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Wild Dog Management
BEST PRACTICE MANUAL

Department of
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AGRICULTURE
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BOARD OF WA

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Introduction

Wild dogs (all wild-living dogs including pure-bred dingoes, hybrids, and domestic dogs running wild) are one of the major pest species impacting on grazing industries across mainland Australia. In this Manual, the text refers to dingoes where the information is derived from studies of essentially pure dingoes. Elsewhere the text usually refers to the more generic term, wild dogs.

The information in this Manual is based on scientific studies, including detailed evaluations of techniques and strategies, as well as considerable practical experience from doggers, Department of Agriculture and Food staff and land managers.

Much of this Manual focuses on sheep enterprises which, with goat enterprises, are at the highest risk of wild dog predation. Although the effects of wild dogs on cattle can also be significant and widespread, wild dogs are easier to control in cattle areas.

A general population reduction of wild dogs, such as achieved by periodic aerial baiting, is usually highly effective in minimising predation impacts on cattle. In sheep areas, however, it is necessary to aim for local eradication of wild dogs. This requires an intensive, ongoing control effort using all available techniques.

The principles outlined within this Manual apply equally to rangeland and farming areas.

Chapter 1.
Legislation and compliance

Landholder obligations

All landholders are required to control wild dogs, where they are present and threatening and/or impacting on livestock. Control activities must be carried out in accordance with all relevant legislation.

Within Western Australia, landholders are legally obliged to control wild dogs (dingoes, hybrids, and feral domestic dogs) under the relevant provisions of the *Agriculture and Related Resources Protection Act 1976 (ARRPA).* (ARRPA will be replaced by new Biosecurity and Agriculture Management legislation, but the relevant provisions relating to wild dogs remain the same.) The sole purpose of these provisions is to minimise the impacts of wild dogs on livestock production. Wild dogs in areas far removed from livestock grazing areas are not targeted by the various control programs, as they pose little or no threat to livestock.

Dingoes are declared pests of agriculture under ARRPA, in category A7. This means that as animals native to WA, dingoes should have an approved, published and implemented program for their management. Such management plans are drawn up in consultation with the Department of Conservation and Land Management (CALM) which administers the *Wildlife Conservation Act 1950*, under which a subsidiary notice lists dingoes as 'unprotected fauna'.

In practice, dingo control is allowed in pastoral areas and adjacent 'buffer zones'; control programs in conservation reserves and national parks are subject to specific local agreements between the relevant departments and landholders.

Dingo hybrids and other wild dogs are declared pests of agriculture under ARRPA, in category A5. This means that hybrids and other wild dog populations must be controlled. In practice, as is the case for dingoes, control work is directed at areas where wild dogs pose a risk to livestock.

Issues relating to the management of dingoes in captivity are handled by CALM, as the keeping of native animals is dealt with under the *Wildlife Conservation Act 1950.* Issues relating to the management of captive dogs are handled by local shires under the provisions of the *Dog Act (1976)*, which is administered by the Department of Local Government and Regional Development.

Because individual wild dogs cover areas that can cross property boundaries, effective wild dog management can only be achieved through the collective and integrated actions of *all* landholders in a given area.

The efforts of a majority of conscientious landholders can be quickly negated by the inactions of a small minority, with the properties of those seeking to opt out of control programs often providing a refuge for wild dogs. Animals removed by control programs can be rapidly replaced by movements from these adjoining refuges, undermining the effectiveness of the overall efforts.

The Zone Control Authority (ZCA), a statutory body representative of landholders within a given area, plays a key role in ensuring that the provisions of ARRPA are efficiently carried into effect, in and in relation to, the area of the State under its jurisdiction.

In the context of wild dog management, the pastoral ZCAs in particular annually determine the nature and extent of control programs, and oversee their implementation 'on-ground'. The ZCAs drive the development and periodic review of regional management plans, which translate the overriding objectives of the State Wild Dog Strategy (2005) to a local level. They identify how wild dogs are to be managed within the ZCAs' jurisdiction, and outline the specific activities that each landholder therein is required to undertake so as to minimise the impact of wild dogs on livestock production throughout the area.

The content of each regional management plan may vary from one area of the State to another, to take account of regional differences in the extent of the wild dog problem. Even within the same region, the requirements upon individual landholders may also vary, depending on the location of their property and the degree of risk posed to neighbouring properties. For example, those with property closer to known 'hot spots' and desired buffer zones may well face more stringent requirements than those whose property is physically remote from such high risk areas. Examples of the sorts of actions that may be required of different landholders include:

1. Active participation in the annual planning sessions conducted by the local ZCA;
2. Ground baiting, trapping and shooting carried out in conjunction with the day-to-day management of their property (undertaken by themselves, and/or via their active membership of an approved Declared Species Group [see Chapter 7]);
3. Active participation in strategic baiting programs as and when requested by the ZCA.

The requirements laid out in a given regional management plan are binding on all landholders within the area to which it relates, irrespective of land tenure. Hence, the requirements for lands managed by Commonwealth, State and Local Government instrumentalities will be enforced with the same vigour as those for privately managed lands.

Department of Agriculture and Food staff will support the ZCAs in the implementation of their respective regional wild dog management plans. This support will include:

1. Ensuring that all landholders are aware of their obligations under the relevant plan, and of the consequences of non-compliance;
2. Advising on available control techniques and those most appropriate to a given situation;
3. Arranging training in the use of poison bait products, and traps;
4. Facilitating access to professional doggers where required;
5. Coordinating the conduct of aerial baiting programs;
6. Auditing properties to assess the extent of compliance with required actions, and
7. Enforcing required actions where the landholder has failed to complete them in accordance with the relevant regional management plan.

Wild dog non-compliance management policy

Where it is suspected that a landholder is not meeting their obligations to control wild dogs under the relevant regional management plan, the following actions will be taken.

- An assessment will be made by an Authorised Inspector as to the possible impact of the non-compliance in relation to surrounding land. The non-compliant landholder and relevant neighbours will be interviewed. An inspection of the non-compliant property and relevant surrounding properties will also be conducted to look for signs of wild dog activity and associated control work.
- Information supporting any claimed control work will be gathered (examples include Risk Assessments completed in response to any applications to use 1080 or Strychnine on property, record of any subsequent sales of 1080 Oats and Strychnine, evidence of traps laid, evidence of use of a Declared Species Group dogger).
- The Authorised Inspector will then deliver a suitable report to the local ZCA Chair and/or Deputy Chair.
- If, in the opinion of the ZCA, the inactions of the relevant landholder are adversely affecting the effective implementation of its regional wild dog management plan, the ZCA Chair / Deputy Chair will authorise the Inspector to issue a direction notice to the non-compliant landholder. This sets out specific instructions as to what control work is required to be carried out on the property in question, and stipulates a commencement date and a completion date by which all such directed control work must be completed.
- If the landholder fails to comply with the ZCA's direction by the stipulated date, the directed control work will be completed by staff of the Department of Agriculture and Food and/or by the Department's appointed Contractor. In either case, the full cost of the control work including any costs of supervision of the work will be recovered from the landholder concerned. Private landholders may be subject to legal action if necessary. Costs will be recovered from public landholders by inter-agency negotiation, including Ministerial involvement if resolution at a senior level is not achieved within a reasonable timeframe.

Other relevant legislation

Animal Welfare Act 2002

This Act provides for the welfare, safety and health of animals, including livestock, native fauna and pest species and applies equally to government and non-government agencies and individuals. It is administered by the Department of Local Government and Regional Development. The Act does not prevent proper management of wild dogs but also does not exempt any type of animal from protection from cruelty under the legislation. Penalties for breaching the Act are a minimum of $2000 and a maximum of $50,000 and imprisonment for 5 years. Penalties are up to 5 times higher for bodies corporate. See Chapter 5 for more specific details relating to animal welfare aspects of wild dog control.

Poisons Act 1964

This Act covers the provisions and restrictions on the sale, supply, use, and possession of 1080 and strychnine. It is administered by the Department of Health.

Firearms Act 1973

This Act, administered by the WA Police, covers the use of firearms.

Federal legislation

Federal legislation of relevance includes the *Civil Aviation Regulations 1988* which govern the aerial application of baits.

The *Environmental Protection and Biodiversity Conservation Act 1999* applies when an activity is likely to have a significant impact on a matter of national environmental significance and includes provisions for the management of invasive species.

Chapter 2.
Identifying signs of wild dogs

It is important that land managers and their staff are familiar with the signs of wild dogs. The presence of wild dogs and any build up in numbers should be identified as early as possible, rather than waiting until stock losses become dramatically evident. In this way appropriate preventative action can be taken.

Tracking

Animal prints are commonly noted when driving along access tracks and roads. To identify prints reliably, it is important to stop periodically for a closer examination. If wild dog prints have been confirmed it is also often possible, depending on the degree of disturbance, to estimate at least a minimum number of wild dogs present. These estimates become unreliable where clear sets or sequences of prints are not found, as often occurs close to watering points.

Checking for prints is best done early in the day, before prints are blurred by wind or human or animal activity. Prints are also easiest to discern when the sun is lower in the sky, when shadows within a print tend to highlight its features.

Wild dogs travelling along a road will often favour the actual wheel tracks which are often softer and smoother to travel on than other ground. Sets of dog prints can continue unbroken for considerable distances, but generally the animals veer off periodically to investigate objects and may return to the road further along. It is important to be aware of these types of movements because they can cause errors when estimating numbers.

Wild dogs frequently follow the well-worn pads of other animals such as sheep and cattle, as these pads also offer soft and easy travelling. Major animal pads which intersect roads should be checked for wild dog prints.

Prints

Most people are familiar with the general appearance of the foot prints of domestic dogs. There are no reliable and consistent features to distinguish the prints of dingoes from other similar sized wild or domestic dogs. Therefore observing the prints of the average domestic dog provides useful training and practice in recognising the prints of wild dogs.

The size of prints can vary widely, depending on the sex, age and weight of the animal, the hardness of the ground, and the speed at which the animal is travelling. Nevertheless, for an individual dog, the prints of the fore-feet are always larger than the prints of the hind-feet (respective lengths of approximately 70 mm and 61 mm for a male dingo, excluding claw marks). When prints are obscured it is important not to count the two different-sized prints of a single dog as belonging to two different individuals.

All clear dog prints show four toes with claw marks and a large hind or heel mark that is triangular in shape. The rear edge of the heel pad of the hind-foot usually has a rounded shape, whereas the corresponding part of the fore-foot is usually straight (see Figure 1). Verifying whether a print is of a hind- or fore-foot can also help avoid an erroneous double count outlined above.

Fox foot prints have the same basic appearance and can sometimes be confused with those of smaller dogs. Fox prints are smaller than the average sized dog (approximately 50 mm in length for fore-feet and 44 mm for hind-feet of a male fox, excluding claw marks). Fox prints are also more elongated and proportionately narrower than those of dogs. This is because there is a marked gap between the pads of the two middle toes and the heel pad of foxes (see Figure 2).

Fig.1 *Dog prints, showing the larger fore-foot on the left, the smaller hind-foot on the right. (Figures are based on Triggs, B. (1985). "Mammal Tracks and Signs". Oxford University Press: Melbourne)*

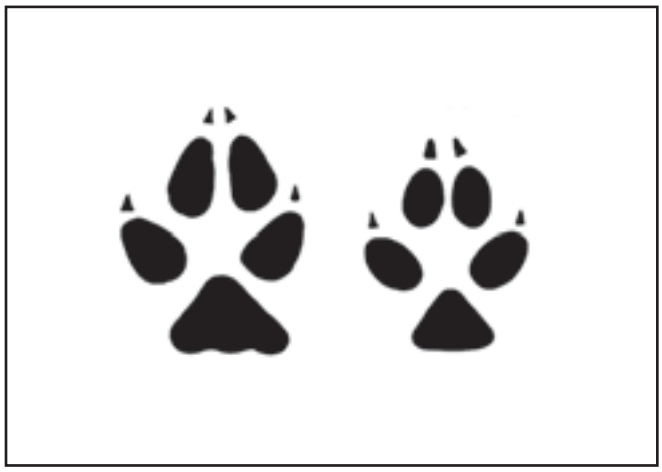

Fig.2 *Fox prints, showing the larger fore-foot on the left, the smaller hind-foot on the right. (Figures are based on Triggs, B. (1985). "Mammal Tracks and Signs". Oxford University Press: Melbourne)*

In clear prints made by foxes, a line drawn between the front edges of the outer toes would not normally cut the rear part of the middle toes, whereas it will for dogs. Claw marks of foxes are sharper and finer than those of dogs.

The foot prints of cats tend to be smaller again, and more rounded, with no claw marks. The fore- and hind-feet are similar in size and shape, and the four toe pads form a more even semi-circular arch about the heel pad than those of dogs and foxes.

The hand prints of kangaroos can sometimes be mistaken for those of dogs, particularly when badly weathered or partly obscured. However, unlike dogs, they have five fingers and claws. As for other situations where there may be uncertainty in identification of prints, it is important to attempt to find areas nearby where the prints are clearer.

Pattern of prints

An important factor to remember when interpreting prints is that the pattern of placement of the fore- and hind-feet can vary, depending on the gait and speed at which the animal is travelling.

A dog that is walking or trotting produces a staggered set of prints of two lines, representing the fall of feet on opposite sides of the body (see Figure 3). Depending largely on speed of travel, the print of the hind-foot can also fall precisely over that already made by the fore-foot. This means that the print of the hind-foot can often be the predominant print noticed.

At faster speeds the stride increases, the prints tend to be less staggered and claw marks become more prominent.

Scats and urine

The behaviour and signs related to excretion of faeces (scats) and urine by domestic dogs and cats are similar to those in the wild. Cats commonly bury their excreta. The excreta of each species has a distinctive and acrid odour.

Scats are typically sausage-shaped and sometimes tapered at the ends, but the form can vary with diet. Dog scats are generally bigger than those of foxes and cats, tend to contain less insect material and larger bone fragments than fox scats, and are not as regularly tapered. Scats of working or tourists' dogs might be mistaken for those of wild dogs, though they seldom contain substantial quantities of hair common in scats of wild dogs.

Fig.3 *Set of prints of a trotting dog. (Figures are based on Triggs, B. (1985). "Mammal Tracks and Signs". Oxford University Press: Melbourne)*

Scats may persist for many months, particularly in dry conditions, losing odour over time. Scats tend to whiten with age, particularly when they have a high bone content.

Aggregations of dog scats are often found on or near prominent objects, particularly at features such as creek crossings. These aggregations generally represent a scent-marking site (see 'Selecting a Trap Site' in Chapter 8). Multiple scats of varying age can indicate that one or more dogs have been visiting the area for some time and that they may be resident in that area.

Urine is less easily detected, though the smell of fresh fox urine is pungent and usually readily identified. In the case of dogs, it is more common to detect urine marks by means of other cues, such as scratches made on the ground.

