
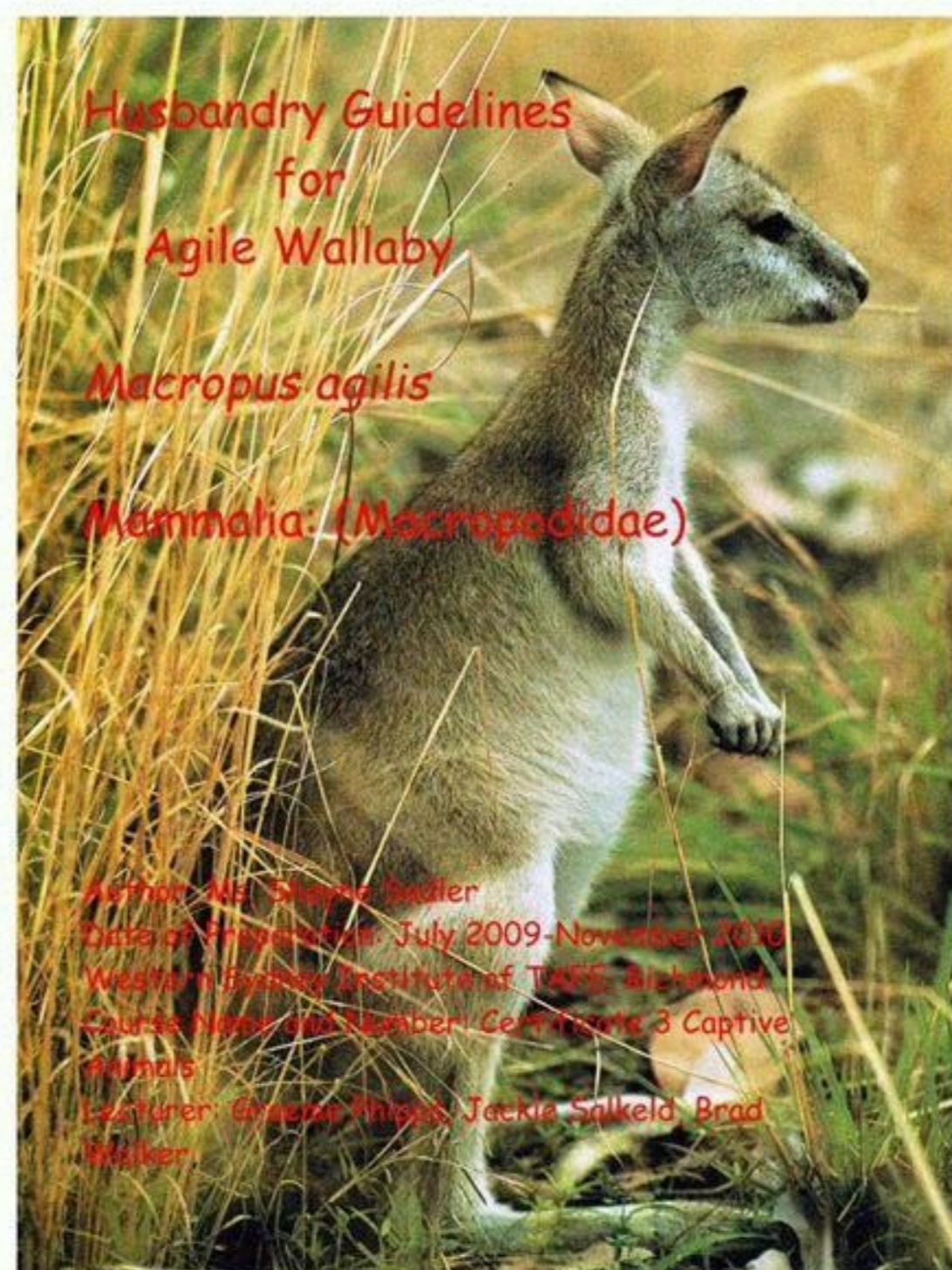


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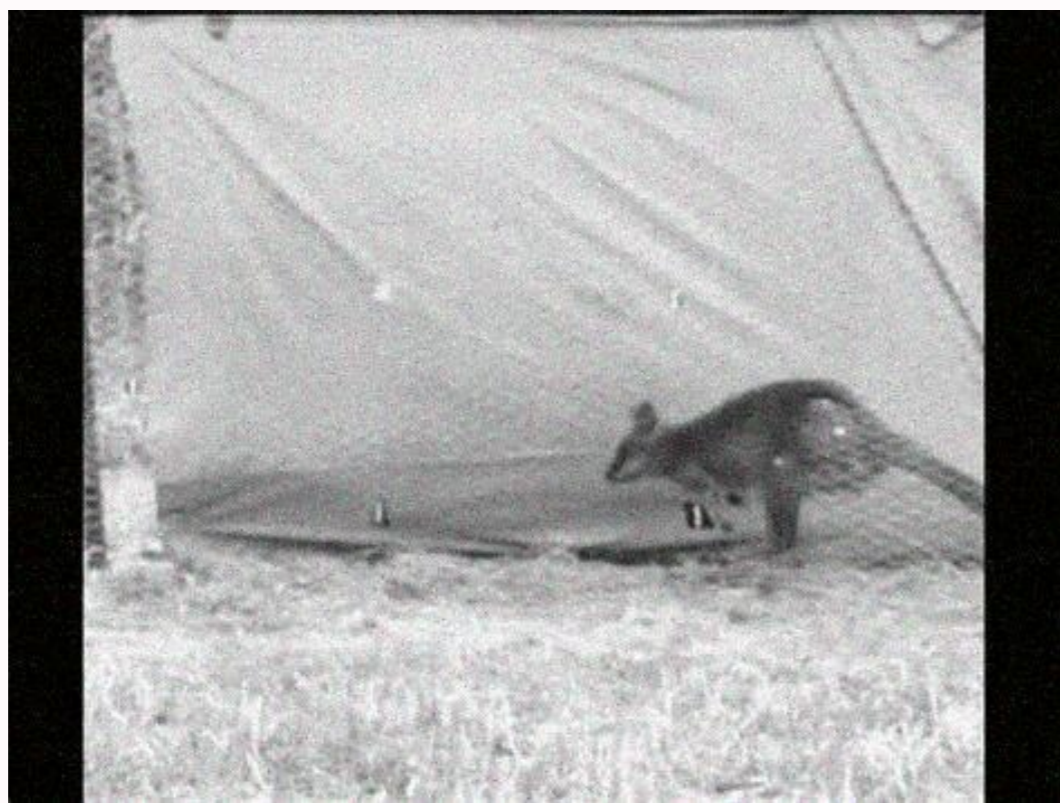
Wallaby husbandry manual.

LinkedIn Twitter Facebook AZA Animal Care Manuals (ACMs) provide a compilation of animal care and management knowledge that has been gained from recognized species experts, including AZA Taxon Advisory Groups (TAGs), Species Survival Plan® Programs (SSPs), biologists, veterinarians, nutritionists, reproduction physiologists, behaviorists and researchers. This varied expertise can be used to enhance animal care and welfare, which includes the physical, psychological, and emotional health of our animals. These manuals are based on the current science, practice, and technology of animal management to maximize capacity for excellence in animal care and welfare. Incorporating the information from these manuals into animal management practices at zoos and aquariums maximizes excellence in animal care and welfare, and ensures institutions are maintaining best practices. ACMs are considered works in progress, since practices continue to evolve through advances in scientific knowledge. The use of information within the manuals should be in accordance with all local, state, and federal laws and regulations concerning the care of animals.



