver is also rich in folic acid, vitamins B12, E and A and iron.

Diarrhoeal disease

The summer months are particularly problematic for young children at Oak Valley since diarrhoeal diseases can easily cause babies and children to become dehydrated. The results of a study carried out in 1985–86 at Yalata, by Dr Sujiva Ratnaik, show that of the 72 children under five years of age in the community, 36 children had 119 episodes of diarrhoea. Children below the age of two years had a significantly greater incidence of diarrhoea than older children. Dehydration was associated with diarrhoeal episodes in 44 per cent of patients in 1985, and 33 per cent of patients in 1986. No work was undertaken at Oak Valley, but since mobility between Yalata and Oak Valley is so high we can assume that a similar picture would emerge for children at Oak Valley. The only factor that might diminish the frequency of episodes of diarrhoea at Oak Valley is the absence of housing. It was found that of the children with diarrhoea, those who lived in houses had the highest frequency of diarrhoea.

Oak Valley clinic treatments for cuts and wounds

We collected data on 83 presentations for medical attention at Oak Valley in order to ascertain the extent of open sores or wounds and their level of contamination with dirt. Forty-three presentations were from males, and 40 from females. By far the most common reason for presentation at Oak Valley (61 cases) was for 'sores', which includes boils, skin lesions and infections. The next most common was wounds (ten) followed by cuts/lacerations (seven) and burns (five). Of the 118 conditions presented by 83 individuals, 70 were infected (59 per cent). The majority of these occurred on the head (63; 53 per cent) while the legs or knees were represented 26 times (22 per cent) and arms 12 times (10 per cent). The results are shown in Table 21 below.

Table 21: Medical presentations for treatment of specific body parts at Oak Valley.

Body part	No. of presentations
Eye	1
Head	63
Hand	4
Arm	12
Chest	1
Buttocks	5
Legs, knees	26
Feet, upper	1
Feet, sole	5
Total	118

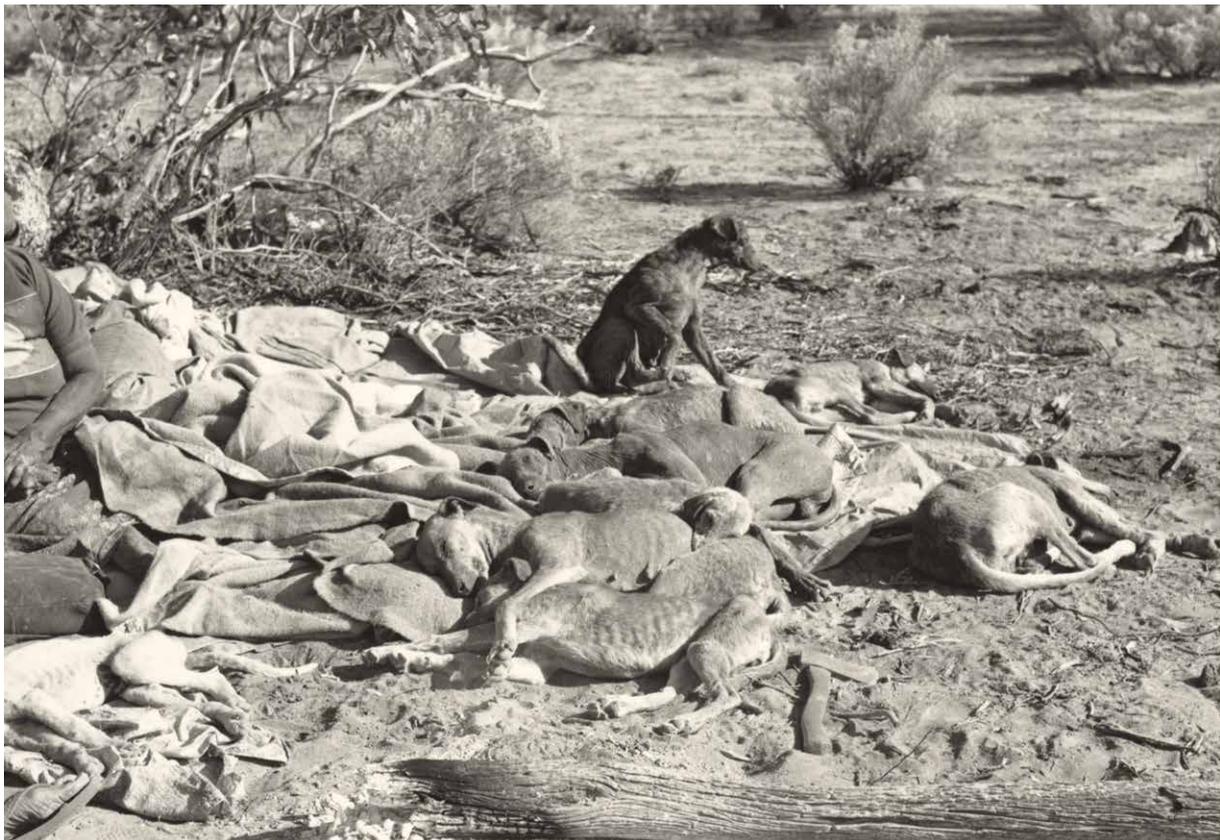
Note

Total is greater than 83 because of conditions affecting more than one part of the body.