Ground scatchings and other marks

Individual dogs and foxes often scratch the ground vigorously with their hind-feet at sites where they or others have deposited scats or urine. Dogs tend to engage in more extensive scent-marking than foxes and often travel in groups, producing multiple marks.

It is sometimes possible to identify soft depressions scratched out by dogs as resting places, usually in the shade and near water or an animal carcass. These resting places with their tell-tale dog prints can give an indication of the number of dogs present.

Howling

Howling is the most common call of wild dogs and the one most likely to be heard by the average person. Other vocalisations such as yaps and growling are used over shorter distances.

Howling generally occurs during the night, frequently soon after sunset and just before first light in the morning. Howling tends to peak during the lead-up to and through the mating season. Chorus howls, with multiple dogs calling, can often be discerned because humans can detect the differences in pitch or form of howl between individuals.

Other indications

Unusual behaviour or distribution of stock, particularly sheep, can indicate the presence of wild dogs. Sheep may appear to be more flighty, be found in less-preferred areas (including outside their designated paddocks), and have a higher incidence of mis-mothered lambs when wild dogs are present.

Concentrations of scavenging birds such as crows can help identify carcasses which should be checked for evidence of predation or scavenging by wild dogs (see Chapter 3). These birds sometimes follow wild dogs as they travel about, occasionally leading to the wild dog being discovered.

Chapter 3. Identifying predation by wild dogs

The following information deals with sheep, the species most vulnerable to attack and injury by wild dogs. However, the same principles apply to other species such as cattle and kangaroos.

In the case of cattle, calves are the age-class most vulnerable to wild dog attack. Calves often sustain less mortal injuries than sheep due to their size and the protection usually given by the cow and other adult cattle, and are more likely to survive an attack. Evidence of dogs attacking cattle is sometimes first noted when the cattle are yarded and instances of bitten ears, tails and other wounds are found.

Because there is a wide range of behavioural responses determined largely by the experience of the attacker and its motivation, such as hunger or play, there is no certain way to distinguish between dingo and domestic or feral dog attacks. Therefore much of the following information, derived from studies on dingoes, applies equally well to damage by other wild dogs.

Wild dog predation of livestock can also give rise to animal welfare issues. When injured stock are found they should be treated or humanely destroyed as soon as possible.

Carcasses found

1. Sheep more than six months old

The following information should be sought:

Signs

Depending on the type of ground and the amount of time elapsed since the attack, tracks may be found indicating a struggle. Both the dingo and its prey often leave deep prints with toes spread out. Freshly broken vegetation, often holding tufts of wool, is sometimes found at the site of the attack. Pieces of wool with patches of torn skin attached, as well as blood trails, are good indicators of dingo predation. Often however, scavengers obscure the tracks and other signs. The presence of dingo tracks at a carcass does not necessarily mean predation by dingoes was the cause of death, particularly if the tracks are more recent than the age of the carcass.

Preliminary carcass details

It is important to note the position of the carcass, as sheep dying from natural causes usually die in shady places, sometimes near water. A carcass found out in the open, away from available shade can point towards predation. In the same way, the age and condition of the sheep can give a clue to predation - when young and apparently healthy sheep are found dead, predator attacks could be suspected.

Fig.4 *Ewe killed by dingoes. Note blood on the ground but little external damage evident.*

Carcass examination

Dingoes generally kill by biting the throat, damaging the trachea and the major blood vessels of the neck. Blood on the throat is therefore good evidence of dingo predation. Blood is often found at the mouth and nose, although care should be taken to distinguish blood here from other body fluids which drain from a decomposing carcass (see Figure 4).

Dingoes often attack sheep from behind as they run away, resulting in injury to the hind legs. Inexperienced dingoes and those attacking 'for fun', frequently inflict considerable damage to the hind end of the sheep, which often leads to its death. In these cases, blood is often found caked on the hind legs. The pattern made by blood flowing down the legs while the sheep was still upright can be clearly distinguished from blood or fluids which may flow as a result of animals feeding on a carcass or from decomposition (see Figure 5).

Fig.5 *Sheep attacked at hind end. Note pattern of blood flow which took place when the sheep was standing.*

Dingoes' saliva, even when dry, can sometimes be seen on the wool of attacked sheep.

Simple skinning of the throat and hind legs is often sufficient to reveal hidden damage. Indications of dingo

involvement include tooth punctures in the hide, subcutaneous haemorrhage, bruising and tissue damage (see Figure 6).

External signs of tissue damage due to feeding or scavenging activities can be readily confirmed in a fresh carcass by simple dissection. Tissue damage caused after death will show no haemorrhage or bruising.

Decomposition and/or scavenger damage can mask the cause of death in older carcasses. Often however, blood-stained wool remains, especially on the lower legs. Again, care must be taken to ensure that decomposition fluids are not mistaken for blood.

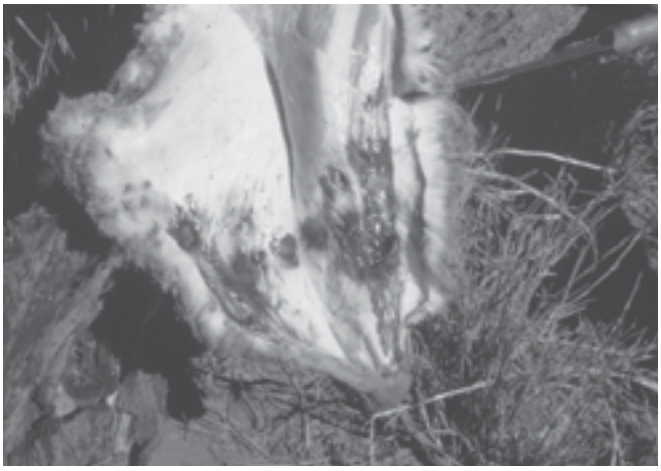

Fig.6 *Skinning revealing tooth punctures, haemorrhage and tissue damage, clearly distinguishable from undamaged portions of the carcass.*

Depending on the age of the carcass, dissection is often warranted, as bruised tissue can be distinguished from undamaged tissue in a decomposing carcass. Provided that the skin is still intact, damage such as puncture wounds on the throat can often be revealed by simply pulling out the wool (see Figure 7).

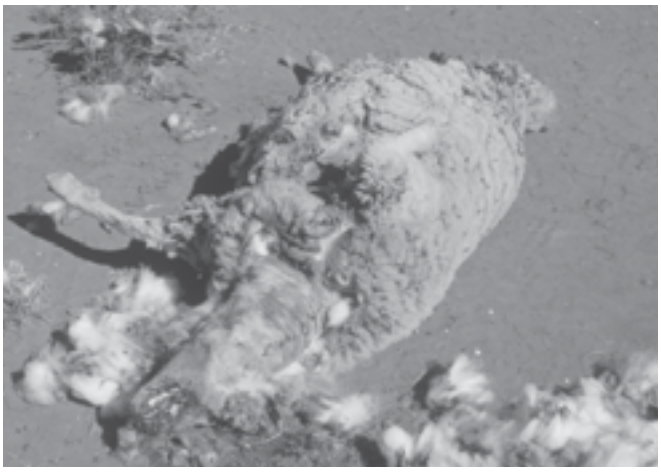

Fig.7 *Tooth punctures and bruising revealed in a decomposing carcass by pulling out the neck wool.*

2. Sheep younger than six months

There are no predators in Australia other than dingoes and dogs that are large enough to inflict the damage to adult sheep described above. In the case of sheep younger than six months of age however, the situation is often more complex.

Many young lambs die from causes other than predation, and predators are often suspected as a result of scavenging on dead or moribund lambs. To verify predation, dissection must show haemorrhage and bruising as described above for adult sheep (other methods can be used to determine whether the lamb was healthy and likely to have survived in the absence of predation).

A further complicating factor in relation to lambs, is that predators other than dingoes could be involved. Although the incidence of fox attacks on healthy lambs is lower than was generally believed, there are occasions when fox attacks occur. Apart from other signs, such as tracks, scats, and damage to adult sheep in the area, it can be difficult to distinguish between fox and dingo predation on lambs. The size of bites and puncture marks may provide the most reliable guide.

Although foxes often tend to feed from the heads of lambs, there are variation in the behaviour of both individual foxes and dingoes that sometimes make definite predator identification difficult.

Injured sheep found

Injured sheep are sometimes found in areas where dingoes are active. Sheep that have been bitten often drift towards the rear of a mob, and can frequently be seen hobbling. They sometimes remain close to water, though serious injuries sometimes prevent them moving at all. Any injured animals that are found should be treated or humanely destroyed as soon as possible.

Sheep showing signs of injury should be examined for bite marks and blood, particularly on the hind parts. As mentioned above, dingoes often bite the hindquarters, causing easily-identified injuries. Rams use their horns to deter dingoes from frontal attacks, and therefore suffer more rear attacks than other sheep. A torn scrotum or complete castration may be found (see Figure 8).

Fig.8 *Ram with damaged scrotum following dingo attack.*

Injury by dingoes to the head or neck of sheep is usually rapidly fatal, so animals found with these injuries are often dead. Any doubts about the cause of severe injuries can be solved by examination of the carcass.

Few sheep recover from severe dingo-inflicted injuries; blood loss, shock, infection and inhibited movement are the most important factors in later death (see Figure 9).

Fig.9 *This sheep was severely injured by dingo attack and would not have survived.*

Occasionally, however, sheep bearing scars from dingo attacks are discovered, particularly at shearing (see Figure 10). Care should be taken to distinguish bite marks and tears from shearing or wire scars, although dingo damage is usually easily recognised.

Injured lambs are rarely found, as they seldom survive a dingo attack.

Fig.10 *Scrotum of ram showing scars from a previous dingo attack.*

Chapter 4.
Wild dog control strategies

General strategy

The aim of controlling wild dogs is to protect livestock from attacks and harassment. The approach used in sheep grazing areas is different from that in cattle areas. Sheep and wild dogs cannot coexist, so a control strategy aimed at keeping sheep paddocks free of wild dogs must be adopted. In the absence of fences to exclude them, wild dogs must be controlled *before* they reach sheep paddocks.

Buffer zone strategy

The concept

Studies in Western Australia and the Eastern States have shown that only wild dogs living within or close to stocked paddocks are likely to pose an immediate threat to livestock. It is therefore sensible to target the limited resources available for wild dog control to those areas.

The territorial behaviour of wild dogs forms the basis for creating a virtually dog-free buffer zone next to the stocked country. Dogs coming in from further out will tend to settle here (the area had sufficient resources for the previous resident dogs, so why would the newcomers need to go further?). The newcomers would be no more likely than their predecessors to roam over a wider area. This would be especially so if the buffer had been cleared across the effective width of typically two territories, which can be 15 to 20 kilometres in total in some areas. General and effective control of these dogs is much easier to manage than trying to deal with dogs that have already reached the paddocks and started to cause damage. Ideally, the buffer zone should extend to form a continuous strip of country fronting the areas needing protection.

Detailed studies and many practitioners have clearly documented the danger of leaving a partially occupied buffer. Wild dogs arriving from further afield are unable to settle in the buffer because of the continuing presence of some established residents, and move through to the stock paddocks. It is well known that dealing with wild dogs that are among sheep is more difficult than tackling them in the buffer and away from stock. In addition, the timing of control in the buffer zone is not as critical as dealing with a dog that is already encroaching on sheep paddocks.

Buffer zone width and level of control

To make sure that adequate food and water are available to immigrating wild dogs, a buffer zone should be as wide as one to two territories. In the Pilbara, this amounts to about 15-20 km. The amount and distribution of water must be taken into account in establishing a suitable buffer zone. Widely-spaced waters, such as found on the Nullarbor, necessitate a buffer zone of up to 35 km wide.

It is more efficient to concentrate control efforts into well-defined areas than undertaking a less intensive effort over wide, poorly defined areas. The general approach to restrict wild dog control within and close to paddocks, also applies to the cattle industry. However, eradication of wild dogs in cattle areas is not as crucial as in sheep areas.

Not all social groups of wild dogs are involved in attacks on cattle, and cooperation between wild dogs is usually necessary for a successful attack on cattle. This suggests that a general reduction in the number of wild dogs in problem areas should be sufficient for the protection of cattle herds. Coordination of baiting between properties to provide a general wild dog population reduction is a good strategy.

Planning and coordination

Fundamental elements of best-practice management are identifying the problem and establishing priorities. As already outlined, the type and intensity of the control effort needed against wild dogs depends on the risks posed to the livestock in question. The most intensive effort is required on those properties running sheep and goats and on immediately adjacent country. Apart from the legislative requirements to control wild dogs on their land (see Chapter 1), managers need to understand and consider the risks they or their neighbours face from wild dogs.

Wild dog control must be viewed as an integral part of routine property management. It is not someone else's problem, and should be viewed in the same way as managing stock and attending to waters.

Planning for wild dog control occurs at different scales. At the property level, it is important for managers to know where dog activity is occurring, and plan their own control work accordingly. This means allocating an appropriate amount of time for surveillance (see Chapter 2), as well as time and resources for actually dealing with the problem. This includes planning in advance for items such as bait supplies, or identifying a critical time when a dogger may be called upon.

However, it is also important to acknowledge that wild dogs can overlap several properties, meaning that the control effort is far more effective and efficient if coordinated over a broader scale than an individual property (Figure 11). The wider regional effort also limits reinvasion into the higher-risk areas.

Fig.11 *Landholders mapping key target areas for aerial baiting campaigns.*

With broader planning, the concept of the nil-tenure approach is critical. In this approach, the landscape is considered without boundaries. Areas that need to be targeted for wild dog control, including buffers against vulnerable enterprise, are identified and mapped out.

These planning activities require the cooperation and participation of all land managers, as outlined in Chapter 1.

Best-practice management also requires monitoring, evaluation and adaptation to achieve continuous improvements in efficiency and effectiveness. Ongoing monitoring and recording of wild dog activity and control efforts should be part of normal property management. Evaluation of the local and regional level of dog activity and control effectiveness will be assessed by the appropriate planning groups.

A Combination of tools

It is vitally important that all options be considered in any control strategy for wild dogs including:

- aerial baiting;
- ground baiting;
- trapping;
- shooting; and
- techniques such as exclusion fencing.

The emphasis on particular techniques may change over time according to the area and local situation.

No single control technique is appropriate for every situation. Baiting is usually the preferred method because it is cost effective, however trapping is sometimes needed to remove wild dogs which do not take baits, and in areas where baiting is not possible. In designing a control campaign, it is important to take account of the following factors.

Chapter 5.
Animal welfare

Animal welfare is both a moral obligation and a legal requirement under the *Animal Welfare Act 2002* (AWA) and its Regulations. Important animal welfare considerations include how pest species are managed or controlled, as well as how injured livestock are treated. The treatment of any animal should always be as humane as possible. This is in line with animal welfare legislation and community expectations.

