5.3. Clinical

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Abstract

Perth Zoo Veterinary Department has been contributing to investigations into disease aspects of population declines in woylies (*Bettongia penicillata ogilbyi*) since April 2006. This has involved contribution at a number of levels, including development and co-ordination of clinical sampling protocols, acting as a responder for veterinary management of sick or injured woylies found in the field, on-site participation in trapping programs including collection of diagnostic samples, and contribution of clinical knowledge and expertise to research programs investigating health and disease of woylies. Since becoming involved in this program, seven woylies have been presented to Perth Zoo Veterinary Department with various injuries. Four of these animals were euthanased and sent to Murdoch University for necropsy examination. Three animals were rehabilitated and returned to their original location. Three orphaned woylies were also reported to have developed Metabolic Bone Disease, two of which were euthanased. Perth Zoo veterinarians have also participated in examination of over 150 woylies from field sites in the Upper Warren region and at Karakamia sanctuary. There has not been any conclusive evidence to indicate a particular underlying disease process based on findings of these examinations to date, however this process has contributed valuable information in regards to captive management and rehabilitation of woylies as well as providing relevant samples for other investigation projects in this research program.

5.3.1. Introduction

Perth Zoo was approached by Dr Adrian Wayne from the Department of Environment and Conservation (then Department of Conservation and Land Management) for clinical assistance with the Woylie Conservation Research Project (WCRP) in April 2006. Our primary roles with involvement in this project have been:

- To contribute clinical knowledge and expertise to the Woylie Disease Reference Council as an active member of the council, particularly from the perspective of veterinarians trained and experienced in diseases of wildlife.
- To act as a responder to sick or injured woylies found in the field, with provision of veterinary assistance for these animals and contribution to investigations into potential diseases as a cause of population declines.
- To actively assess animal health and investigate disease during population surveys
- To assist in co-ordination of and provide advice for the sampling of live wild woylies trapped as part of the research program. This has included the development of protocols for the clinical sampling of live woylies sampled in the field and at Perth Zoo (Volume 3), as well as active participation and co-ordination of sampling sessions.

This chapter will discuss findings from the clinical cases presented to the Perth Zoo Veterinary Department since May 2006, as well as examination of animals in the field and clinical issues that have arisen through other channels.

5.3.2. Methods

5.3.2.1. Clinical Cases

Wild woylies showing symptoms of injury or illness were presented to the Perth Zoo Veterinary Department for veterinary attention. Animals with disease or injuries of a known cause (and considered unlikely to contribute to population declines), and which were felt to have potential for return to the wild, were treated and passed on to wildlife rehabilitators for return to the wild (e.g. concussion from trapping trauma). Samples were collected as per the protocol in the WCRP Operations Handbook (Volume 3). Animals with evidence of disease that may have contributed to population declines, where the welfare of the individual was significantly compromised, or that was considered untreatable for return to the wild, were anaesthetized with Isoflurane and oxygen delivered via face mask, examined for health assessment with samples collected as per the WCRP Operations Handbook, and then humanely euthanased with an intravenous overdose of barbiturate. The cadaver and samples were then transferred to Murdoch University for further analysis.

Information was also obtained from external veterinary practices and other sources of information regarding any clinical issues that were reported to Dr Adrian Wayne, by use of phone conversation and email.

5.3.2.2. Field examinations and sampling

In July 2006, Perth Zoo veterinarians Dr Paul Eden and Dr Karen Payne participated in sample collection and physical examination of trapped woylies from the Karakamia Wildlife Sanctuary site near Chidlow, representing an as yet unaffected population. Over 80 animals were sampled and examined on the single day of trapping.

In November 2007 two Perth Zoo vets (Dr Andrea Reiss and Dr Karen Payne) attended the Upper Warren trapping sessions for a total of eight trapping nights and examined approximately 100 animals in the field. Three separate trapping sites were surveyed and included one which had recently undergone a decline (Balban), one which had not yet undergone a decline (Keninup), and one which was thought to be recovering from a previous decline (Warrup). Blood samples were collected from around 80 individuals, and skin samples (under general anaesthesia, performed at mobile field stations) were collected from three individuals, in order to investigate suspected skin disease.

5.3.3. Results

5.3.3.1. Clinical Cases

Six woylies have been presented to Perth Zoo for veterinary attention since May 2006. These cases are summarized in Table 5.3.1. Two woylies were treated for their injuries and returned to the wild – on discussion with various parties (including Dr Adrian Wayne), it was felt that the injuries sustained by these animals were not likely to be contributing to the observed population declines for this species. Four woylies were euthanased and samples collected as described above, and the cadaver and samples sent to Murdoch University for further analysis.