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page 145 G.W. Meadows Auckland Zoological Park, Auckland Of the six species of wallaby feral in New Zealand, four have been held in captivity at the Auckland Zoo since 1970. These are the tammar wallaby Macropus eugenii, the parma wallaby M. parma, the red-necked wallaby M. rufogriseus, and the brush-tailed rock-wallaby Petrogale penicillata. In addition a colony of the agile wallaby M. agilis has been maintained. The main factors in successful management are careful acclimatisation of new arrivals, the avoidance of stress, attention to the quality of the environment and to the materials used, strict attention to nutrition and diets, and an established preventative medicine programme. Regular recording and data collection are essential, and all animals are individually identified to facilitate these procedures. The main disease problems have been the occurrence of Fusiformis necrophorus infection ("lumpy jaw" syndrome) and a predisposition to primary or secondary pneumonia. Ecto- and endo-parasitism is not a problem but nevertheless the animals are treated regularly with an anthelmintic as part of the preventative medicine programme. Successful breeding colonies have been established for all species, using either wild-caught or captive-bred animals. The wallaby species feral in New Zealand have a definite place in captivity, not only for exhibition purposes, but also as reproductive colonies providing opportunity for research and animal studies. Of about twelve species of marsupial introduced into New Zealand between 1858 and 1870, only the common brushtail possum Trichosurus vulpecula and six species of wallaby became successfully established (Wodzicki and Flux 1967). In some areas the latter multiplied to such an extent that in 1956 wallabies were classified as noxious animals, but eradication programmes against the red-necked page 146 wallaby Macropus rufogriseus * had commenced as early as 1947 in the Waimate area.

Apart from the black-striped wallaby M. dorsalis which is now very rare if not extinct, these species provided the nucleus from which animals have been caught for display or research purposes in New Zealand, and hundreds have been exported. Four of the six species have been held at the Auckland Zoo since the beginning of 1970. These are: Red-necked wallaby M. rufogriseus Tammar wallaby M. eugenii Parma wallaby M. parma Brush-tailed rock-wallaby Petrogale penicillata In addition, a colony of the agile wallaby M. agilis has been maintained. * Editor's note: to maintain consistency throughout these Proceedings vernacular and scientific names follow those recommended by the Australian Mammal Society in 1980 - see also Preface. Records are incomplete prior to 1975, but from information available it is clear that only in the last few years have viable and expanding colonies been established. Stock losses from disease or injury were substantial until the introduction of new management and feeding techniques, and the application of a strict preventative medicine programme.

Figures for additions through importation and births, and for losses from disease or injury are shown in Table 1. Two encouraging factors emerge from these figures. Firstly the incidence of death from disease has fallen dramatically between 1971 and the present, as has the incidence of disease occurrence itself. During the last eighteen months only three animals have required treatment, and none has died. Secondly, the number of births has risen, and within the four established colonies there have been twelve pouch-young from fifteen females since May 1976.

Our definition of a successful birth is the first appearance of a pouch-young, page 147 Table 1. Additions and losses of wallaby stocks at Auckland Zoo 1968-1977 - all species included. YEAR IMPORTS BORN TOTAL ADDITIONS DEATHS TOTAL LOSSES INJURY DISEASE 1968 3 n.r. 3 n.r. n.r. 3 1969 25 n. r. 25 n.r. n.r. 26 1970 0 n.r. 0 n.r. n.r. 13 1971 23 2 25 12* 18 30 1972 7 1 8 0 6 6 1973 1 3 4 0 8 8 1974 1 2 3 0 5 5 1975 9 2 11 8* 1 9 1976 23 4 27 6† 0 6 1977 7 8 15 3* 0 3 to May Table 2. Number of wallabies displayed at Auckland Zoo (1 May 1977). Species No. ♂♂ No. ♀♀ No. ? sex TOTAL Agile 2 4 2 8 Parma 0 1 0 1 Red-necked 3 5 0 8 Rock 3 4 0 7 Tammar 1 4 1 6 Total 9 18 3 30 page 148 usually at about three to four months after birth has actually taken place. These two factors have resulted in an overall increase in the wallaby population, and this has been supplemented by the translocation of rock-wallabies from Motutapu Island and red-necked wallabies from the South Island. Deaths from injury are tabled separately to highlight the disastrous results that attacks by feral dogs can have on wallaby colonies.