Wild dog control practices must comply with AWA and its Regulations. There are heavy penalties, including imprisonment, for non-compliance (see Chapter 1). Apart from any moral and legal considerations, it should be recognised that the use of inappropriate control practices puts at risk the whole State Wild Dog Management Strategy. This is because inhumane practices have the potential to undermine community confidence that pest management can be achieved without cruelty. Unacceptable practices by even a few are also likely to be widely publicised by animal welfare and animal rights' groups. This has the real potential to impact negatively on legitimate and responsible wild dog management.

Metal-jawed traps are a prescribed inhumane device under AWA and their use is therefore prohibited. However, there is a Defence in the Regulations that allows use of these traps only for the purpose of wild dog control, on the condition that the jaws of the trap are bound with cloth containing sufficient strychnine to ensure the rapid death of the trapped animal.

Similarly, although intentionally or recklessly poisoning an animal is a cruelty offence, there is a Defence in AWA relating to killing pests. However, this Defence relies on control practices being as target-specific as possible, and reasonable steps must be taken to avoid harming non-target animals.

It is also a Defence under AWA to a charge of cruelty that a person was authorised by law to perform an action and that the action was done in a humane manner.

Killing an animal *per se* is not an offence under AWA but being cruel is. Therefore, shooting must be carried out to achieve a clean kill and avoid merely wounding an animal. Specific details and recommended calibres and ranges are given in the 'Shooting' section of Chapter 9.

Livestock owners also have a responsibility under AWA to take reasonable steps to prevent predation of livestock and to treat or humanely destroy any injured livestock that are identified.

It should be remembered that 1080 is the only poison registered in WA for use in wild dog baits. As such the use of any other poison for baits is likely to breach the *Poisons Act 1964* as well as animal welfare legislation (see Chapter 1).

Chapter 6. Baiting

Aerial baiting

Aerial baiting was largely developed to achieve cost-effective and widespread preventative control, to enable baiting in otherwise inaccessible areas, and to assist in creating buffers to prevent the movement of wild dogs into stocked areas. Adopting aerial baiting as the single tool to solve all wild dog problems is not a good strategy. For example, aerial baiting is sometimes used over accessible areas where baits could be laid more effectively from the ground. There are many examples of where properly directed and conducted aerial baiting has been and continues to be very effective. There are also examples of where aerial baiting has not been so effective.

In the large, regional baiting campaigns, fixed wing aircraft such as a Cessna 206 are generally used (Figure 12). These fly at a height of about 100 metres. Aircraft are fitted with hoppers and bait chutes, and the navigator directs a person acting as a 'bombardier' as to when and how many baits should be dropped. The path followed by the baiting aircraft is automatically logged into an on-board GPS, to ensure that accurate records are made of baiting operations. Sensors are incorporated into the bait chute and data are linked to the GPS, logging the location and number of baits dropped. This allows for review of baiting campaigns and helps with future planning.

Fig.12 *Loading baits into a baiting aircraft.*

Ground baiting

Fewer baits are required for ground-based baiting than for a equivalent aerial baiting program, possibly in the order of one ground bait to five aerial baits. Ground baits can be carefully placed where they are most likely to be found by a wild dog, and not trampled by cattle or dropped into water. If non-target animals such as birds are at risk, baits can be buried or hidden among leaves or bushes. A lure, such as a decomposing carcass, can be used to attract wild dogs into an area where baits have been placed.

Hand-placed baits can also be more easily monitored for 'take' by wild dogs. Reliance on any type of baiting should be reduced when food supply is very high, and where wild dogs are already in sheep paddocks, because baiting is likely to be less effective in these circumstances.

Poison used in baits

1080 is now the only poison registered for use in baits for wild dogs in Western Australia, and strict regulations govern its use. Trained landholders can purchase bait products containing 1080 after they have obtained Baiting Approval from an authorised officer of the Department of Agriculture and Food.

'Guide to the Safe Use of 1080 Poison' (see Further Reading) details important precautions.

1080 has many advantages over other toxins such as strychnine. Compared with many native species, canids such as dogs and foxes are particularly sensitive to 1080. This makes baiting with 1080 more target-specific than with other types of poison. In addition, the water solubility of 1080 means the toxin is eventually leached out of uneaten baits by rain, reducing any lasting potential hazard posed by the baits. Additionally, 1080 is broken down into harmless by-products by micro-organisms, eliminating any potential for long-term environmental contamination.

Why can't strychnine be used to bait wild dogs?

Some calls have been made to allow strychnine to be available for bait making, principally to make carcass baits. Strychnine has been banned as a pesticide in many Australian states and other countries because it is considered an inhumane poison. Carcass baiting with strychnine is non-selective, and would kill many native animals. The return of strychnine for wild dog baiting cannot be justified and would not be compatible with the responsible use of poisons by landholders.

There is also a risk that strychnine could be lost as a poison to use on trap jaws. This apparent anomaly, that strychnine is still used on traps, is argued on the grounds that a trapped dog would suffer longer and die a crueller death if left in an unpoisoned trap. The use of poison on the trap is also the reason that unpadded traps can still be used for wild dog control in Western Australia.

If carcasses are seen as desirable food for a wild dog, there is no reason why they can't be used as lures, with hand-placed 1080 baits scattered nearby.

Bait type

Commercially-produced baits from Victoria are available in Western Australia but currently, most baits used for wild dog control in this state are prepared in the field from kangaroo meat. These baits are made from pieces of meat (110 g fresh weight), injected with 1080 solution (or treated with a single 1080-impregnated 'Rhodamine oat'), and then sun-dried on racks to lose about 60 per cent of their weight in moisture (see Figure 13). Each bait

nominally contains 6 mg of 1080. Details of making dried meat baits are given in a later section.

Trials have shown that dogs readily eat dry meat and that dried meat baits have several advantages over undried baits. Dried meat is more difficult than moist meat for small native carnivores and other species to eat, making the baiting more target-specific. Furthermore, dried meat remains intact for longer, and is more resistant than moist meat to the rapid loss of 1080, which can occur through exposure to rainfall, microbial action, or insect attack. Rapid loss of 1080 is undesirable because baits may become sub-lethal while still available to wild dogs. Sub-lethal dosing could result in some individuals becoming bait-shy, and in the longer term, might even select for genetic resistance to 1080.

Research has shown that dried meat baits killed radio-collared wild dogs up to seven weeks after the baits were laid, and testing for 1080 content showed that some dried meat baits can remain toxic for considerably longer than this. Although generally helpful, the persistence of 1080 in dried meat baits in the absence of rain must be considered when judging the potential risks to non-target animals, particularly domestic dogs.

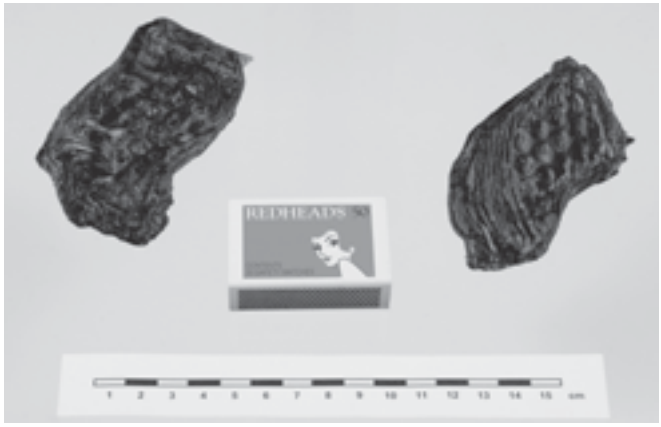

Fig.13 *Well-prepared dried meat baits.*

Despite the known effectiveness of the 1080 dried meat bait, there is some merit in alternative bait materials. A salami type bait developed for foxes in Western Australia may be further developed for use against wild dogs. If effective, the salami bait would be available from retailers. One advantage of manufactured baits such as these is that they have a uniform size and weight, which means that they may be suitable to be aerially dropped via an automated delivery system. This would allow the navigator to have complete control of the bait-drop.

Commonly-asked questions about baiting

Is it true that baiting can be ineffective because some dogs won't eat baits?

Wild dogs that don't eat baits are not necessarily bait-shy. Bait-shyness generally comes about through a sub-lethal dosing of poison, which leads to later avoidance of baits. Alternatively, and of more concern, is that perhaps some genetic trait makes some individuals more wary, and they avoid objects such as baits. This could then confer a selective advantage so that in time, the proportion of dogs displaying that trait would increase. There is no direct evidence that this is the case.

It is common to see evidence of wild dogs walking past baits. However, detailed radio tracking of similar, supposedly bait-shy, individuals showed that many eventually took a bait, six to seven weeks after the baits were laid and first encountered. Talk of extensive bait-shyness is unsupported speculation and can be counter-productive by directing resources away from baiting in areas where it is a highly appropriate technique.

How does available food supply affect baiting success?

Wild dogs are less likely to take baits when there is abundant food available. In these circumstances, dogs simply seem to prefer their natural, fresh prey (Figure 14). There are many anecdotal observations of wild dogs walking past freshly perished cattle, foregoing an abundant source of ready meat, and proceeding to hunt kangaroos. The same is common in sheep areas: dogs will leave freshly killed or mortally injured sheep and move on to hunt kangaroos.

When food supply is high, the wild dogs most likely take baits are the younger ones. There is no clear information that adult dogs teach young dogs to avoid baits, although there are observations of previously trapped or trap-shy dingoes leading others away to avoid traps. Whether adults can similarly dissuade youngsters from eating baits is a matter of speculation.

Fig.14 *Wild dog feeding on a kangaroo kill.*

Is it worth baiting paddocks where sheep are being killed?

Because of the food supply issues outlined above, baiting is seldom the primary control method recommended in paddocks where wilds dogs have already started killing sheep. Not only do sheep provide an easy food source, but kangaroos and other preferred prey of wild dogs are usually readily available in sheep grazing areas. Under these circumstances, the chances of dogs taking baits are reduced. Research in the Pilbara showed that dingoes in sheep paddocks were in the best condition, because they had access to easy food.

This information indicates that it is better to use baits where they are most likely to work - in the buffer or outside the paddocks where food is harder to hunt or find. Baiting in sheep paddocks need not be abandoned altogether in these circumstances, but it may not be highly effective. Nevertheless, it will still remove foxes if they are present, and that can help with other forms of wild dog control such as trapping.

What other factors affect baiting success?

The real key to baiting success, apart from the availability of natural food, is bait placement. Poor placement can lead to conclusions that aerial baiting 'doesn't work', but examination often reveals that the baits were laid in inappropriate places, often not in wild dog refuge areas or near natural waters or hunting areas. It is crucial that such places are better mapped and targeted, and that a person with sound knowledge of the area navigates the baiting plane.

Ample proof exists showing the effectiveness of aerial baiting when carried out properly.

Can poor baiting results stem from poor quality baits?

Much time has been spent speculating about bait quality including:

- wet versus dry meat;
- too-dry baits;
- use of thawed frozen meat versus unfrozen meat;
- the effectiveness of the 1080;
- the method of applying 1080 to the baits; and
- ants eating baits.

These suggestions stem from the observations that some wild dogs were still alive after baiting, and were seen to walk past intact baits. It is likely that poorer results in some areas are due to the two main factors already mentioned:

1. The baits not being placed in the most appropriate areas; and
2. The availability of abundant, preferred natural food.

Can wild dogs become bait-shy?

The issue of sub-lethal baits is worth some discussion. 1080 is leached from baits by water, resulting in baits eventually losing their toxicity and going through a phase of being sub-lethal. Suggestions that this could explain an increase in supposedly bait-shy dogs is not supported by past experience.

If consumption of sub-lethal baits had been a regular occurrence over the past 20 years, there would have been a more rapid deterioration in the effectiveness of 1080 baiting. There is also no evidence of this occurring with fox control, despite repeated baiting campaigns over many years, and in wetter areas than where most wild dog control is carried out.

1080 has a long latent period. This means that after the wild dog has eaten a bait, 10 hours or more can elapse before symptoms of poisoning appear. This latent period is greater for lower doses. It seems unlikely that a dog, eating a variety of foods in the course of a 24-hour period, would be able to readily associate feeling sick with a bait eaten many hours earlier.

The practice of using dry rather than moist baits will counter any tendency for rapid 1080 loss and therefore reduce any *potential* problem with sub-lethal baits.

Making and laying baits, and requirements for using 1080 products

The following information is taken largely from the Directions for Use leaflets for the various registered 1080 products used in Western Australia for wild dog control. A specific Directions for Use Leaflet accompanies the product when supplied. Additional information regarding 1080 use is given in 'Guide to the Safe Use of 1080 Poison' (see Further Reading).

In accordance with Poison (Section 24) (Registered Pesticide 1080) Notice 2000 made under the *Poisons Act 1964*, 1080 poison baiting can only be undertaken with the approval of the Directors General of authorised departments, currently the Department of Agriculture and Food and the Department of Conservation and Land Management. Only the Directors General (or officers delegated in writing) can approve the distribution of 1080 baits to other persons, subject to those persons having received adequate training.

A formal assessment of risks to humans, domestic animals and wildlife must be undertaken before baiting is considered. All 1080 dried meat baits must be laid as directed within the conditions of the 1080 Risk Assessment Approval, and appropriate warning signs must be displayed.

Dried meat baits containing 1080 are very effective in controlling wild dogs. Used according to the label and associated directions, the baits are safe to use and pose little risk to non-target animals and the environment.

Drying racks

Racks for drying baits should be made from wire netting stretched over a frame. The netting should be 25 mm mesh or smaller and stretched as tautly as possible over the frame. The smaller the mesh used, the easier it is to remove the dried baits. Square mesh is preferable to the woven chicken-wire type. The racks should be of a convenient height (waist height) and width (the operator must be able to comfortably reach across) and be situated in the open to gain maximum sunlight and air circulation (Figure 15). As a guide, an average rack will have the capacity for approximately 100 freshly cut (wet) baits per metre of length.

Fig.15 *Spreading meat on a bait rack.*

A light coating of vegetable oil, applied to the mesh with a brush or similar, helps prevent baits sticking to the rack.

Sometimes it is necessary to spread a second layer of netting over the drying baits to prevent birds such as crows removing baits from the rack.

The selected site must be isolated from general access. Maintain a watch over the baits for the entire period they are on the drying racks. As an added precaution, warning signs should be displayed prominently nearby.

When a small number of baits are to be made, such as less than 50, a rack is unnecessary as baits can be hung and dried individually on small wire hooks.

Meat

Baits can be cut from fresh carcasses, or meat can be bought cut to bait size. It is usually more convenient to buy meat for large-scale operations.