Table 5.3.1. Summary of clinical presentations of sick and injured woylies to Perth Zoo.

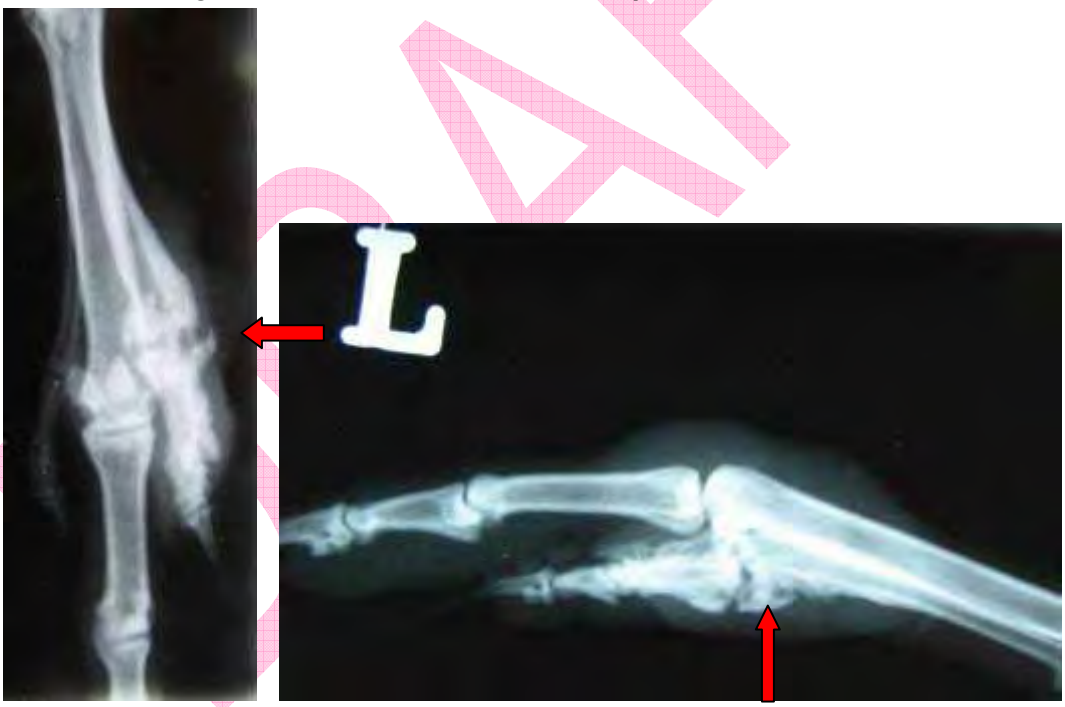
PZ ID	Ear Tag	Date of Arrival	Source*	Age	Sex	Wt (g)	Ecto parasites	Clinical summary	Blood	Result	Swab	Other	Fate	MU Path number	Comments
M120636	none (new capture)	12/06/06	K	A	M	858	ticks, lice	Thin,dehydrated(>10%), ulcerated granulating lesions LH foot with evidence of reactive bone on Radiographs	EDTA + serum		wound, cloacal	urine, impression smears of wound	E – sent Murdoch for Necropsy	06-591	
M080742	K1065	8/07/06	K	A	F		ticks, fleas	R eye - Deep corneal stromal abscess with descemetocoele and uveitis	EDTA + serum				Returned		Possible trapping injury? Treated and returned to Karakamia; no fungal elem on in-house cytology
M150743	D03895/ D03896	15/07/06	UW	A	F		ticks	Trapping injury - hindlimb paresis; spinal bruising?; corenal ulceration R eye	EDTA + Serum			Urine; faeces	Returned		Treated and returned to wi fully furred pouch young expelled at trapping and gi to carer for hand raising
M2908117	K1129	29/08/06	K	A	M	1004	lice, fleas	Large maggot infested draining abscess/granuloma R side neck; reasonable body condition	EDTA + Serum		Oral swab	Urine; faeces	E – sent Murdoch for Necropsy	06-879	
M170529	K1008	17/05/07	K	A	M	840		sig wt loss and neurological/ocular symptoms, azotemic on bloods.	EDTA + serum	NSF	Oral swab	Urine free catch	E – sent Murdoch for Necropsy	07-658	Aged animal? given degre tooth wear
M210532	none	21/05/07	K	A	M		yes - type unknown	open wound and swelling around L hock, conjunctivitis R eye	EDTA + serum		Oral swab; swabs from L hock	urine	E – sent Murdoch for Necropsy	07-659	L hock - heavy mixed grow Pasteurella, Aeromonas hydrophila, Klebsiella oxyt Conjunctiva - mod mixed g coag neg Staph, Corynebacterium bacilli
M251063	DO1553/ DO1554	25/10/07	UW	S	M		ticks, lice	Found w odd behaviour - possible road trauma?? Heavy ectoparasite infestation and anaemic (possibly linked). Improved w symptomatic therapy.	EDTA+ serum	anaemia	Oral swab	Faeces	Returned to UW for release		

