

## **Supplementary material for**

### **‘The dingo menace’: an historic survey on graziers’ management of an Australian carnivore**

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#### **Text S1. Survey questions**

The original survey questions, along with introductory information, that were sent to participants in 1953/54 by Professor N.G.W. Macintosh.

A subset of these questions has been analysed in the current study. These questions are underlined.

## The Dingo Menace

This list of questions is being distributed in order to gather as much practical and biological knowledge of the dingo as possible.

It is recognised by everyone that the dingo causes enormous personal loss to the individual man on the land and also to the economic wealth of the country. By answering these questions each one of you will be contributing to scientific work which may be of national value.

Up to the present control have been directed towards the effects rather than towards the cause of the dingo problems and, apart from aerial baiting, methods have changed very little in the last 50 years. The use of myxomatosis against the rabbit menace is an example of what can happen when a scientific attack is made on a biological problem.

Unfortunately we know very little scientifically about the biology and health of the dingo. Answers to the following questions would help very greatly to fill the gap in our knowledge and perhaps make possible a scientific approach to the methods of control. It is almost certain that no one person can answer all the questions, but if a large number reply then it is likely that very helpful information will be obtained.

These questions have been compiled by Dr. N.W.G. Macintosh, Reader in Anatomy at the University of Sydney, who has been working on the anatomy and biology of the dingo for the last 4 years. The sending out of the questions is sponsored by the Graziers' Federal Council of Australia, and the dingo investigations so far carried out have the approval of the Chairman of the C.S.I.R.O (Commonwealth Scientific and Industrial Research Organization).

Will you therefore help us by answering as many of the questions as you possibly can and returning the forms to Dr. N.W.G. Macintosh, c/- The Secretary, Graziers' Federal Council of Australia, 56 Young Street, Sydney.

If you have more information that can be fitted into the spaces provided, we would be grateful if the additional information was pinned to the forms.

A request for information was circulated 2 years ago with most helpful results, but we realise now that much greater value would have been obtained if we had asked detailed questions on the following lines. Please do not leave out any questions in which you consider your view unimportant, your view may be of the greatest importance to us.

The following information is required:- (PLEASE USE PENCIL).

NAME.....

ADDRESS.....

DISTRICT and NEAREST LARGE TOWN.....

TYPE OF COUNTRY: (mountainous, dense of open forest, scrub, grass, stony, sandy, flat, dry, marsh, river, lake etc.).....

PASTORAL ACTIVITY: (sheep, cattle, dairying etc.).....

### **1. If there are no dingoes on your property**

- a. Have they ever been there?
- b. Were they exterminated or did they gradually take their departure?
- c. If they were exterminated, what was the method?
- d. Any other reason for their departure – namely – lack of wildlife (wallabies etc.), lack of suitable haunts through clearing, disease, drought etc.?

### **2. Taming of dingoes**

- a. Have you ever reared a dingo pup?
- b. How did you capture it?
- c. What was its approximate age?
- d. Did you keep it chained or allow it its freedom?
- e. Did it learn to bark?
- f. Did it show any signs of becoming wild?
- g. Did it finally run away to the bush? If so, did it ever return?
- h. What did you feed it on?
- i. Did it show any signs of wishing to kill sheep, fowls, etc.?
- j. How did it behave towards you domestic dogs e.g. was it friendly, or savage, or did it ignore them?
- k. Did it seem anxious, willing or unwilling to mate with them?
- l. Was it more liable or less liable to contract the diseases of domestic dogs?
- m. If it contracted any illness could you describe the signs and symptoms?
- n. What eventually caused its death?
- o. Was it friendly, affectionate or sullen towards its owner?
- p. Was it friendly or unfriendly towards other people on the property?
- q. Was it friendly or unfriendly towards complete strangers?
- r. Have you ever tamed an adult dingo caught wild in the bush? Did it remain tame?
- s. Have you ever known a tamed dingo to bite a human? Was it man, woman or child? Please describe the circumstances fully.
- t. Have you ever known a wild dingo to attack a human?
- u. Have you ever heard a wild dingo bark or does it only howl?
- v. Do you consider the dingo is a coward or do you think it is merely a case of discretion, cunning or common sense?
- w. How does a dingo compare in intelligence with domestic dogs?
- x. Have you ever seen a dingo fight a domestic dog? What type of dog was it? What was the result of the fight?
- y. Will a dingo voluntarily attack a domestic dog or will it always try to get away?
- z. Have you ever known a domestic dog try to attack a dingo or has the domestic dog tried to get away?

### **3. If dingoes occur on your property:**

- a. Have they always been there or have they moved in recently?