Meat characteristics vary between different species of animals, though any lean meat with reasonable sized blocks of muscle can be used. The order of preference is kangaroo, camel, donkey, beef, sheep then horse. Kangaroo meat makes the best baits as it has a fine grain, is low in fat, and dries more quickly than other meats. However, because of their smaller muscle size, kangaroo carcasses give a greater proportion of wastage than those of larger animals.

When carcasses are obtained directly from the field, dress and hang overnight so that the meat 'sets'. Frozen meat should be thawed and allowed to drain before cutting into baits. Do not attempt to saw frozen meat into baits, as many baits will fall apart on thawing.

Cutting baits

When cutting baits, remember:

- Ragged edges, connective tissue and deep cuts make ideal sites for blowflies to lay their eggs;
- A bait with a major seam of loose connective tissue may fall apart when dropped from an aircraft;
- Smooth, even-sized baits are easier to handle, store and feed through the bait chute of an aircraft;
- Small, ragged or flat baits pose risks to native, non-target animals;
- Fat on a bait can go rancid and the resultant stench makes handling the baits unpleasant, especially in the confines of an aircraft; and
- Fat is unable to absorb 1080 and prolongs the drying time of the underlying meat.

To cut good baits:

- Trim off ragged edges, fat and connective tissue;
- Cut baits from a single block of muscle, using strong decisive cuts;
- Cut baits 6 cm square (approximately the size of two matchboxes placed side by side) and 4 cm thick;
- Periodically check the weight of baits being cut (nine baits should weigh 1 kg);and
- Be strict about the size and quality of baits, and discard sub-standard and fly-blown baits.

If pre-cut meat has been purchased, check pieces for size, trim off any ragged edges, fat or connective tissue and discard any that is unsuitable.

Placing baits on racks

Spread baits out evenly on the rack as soon as possible after cutting (see Figure 15). Moist meat deteriorates rapidly when cut, especially in hot weather. Do not allow baits to touch each other as this prevents uniform drying and provides good sites for blowflies to lay their eggs. Place baits on the wire netting and not on a solid surface.

Use of insecticides

In hot, dry weather, baits will dry quickly and safely without the need to protect them from fly strike. If blowflies are a problem, moist baits can be sprayed on the rack with 2 g Vetrazin ® larvacide per litre of water before applying 1080. Spraying baits on the underside and on top to provide complete coverage should prevent the development of maggots without affecting the palatability of the baits.

Where Vetrazin® is not used, chase flies off baits, or spray (not directly onto baits) with a commercial fly-spray.

Inserting 1080 impregnated oats into baits

Ideally, baits are ready for oat insertion as soon as the baits have drained, and while moist enough to enable a dry finger to be run smoothly over their surface. About 15 minutes drying time is sufficient under warm conditions. Baits should not have formed a hard skin and the muscle fibres should not have started to tighten.

Do not insert a Rhodamine 1080 impregnated oat grain into fat or connective tissue. Insert only one 1080 impregnated oat grain into each bait.

To insert a 1080-impregnated oat grain into a bait, make a pocket in the bait with a tapered skewer approximately 30 mm long and 5 mm in diameter. Avoid using a knife to cut the pocket as the resultant pocket may be too large and the oat may fall out during subsequent handling. The placement of the oat grain should be in the thickest portion of the bait and at an angle to avoid penetrating through the other side of the bait.

An alternative approach is to use a pair of sharp-nosed tweezers to firmly hold the oat and then force the tweezers and grain into the piece of meat.

Injection of baits

In larger-scale operations, it is more efficient to inject baits with 1080 solution (see Figure 16). This must be done by authorised staff of the Department of Agriculture and Food or Conservation and Land Management, or Pest Control Operators with appropriate endorsements.

Fig.16 *Injecting the meat with 1080.*

Drying baits

It is important that the baits dry as quickly as possible. Turn baits over once they have formed a tough skin. Under dry conditions this takes about four hours. Baits turned at this stage dry more quickly, to a more rounded shape and are easy to remove from the rack. Baits left longer tend to cling to the racks and are difficult to remove from the netting.

Dried baits should be dark coloured, hard on the outside and weigh only 40 per cent of their original weight. Weight loss can be determined by weighing a convenient number of baits (such as 20) prior to their treatment with 1080, and weighing that same sample periodically until dry. Dry baits can still have a very slight 'give' to them when pressed firmly but there should be a definite hard outer layer.

It is essential that only hard, well-dried baits are used because:

- they pose less risk to small non-target animals;
- there is less possibility of 1080 being leached out by rain;
- they can better withstand weathering;
- they will not rot before being laid;
- they are less likely to go mouldy;
- it will be more difficult for ants to eat through to the softer centres;
- sand and other matter will not stick to dry baits; and
- they are physically tougher and can better withstand trampling by stock.

Pieces of damaged baits and baits which deteriorate due to the effects of rain, rotting or mould could contain insufficient 1080 to kill wild dogs, potentially leading to bait shyness.

Baiting precautions

Operators must be familiar with 'Guide to the Safe use of 1080 Poison' (see Further Reading).

Only prepare enough baits for immediate use and do not store baits for extended periods. Temporarily store dried baits in containers which allow air to circulate freely around them, such as onion bags. Baits must be labelled and stored in a locked room or shed. Do not store baits and foodstuffs together.

1080 is a non-accumulative poison which is broken down rapidly in the body. It can be absorbed through mucous membranes and open wounds, but is not readily absorbed through unbroken skin. Wear protective clothing and PVC gloves when using baits. Always wash hands thoroughly with soap and water after handling any 1080 product.

Collect all meat scraps and discarded baits from the racks and surrounding area and incinerate or bury (see Storage and Disposal below).

Notification of neighbours

Inform neighbours in writing at least 72 hours prior to baiting about where and when the baiting is to take place. Also warn visitors and anyone living on our property.

When undertaking a coordinated community baiting program to control wild dogs, alternative ways of

informing neighbours may be used, such as letter drops, newspapers, notices and local radio. However, this can only be done with the approval of the Director General of the Department of Agriculture and Food or his delegated officer.

Warning signs

When baits are laid, appropriate warning signs must be displayed prominently at all designated road entrances to the property, at the extremities of the property boundaries fronting a public thoroughfare and at other strategic points, for the duration of baiting and for one month thereafter. These warning signs are generally available from the authorising officer or supplier.

Laying baits

If possible, lay baits where wild dog activity has been identified. If this is not possible, lay baits near watering points and along identifiable routes used by wild dogs, such as vehicle tracks, major pads and watercourses.

Lay baits separately; do not place multiple baits together. If non-target animals such as birds are at risk, baits may be buried or hidden among leaves or bushes.

Bait should be left undisturbed for a minimum of 10 days.

Distance requirements

Aerial baiting:

Baits must be placed no closer than 500 metres from all property boundaries and constructed recreation sites, and 250 metres from gazetted public roads.

Ground baiting:

Baits must not be laid within:

- 20 metres of property boundaries;
- 100 metres of any dwelling without written permission of the occupier;
- 20 metres of gazetted roads, stock routes or government authority reserves;
- 20 metres of dams;
- 20 metres of any recreational path or trail frequented by the public;
- 500 metres of any constructed picnic or recreational sites; and
- adjacent to built up areas, semi or special rural holdings.

The distances specified above may be increased or decreased by the Director General, or an officer delegated in writing, of an authorised department provided that:

1. Public safety would not be placed at risk from the effects of the poison bait; and
2. It would not increase the opportunity for the poisoning of animals other than pest animals from the poison baits.

Rate of bait laying

There are no specific recommended rates of bait laying for wild dogs. Rates are determined by local experience. The use of fewer baits saves money and reduces any potential non- target risks associated with a baiting program. Ground baiting of a given area requires fewer baits than aerial baiting.

Timing and frequency of baiting

The issue of when and how often to carry out major baiting campaigns is complex, and depends on a number of factors. As well as economic factors, the availability of natural food for the wild dogs, and seasonal conditions such as the weather, availability and distribution of water, and stage of the breeding cycle, can play a role.

Traditionally, regional baiting campaigns in Western Australia have been carried out in autumn (late April-May) and spring (September-October). The autumn timing coincides with breeding activity, when mating is taking place, and when bitches are in early pregnancy. The spring timing coincides with the stage when pups begin to move about, increasing the likelihood of wild dogs finding baits. Food demands are also high at this time, and in the more arid areas, surface water becomes more restricted, making it easier to target the limited number of waterholes with baits.

Currently, baiting is often undertaken only in spring. Baiting earlier in the year is sometimes abandoned due to cost considerations and the possibility of rain leaching 1080 from the baits. In some areas, the spring baiting is being delayed until early summer, when water supplies become even more restricted.

Aerial baiting for wild dogs is usually repeated on an annual cycle. There may be occasions when baiting in buffer zones could be missed in some years without jeopardising livestock protection, but this could be a risky approach unless very detailed information is available on the number of wild dogs in an area and the abundance of the food supply. It is safest to bait known problem areas on an annual basis.

Ground baiting is generally carried out on a more reactive basis, dealing with specific issues as they are identified from the ground. However, ground baiting also has a place in the more traditionally-timed major coordinated campaigns.

Fate of carcasses

1080 is destroyed as wild dog carcasses putrefy and bacteria degrade it to harmless residues. It is unlikely that any animal would receive a secondary poisoning dose from eating a poisoned dog carcass. For example,

it is estimated that an eagle would need to eat about six whole dog carcasses to receive a lethal dose. Carcasses do not need to be recovered.

Protection of wildlife, fish, crustacea and environment

Do not contaminate streams, rivers or waterways with 1080 products or used containers. Information on non-target animal distribution, conservation status, habitat preference, diet, tolerance to 1080, body weight and size of home range, can be used to reduce risks posed by baiting programs. These matters should be discussed with the person authorising the baiting.

Warning

Domestic dogs and cats should be restrained when baits are in use. Do not handle baits where there is a risk of contaminating food, animal food or drinking water.

Storage and disposal

Safe storage is the responsibility of all persons who are supplied with products containing 1080.

1080-impregnated oats and 1080 baits must be kept in their original, labelled containers in a locked room away from children, animals, food, feedstuffs, seed and fertilisers at all times, except when required for immediate use.

Dried meat baits can be subject to some deterioration during storage. Baits should be used on a 'first in, first out' basis. Meat baits which have been frozen should be kept frozen until used.

Transport 1080 products only in original containers and ensure packaging is secure before handling. Secure baits from unauthorised persons and non-target animals such as domestic dogs and scavenging birds.

Bury empty containers in a local authority landfill. If no landfill is available, bury the containers at least half a metre deep in a purpose-built and marked disposal pit clear of waterways, desirable vegetation and tree roots. Empty containers should not be burnt and should NOT be re-used for any other purpose. Unused or retrieved baits should be either incinerated, or buried as specified above for containers.

Safety directions

1080 is very dangerous. It is poisonous if swallowed, and harmful if absorbed by skin contact. If such contact occurs, immediately wash the area with soap and water. After using 1080 products and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water.

When using the product, wear cotton overalls buttoned to the neck and wrist, a washable hat and elbow-length PVC gloves. After each day's use, wash gloves and contaminated clothing.

First Aid

Speed in treatment is essential.

If poisoning occurs, contact a doctor or Poisons Information Centre (telephone: 13 11 26). If swallowed, give large quantities of water and induce vomiting. The victim should be maintained resting in a quiet area and kept warm (or at a comfortable temperature in hot weather). Apply artificial respiration if not breathing. If skin contact occurs, remove contaminated clothing and wash skin thoroughly.

Checklist for bait-making and baiting

This list does not contain full legal instructions and requirements. Labels and 'directions for use' issued with 1080 products must be adhered to.

Basic 1080 requirements:

- Prior to baiting an 'Approval to Bait' must be obtained for the area to be baited, and all requirements of the Approval, including any added restrictions, must be met.
- Anyone handling 1080 products must be appropriately trained in the use of 1080.
- Neighbours must be notified at least 72 hours prior to baiting.
- Signs must be displayed during and for one month after a baiting program.

For making baits:

- Drying racks should be sited away from public access and be made to the appropriate design and capacity for the operation planned. Vegetable oil wiped over the wire mesh makes it easier to turn and remove baits.
- Small numbers of baits (<50) can be hung on small hooks instead of using racks.
- Meat should be 'set', and if obtained frozen, thawed and drained before handling. Do not attempt to saw frozen blocks of meat into baits. Meat should be trimmed of fat and cut into even-sized chunks of whole muscle.
- Meat should be cut to a size that nine freshly-cut baits weigh 1 kg.
- Discard ragged, small, fly-blown or otherwise sub-standard baits.
- Apply the recommended insecticide treatment if blowflies are a problem.
- Spread baits out on the rack as soon as possible after cutting or thawing, ensuring that baits do not touch each other.
- Baits should form a light 'skin' before a 1080-impregnated oat is inserted.
- After baits have been impregnated they should be left to form a tougher skin before being turned over.
- Baits must be properly dried before use, to a point where they are dark coloured, hard on the outside, and weigh about 40% of their original weight. They should be temporarily stored in open-mesh bags to allow air circulation

Laying baits:

- Adhere to distance restrictions (which vary between aerial and ground laying).
- If possible target specific areas where wild dog activity has been identified.
- Also lay baits along likely travelling routes (vehicle tracks, major pads, watercourses). Remember that if baits are placed too close to watering points, other animal activity can disturb or destroy baits.
- Do not place multiple baits together, as one dog may eat them all. Spread baits across a likely area, aiming to place baits where wild dogs are likely to encounter them.
- If birds are at risk, baits may be buried or hidden under vegetation.
- Try to at least roughly gauge the quantity of baits used to the level of dog activity in an area. There is no point saturating an area with hundreds of baits if only one dog is active in the area.

Precautions:

- Baits must be labelled and kept in a locked room or shed away from foodstuffs if stored temporarily before use.
- When transporting baits ensure that they cannot accidentally fall from the vehicle and that they are not even temporarily accessible to birds and domestic animals, particularly dogs.

Please follow all safety instructions in the making and handling of baits and in the disposal of baits and contaminated materials.

Chapter 7.
The role of doggers

When is intensive ground work needed?

In some instances, particularly when wild dogs are operating within sheep paddocks, specialist trapping is required. A novice can be readily taught the basic skills of setting a trap, but needs to spend time with an experienced dogger to learn where to set traps and the type of sets that can be used. Incorrect placement of traps not only wastes time, but more importantly has the potential to create trap-shy dogs, which often become a challenge for even the most experienced dogger.

Experienced doggers can also assist with the effective placement of baits, whether by direct ground baiting or precision-targeting for aerial delivery of baits. Baiting should always be considered, even when trapping is being undertaken. Baits are often laid at sites where traps have been removed, as wild dogs often investigate such areas.

How can the effectiveness of doggers be assessed?