This table shows that wounds or sores on the head are extremely common and a condition exacerbated by poor or non-existent washing facilities. Mothers sometimes attempt to wash their children's hair in a bowl, but often lather the hair with shampoo and then towel off the suds without rinsing them, or the dirt, out. Buttocks, legs, knees and feet are often in direct contact with the ground. By far the majority of the population wear no shoes, and children are invariably barefoot. This means that the potential for contamination and infection is considerable, particularly when the dusty sand may contain decayed food, dog faeces, human excrement and other bacteria-rich materials.

From these data we can make the overall observations that males and females are equally affected by open wounds or sores; that sores or skin lesions are the most common 'external' ailment requiring treatment; that most of these are already infected by the time they are attended to; that they are probably also contaminated with dirt and that a large number are head sores or wounds.

Of the 83 presentations for which we have data from Oak Valley, ten involved alcohol-related injuries sustained at Yalata (six males and four females). Five injuries were burns, and five were cuts or lacerations. Seven of the ten injuries were already infected when seen, and five were considered to be contaminated with dirt and dust. Of the four cases already treated, three dressings were no longer intact. Four of the injuries were on the feet or legs, one on the buttocks, four were injuries to the upper torso or arms, and one was a scalp laceration.



Dogs at a camp, August 1987.

Dogs and health

Oak Valley residents own many dogs. All hearth groups own several dogs, which have names, and are fed to varying degrees by their owners. In February 1987 we attempted to count the number of dogs at Oak Valley. This was harder than it sounds since the dogs are accustomed to sleeping in protected places but, at the slightest indication of a confrontation (between individuals or, more usually between other dogs) assemble with lightning alacrity and form a single entangled mass of fighting beasts only to disappear as quickly as they came together. This confounds simple head (or tail) counts. After several attempts we arrived at an estimate of 43.

Dogs are important as companions, as hunters and as sources of warmth in winter. Hunting 'kangaroo dogs' are particularly prized by their owners and more care is taken to ensure that they are fed. At Yalata some dogs are trained to hunt wombat (White 1972). Other miscellaneous dogs must seek food wherever they can. People often leave their 'miscellaneous' dogs behind when they leave Oak Valley for a few days, which can result in packs of ravenous dogs searching the camps for food. Dogs can transmit and carry a large number of bacteria and parasites as well as scabies. Contact between children and dogs is associated with skin infections and scabies, diarrhoeal disease (particularly *Giardia*, carried by dogs and chronic gut parasite infections (Nganampa Health Council 1987: 20).

Dogs, often in a poor state of health without hair and with suppurating sores, may be fondled and frequently come into close contact with both children and adults. Dogs frequently lick dripping taps and so may contaminate water supplies. Suggestions that the dog population should be culled are met with strong resistance, and the people recall with bitterness missionaries who shot people's dogs.

The most practical solution to health problems associated with dogs would be an inoculation program with Avomec, a treatment used with sheep which has had success in the Northern Territory. The series of injections of Avomec acts to eradicate existing parasites carried by dogs (see AB Palmer 1990).

Conclusion

The manner in which these data were utilised in the construction of radioactive dose measurements is beyond the scope of this report. A number of other studies had also been commissioned to complement this one. A group of technical experts, convened by the Minister for Primary Industries and Energy (the Technical Assessment Group, or TAG), prepared a report *Rehabilitation of Former Nuclear Test Sites in Australia* (Department of Primary Industries and Energy 1990). Hypothetical doses were calculated for persons presumed living in the contaminated area, having regard to ingestion, inhalation and absorption (pp. 105–12). Certainly the singular lifestyle of these desert people was a significant factor in the calculations particularly with respect to dust inhalation and the quantity of meat eaten, and the manner in which it was prepared. On the other hand the comparatively small amounts of vegetable food eaten, particularly root crops, limited the possibility of that food as a source of contamination.

Plans and costings were drawn up to undertake a clean-up or make safe the lands to a degree where they could be considered suitable for unrestricted access and occupation. The plans consisted of fencing or clean-up or a combination of both. The price tag varied from \$13 million for fencing to \$650 million to effect a clean-up that would require no fencing at all. At the time of writing the Australian Government had made no decision as to which option, if any they were prepared to accept. However, considering both the costs and the technical difficulties involved, it seemed unlikely that the Maralinga Lands would ever be restored to anything like their original condition.