- b. If they are recent arrivals is it due to drought in regions further away or does your property offer easier food, or is there any other reason that occurs to you?
- c. Can you give the number of stock killed annually by dingoes on your property? Has the number increased or decreased in the past few years?
- d. If killing has increased is it because there have been more dingoes or more stock, or because the dingoes have become more clever, or any other reason?
- e. If killing has been less is it because of better control measures or some other reason?
- f. How much of the carcass does the dingo eat and what parts does he select?
- g. In the case of stock, does he prefer the blood, the entrails, any particular organ such as liver, kidney, or the flesh?
- h. Can you in your own personal experience vouch for killing in fun, e.g. without eating any part of the carcass at all?
- i. Do maimed stock ever recover?
- j. What other domestic animals or pets on your property have been killed by dingoes, e.g. fowls, ducks, goats, pigs, dogs, cats, caged birds etc.?

**4. Method of extermination and/or control most suitable for your property:**

- a. What method would you use unaided, e.g. dingo-proof fence, baits, traps, shooting, etc.?
- b. Mention any other method of catching dingoes dead or alive of which you know.
- c. What method would you prefer to use when aided by government or local finance?
- d. Do you know of any case in which a dingo has jumped, climbed over, burrowed under, or otherwise defeated a dingo-proof fence?
- e. How high are dingo-proof fences in your region? And how deep into the ground?
- f. How many dingoes are killed annually in your region?
- g. Can you give a rough idea of the percentage accounted for by traps, poison, shooting or other means?

**5. Aerial baiting:**

- a. If this has been tried in your region, what was the result?
- b. What is your opinion of this method?

**6. Professional doggers or trappers:**

- a. In your opinion, what percentage of effectiveness does this method of control represent?

**7. Shooting:**

- a. Is this more successful at night or during the day and at what times?
- b. Which is more successful – using a car, a horse, on foot, with or without dogs?

- c. How do you go about shooting dingoes, do you go hunting in the hope of seeing them or do you locate their drinking places or lairs and lie in wait, or any other method?
- d. How do you decide for certain that you are firing at a dingo rather than an ordinary dog?
- e. Have you known dingoes hit by bullets continuing to run and finally escaping?

#### **8. Poison:**

- a. What bait do you prefer?
- b. How do you insert poison into it?
- c. What is the best place to leave the bait?
- d. Will the dingo, after eating the bait, try to get rid of it by vomiting?
- e. If it succeeds in vomiting the bait will it still die or only become sick?
- f. When a few dingoes have been killed by poison do you think it possible that other dingoes realise the danger and leave the vicinity for the time being?
- g. Is it frequent for other wild animals such as the native cat or domestic animals – dogs, pigs etc. to eat the bait?
- h. What precautions can you take to prevent this?

#### **9. Traps and lures:**

- a. What type of trap do you employ? Diagram would help.
- b. How do you select a site to set the trap?
- c. How do you conceal it?
- d. How do you recognise a dingo track?
- e. Where do these pads usually lead, e.g. to water, to a den, towards dense forest, open country, to hills etc.?
- f. In the case of a dingo caught by the leg in a trap, do you know of cases where it has gnawed through the leg and escaped?
- g. In such a case can you say whether the dingo survived or died at some remote distance?
- h. In the case of a dingo caught in a trap do you know how long it will remain alive?
- i. In the case of a dingo caught in a trap does it remain silent or does it howl or cry?
- j. Do you know of a dingo caught in a trap dragging the trap away and if so, how far?
- k. Do you know whether other dingoes are frightened away from the region when one has been caught in a trap?
- l. Do you know of any case where other dingoes have attempted to assist a trapped dingo?
- m. Do you employ a lure with the trap?
- n. Do you place it in the trap, or near it, or a series of lures leading to the trap?
- o. What do you use for a lure?
- p. Is there any food or substance the taste or smell of which is particularly attractive to a dingo?

#### **10. Diet:**

- a. What does a dingo eat? Please make full list:
- b. Can a dingo find enough food on your property without having to kill stock?
- c. Do you know if the dingo prefers different types of food in different seasons?
- d. Does he prefer feeding by day or night and at what times?
- e. Is he a scavenger, does he prefer putrid flesh or fresh meat?
- f. Has the dingo any preference in wild life, e.g. wallaby, possum, kangaroo rat, lizard, goanna etc.?
- g. Do you know of any case of a dingo killing a powerful creature such as an "old man" kangaroo or an emu?
- h. Did any variety of wild animal rapidly increase in numbers after the dingoes started killing sheep?
- i. Did any variety of wild animal rapidly increase in numbers after all the dingoes had been cleared from your property?
- j. If you stopped running stock, do you think the dingo would disappear from your property, either by starvation or migration?
- k. Do you think that any particular conditions such as drought, flood, cold, etc. cause increased stock killing by dingoes?
- l. Does the change from sheep to cattle on a property result in increase or decrease in the number of dingoes? What in your opinion are the reasons?