The value of dogging should be measured in terms of the prevention of losses and harassment of livestock. There is often a tendency to rate a dogger on the number of dogs caught or scalps collected. This can foster a move away from ground baiting, because with 1080, wild dog carcasses are seldom found. An unfortunate consequence of this is that some doggers tend to rely more on trapping and shooting, when all techniques have a place in an effective program.

The scalp-count evaluation method is fraught with misinterpretation. For example, who has done a better job: a dogger who has collected 300 scalps from the desert fringe well away from stock, or the dogger who has battled to kill 30 wild dogs from in and around sheep paddocks and has prevented stock losses? The answer is obvious.

What other roles can doggers play?

Recently, there has been a general reduction of experienced doggers and dogging expertise in the industry. In most pastoral areas, there has been a reduction in station staff resulting in fewer experienced people able to take note of wild dog activity and act on it. The lack of on-ground information in many cases has led to aerial baiting of inappropriate areas, which has led to support for the retention of doggers. Doggers can give valuable input to the effective targeting of control efforts in local operational plans, in addition to baiting and catching dogs, keeping track of dog numbers and identifying signs of movement.

Declared Species Groups

The benefits of coordinated, community-based control programs for wild dog control have already been outlined. To facilitate these and similar programs, the Department of Agriculture and Food and the Agriculture Protection Board (APB) have allocated funds to assist in the establishment of Declared Species Groups (DSG).

Under this arrangement, groups of landholders in the agricultural area are able to apply for funding to assist in the appointment of a contract dogger. The maximum allocation is normally $15,000 per group, which must be matched dollar for dollar with contributions from the landholders and/or Shires. In applying for funds, the duration and objective of the program must be clearly outlined, along with the strategies to be implemented. This limited funding facility for the agricultural region is to enable landholders in that area to access Government funding for coordinated pest management in a similar way to that already available to pastoral landholders through the Declared Plant and Animal Control Fund.

A number of other criteria apply, including:

- The DSG must have a local coordinator and must supply a report on activities and achievements to secure subsequent-year funding.
- The DSG must either be an incorporated group or have the agreement of an incorporated body to administer the funds. In many instances, this fund administrator is the local government authority.
- The DSG must either set up a bank account into which approved funds can be deposited, or arrange for a participating Shire to administer the funding on its behalf.
- The Department and the APB recognise the in-kind work that is performed by many groups, but the application will only deal with matched financial contributions.
- The Department will provide technical support to the DSG.

Any agreements recommended under the funding criteria are formally ratified by the Chief Agricultural Protection Officer.

In practical terms, the DSG coordinator oversees the day-to-day operations of the DSG contract dogger, including determining where the dogger should be deployed from time to time. In addition, the coordinator deals with the reporting and financial aspects of the DSG agreement.

The contract dogger must comply with various Acts, Regulations, Codes of Practice and policies. They must maintain a professional standard of knowledge, conduct and skill to carry out the tasks outlined by the DSG. This includes appropriate training and endorsements for pesticides and firearms use. In addition, the dogger must supply and maintain an appropriate vehicle and equipment for the job.

The DSG arrangements have proven to be very beneficial, allowing doggers to be employed in areas where properties would have been unable to individually finance a dogger. Apart from the usual ground work of trapping and baiting, DSG doggers can also monitor wild dog activity in their area and provide the local input in wider programs such as regional aerial baiting.

Chapter 8. Trapping

Introduction

Trapping is a labour-intensive technique generally restricted to high-risk areas such as sheep paddocks and adjoining buffer areas. In these areas, *all* wild dogs pose a significant risk to livestock, and the usually abundant food supply means that baiting may not be highly effective. Trapping is used to target specific wild dogs that remain in those areas. Trapping is not normally cost-effective or justified in areas running exclusively cattle, because complete removal of all wild dogs is not necessary to minimise the predation risk to cattle.

Trapping is not permitted on conservation reserves unless there are exceptional circumstances and approval is given by the Department of Conservation and Land Management.

This chapter outlines information to assist novices or operators wishing to refresh their approach. It is important that anyone who sets traps has a good knowledge of the basics, as incorrect or sloppy setting of traps can lead to wild dogs becoming trap-shy, making them much more difficult to catch. Effective trapping requires training and experience.

Before trying to catch wild dogs, all novice trappers should spend time with an experienced person for hands-on practice.

Some of the following is based on material prepared by a highly regarded Western Australian dogger, Bernie O'Driscoll.

Guide to the preparation, setting and placement of traps

Steel-jawed traps are coming under increasing scrutiny from animal welfare groups. To ensure their continued use, it is crucial that correct procedures are followed. This will minimise any suffering of trapped wild dogs and reduce the risk of catching non-target animals.

Under the *Animal Welfare Act 2002* and associated *Animal Welfare (General) Regulations 2003*, it is mandatory to use strychnine on jawed traps used for wild dog control in Western Australia. The use of strychnine results in the rapid death of a trapped dog. The strychnine is enclosed in cloth wrapping which makes it accessible only to a trapped wild dog biting on the wrapping (see below).

The Lanes trap

The following information is based on the use of the Lanes trap, manufactured in Western Australia. It is the most commonly used trap for wild dog control in Australia. The basic principles of setting and adjustment also apply to other traps. The Lanes trap can be fitted with modified jaws with rubber inserts to comply with requirements elsewhere in Australia. Please contact your local Department of Agriculture and Food office for advice on where to obtain traps.

Preparing the trap

New traps generally have no coating or rust-proofing. This is desirable, because any waxy or tarry coatings that might carry a distinctive odour must be removed before traps are used. Some operators deliberately leave new traps exposed in the open for a while, encouraging a fine rusting of the metal which helps camouflage traps, should they become partially uncovered when set. This also helps to dissipate the smell of bare metal.

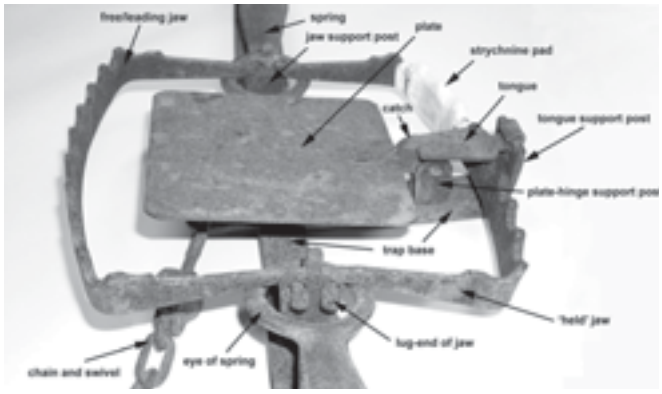

Fig.17 *Close-up of the plate/jaw area of a Lanes trap, showing the major parts referred to in this document.*

Traps must be tested and if necessary, adjusted prior to each setting. Refer to Figure 17 for the naming of parts.

- Ensure that the trap springs are sufficiently strong. Occasionally, springs can lose their tension and become too weak to ensure a fast action; weak springs can even allow a trapped dog to pull free from the trap. Check the trap by placing it flat on the ground (see later section on setting), and place a foot on each of the springs. It will become quickly apparent if one spring is weaker than the other, or if both springs are weak. Traps with weak springs should not be used, and can be re-fitted with replacement springs.
- Ensure that the jaws meet and mesh squarely, and that neither is distorted. Re-form and adjust if necessary.
- Ensure that the eye of each spring moves freely over the support post which holds the lug-ends of the jaws. If there is significant contact between spring and post, there is a danger that with the additional resistance of compacted soil, the springs may be jammed and the jaws will not close when the trap is sprung. Adjust if necessary.
- Ensure that the lugs of the jaws are soundly through the socket holes in the support posts. Sometimes a slight distortion in the jaw can increase the chance of it coming free of the socket hole. Straighten the jaw if necessary. On some older traps, the jaw lugs protruded too far, leading them to catch on the eye of the spring. It is only necessary to have about 5 mm of the lugs protruding. Trim off if too long.
- Ensure that the jaws pivot freely, but are not too loose. The jaws at the lug ends should be almost flush with the support posts. This should be checked while the

springs are depressed. Make sure that the jaws move easily through the full arc they will travel when the trap is sprung. Adjust if necessary.

- Ensure that when the plate is down, and the tongue is pushed towards the plate, there is good clearance (1-2 mm) between the end of the tongue and the catch on the plate. If not, bend the post holding the tongue to achieve the appropriate clearance.
- Ensure that the curved hinge of the tongue is well rounded, without flat spots. Occasionally this hinge can become distorted, leading to the tongue jamming and preventing the held jaw from closing. Make sure the tongue rotates freely around its hinge point. In some instances the curved metal is fully closed with a weld. This helps prevent distortion and effectively stops the occasional loss of tongues from traps.
- Ensure that the notch in the catch where the tongue engages the plate is kept filed at right angles. With prolonged use, this notch can become worn and rounded, making the trap easily sprung by small non-target animals. It also means that a dog can spring the trap when its foot is not properly centred in the trap, potentially resulting in the dog not being caught and creating a trap-shy dog. Don't make the notch too deep, as this can affect the position of the plate, making it sit up too high if the tongue is fully seated. The notch should be about 2.5-3 mm deep.
- Don't be tempted to set traps with a 'hair-trigger'. Traps should be set so that a firm weight is needed to spring them. When the trap is arranged correctly, the dog will step with sufficient force to spring a firmly set trap.
- Check that the plate moves freely, but has minimal sideplay. Excessive sideplay can come about through the rivet that fastens the plate to its supporting arm becoming loose. If the rivet is loose, either firm it up or add a spot of weld under the plate. If a too-wide gap is evident in the support post holding the plate hinge, close it by carefully hammering on the fastening rivet. Be careful not to close this too much, or the plate will be tight and may jam when set (fine sand and rust can add to the incidence of jamming).
- The trap should now be set to check adjustments and function. Set the trap (see later section) and hold the plate from below, with hand *under* the 'free' jaw, and tap the tongue fully into the notch on the plate. Then hold the trap away from you to see that the plate does not sit too high, and that it sits squarely in relation to the jaws and trap frame. The free jaw should drop below the level of the plate and the held jaw. Raising the free jaw slightly should make the trap look flat when viewed across both jaws and the plate. If necessary, make adjustments to alter the plate setting, by bending the supporting post of the tongue in or out. The plate should end up having a fall of about 30 mm before the tongue releases.
- Ensure that the swivel and chain is sound, and if necessary replace or weld open hooks.
- Never be tempted to enlarge the plate area of any jaw trap. Jaw traps are designed so that target animals should not be able to spring them while part of their foot rests on the trap's jaw. Enlarging the plate closes the gap between jaw and plate, resulting in frequent springings where the animal's foot is thrown off by the jaw. The result is more misses and trap-shy dogs.
- Before setting in the ground, attach the trap chain to a weight of several kilograms, such as a windmill part, to act as a 'drag'. Flatter pieces of iron such as cogs and sprockets and railway 'fish plates' are ideal as they are easy to bury or hide in vegetation. Use heavy gauge, soft wire and twitch well to fasten the drag to the trap chain. The use of a drag lessens the likelihood that a dog will pull free of an otherwise solidly-anchored trap if only caught by the toes. The drag will provide the trap with some 'give' as a trapped dog lunges, and it will leave a distinct mark on the ground to follow if required. Sometimes traps are attached to immovable objects such as trees, or short steel posts hammered into the ground. A coil spring can be placed in parallel into the chain to provide some 'give'.

Applying strychnine to the trap

Strict conditions apply to the supply and use of strychnine, which is available to landholders only following authorisation and training from officers of the Department of Agriculture and Food. For further information, see 'Guide to the Safe Use of Strychnine for Jawed Traps' (see Further Reading), and note safety warnings and the requirements for storage and disposal.

- It is vital that traps are poisoned correctly. This ensures that trapped dogs are killed quickly and do not suffer extended periods of time in traps, and also lessens the risk that they might escape and become difficult to catch again.
- Strychnine is applied to one side of the jaw that is held by the tongue. DO NOT put the poison on the free jaw. A trapped dog will bite more easily on the 'front' jaw, which will be the held jaw if the trap is set properly.
- Jam the trap jaws apart with a stone or tool handle to provide easy access to one side of what will become the held jaw.
- Cut some hessian or similar coarse fabric into strips approximately 50 mm wide and 250 to 300 mm long. Force the end of a strip of the material over the last 2 teeth in from one end of the jaw, and then wrap in a bandaging pattern, with 50% overlap, for 2 full wraps of the jaw. Be careful not to extend the wrapping to a point where the jaw is held by the tongue, as it could jam the jaw or otherwise interfere with the mechanism of the trap.

- Place 0.25 to 0.5 g of strychnine crystals (about half a teaspoon) on the flat outside of the jaw, along the wrap you have placed, leaving about 10 mm of wrapping free of strychnine at each end.
- Complete wrapping the cloth over the area first started, making sure the entire area treated with strychnine is well-covered by cloth wrapping.
- Use two pieces of soft wire each about 150 mm long to fasten the cloth pad. Tie-wire of about 1.6 mm or 16 gauge is suitable. Start at one side of the cloth pad, in about 10 millimetres, and make several firm turns of one piece of wire, in the middle of the length of the wire, around the jaw and pad. Twitch this off firmly underneath the jaw, and cut off excess wire. Repeat for the other end of the pad. This will leave the main central part of the pad free of wire, and yet firmly wired on. Remember that a trapped dog will bite with great force, and care must be taken to ensure the wire is not ripped away before the dog chews on the soft wrapping, otherwise the wrapping may be torn away easily, and the dog may not ingest any poison.
- As a precaution against strychnine loss through the cloth, some doggers choose to bind the finished strychnine pad with electrical insulation tape.
- Remember that Strychnine Poison warning signs must be in place on properties where wild dog traps are being used.

Setting the trap

- Place the trap on flat ground with the tongue away from you.
- With a foot on each spring, depress the springs. Lighter persons may need to additionally pull down by grasping the jaws, parting them as the springs depress. Avoid placing your fingers in any gap between the jaws. The heel of your boot can then be used to hold the jaws apart while the tongue is lifted with one hand, and the plate is held with the other hand (from *under* the free jaw).
- The tongue is then engaged, and the pressure allowed to transfer to the mechanism.
- The trap should then be checked as described earlier (and see Figure 18). This should be undertaken away from the actual site where the trap will be placed and away from the track on which you and the dogs are travelling, to minimise ground disturbance and odour at these critical places.

The trap is now ready to be placed in the ground at your selected site (see later section).