In 1971 and 1975 twenty wallabies were either killed outright or died shortly after attack from injuries received or from shock. Only eight days ago a further three suffered the same fate. Although the Zoo has a three metre perimeter fence surrounding it and all precautions are taken to prevent entry of dogs through open gateways, it has proved impossible to entirely eliminate the risk, and dog traps are now set every evening as a precautionary measure. Any animal caught is destroyed. In our experience attacks have been by two or more animals acting together, and any organisation considering setting up colonies for display or research purposes should be aware of the danger, particularly in urban areas where roaming dogs are liable to form packs. The numbers of each species currently held are shown in Table 2. † 4 dead on arrival from Australia 2 died after capture and translocation The first consideration in acclimatisation is to place the animals in a stress-free environment. The stress involved in the capture and/or shipping of animals, particularly those which are wild caught, or species, such as the agile wallaby, which are naturally of a nervous disposition, is considerable (Meadows, unpublished). The six deaths in 1976 all occurred during or immediately after translocation - four out of a shipment of eight agile wallabies were dead on arrival at the Zoo, post mortem examination showing the cause of death to be cardiac tamponade induced by the psychogenic stimulation of loading in Australia. The other two deaths were of brush-tailed rock-wallabies which had been caught and translocated to the Zoo as part of a research project. One animal died from injuries sustained in its violent attempts to escape while recovering from the influence of a neuroleptanalgesic, and the other died from shock. Incoming animals are placed into the quarantine area for a minimum of seven days, regardless of their origin. During this period the animals are observed several times a day, routine faecal egg counts are carried out for page 149 the detection of parasite burdens, and routine anthelmintic treatment given with the food.* As soon as possible after arrival animals are weighed, sexed and identified by means of ear-nicking (Karsten 1975). The quarantine buildings and yard are entirely surrounded by a three metre concrete block wall, and covered with a roofing of wire mesh. Thus animals contained within the quarantine area are unable to see anyone except the staff assigned to look after them, and stress from sight and sound of humans is minimal. Only assigned Zoo staff, the veterinarian and Department of Agriculture inspectors are allowed access. Animals are allowed free access from a 5 × 4 metre loose box to an outside concrete yard measuring about 15 × 5 metres. The concrete floor of the loose box is covered with a layer of hay or straw, and several bales of hay are placed to form small hideouts for the animals. Animals adapt quickly to the presence of a quiet human being, and stress is thus kept to a minimum.

However, wild-caught animals and nervous species require quiet handling throughout their lives. Food is provided in the form of a zoo-animal cake containing 14% protein, fed at a rate of approximately 2 kg cake per 100 kg animal. A small amount of lucerne chaff is given, and hay and water provided ad lib. With such a dry feeding regime, no nutritional scour has been noted. Once animals have become reasonably quiet, are eating well and are cleared by the veterinarian as being free from disease they are transferred to their outside enclosure. Animals are caught by one of two methods. The most common is the use of a large catch net. This is made of double strands of 3 mm brushed nylon cord with a mesh of about 8 cm square and is 2 m high and 10 m long. It is laid on the ground and the animal to be captured is driven quietly across it. As the animal passes over, the net is lifted and the animal tangled in the mesh.