*K=Karakamia, UW =Upper Warren

Woylie M120636 (no tag id)

This animal originated from Karakamia and presented with swelling and open granulating wounds to its left hind foot (Figure 5.3.1). It was also thought to be in thin condition, with a body weight of 858g, and was dehydrated. Radiographs of the affected region revealed evidence of underlying bone pathology (Figures 5.3.2 a&b). This animal was euthanased as per above discussions.

Figure 5.3.1 Skin lesions on outer aspect of left hind foot.



Figures 5.3.2. a & b Radiographic lesions of left hind foot. Note the extra bone proliferation and evidence of bone lysis and joint deformity (arrow).

a) Dorsal view. b) Lateral view.

Woylie M080742 (K1065)

This animal was observed to have a problem with its right eye during a sampling session held at Karakamia in July 2006. Closer inspection of the eye revealed a deep abscess of the cornea of the right eye and secondary uveitis. The lesion was thought to have originated through trauma (possibly from trapping), and it was elected to treat this animal and return it to Karakamia when recovered. Treatment involved daily application of topical antibiotic and anti-inflammatory eye medication, subconjunctival injections of Gentamicin, plus systemic anti-inflammatories. The animal was also anaesthetized on a regular basis for monitoring of the eye. The abscess

responded to treatment, although a scar had developed on the surface of the eye as a consequence of the abscess. The impact of this on the animal's vision was discussed with Karakamia and Adrian Wayne, and it was decided to return this animal to Karakamia where the outcome of this animal's return was more likely to be known. Following veterinary treatment this animal was sent on to Chidlow Marsupial Hospital for further rehabilitation prior to release.

Woylie M150743 (D03895/D03896)

This woylie was presented due to an acute spinal injury sustained during trapping for population surveillance. Symptoms included paresis of the hind limbs, with reduced activity and reflexes, as well as general depression. It originated from the Upper Warren region. Examination under anaesthesia revealed an area of deep bruising over the lumbar spine. Radiographs revealed there was no evidence of a spinal fracture or injury. This animal was given supportive therapy with rest and systemic anti-inflammatories. It recovered from its injuries and was returned to Upper Warren.

Woylie M2908117 (K1129)

This animal was presented from Karakamia with a large ulcerated swelling over the right side of the neck. The swelling was infested with fly larvae. This animal was in reasonable body condition at presentation. Upon discussion with relevant parties, this animal was euthanased as described above.

Woylie M170529 (K1008)

This animal was presented from Karakamia with evidence of severe visual deficits in both eyes. It was also found to be in thin condition. Blood tests revealed evidence of renal failure. Ocular examination did not reveal evidence of retinal detachment, however did reveal evidence of retinal degeneration. This animal was euthanased as previously described.

Woylie M210532 (no ear tag)

This animal presented from Karakamia with swelling and an open wound over the left hock joint, as well as an injury to the right eye. Examination under anaesthesia revealed the animal to be in suboptimal body condition, an open fracture of the left hock and reddening of the conjunctiva of the right eye. Radiographs confirmed the presence of a fracture involving the left hock joint (Figure 5.3.3). These injuries were though to be a few days old and were likely to be a result of trauma. Due to the severity of the injury to the left hock, this animal was euthanased as described above.

Figure 5.3.3 Fractured hock (arrow).

Woylie M251063 (DO1553/1554)

This woylie was found in the Upper Warren region. It was showing signs of unusual behaviour, including subtle ataxia, and was poorly responsive to approach by people. Examination showed a heavy infection with ectoparasites, with evidence of anaemia on haematology. There was also a slightly reduced responsiveness to the left pupil, and biochemistry revealed evidence of muscle injury, consistent with trauma. No other abnormalities were found. This animal underwent supportive treatment at Perth Zoo Vet Department, including ectoparasite control, and responded well to this. The animal was returned to the Upper Warren area for release where it was found.