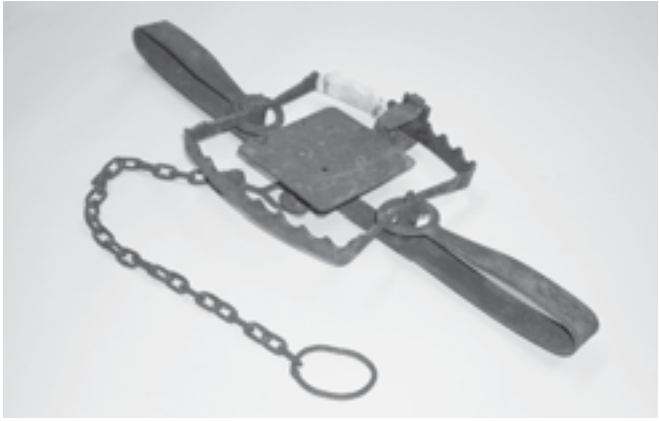

Fig.18. *A properly adjusted Lanes trap ready to be attached to an anchor point or drag, and set in the ground.*

- Clear away sticks and other large debris which might interfere with the dog's approach. Be mindful of the level of a dog's stance and its likely head position as it smells the decoy in a decoy set. Ensure that there is no vegetation which might poke the dog's face, potentially deterring it from your planned approach path.
- Work from a bag or piece of canvas laid on the ground in front of the site. This minimises disturbance in front of the set. It also eliminates prolonged direct contact of your body with the ground, reducing the likelihood of leaving human scent. Debris and soil from the operation can be placed on the bag while the trap is being buried, allowing for easy disposal of excess material.
- Clear the position of the trap and scratch out the outline of the trap where it will be laid. The trap should be at right angles to the dog's approach, with the tongue away from you. Position it so that there is about 400 mm (approximately the length of an average person's forearm plus clenched fist) from the centre of the plate to the position of the decoy. This approximates the distance between an adult dog's front foot and the tip of its nose as it leans forward to sniff at something.
- Clear a position for the trap drag or stake. In some instances, a drag can be fully concealed under vegetation such as a clump of spinifex. Otherwise, it may be necessary to bury it near the trap. In some instances, the drag can be buried underneath the trap itself, but this requires care to ensure the trap can still be positioned at the right depth and firmly bedded. If the drag is buried, it is best to do so behind the trap, or away from the direction from which the dog will approach. Otherwise a wary dog may detect the drag before it even reaches the trap. The drag should be covered by several centimetres of soil. If the drag has to be buried in a position that could be seen by the dog, take care to disguise the spot, in the same way as described below for the trap.

- Dig the hole to be a neat fit for the trap, with a connecting channel to bury the chain to the trap attachment. The hole should be deep enough so that when the trap is in final position, it should sit level with, and about 5 mm below, the original ground surface (see Figure 19). Do not bury too deeply, as the trap's operation will be slowed by too much soil covering it, and it could become locked hard in clay soil following rain. If the trap is too shallow, there is a high risk that wind, birds, or even insects will expose parts of the trap, so that a dog may easily detect the trap and avoid the site. If the depth is wrong, start again, don't try and correct it later by making either a mound, or leaving a depression when the trap is fully buried.

Fig.19 *Final check before trap is covered, to ensure that trap is level and at the correct depth.*

- Make sure that the trap is firmly bedded so that it cannot be tilted if stepped on, even by heavy non-target animals such as cattle. To achieve this, tamp the soil around and under the springs and the trap base. The free jaw (facing you) should be firmly supported, by placing flat rocks or similar at the two corners of the jaw, and tamping them so the jaw sits at the correct level. Make sure the jaw and trap does not tilt if the jaw is stepped on. Failure to follow these steps can mean that any animal, including a dog, can tip the trap if it happens to miss stepping on the plate, potentially exposing the trap and spoiling the set.
- Ensure that the area beneath the plate is clear, and that the chain and swivel (or loose rocks) have not worked up to interfere with the plate's action.
- Prior to covering the trap with soil, paper is traditionally used to cover the plate and surrounding spaces within the jaws. This ensures that soil cannot get under the plate and prevent the trap from being sprung. The best paper to use is plain butcher's paper, as it is free of the ink smell associated with newsprint. If it is necessary to use newspaper, try and use older papers that have lost the fresh ink smell. The paper should be torn or cut to overlap the jaws of the set trap and fold down around the outer edges of the jaws. Other types of paper should not be used as lighter-weight paper will tear easily, especially if damp, and is likely to collapse, exposing the plate of the trap. Heavier paper doesn't tear well, and when the trap is sprung, can slow the action of the jaws closing. In particularly wet conditions, some doggers use light 'cling-film' food plastic to cover the trap directly or even add it over the usual paper cover. Plastic film has to be used with caution; the plastic will not tear like paper and it can seriously slow the action of the trap. You must also avoid wrapping it too deeply. If in doubt, experiment to check. Anything which slows the action of the trap can lead to a dog being missed, or merely 'nipped' by the trap.
- An alternative to the use of paper over the trap is a pad of foam rubber under the plate. Use medium-density foam thick enough to fit neatly between the trap plate and the trap base. The pad should be cut to protrude slightly (several millimetres) beyond the plate edges. It should also be cut so that a tongue of foam is left to fit under the plate support arm, between the edge of the plate and the plate-hinge support post. With the foam pad in place, no soil can lodge beneath the plate or arm, ensuring that the trap mechanism is unimpeded and the trap fires correctly.
- The trap hole can now be filled in with soil. The soil should be tamped down around the trap, firmly so the ground will not subside over time or if stepped on by a dog. If a foam pad is being used, you will also have to fill in the area between the plate and jaws, but be careful not to force soil under the plate. If the soil is very clayey and if rain is possible, use sandy soil as fill material to place in actual contact with the trap to avoid the chance of the trap becoming 'concreted in' and virtually impossible to set off. The actual soil covering over the plate and remainder of the set should be the natural material you dug out, so that it blends with the surrounding soil, and has the same appearance and odour. The set must look as natural as possible. It is often simplest to use a sieve to spread the final covering of soil. That avoids leaving clods of soil over the trap area, as that may produce an unnatural appearance. Don't forget that the covering depth over the plate should be about 5 mm when finished, as pointed out earlier.
- Finishing-off is a critical part of the operation. Use a curved stick to carefully smooth off the surface and blend in with the surrounding surface. Sometimes it is necessary to collect a small amount of matching surface soil from somewhere nearby, and sprinkle over your trap site. You then need to use natural debris such as leaves and twigs, again from the immediate site or close by, to guide the dog to place its foot onto the trap plate. The centre of the plate area is deliberately kept clearer than the surrounds. Nevertheless, avoid making something that looks like a bird's nest, it will look out of place. Remember too,

that leaves and dry grass can be blown away by wind, sometimes rendering a carefully set up site totally bare! So use soil, twigs, rocks or anything natural to effectively pin down loose material. But be careful to avoid having large sticks or rocks within the trap jaws, as these might prevent the jaws from fully closing, leading to the dog escaping. Some doggers use a 'stepping stick' placed at the leading edge of the free jaw, with the aim of having the dog step over it, and onto the plate. That can work well, but there is a danger that other animals can knock or inadvertently kick the stick, possibly to a position which actually deters the dog from stepping in the right place. So you'll need to judge whether this is likely to happen. Near enough is not good enough when trapping, so nothing should be left to chance.

- At this point the decoy can be put in place, at your pre-determined spot at the correct distance for the trap position. Types of decoys and lures are described later.
- Finally, remove excess soil / rocks from your workings, and dispose of well away from the trap. Having gone to the trouble of disguising the position of the trap, you don't want to alert the dog by tossing the loose material in the approach area to the trap. Dust off the area if you've created dust by sieving or digging, and sweep away any marks or imprints you've left from where you were working at the site. Sometimes that is made easy by the fact that you might be setting just off a vehicle track, in which case you can clear up the site, and drive over the track to wipe out signs of disturbance. A disturbed site can also be disguised by mimicking the ground-scratching dogs often carry out when they scent-mark. But don't do this at every trap; you should vary your approach. You'll make it too easy for a wary dog to avoid all your traps if they are all set up exactly the same way.
- Clearly you should avoid leaving other signs of your presence in the area of your trap, so don't drop cigarette butts, pieces of paper and so on. And when checking your traps later, be careful to avoid leaving obvious, tell-tale tracks leading straight in to your sets. These can give wary dogs enough cues to avoid your trap.

Selecting a trap site

This is a critical part of the trapping operation and it is well worth spending time to choose good sites. Setting a trap in an inappropriate site is at best a waste of time, and at worst creates a risk that the trap may be sprung by other animals, possibly making a dog wary of the general area. You are aiming to choose an area that maximises the chances of a dog coming along and checking your decoy as though it was a perfectly natural situation. At the same time, you need to minimise the chance that other animals such as kangaroos, birds, or livestock will wander into your set. Be mindful too of public access, and avoid situations where members of the public may readily encounter a trap or trapped dog.

The best way to learn about locating dog activity and choosing trap sites is by spending time in the bush with an experienced dogger. There are many practical considerations in site selection that cannot be spelled out to cover every type of situation.

- The sorts of places to look for dog activity are along routes such as vehicle tracks, fencelines, and animal pads, especially where these travelling routes cross features such as creeks, other tracks, ridgelines and so on. Watering points are other areas where the activity of dogs (and other animals) is focussed. However, it is often difficult to find ideal trap sites very close to water, as there is a high risk of other animals getting caught or interfering with the set. It's best to look for places further out from the water, such as major pad junctions and so on, where other animals are less likely to be milling about.
- You are seeking an area where the chance of a dog returning are high, and so you would normally look for multiple dog tracks of various ages, or choose a place where you've seen sign before. You need to look for scats as well, as these often provide a guide as to where a dog might return and check new scents. Scats are often deposited on raised objects like vegetation, rocks and logs, and usually there will be particular spots that have multiple scats deposited at different times. Such 'scent-posts' often have evidence of ground-scratching, hence the common term 'scratching bush'. These are good sites to set traps at, but you need to choose the position of the trap very carefully. Given that the area is familiar to the dog(s), it is not wise to change its appearance dramatically by positioning new sticks and rocks around your trap, as this might make the dog wary. Instead, it's better to find another spot nearby, and keep the whole area as natural as possible. As well as scats, careful observation may reveal places where dogs have urinated, another type of marking that can be made use of in trapping.
- It is best to have a trap set a metre or so off the actual track or pad that you are targeting. This lessens the risk of the trap being sprung by wandering stock or kangaroos, or even by rocks flung up by a passing vehicle.
- Although it is obviously easier to set a trap in sandy ground than in hard, rocky ground, don't allow this to completely dictate your choice of site. If the best position for a dog to visit happens to be the hard ground, then set there.
- Having found the general area to set your trap, you then need to position the trap so that the dog must approach the decoy from one direction, over your trap. You need to take account of existing bushes, logs

Fig.20 *Trap positioning for a decoy set utilising existing vegetation (spinifex here). The decoy has also been placed at the correct distance from the trap and in an elevated position on the spinifex.*

Fig.21 *Trap positioning for a decoy set utilising existing natural debris to limit approach angles. The whitish decoy has also been placed at the correct distance behind the trap and in an elevated position on the debris.*

and so on, and generally you'll find a place where minimal re-arranging is needed (see Figures 20 and 21). Unless you have studied an area very thoroughly over a period of time, it is not advisable to set a trap at a spot where a dog can come in from any direction and smell the decoy. Chances are that if a dog can come in and miss your trap, it will!

- A vital consideration before finally selecting your trap site and position is the likely wind direction. Given that a decoy set relies on the dog smelling your decoy, there is no point putting your trap in what would be an upwind position from the decoy, particularly if the wind is strong. Take notice of the breezes overnight, as they often differ from the daytime wind direction. Night-time (including early morning and late afternoon) is when the dogs are most likely to be moving about. Wind direction may well decide which side of a track or pad you set your trap on.
- Remember that if there are multiple dogs in an area, it is good practice to set several traps, generally within sight of each other. Multiple captures are common, because if one dog of a group is trapped, the others often mill about in the area, increasing the chances of being caught in other traps nearby. 'Blind' sets (see below) are sometimes placed near decoy traps for this reason.

Trap lures or decoy

There are many claims made about magical lures and brews for trapping wild dogs. However the fact is that most dogs are caught on lures comprising mainly dog faeces (scats). Domestic dog faeces contain the same pheromones and secretions as for dingoes and other wild dogs, so it makes sense that they act as a strong lure. The reason why wild dogs (and domestic dogs for that matter) check the scats and urine of other dogs is that these products convey a chemical message (thought to include the identity of the individual, its sex, and its reproductive status, and probably how long ago it was there). Being social animals, these are important messages to a wild dog, helping keep track of fellow pack members, or signalling that an intruding dog may be in its territory. Scent-marking in wild dogs is particularly prevalent during the lead up to mating, generally in the period March to May in northern areas, and this can be an especially productive time for trapping.

- A useful lure can be made from dog faeces moistened with dog urine, or even water, and mixed to a creamy consistency. This can then be placed on your chosen tuft of grass or bush or whatever was to hold the lure, at the pre-set distance you had determined for your set. The resultant 'scent-mark' can look very natural. Pieces of dog faeces can also be used alone, or in addition to your mix, and can give an added visual and scent cue to a passing dog (see Figures 20, 21).
- If dogs seem to be disinterested in your usual lure, as sometimes happens, it is worth trying other types of odours. Dogs have been caught on lures of burnt rubber, aircraft oil and dozens of other artificial smells. These presumably work through drawing on the dog's natural curiosity. However, such scents can also attract other animals, for a similar reason, and it is best to try this approach only if the conventional one seems to be failing.
- Finally, it is also possible to use food lures, such as a piece of carcass hidden under a bush, though generally this is done in combination with blind sets, outlined in the next section. Food lures carry a much higher risk of attracting non-target animals such as crows and bungarras, and should not be routinely used. They should only be used if you are checking your traps very regularly and are able to ensure that non-target animals are not at risk of being caught.

'Blind' sets

Blind sets refer to traps set along pads or tracks where dogs are walking, with no decoy to bring the dog onto the actual trap itself (see Figure 22). The dog essentially

gets caught in the process of its natural travel. In general, blind sets should only be used if a dog has become wary or disinterested in conventional decoy sets. Thorough reading of the sign and particular care in positioning the trap are crucial elements to the successful use of blind sets. Part of the skill is also to avoid having traps sprung by other animals using the pad or track. Blind sets are normally only used when the trap can be regularly checked, in case stock or other animals happen to come along unexpectedly.