Inhalation of dust was identified by the TAG as an important pathway by which radioactive contamination could enter the system of those living in the study area (Department of Primary Industries and Energy 1990: 71). Attempts to monitor accurately dust inhalation were hampered by technical and practical difficulties, but did serve to confirm high levels of dust inhalation (up to ten micrograms/m³) which had been assumed in earlier calculations (see Pearce and Pegler 1989; Palmer and Brady 1989).

Clearly the implications of the study reported here extend far beyond the radiological ones which were its genesis. The data presented in this report provide a view of the life of a small group of Aboriginal people living in a harsh desert environment in Australia. It remains, then, to draw some general conclusions about the diet and lifestyle of these people and to comment on what these data say about their overall health and wellbeing. We then make some concluding remarks on the aspirations of these people and the implications that this has for their future, and that of their children.

Diet, lifestyle and health

The desert dwellers of Oak Valley have an unbalanced and unhealthy diet, which is high in refined carbohydrate and protein, lacking fibre, complex carbohydrates and balance. Moreover, we conclude that the extremes of the diet may have health implications that have not been properly assessed. Oak Valley residents have periods of both boom and bust, ranging from periods when there is really too much to eat (particularly meat and flour) to periods when the inhabitants must rely on tinned foods, tea, sugar and flour. The inability of children to resist common complaints is an indication of a low level of resistance within this age group.

As with so many health-related matters, diet alone is not responsible for the poor health status of the Oak Valley people. The complete lack of sanitation, washing facilities and a clean living environment is a significant and major factor in the appalling levels of infection, lesions, bronchial complaints and internal parasites evident in this population.

Outstation development and the future of remote communities

This somewhat pessimistic view of the diet and lifestyle of the Oak Valley people needs to be placed in a broader context. The move back to the desert by the Yalata people in the early 1980s had to do with a determination on their part to return to traditional country. They wished to escape from a former mission settlement which, for many, still exhibited the disadvantages it had acquired over the decades since it had come into being. Considering the difficult circumstances and the physical hardships of sustaining existence at Oak Valley, the perpetuation of a settlement there is, to a non-Aboriginal mind, an extraordinary fact. The Aboriginal desire to live in places that would be untenable for most non-Aboriginal people is the result of several factors. Aboriginal people, like the Oak Valley residents, have an intense spiritual attachment to their land and have a strong desire, and perhaps also a need, to live on or near to it. Moreover, the alternatives (in this case living at Ceduna, or further afield) are hardly attractive. Away from their own communities the Oak Valley people are likely to become second-class citizens with little or no control over their own future and subject to the disadvantages experienced by those who live on the fringes of European-Australian society. Oak Valley and the lands of the Great Victoria Desert constitute their home.

Life at Oak Valley is not an aberration and the future of the children who live there is not a fleeting encounter with the desert and its past mysteries. The development of Aboriginal outstation societies is evidently a pattern for the future just as it has been the experience of the past. If they are to be supported and encouraged, their future needs to be built on an assurance that fundamentals like diet, living conditions and sanitation will allow for a reasonable standard of health.

Despite having had limited access to their country since 1952, the Aboriginal attachment to the land does not appear to have diminished substantially over the last half century. Some aspects of ritual practice and lifestyle may have changed, but for Oak Valley people life is still very much a question of living out religious beliefs in the context that is its genesis; the land. Given the dilemmas faced by successive Australian Governments over the intractable issues of Aboriginal welfare, economic investment in outstation movements has proved politically popular and socially acceptable (Commonwealth of Australia 1987). However, the rhetoric of political statements may not be altogether matched by well-funded programs to improve living conditions. In addition, some places where Aboriginal people wish to live are both so isolated and lacking in basic requirements for habitation as to make investment in them an all too costly exercise. Recognising what is actually possible in development programs for desert living is an important part of self-determination. Aboriginal communities like Oak Valley cannot 'go it alone' because of their total financial dependence on government funding. The other side of self-determination then is the gaining of an understanding of the responsibilities and the consequences of making choices about where to live.

Oak Valley residents have chosen to live in the desert because it represents an environment (both physically and emotionally) that is recognised by them as their own. This sense of ownership and the eschewing of alienation that was their experience on the mission at Yalata, may indeed have had benefits for health and self-esteem that are immeasurable. Moreover, for some at least, the refuge of Oak Valley has meant safety and an improved lifestyle when compared with the heavy destructive drinking episodes that were their experience (either as participants or unwilling observers) at Yalata (Brady and Palmer 1984). Nor is there any evidence presented here that health at Yalata is any better than health at Oak Valley. While we have discussed the reasons why it is impossible to come to any firm conclusion over this last point (mainly because of mobility factors), there have been serious attempts in the last five years to introduce housing at Yalata,



ablution facilities and toilets. The community now has a modern store with plenty of fresh and frozen produce, available on a regular basis providing plenty of choice. While there may be many practical problems yet to be overcome with these facilities, Oak Valley is not likely to share these facilities in the foreseeable future. Infrastructure costs are simply too high and the population too mobile to convince governments that massive investments are worthwhile (Altman 1990).