Hoop nets may be used but are less satisfactory. Quiet animals can be caught by hand at the base of the tail. Once caught, animals are restrained by placing them into a sack, or if they are reasonably quiet they are carried on one arm by placing the forearm page 150 across the top of the animal's body and then between its hind legs, gripping the base of the tail, the animal facing the operator. Once held like this a wallaby can be carried with little stress to either itself or the operator. These should be as spacious as possible. Although animals have bred in enclosures of about 6×3 metres, at least three times these dimensions are recommended (Bergin 1976). The enclosure sizes at Auckland have been a minimum of 20 m × 10 m, and two years ago three enclosures were made into one large one for the exhibition of a mixed group. After enlargement the measurements were 40 m × 20 m. Currently this contains 1 eastern grey kangaroo Macropus giganteus, 9 common wallaroo Macropus robustus, 8 agile wallaby, 1 parma wallaby and 6 tammar. The move has been very successful, and interspecific interaction has so far been confined to periodic sparring matches between a male agile wallaby and the second male wallaroo, who despite his greater size usually is the first to break contact. Perimeter fences are a minimum of 2.5 m high - more to keep out feral dogs than to keep in the wallabies. When new animals are introduced into an enclosure wire fences are made more visible by hanging them with hessian as panicky animals will bound straight into a wire fence. The floors of most enclosures are sanded to a depth of at least 20 cm. Earth and grass floors are not favoured except for large enclosures on a hillside in which are kept two colonies of rock-wallaby. The extensive nature of these ensures the preservation of adequate ground cover. Enclosures should be well planted with trees and shrubs protected by guards. These not only give shade, but allow escape and afford protection from animal interactions. They are also aesthetically pleasing, and Auckland enclosures have been planted out with Australian native plants to represent more fully the Australian zoogeographical region. If adequate trees, shrubs, rocks and logs are provided there is no need for formal shelters. However, in the mixed exhibit there are two large shelters, each 4 × 3m, in which food troughs are placed in summer, and into which hay is placed in winter as bedding material (small amounts being added daily until the bed is up to 30 cm thick by 3 months at which time it is all page 151 cleared out). Provided that an adequate amount of fresh hay is added daily, no disease problems arise, and the animals enjoy the warmth and comfort of the bed. Enclosures are cleaned every morning. Faeces are picked up by brush and shovel wherever practical, and sanded enclosures are thoroughly raked to expose any contaminants to the actions of sunlight and wind. Food and water bowls and troughs are cleaned daily. Animals are fed once daily, in the afternoon, using the same system as for the quarantine animals. In addition occasional green food is given, such as grasses, tree or shrub leaves, bamboo, green vegetables, etc. Lettuce should be fed sparingly as it predisposes to diarrhoea. All food is placed in troughs to reduce the possibility of ingestion of parasitic ova or other contaminants.

Water is provided by automatic drinking bowls placed about 30 cm above ground level. From time to time a young animal may need to be hand-reared (Wilson 1971) and for this a lactose-free diet should be used to avoid the occurrence of nutritional diarrhoea or cataract formation (Stephens 1976, Finnie 1976). The tammars mature sexually at about two years in males and at about one year in females, which continue to breed throughout life. They are seasonal breeders and in the southern hemisphere produce young in January (Barker 1971). Parma wallabies breed mainly in the spring, while red-necked wallabies breed all year round. The present colony of agile wallabies appears to be exhibiting similar behaviour to the tammar wallabies. Currently no selective breeding is carried out, and any male may serve an oestrous female of the same species. Eventually selection will be carried out for females by the removal of male pouch-young, a technique used successfully at Adelaide Zoo (Dunn 1972). * Equizole - Merck, Sharpe and Dohme In the past colonies have suffered from two main disease problems - the first, lumpy jaw, has been a common problem in many zoos (Wallach 1971, Barker, Calaby and Sharman 1963) and is now known to be caused by Fusiformis page 152 necrophorus with secondary infection by a large range of bacteria. While the disease appears refractory to most forms of treatment, Vibramycin has been effective in at least one case at the Auckland Zoo (Smith, pers. comm.). The second, pneumonia, has been a salient post-mortem finding in many instances, and is thought to have been induced by lowered bodily resistance resulting from stress or sub-clinical infections. Many cases occurred shortly after translocation, but no common organism was isolated. The current disease prevention programme is based on accurate observation and recording by well trained staff, and has virtually eliminated disease problems during the last two years.