Fig.22 *Trap positioning for a blind set on a pad.*

- If other larger animals are also using the pad, it is often possible to find natural places where overhanging branches cause most animals to detour away from the straight line, but allow smaller animals such as dogs to pass under and straight along. These are ideal sorts of sites to position a blind set.
- The traps are set in the ground in the same manner as already described. The free jaw faces the direction from which you expect the dog to approach. If possible, make use of natural 'stepping' obstacles such as tree roots, imbedded rocks, or small clumps of grass or spinifex on the pad. Set your trap so that the dog will step over the obstacle, and directly onto your trap plate.
- Take care when setting on deep, narrow pads that the trap springs do not become too deeply buried in the 'banks' of the pad. This can slow the closing action of the trap, as the springs have to lift considerable extra weight of soil when the trap is sprung. This is made worse if the ground gets compacted and hardened after rain. Some doggers advocate orientating the trap to avoid this (lengthways in the pad, rather than at right angles), but it's better to avoid the situation altogether. This is a situation where the smaller, compact imported traps are very handy, as they have no protruding leaf springs to deal with.
- Be particularly careful where you select the position from which to work on the set, bearing in mind how you will finish off to disguise your activity. Remember to blend the set in with the general appearance of the surroundings. If on a pad, your set will look obvious if you carefully level the ground over your trap while the rest of the pad is covered in pockmarked depressions and animal tracks. So try and match it.
- Blind sets can also be placed on the actual wheel tracks of a vehicle, as dogs often follow exactly in the dusted-up tread marks on a road or track. Obviously you need to be sure that other vehicles don't come by, so these types of sets are quite specialised. It's best to choose a site where the dog is effectively channelled through a gap in vegetation or rocks to follow the exact wheel track you choose. Sometimes it may be necessary to set one trap on each of the pair of wheel tracks. It is possible to choose an area where you can continue to drive along the road yourself, carefully detouring past your trap by driving over rocks or vegetation. But be warned that if you make an obvious detour on soft ground, the dog is likely to follow your detour, missing the trap.
- Carcasses can be used as a general lure to attract dogs to a particular area, where decoy sets can be used. You can also set blind sets in gaps in vegetation where a dog will walk through to investigate the carcass. The same principle of setting on a pad applies, though in this case the 'pad' is one that is probably not in use. These types of sets rely on a careful choice of where to position the carcass, usually amongst thick vegetation, leaving limited access to dogs. Their access will be via gaps where you have traps set. Again these sorts of sets are fairly specialised, and run the risk of attracting other scavengers. They should also be checked regularly. Don't set traps right alongside carcasses, as the risk of catching birds and other scavengers is too high.
- A carcass can also be dragged through an area to create a scent trail that dogs often follow. The carcass can then be positioned as described above. Traps can be set on the actual drag/scent trail leading to the carcass.

Trapping tools and other equipment

This is an area where personal preference and experience will dictate which type of equipment people use in their trapping work. Standard tools such as hammer, adjustable spanner, and flat file should be carried for trap adjustments. Fencing or similar good-quality pliers are necessary for tying off wire attachments. More specialised items can include a trap-setting tool, a lever device which makes the mechanical setting of a Lanes trap very simple and safe, and useful for working on the trap to apply the strychnine. Other requirements include lockable boxes for strychnine, as covered under 'Guide to the Safe Use of Strychnine for Jawed Traps' (see Further Reading).

For actually setting your trap in the ground, you will need some type of small digging tool; a geologist pick can be useful in hard ground. Some doggers use a tin such as a billy-sized powdered milk tin to gather diggings and

debris. With holes punched in the bottom, the tin can also serve as a sieve for finer finishing off. A bag or piece of canvas is used for kneeling on, and working from. Kitchen tongs are useful for handling scats and manoeuvring decoy at your trap site.

Trap cleaning and care

Traps are generally quite robust, but it pays to keep them hanging when transporting and storing, rather than having them piled up and knocking on each other. Some care in transport will also reduce the need for frequent re-adjusting of traps. Remember that there are regulations concerning the storage of strychnine, including strychnine in place on trap jaws.

Traps that have caught dogs should be cleaned up, with any remaining strychnine pad carefully removed and disposed of correctly. The traps should also be washed thoroughly with warm water to remove any dog smell. Otherwise there is a danger than when used again, a dog may smell the buried trap and focus on this rather than the decoy or lure, sometimes even digging up the offending trap.

Combining trapping and baiting

Ground baiting should still be considered during routine trapping operations. Even if some individual wild dogs fail to take baits, younger dogs are generally more susceptible. Baits may also remove foxes from the area, reducing the likelihood that foxes will interfere with traps set for wild dogs. It is often worthwhile also targeting baits at sites where traps have been removed, as wild dogs frequently investigate old trap sites.

Checklist for trapping

- Ensure that you have all the equipment you need: traps, trap-drags, tools, paper (or foam pads), wire, decoy.
- Before setting a trap, check its adjustments (springs sound and moving freely, jaws meeting properly and pivoting freely, jaw pivot lugs secure, tongue/plate clearance correct, tongue hinge sound, plate notch square, plate has minimal sideplay, when set the plate and jaws are aligned squarely), and adjust if necessary.
- Check chain and attachments for weaknesses in links or hooks/swivels.
- Ensure that the strychnine pad is intact and correctly placed on the trap, firmly wired onto the 'held' jaw, and clear of the tongue and support post.
- Ensure that the property or general area is properly sign-posted for strychnine use.
- Choose a site based on dog activity, preferably fresh and old, and where dogs are likely to return or pass through.
- Equally check for the activity of other animals that might get accidentally caught, or interfere with your set. You must minimise the risk of this happening.
- Assess likely wind direction and aim to place your decoy set upwind of where the dog will travel. Decide where you will place the decoy, preferably in a raised position such as on a rock or vegetation, and measure back to where you will place your trap.
- Make sure that the drag or trap anchor is properly attached to the trap, and well hidden or buried near your trap position.
- Carefully dig out the hole for the trap, checking that the depth of the trap is correct; start again if not, don't try and correct later.
- Before covering the trap, make sure that it is firmly bedded, and the free jaw firmly supported.
- Make sure the fall of the plate is not impeded by rocks, trap chain or swivel.
- Tamp the filling soil sufficiently to avoid it later subsiding, taking care not to force any under the plate.
- Finish off the trap area thoroughly, making it look as natural as possible. Check that you have created a situation where the plate of your trap is the mostly likely place for a dog to place its foot when it comes in to smell the decoy. Make sure that there are no protruding twigs or similar obstacles at the dog's height which might make it deviate from your planned path.
- Apply your decoy and do the final clearing up of the site, including where you worked.
- Remember, near enough is not good enough, don't leave anything to chance. You can catch dogs in sloppy sets, but there will be some that you'll miss, and these are likely to become problem dogs to deal with. You must aim to catch every dog you try for, that's why you are using traps.

Checklist for use of strychnine on traps

This list does not contain full legal instructions and requirements. Labels, 'directions for use', and any other documentation issued with strychnine must be adhered to.

Basic requirements:

- Only officers of the Department of Agriculture and Food can authorise the purchase or supply of strychnine, which is available only from S7 retailers. Landholders must complete a Strychnine Application Form.
- Only authorised, trained persons can receive and use strychnine.
- Strychnine is only issued to landholders for use on trap jaws, and must be used only on land identified and approved in the Application.
- Neighbours must be notified at least 72 hours prior to traps being deployed.
- Signs must be displayed during trapping and for one month after trapping is complete.
- Distance restrictions must be maintained.

Applying strychnine to traps:

- Apply to one side of the jaw held by the tongue of the trap.
- Use hessian or coarse cloth 50 mm wide and 250 to 300 mm long.
- Wind the cloth onto the jaw in a bandaging pattern with 50% overlap, for two full turns before adding strychnine.
- Apply about half a teaspoon on the flat outside of the jaw along the part of the cloth already wrapped onto the jaw.
- Wrap the remaining length of the cloth tightly over the existing wrap and strychnine, ensuring that the strychnine is well within the cloth binding and not leaking out the ends.
- Wire the pad on with two pieces of soft, approximately 16 gauge wire, about 10 mm in from each end of the pad.
- Check to ensure that the strychnine pad does not interfere with the mechanism or functioning of the trap.

Precautions:

- Strychnine must be kept locked away and in the original container until used.
- Traps with strychnine wrapping must be stored under the same conditions as strychnine.

Strychnine is a deadly poison. Please follow all safety instructions in the use of strychnine and in the disposal of carcasses and contaminated materials.

Chapter 9.
Other techniques/strategies

Shooting

Wild dogs are seldom seen during the day and in controlled areas they are especially wary of people. Shooting is therefore only an opportunistic method of wild dog control.

Shooting should only be attempted if an appropriate firearm is used, the shooter has the appropriate experience, and the distance and circumstances are such that the target animal can be killed with a single round. The shot must be aimed to achieve a humane kill by destroying the brain or heart of the animal.

The minimum calibre for shooting wild dogs at distances greater than 30 m is .222. At shorter ranges, a .17 Remington, .22 Hornet, or 12 gauge shotgun with a minimum of BB shot can be used. Wild dogs found alive in traps can be destroyed with a brain shot from a .22 rimfire.

Remember that when shooting free-ranging wild dogs, you need to make certain that a clean kill can be achieved. Aside from considerations of animal welfare from merely wounding an animal, a missed shot is liable to make the animal extremely wary.

Exclusion fencing

Exclusion fencing provides a non-lethal means of protecting livestock from predators. Where conditions are suitable, and fences are properly maintained, wild dogs can be excluded by either wire netting or high-voltage electric fences. Fencing is very costly and only useful when wild dogs can be effectively removed from the properties needing protection. In Western Australia's rangeland areas, large scale exclusion fencing against wild dogs is normally not practical. Not only is there an uneven assortment of problem and non-problem areas, but also much of the terrain involved (such as watercourses and breakaways) would make the construction and particularly the maintenance of exclusion fences very difficult and expensive.

Netting fences have been used in the Eastern States for many decades and generally act as a barrier along the extensive and distinct boundaries between sheep grazing areas and cattle country or crown land. In most cases, those areas that became protected by a barrier fence had essentially removed wild dogs prior to fence construction. In some instances, the barrier fence began as an amalgamation of portions of fence from individually-fenced properties. Several Western Australian properties on the Nullarbor have boundary fences of dog-proof netting. These fences are effective but they are very expensive to construct and maintain.

Electric fences are generally cheaper than netting fences. Electric fences have been developed to keep out a variety of vertebrate pests, including wild dogs. Some make use of an existing fence and incorporate one or two electrified wires on outriggers; others are constructed as plain wire fences with six or seven alternating live and earth wires. Reducing the wire spacing and increasing the number of wires increases the effectiveness of electric fences, but also increases their cost.

Wild dogs sometimes cross even well maintained fences so occasional mopping-up efforts using standard control techniques must also be used. In most fenced areas, some form of buffer zone control is used to relieve potential pressure on the fences.

Biological Control

It is unlikely that deliberate biological control of wild dogs would be successful. Dog diseases such as distemper and mange are already present in wild populations, so attempts to re-introduce them to some areas would have little or no impact. New or genetically modified diseases offer little hope because domestic dogs would be equally susceptible, and public concern would almost certainly prevent their introduction. As well, the conservation status of dingoes would have to be considered in any attempt to introduce any new and naturally spreading lethal agent.

Bounties

Bounties or bonuses have been paid on many species around the world for centuries. The payments are a reward for killing pest animals, usually on presentation of evidence such as scalps. Though now phased out over much of Australia, the bounty system is still occasionally suggested as a means of improving the management or control of certain pest animals, including wild dogs. There are sound reasons why a general bounty system would not prove beneficial to the management of wild dogs in Western Australia or elsewhere.

Worldwide evidence against bounties

The experience worldwide has been that bounty systems do not deliver effective control of pest populations. In Australia, evidence from discontinued fox and wild dog bounty schemes has been the same. When the numbers of scalps taken for either species are plotted over long periods of time, the results invariably show a common outcome: numbers fluctuate over time, but there is no downward trend in pest numbers. This shows that the bounty system has not worked: if it had, there would be a progressive reduction in the number of bounties paid.

As well, general bounty schemes encourage fraud. Historically, the variety of fraud has varied greatly, from the careful counterfeiting of scalps, through to the more common trafficking of scalps from other jurisdictions or localities.

Flawed rationale

There is overwhelming evidence that wild dogs cause economic losses, particularly in the sheep industry, so livestock producers do not need the incentive of a bounty before undertaking wild dog control. The financial incentive to carry out dog control already exists.

The argument is sometimes put forward that station workers, for example, might be more likely to hunt wild dogs if there were some kind of financial reward to do so. In that case, managers may well choose to reward their staff personally, but that does not require a general bounty scheme. General bounty schemes divert funds that could otherwise be spent on regional control programs, producing more widespread effects and benefits.

Losing focus of the main objective

One of the dangers of a general bounty system is that it tends to encourage a scalp-count mentality. This means that success is incorrectly measured by the number of pests killed and collected. The real measure should be to achieve or maintain a reduction in the numbers of stock lost through predation.

Influence on control methods and strategies

Bounty systems tend to encourage the hunting of wild dogs where they are easiest to find or kill. That too can take the focus away from where the real problem exists, such as in or close to the stocked paddocks where wild dog numbers would be lower, and where individuals would be quite likely to be harder to find and target.

Bounty systems also encourage the use of techniques that yield carcasses (trapping, shooting, inappropriate poisons). There is evidence in Western Australia that 1080 baiting had not been favoured in some areas in the past because carcasses were seldom found, and so bounties could not be claimed. Failure to use 1080 baiting for that reason has the potential to severely compromise the efficient and cost-effective control of wild dogs.

The incentive to improve a scalp tally has formerly led to extreme practices such as delaying the targeting of bitches until after pups are born. Waiting until pups are old enough to be collectable potentially increases the number of scalps (and payments) available to claim, though at great risk of losing track not only of the bitch, but her litter as well.

Individual rewards to remove rogue animals?

Despite the arguments against general bounty systems, there is still some merit in providing financial incentives for the removal of specific individual wild dogs through the so-called ‘smart bounty’. This is sometimes done effectively on individual properties, and more rarely over groups of smaller holdings. In these situations, the target animals are usually readily identifiable. The reward provides some recompense to operators who might spend a considerable amount of time dealing with the problem animal. Generally these informal arrangements are set up and paid for by the relevant landholders themselves. This is quite different to a general bounty scheme.

Chapter 10. Background biology of wild dogs

Naming and origin

As outlined at the beginning of this Manual, 'wild dog' is a collective term used for dingoes, hybrids and feral domestic dogs. In practical terms, the general biology and behaviour of these canids (members of the dog family) are so similar that it is difficult to distinguish between them.

Dingoes are considered to have descended from the Indian wolf, *Canis lupus pallipes.* Dingoes are still often classified as a sub-species of the domestic dog, *Canis familiaris*, with which they are able to interbreed and produce fertile offspring. However, given the wolf ancestry of dingoes and domestic dogs, it has become common in Australia to use the scientific name *Canis lupus dingo* for dingoes and *Canis lupus familiaris* for domestic dogs.