### **11. Bushfires and clearing for stock:**

The destruction of normal cover, scrub, trees, etc., results in a disappearance of smaller animals and even birds, this clearing therefore probably robs the dingo of food supplies and shelter.

- a. Do you think that the dingo then kills more stock?
- b. That more dingoes are seen because their shelter is gone? OR
- c. That dingoes become fewer because they have moved away as a result of lack of cover?
- d. That they may leave the vicinity through lack of natural food?

### **12. Disease:**

- a. Have you ever seen a sick dingo in the bush?
- b. If yes, what do you think might have been the illness?
- c. Do you know of any disease to which the dingo is subject?
- d. Any disease which the dingo carries but does not suffer from itself?
- e. Have you observed ticks, fleas, mites, lice, flies, or other parasites on dingoes?
- f. Have you any knowledge of parasites of other animals being transferred to the dingo, e.g. kangaroo ticks etc.?

### **13. Coat colour, form, and size:**

- a. Will you describe the coat colours and patterns of the dingoes in your region, e.g. main coat colour – black, red, white, rust, tawny, yellow, creamy, sandy,

albino; with white socks, white tail tip, white muzzle, and any other combinations of colours observed, particularly the presence of black, tan, yellow or white markings on the back of the neck, between the shoulders, midway along the tail etc.?

- b. Type of ears – e.g. fully erect, semi-erect, change of ear position when fighting, attacking stock, or running away?
- c. Type of tail – very bush, semi-bushy, not bushy etc.?
- d. Whether tail is carried high, horizontal or low, and what is the animal doing when the tail is in different positions?
- e. Do you think the dingo of your region resembles any domestic dog, if so what type of dog?
- f. Eyes – are the eyes very slanting or straight?
- g. What is the size of a full grown male dingo in your region compared with say a sheep or cattle dog?
- h. Is the dingo of your region usually lean and gaunt or well-conditioned?
- i. Is the dingo of your region of stocky or rangy build?
- j. Do you regard the dingo as stronger than a domestic dog of equal or larger size?

#### **14. Gait:**

- a. Is there anything different or peculiar in the walk, trot, lope or run of a dingo to distinguish it from a domestic dog?
- b. How can you distinguish the footprints of a dingo from those of a domestic dog?

#### **15. Cross breeding:**

- a. Have you positive knowledge from your own experience of cross-breeding between dingo and domestic dog? If so, what type of dog was it and was it domestic dog with dingo bitch or vice versa?
- b. Were the hybrid offspring more like the dingo or the dog?
- c. Did the hybrids join the wild dingoes or did they hunt alone, or did they tend to stay neat the property?

#### **16. Mating:**

- a. Is a female dingo on heat pursued by more than one male as in the case of dogs?
- b. Do the different males fight one another for the bitch on heat?
- c. Is it the female who eventually makes a choice of one of the males?
- d. How often in a year are the females on heat and in what months?
- e. How would you decide that a female dingo was on heat, and is her howl or call any different at this time?
- f. How long is the female on heat?
- g. How long after coming into heat does mating take place?

- h. Have you observed any peculiarities in the mating of dingoes different from that in the mating of dogs?
- i. Do the male and female dingoes remain partners for life or do they change partners?
- j. Do you know of one male having more than one female as temporary or permanent partners?
- k. When one male has mated with a female will another male also mate with her in the same heat?
- l. If the male or female is killed will the partner at once choose another mate?
- m. Is the female ever killed by the male in the "love-play" accompanying mating?

### 17. Reproduction:

- a. How long is the carrying period?
- b. What are the largest and the smallest numbers of pups in a litter?
- c. Are any of the pups stillborn?
- d. Does either parent howl in a different fashion at the birth of their pups?
- e. Is there a difference in the number of pups born by a young female or an old one?
- f. What months are the pups usually born?
- g. Where does the mother go to have her pups, e.g. hollow log, cave, scrub thicket, does she dig a burrow?
- h. How are the young carried by the mother after birth?
- i. Does the male stay with the mother and the pups?
- j. Does the mother try to keep him away from them?
- k. Does the male make any attempt to kill the pups?
- l. Do you know of any case where the female herself killed her own pups?
- m. Do you know of any case where the pups, having been killed by either parent, were eaten?
- n. Will the mother desert her pups if threatened by man?