Every animal is closely inspected each day, as routine, and any change in behaviour or illness is reported immediately. Keepers' observations are recorded in a daily diary kept at the feed shed, and include group behaviour as well as individual. Each animal has its own record card, on to which are transposed all relevant observations, including matings, changes in habit, sighting of pouch-young, dietary changes or illness, treatment, and transfers. Regular collection of faecal samples for examination for oocysts and for worm egg counts, plus routine treatment with anthelmintics at three-monthly intervals has completely eliminated intestinal parasitism. Coccidiosis has never been diagnosed, and no coccidiostat is added to the food. No other vaccinations or procedures are carried out, except that whenever practical animals are weighed. Any animal appearing sick, or showing loss of weight, is transferred to an isolation pen where regular attention can be given without stress, either to the individual animal or to the composite group. Although in many areas the wallaby is a pest, it certainly does have a place in New Zealand. It has a value as a tourist attraction in reserves such as Kawau Island, and in captivity it makes an attractive, interesting and educational exhibit in zoos and wildlife parks. No major exhibition of wildlife would be complete without at least one colony of wallabies, and because of their size they are easy to keep and handle. Tame animals can be successfully incorporated into a walk-through or contact area. page 153 Captive colonies have proved popular for research purposes in Australia and have been used in America (Barker 1971). An Auckland Zoo colony of the rock-wallaby is currently under post-graduate study by the University of Auckland in order to obtain some basic information on territorial and agonistic behaviour prior to a field study on Motutapu Island, and the other colonies are used by undergraduates from various faculties for behavioural study. Plans for a study programme by Zoo staff are currently under way. Between the two extremes of attitude to the wallaby there must be a compromise, and I suggest that the animal not only has a future as part of New Zealand's mammal fauna, but also makes a most interesting subject for research and a pleasing and entertaining exhibit. It should not be forgotten that the "rediscovery" of the parma wallaby on Kawau Island led to export of stock from New Zealand which established the species in many parts of the world in an attempt to prevent its extinction. Currently the rock-wallaby, a subject of extermination on Motutapu Island, is reported as becoming rare in parts of Australia (Bucher pers. comm.) and certain universities and wildlife parks are currently negotiating the capture and translocation of these animals from the island. Control measures are necessary, but should only be carried out after all aspects have been studied, and this indicates a need for closer communication between those who are interested in captive propagation and the government departments with an interest in wallabies. Barker, S. 1971.

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Lumpy jaw in captive kangaroos. International Zoo Yearbook 11: 13. Wilson, P. 1971. Hand rearing a dama wallaby, P. eugenii, at Auckland Zoo. International Zoo Yearbook 11: 20. Wodzicki, K. , & Flux, J.E.C. 1967. Guide to introduced wallabies in New Zealand. Tuatara 15: 47-59. page 155 CUMMINS. During a visit to Australia last December I learnt of a research grant into work on the reproduction of macropods that exceeded six figures, so there is a lot of money involved in such research there. LEES. Mr Meadows, first I would like to congratulate you for helping us realise there are other marsupials apart from possums. I have two points, the first regarding ear-nicking of wallabies - we should be using a different method for you also get tearing of the ears with fighting so it may be difficult to distinguish such tears from an ear-nick. LEES. In the case of lumpy-jaw, we have animals that may need treatment time and time again. Is it worth continuing to inject them? MEADOWS. I have not been in a position of having to do this myself, but I'm tempted to say no because it is claimed that there is no satisfactory cure.

Vibramycin had been found to cure it in one case only but that was before my time. I think it is generally accepted that it is extremely difficult to cure. When you look at the bone erosion that occurs and the secondary infections, such as lung infections, I think it is very doubtful that one should treat it, apart from the fact that you may still have the organism being spread. I think there should be isolation to start with. ANONYMOUS. Could you comment on the accumulated hay bedding in some shelters which are cleared out every 3 months. MEADOWS. In the summer rocks and shrubs provided much of the shelter. In the winter last year we tried the hay bedding system in a fairly large house which the animals shared. We simply built up a hay (not straw) floor and this was added to daily. We did not clean it out - faecal and urine matter under the bedding broke down but the top of the bed was completely dry and remained clean for 3½ months. We were told this was not the right thing to do, so we are keeping our fingers crossed. Rightly or wrongly we got through and we did this with ungulates as well. We shall try again next winter. page 156