The comments provided here about diet, lifestyle and resultant physical health are also apposite to a legion of other issues including schooling, adult education, community government and participation in the broader Australian experience. Oak Valley is a product of self-determination (Palmer 1990) and the community, like many other desert outstations, faces a dilemma. By choosing to live in a remote desert outstation, they distance themselves from the service provisions of larger settlements which are not so remote from sources of supply. By choosing an area of the Great Victoria Desert where there is very little water so that the provision of even the most basic services require gargantuan and expensive programs, Oak Valley residents face a new choice. Their actions may place their health and the health of their children in jeopardy. By choosing their own country and their own lifestyle they may also have richer more worthwhile lives. It is important that they recognise the choice they are making.

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Author biographies



Kingsley Palmer is an anthropologist who has worked in many areas of Aboriginal Australia. He was Director of Research (1985–94) and Deputy Principal (1994–2001) of AIATSIS during which time he oversaw the development of the Institute's current premises on the Acton Peninsula. He is now a private anthropological consultant. Kingsley has been involved in numerous native title claims, has authored expert anthropological reports, participated in conferences of experts and given evidence in the Federal Court. Kingsley undertook the anthropological research for the Timber Creek native

title compensation case which was appealed to the High Court of Australia and established the rights of Indigenous Australians to gain compensation for cultural loss with respect to rights extinguished in certain circumstances. He has conducted anthropological research and provided expert evidence on matters including cases brought in relation to the *Aboriginal Land Rights Act* (Northern Territory), criminal trials as well as undertaking research in relation to social impacts, community planning and management. Kingsley has written numerous articles and books based on his anthropological research. He published a revised version of his expert report prepared for the combined Noongar native title application, *Noongar People, Noongar Land* (2016) and more recently *Australian Native Title Anthropology* (2018).



Maggie Brady is a social anthropologist who has undertaken field-based research on Indigenous social and environmental health and alcohol and other drug use. In the 1980s she became a researcher for legal counsel representing Aboriginal groups at the Royal Commission into British Nuclear Tests in Australia (1984–5). Later, while based at AIATSIS she worked with Kingsley Palmer on a study of the diet and daily lifestyle of the Pitjantjatjara-speaking people of the Maralinga Lands: one of several studies for the rehabilitation of the Lands. Maggie has published for both academic and

community-based audiences and is committed to knowledge translation, for example *The Grog Book* (a practical resource to mobilise grassroots community action) – widely distributed across Australia and overseas. She published the first anthropological study of volatile solvent use (petrol sniffing) among Indigenous Australians (*Heavy Metal*, 1992); an alcohol policy analysis (*Indigenous Australia and Alcohol Policy*, 2004), and a study of community-owned hotels and licensed clubs (*Teaching “proper” drinking? Clubs and pubs in Indigenous Australia*, 2017). She is interested in the history of Indigenous and non-Indigenous women's activism around alcohol; traditional Indigenous fermentation practices; and the diffusion of alcohol policies and temperance ideas around the world.

Between 1953 and 1963 the British, in collaboration with the Australian Government, conducted atmospheric atomic tests and other trials at Emu and Maralinga in the Great Victoria Desert of South Australia. Quantities of radioactive debris were scattered over an area of several thousand square kilometres, contaminating Aboriginal sites and waters in the region now known as the Maralinga Tjarutja Lands.

In 1984 the Australian Government appointed a Royal Commission into the British nuclear tests in Australia to inquire into the management and conduct of those tests and the protective measures taken. The Royal Commission recommended that criteria be established for the clean-up and rehabilitation of these lands. A Technical Assessment Group (TAG) was set up in 1986 in order to do so, and to oversee the eventual clean-up of the Lands. One of the TAG investigations was an anthropological study of the diet and lifestyle of the Aboriginal people living at what was then an embryonic outstation, Oak Valley, 140 kilometres northwest of Maralinga.

This report presents some of those findings, examining the diet and per capita consumption of store and bush (hunted and foraged) foods, and an assessment of their protein and calorific values. The report also documents peoples' lifestyle in that period (late 1980s), living conditions, dust levels and water supply, and how these affected overall health. For these reasons, the report will be of interest and benefit to all those concerned with the environmental and social health of desert communities.



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