### 18. Feeding of pups:

- a. How many weeks do they suckle?
- b. Are they weaned gradually or suddenly?
- c. Does the mother vomit food for the pups during weaning?
- d. If the mother took a poisoned bait and vomited it, did the pups then eat this and die?
- e. In the case of a large litter will the mother ever discard some of the pups?
- f. Does the mother bring food for the pups after weaning and if so for how many weeks?
- g. Do the pups stay with the parents indefinitely or are they hunted away to fend for themselves?
- h. If so, how are they driven off?
- i. Do the adults teach the young ones to hunt?



## 19. Hunting habits:

- a. Do the dingoes hunt singly, in pairs, or packs?
- b. What is the largest number you have seen in a pack?
- c. Will a wounded dingo be killed by other dingoes, and will the other dingoes eat the killed one?
- d. If a pair hunt together does the male do the killing while the female watches or do they both take part?
- e. Do the young ones help in the hunt?
- f. Does the dingo depend most on smell, sight or hearing, or all three equally?
- g. If there is plenty of natural food, e.g. wallabies etc. does the dingo still prefer to kill stock, if so do you think it is because the killing is easier or for some other reason?
- h. Has the dingo a special method of killing, e.g. by tearing at the throat, hamstrings, or the belly, etc.?
- i. Does the dingo use the same method whether attacking sheep, cattle or kangaroo?
- j. Does the dingo prefer lambs, ewes, wethers, or calves Can you give approximate lambs killed for every wether etc.?
- k. Do you know of any instance of dingoes controlling other vermin such as rats, bandicoots, wombats etc.?
- l. Are fewer stock killed where rabbits are plentiful?
- m. Do you know of any preference which the dingo has between rabbits and stock?
- n. Does the number of dingoes increase or decrease in proportion to the increase and decrease of rabbits?
- o. Has the wiping out of rabbits by myxomatosis shown a noticeable increase or decrease in the number of dingoes in that region?

## 20. Lairs:

- a. Do dingoes tend to have a semi-permanent home to which they frequently return?
- b. If so, what sort of home, e.g. caves, between boulders, in hollow logs, in dense scrub, or do they burrow either in open or bush country?
- c. Are lairs frequented by single dingoes, or pairs or by a pack?
- d. Does the dingo have more than one lair?
- e. Do they change such hide-outs from season to season or do they always return to the same one?
- f. Will different dingoes or successive generations use the same retreat?
- g. Do dingoes tend to live in communities or are they by preference a small family group or solitary individuals?
- h. If such a retreat is investigated by man, will the dingoes avoid it from then on?
- i. Does a wounded dingo make straight for such a retreat or does he try to mislead the hunter, or does he run aimlessly to any form of cover?
- j. Approximately how much ground does a dingo cover in any one vicinity?

- k. Does the dingo tend to have fixed habits, e.g. does he always take the same route in his hunting and drink at the same waterholes, or is he very varied in his hunting, taking a different route each day or night or week?

**21. Migrations:**

- a. Do the dingoes seem to prefer the same hunting ground or do they periodically leave these for others?
- b. Have you observed anything in the nature of an annual or seasonal migration from one region to another? What do you think is the cause of this? Give the direction or route of geography of such a migration?
- c. Is it a case of following water with the onset of the dry season and the drying up of local waterholes?
- d. Is it a periodic migration irrespective of what the season and supply of food may be like?
- e. Have you observed any periodic or rhythmic increase and decrease in the number of dingoes in you region over the years?
- f. Do such increases or decreases correspond with similar changes in the numbers of other wild animals or rabbits?

**22. Swimming:**

- a. Have you ever seen dingoes crossing rivers or lakes? Do they ford the river or do they swim?
- b. Do they deliberately look for fallen trees or lines of boulders to enable them to cross?
- c. Will they follow the course of a river for some miles to find such a crossing in preference to swimming across?
- d. Have you ever seen a dingo swim a considerable distance i.e. 30 yards or more?
- e. Do you consider the dingo a good and strong swimmer?
- f. Do you consider a river to be a natural barrier to the dingo?
- g. Do you know of any natural feature, e.g. desert, precipitous mountain, etc. to be an obstacle to dingo migrations?

**23. What other habits of the dingo are different from the habits of domestic dogs?**

**Any other comments:**

**Text S2: Example of coding assigned to responses for the question**

"What is your opinion of aerial baiting?"

<b>Score</b>	<b>Response</b>
1	"Very good" Vic
0.5	"Probably effective according to the country trialled" NSW
0	No response given
-0.5	"Costly for results obtained" Qld
-1	"Waste of taxpayer money, should be abolished" NT