Appearance

The dingo resembles a lean kelpie sheepdog in body form and size, with erect ears and a bushy tail. Size and weight vary according to the location. For example, on the Nullarbor Plain in Western Australia, the average weight for dingoes older than nine months was 15.9 kg for males and 12.7 kg for females. At the Fortescue River, in the Pilbara region of WA, dingoes of the same age group were larger, with respective weights of 17.5 and 14.4 kg. Respective weights for adults (>21 months) at the Fortescue River were 18.9 and 15.2 kg.

Dingoes are frequently ginger in colour, although black-and-tan and white individuals are also found. Mixed colouration and brindling is commonly observed amongst hybrids. Dingoes typically have white points on their feet and tail-tip, though some hybrids can also display these features.

Distribution and population density

Dingoes reached Australia about 3500–4000 years ago, most likely accompanying Asian seafarers rather than during an aboriginal migration. They are now found in all Australian States except Tasmania. In WA, dingoes are rare or absent in most closely settled areas of the South West.

The proportion of hybrid animals is generally highest closer to settled areas. In WA, the proportion of hybrids tends to be higher in the southern portion of the state, roughly below the 26th parallel. A high proportion of wild dogs in south-eastern Australia appear to be hybrids.

In the absence of control by man, dingo population densities vary according to the distribution and abundance of food and water. In the Fortescue River area, during a period of apparently adequate food supply and in the general absence of control work, densities of a little over 20 dingoes per 100 km^2 were recorded (excluding pups). In more arid inland desert areas, population density is likely to be considerably less than this.

Habitat

Dingoes have the ability to adapt to extreme heat and cold, which enables them to occupy a range of environments from semi-arid desert to sub-alpine regions. At a local scale, dingoes clearly prefer some habitats to others. For example, at the hot, arid Fortescue River area, dingoes spend proportionately more time in riverine areas than in other parts of their range (see Figure 23).

Activity Patterns

Dingoes seldom travel during the heat of the day, especially in the summer months. Peak activity occurs at dawn and dusk, with some activity during the night. In temperate areas, more daytime activity has been recorded.

Fig.23 *Radio-tracking dingoes in the Pilbara. Riverine areas in the background were favoured habitats.*

Reproduction

Female dingoes have a single breeding season each year. Oestrus occurs between March and June, and whelping between June and August. In the Fortescue River area, the average whelping date was 18 July. Evidence of a reproductive cycle in males has been found, with few viable sperm being produced in summer. Hybrid animals tend to have a less distinctive seasonal timing of their reproductive cycle. The well-defined pulse of whelping characteristic of dingoes is disrupted when a large proportion of hybrids and/or feral dogs occurs in the population.

The gestation period of 63 days for dingoes is the same as that of domestic dogs. Bitches seek caves, rock piles, hollow logs, enlarged rabbit burrows or similar sheltered sites in which to whelp. Dens are usually in elevated positions, close to water. Litters average five pups, which are weaned from about two months of age.

Some young dingoes become sexually mature between 9 and 12 months of age. However, the breeding success of young dingoes is likely to be lower than that of older dingoes. Breeding success may be affected by social circumstances, such as dominance status in a pack, and the presence of potential companions to help obtain food, as well as the type and abundance of prey.

After whelping occurs, other members of the social unit help feed the pups when they begin to eat meat and are thought to provide for the bitch during early lactation. After the den is abandoned at about eight weeks (ranging between four and nine weeks) the pups are moved to a succession of sites and food is brought to them by the adults. By about 9 to 24 weeks of age, the pups accompany adults on forays that become progressively longer, sometimes to the sites of kills. At this stage, the litter may be split up among several adults of the pack. In the Fortescue area, pups remained with the pack. In some areas of Australia, pups appear to become largely independent of the adults by the age of four to six months.

Social behaviour

How do wild dog packs function?

Wild dogs are social animals. Though often sighted as individuals or in pairs, wild dogs are usually organised into distinct social groups consisting of a dominant male and female and their offspring of various years.

These packs maintain and defend their territories which have very little or no overlap with those of neighbouring packs. The development, size and stability of packs appears to be related to the size and abundance of available prey. Larger packs and strong territoriality seem to be common when kangaroos are the main prey, whereas smaller packs and less defined territories are seen in areas where rabbits are the main prey. Packs of up to 23 individuals (including young-of-the-year) were identified during the Fortescue River study, where kangaroos were the main prey.

Pack stability and the separation of adjacent packs is maintained by means of visual, vocal (howling) and scent (scats and urine) cues. Howling is heard throughout the year but becomes more frequent prior to the breeding season. Urination and ground-scratching increase in frequency two to three months prior to the breeding season. There is no evidence to suggest that scent-marks repel other wild dogs that might encroach into the pack territory from outside.

It is rare to see all pack members together and is more common to see solitary animals or small sub-groups of two to four individuals of the pack. A dominance hierarchy exists within packs, which allows for the next animal in the order to replace the lead or 'alpha' dog and bitch. This can happen through one of the leaders being killed or being out-competed by fellow pack members (usually their own offspring). Such changes in the pack rarely lead to significant changes in pack behaviour or the territory occupied.

Outright fighting between pack members is rare and aggression seems to be countered by submissive postures.

Home range and movements

What do home range and territory refer to?

The term 'home range' means the normal living area of an animal. If a wild dog spends time coming in and out of sheep paddocks, then that area is part of its home range. The home ranges of social companions overlap, with the combined area forming a group home range. When defended, this can be termed a 'territory'.

The home range of individual adult pack members in the Fortescue River area averaged 56 km2 for females and 85 km2 for males. Group home ranges, or pack territories, ranged from about 45 to 110 km2. On the Nullarbor, dingoes roamed over larger areas, of up to 300 km2.

Territoriality of wild dogs implies defence of an area. Territoriality involves resident animals stopping intruding dogs from settling in that area. Intruders usually avoid the residents and encounters can lead to desperate chases, which can lead to the killing of the intruders by the residents defending their patch.

This doesn't mean that intruders normally turn around and retreat the way they have come. Rather, the intruders keep wandering, looking for an area where there is no sign of existing dogs, such as scents, markings, or howling, and where there is sufficient food and water. They can actually spend some time within a pack territory without conflict, but only by keeping out of the way of the existing pack. More often, these wanderers simply move on, searching for vacant areas with sufficient food and water. This further movement can lead these wild dogs into stocked country. In effect, the territorial residents force the intruders through, rather than turn them back.

Will animals routinely travel large distances to sheep paddocks?

Distances travelled by wild dogs have been the subject of much discussion and study, as well as some wild speculation. The fact that a dog is quite capable of covering tens of kilometres in a day doesn't mean that they normally do so. Travel over significant distances consumes considerable energy, and is rarely undertaken unless the wild dogs receive an immediate survival advantage by travelling.

The issue of wild dog movements has an important bearing on control activities, because it influences decisions such as how far to extend control work from stock paddocks.

Decades ago, there was a general view that wild dogs roamed vast distances and that any dog within hundreds of kilometres had the potential to kill stock. As a result,

some doggers previously operated in distant, remote country where their efforts were wasted. The real problem dogs are far closer to home.

Wild dogs tend to settle in an area that provides them with adequate resources. They roam as far as necessary for food or water, but there is a biological advantage in an animal being familiar with the best sites for food, shelter, and escape from predators and humans.

Where resources such as watering points are more scattered, dogs roam further and have larger home ranges. Intensive radio tracking of hundreds of dingoes has shown that instances of individuals living well away from the paddocks and making 'raids' from afar, are rare. At the Fortescue River, the average distance moved from one day to the next was only about 3 km.

Most commonly, wild dogs that travelled to encroach on sheep country either:

- settled there (this was more likely to occur in pastoral country where suitable habitat usually exists in the paddocks); or
- shifted their home range to the neighbouring refuge area (this was more likely to occur in farming areas where limited opportunities exist for dogs to settle within the actual paddocks).

There's not much biological advantage in an animal living in one area and having to travel through largely unknown country into an area such as a sheep paddock, despite the easy food. Dealing with such an occasional occurrence shouldn't be totally ruled out, but this should not form the basis of an entire control strategy. The wild dogs that pose the greatest risk to stock live closer to paddocks.

Do dingoes migrate?

Dingoes do not undertake regular or seasonal migrations (which are directional movements of a significant proportion of the population). Rather, their movements are generally short and localised, concentrating around favoured areas such as gorges and river pools, where food, water and shelter are readily available. Dingo movement patterns appear to be similar from season to season, except when breeding females are confined to dens during the whelping and early nursing period.

Individuals do occasionally disperse from their home range, but long distance dispersal moves are rare. During the Fortescue study, only one-third of the dingoes which dispersed travelled more than 20 km from their original range, and only one dingo dispersed more than 50 km. On the Nullarbor, less than 10 per cent of dingoes moved in excess of 50 km.

Food habits and predation

Dingo hunting strategies are flexible and range from individuals operating alone to capture small prey such as lizards, to groups of dingoes cooperating to hunt large prey such as kangaroos or cattle. The dingo diet broadly reflects the type of prey available and the relative abundance of various prey species. Dietary studies usually identify a relatively narrow range of prey species, indicating that dingoes are specialists rather than opportunistic feeders. For example, although dingoes kill sheep, they appear to prefer to eat other prey such as kangaroos.

In the Fortescue area, dingoes prey predominantly on euros and red kangaroos, though cattle carrion and sheep are also eaten. Less common species such as echidna and rock wallabies also appear as minor items in the diet. On the Nullarbor Plain, rabbits are the predominant dietary item, even though kangaroos are present.

Dingoes usually catch large prey from behind, as the pursued animal is running away. When prey such as kangaroos have been brought to a stop, dingoes transfer their attack from the hind end to the throat. Death usually results from suffocation and shock, rather than blood loss. Mutilation often results from attacks by inexperienced dingoes and by dingoes attacking prey for reasons other than for food, resulting in injured or mutilated sheep where dingoes are active.

Animals killed by dingoes usually have clear puncture wounds at the throat. There may also be evidence of bites and bruising to the legs, particularly the hind legs. Verification of predation often requires skinning of the throat and legs, and may require an examination of signs of the struggle near the carcass. The procedures used in identifying wild dog predation are given in Chapter 3.

Chapter 11.
Economics of damage and control

In Western Australia, sheep comprise the bulk of stock losses attributable to wild dogs, including dingoes. Research carried out at the Fortescue River showed that:

1. Most dingoes in sheep paddocks attacked sheep;
2. Dingoes often maimed sheep without killing them;
3. Dingoes sometimes chased sheep without biting them. Harassment by dingoes can lead to problems such as increased mis-mothering of lambs; and
4. The presence of a dingo not even actively harassing sheep in the area could have an adverse influence on sheep distribution and behaviour.

Sheep losses

The extent of sheep losses is very difficult to measure, particularly under Western Australia's extensive rangeland grazing conditions. However, examples of potential losses caused by dingoes were obtained from the Fortescue study. In one instance, losses of 33 per cent would have been expected if dingoes had killed sheep at the recorded rate over the full year. In another instance, an annual loss of 16 per cent was calculated. Losses of these levels far outweighed the costs of a subsequent aerial baiting campaign that effectively protected the sheep flock from further predation. Benefit-cost analyses on a State-wide basis are difficult to carry out because losses of stock in the absence of control work can only be estimated. A benefit-cost analysis in 1987 calculated that WA's wild dog control program was economically justified if predation on sheep was greater than five per cent. Data from the Fortescue study suggest that losses of this magnitude are likely.

Cattle losses

The impact of wild dog predation on cattle is more variable, and not as well documented. It is well known that dingoes are capable of efficiently preying on calves. However, the incidence of attacks on cattle is often low, particularly when alternative, natural prey such as kangaroos are available.

Dingoes were implicated in significant losses of young calves in a northern Queensland study. More recent work in Queensland has further demonstrated that losses of up to 30 per cent of calves can be attributed to predation, though average predation losses would normally be in the order of up to 10 per cent. Factors such as the abundance and type of natural prey, and even the breed of cattle which can influence mothering behaviour and defence against wild dogs, appear to be important factors affecting the incidence of calf losses to wild dogs.

The overall economic significance of dingo predation to the pastoral cattle industry is unknown. It seems likely that for an individual station, the potential benefits gained by saving even a few calves from predation would outweigh the costs of a baiting campaign.

Environmental considerations

The role played by dingoes in the wider ecosystem must also be recognised. Dingoes at the Fortescue preyed disproportionately on certain classes of kangaroo and appeared to be responsible for the decline of a local population of euros. Work in the Eastern States has also indicated that dingoes can control populations of kangaroos. In some cattle grazing areas, dingo predation on kangaroos or wallabies may be advantageous to the industry.

The removal or control of dingoes in areas where they pose no threat to livestock is not only economically unsound but also threatens ecological balances.

Chapter 12.
First aid for 1080 and strychnine

Both 1080 and strychnine are extremely toxic poisons and if swallowed, speed in treatment is essential.

There are no specific antidotes.

- If poisoning occurs, contact a doctor or Poisons Information Centre (telephone 13 11 26).
- If skin contact occurs, remove contaminated clothing and wash skin thoroughly.
- If in the eyes, hold eyes open, flood with water for at least 15 minutes and see a doctor.

1080

- If swallowed and victim is conscious, give large quantities of water and induce vomiting.
- The victim should be maintained resting in a quiet area and kept warm (or at a comfortable temperature in hot weather).
- Apply artificial respiration if not breathing.

Strychnine

- If swallowed, give activated charcoal and keep patient quiet in a dark place if possible. [Charcoal given at a dose of 30-100 g for an adult, as a slurry of 240 mL water per 30 g charcoal.]
- Avoid sudden or violent stimuli such as noise or touch as these could trigger convulsions.

Further reading

"Western Australian Wild Dog Management Strategy 2005". Department of Agriculture and Food, Western Australia, and Agriculture Protection Board of WA. Miscellaneous Publication 27/2005. Available from the following website: http://www.agric.wa.gov.au. Suggest use the website's 'Search' facility and type in the title.

"First Aid. 1080 and your dog". Australian Wool Innovation. Available at the following website: http://www.pestanimal.crc.org.au/info/1st%20aid%20book.pdf

"Managing the Impacts of Dingoes and Other Wild Dogs", by Peter Fleming, Laurie Corbett, Robert Harden and Peter Thomson. Bureau of Rural Sciences, 2001. See http://affashop.gov.au/product.asp?prodid=12079

For other general information on wild dogs and wild dog control, various publications are available on the Department of Agriculture and Food website: http://www.agric.wa.gov.au. Suggest use the website's 'Search' facility and type in 'wild dog' or 'wild dog control'.

'Guide to the Safe Use of 1080 Poison'

'Guide to the Safe Use of Strychnine for Jawed Traps'

These documents are available on the Department of Agriculture and Food website: http://www.agric.wa.gov.au.

Use the website's 'Search' facility and type in the title.

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