5.3.3.2. Metabolic Bone Disease

Three case of Metabolic Bone Disease were reported from Busselton Veterinary Clinic (Dr Richard Lucas). The three woylies involved were all orphaned pouch-young that were hand reared by a wildlife rehabilitator with substantial experience with woylies. The three affected animals showed symptoms of lethargy and reduced activity. Radiographs revealed thinning of the bone cortices in all three animals, whilst two animals had pathologic fractures of the distal femur. These two animals were euthanased on welfare grounds. The remaining affected animal was treated with calcium supplementation and continues to be in good health. This animal is currently housed at Yelverton Eco-retreat in a predator proof enclosure where it can be monitored regularly.

5.3.3.3. Field investigation of skin disease

Clinical signs of skin disease (hair loss, skin thickening, redness and scabbing) had been noted in Woylies during population monitoring earlier in 2007. Biopsy samples were collected from three individuals with signs of skin disease during trapping sessions at Balban (1) and Keninup (2). A biopsy was also taken of woylie *M251063 DO1553, 1554* prior to its release to serve as a reference for "normal". Histopathological examination of the skin tissues showed either normal skin or mild non-specific inflammatory changes. Occasional larvae of an unidentified parasite were seen within the keratinized layers of both normal and inflamed skin samples in two animals. Microbiological culture of the skin samples showed only normal skin flora, or organisms which might be found as opportunistic agents.

5.3.4. Discussion

Based on the limited number of sick or injured woylies presented to the Perth Zoo Veterinary Department to date, there has been no clear indication as to an underlying disease process that may be contributing to the declining woylie populations in southwestern Australia. Three woylies presented with lesions that would be consistent with an initial traumatic injury that was secondarily infected (i.e. not thought to be related to observed woylie declines). The woylie that presented with renal failure and visual deficits is an interesting case. It is possible the visual deficits could be related to retinal detachment from increased blood pressure associated with renal failure, however there was no evidence of retinal detachment on examination of the eyes. Many factors can result in renal failure, including diet, exposure to toxins, age-related degeneration, and infectious diseases. This animal also originated from Karakamia, where declines in woylie populations have not been observed to date. It is therefore likely this was a singular occurrence of this problem, unrelated to population declines (particularly given that the animal came for Karakamia where woylie declines have not been observed).

Metabolic bone disease (MBD) is largely a disease of captive animals, and is mostly caused by nutritional and husbandry issues. In particular, diets deficient in calcium or with a calcium/phosphorus imbalance, or the lack of exposure to UV light for Vitamin D3 activation, are commonly implicated in the development of this complex disease. Discussions have been held between the various parties involved in an attempt to identify an underlying cause for these three animals, however no underlying issue was identified. This disease is of significance in relation to captive management of woylies. Its significance in relation to population declines is likely to be low, however MBD has been reported in wild populations of mammals in other parts of the world (various deer and rodent species, Ullrey, 2003; beluga whales, Mikaelian *et al*., 1999), and continued monitoring for this condition, including routine radiographs of woylies presented for clinical assessment, will be undertaken.

5.3.5. Future work/Conclusion

This process has provided a valuable contribution to the knowledge of the health and disease status of woylies by monitoring of clinical presentations of sick or injured woylies. The health assessment and sampling protocol for these woylies has been working well so far, however it will be refined to include routine radiography for all sick or injured woylies presented to the Perth Zoo Veterinary Department. It has also provided the opportunity to collect samples that are utilized in other investigations as part of this research program. It has also contributed to furthering the development of techniques required for rehabilitation of woylies for return to the wild.

5.3.6. References

Mikaelian, I. Qualls CW Jr, De Guise S, Whaley MW, Martineau D (1999), Bone fluoride concentrations in beluga whales from Canada, *J Wildlife Disease* **35(2):** 356-360.

Ullrey DE (2003), Ch 80: Metabolic Bone Disease, In ME Fowler and RE Miller (eds), *Zoo and Wildlife Medicine 5th ed*, Saunders, Missouri.

5.3.7. Appendices

Refer to relevant sections in WCRP Operations Handbook (Volume 3) for: Field Clinical Examination Checklist for Woylies and Perth Zoo Clinical Examination Checklist for Woylies.

Volume 2 Appendix 4 – Metabolic Bone Disease of Woylies.