DairyingForTomorrow

DairyCatch

A Partnership for Sustainable and Profitable Dairy Farming in Western Australia

ENVIRONMENTAL BEST PRACTICE GUIDELINES

9.0 WEED AND PEST MANAGEMENT

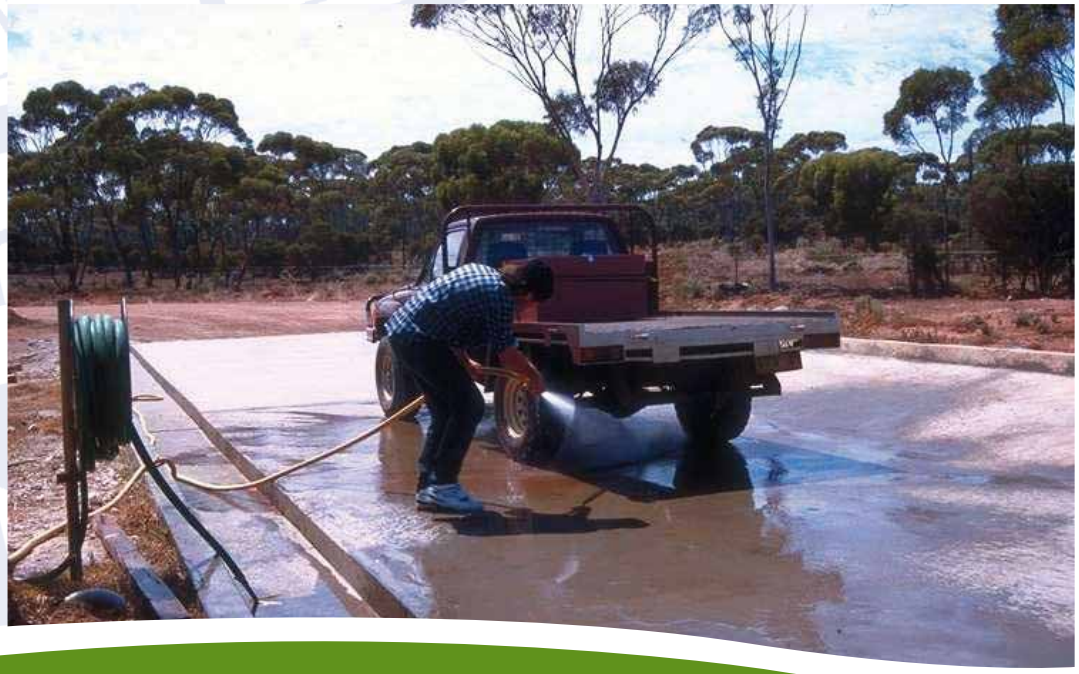


TABLE OF CONTENTS

Back to Main Table of Contents

TABLE OF CONTENTS

Page

List of Figures

List of Tables

Back to Main Table of Contents

WEED AND PEST MANAGEMENT

9.1 WEED MANAGEMENT

This is one of the most significant environmental challenges facing Western Australia. In the relatively short history of this State since European settlement, some 1155 exotic plant species have established as weeds in our diverse and generally fragile ecosystems. Without a substantial change in the way we approach weed problems, their long-term impact on the economy, environment and community may overtake our salinity problems.

The National Weeds Strategy defines the term "weed" as any plant that has, or has the potential to have, a detrimental effect on economic, social or conservation values". Pasture weeds cost farmers millions of dollars in lost production and control measures each year. Weed eradication can be very expensive and time consuming as large areas of land can be quickly infested. Seed stores can remain in the soil for many years and a weed management program may need to continue for 5-10 years to eventually run down the seed store.

Implementing Good Practice

Integrated Weed Management (IWM) is a long-term sustainable approach to weed management that uses a combination of control options including grazing, herbicide application and biological control agents. Central to IWM is the idea that a full range of weed control techniques should be applied and integrated into a single strategy that (a) recognises the ecology of the organisms and the environment concerned, and (b) aims to bring weed populations down by depleting the weed seed bank.

IWM avoids the use of single techniques, such as repeated use of the same herbicide, which increases the risk of herbicide resistance. It is a long-term approach, working for example to a five or ten-year weed reduction strategy rather than merely responding to current seasonal events.

Weeds can quickly take over the natural bush and become the dominant species.

- Use weed-free seed. Be sure to ask for a "Seed Analysis Report" whenever you buy seed
- Always clean machinery when moving between paddocks or farms. Be aware that weed seeds are transported on vehicles, trailers, clothing, shoes, in soil and in pet fur and hair
- Control weeds along roadsides at the edge of paddocks
- Eradicate small patches of new invading weeds
- Consider weeds when importing hay
- Don't import grain or products that may contain certain herbicide resistant weed seeds
- If you physically pull out the weeds, dispose of them in a black plastic bag, sealing it and "baking it" in the sun for a couple of weeks prior to placing it in the bin
- Always cover trailers when transporting plant material to prevent seeds and other live plant material falling off
- It is not uncommon that newly purchased stock may have viable weed seeds in their gut or attached to their bodies. To prevent weeds from entering your farm in this manner quarantine such stock in a designated holding pad for up to seven days before putting them out onto your weed-free pasture. Any viable seeds they were carrying will germinate on the pad where they will be much easier and cheaper to control

Physical and biological control methods include:

- Increasing seeding rates to maximise crop-weed competition and yield without reducing grain size
- Grazing

Chemical control involves the use of herbicides. A wide range are currently available and include those that can be applied pre-emergence, early post-emergence or late post-emergence. You should contact your farm consultant or local DAFWA office for advice on suitable chemicals for use on different weed species.

When applying herbicide to pastures, a stock withholding period is normally required to ensure animal health. This is the time interval between herbicide application and crop harvesting or grazing required by law. The length of this withholding period various according to the type of herbicide used. You should always refer to herbicide label instructions

Boom sprays like this are useful pieces of equipment for weed and pest control

Get to know the local weeds in your area. Contact your Local Council, Landcare Group or DAFWA Office to identify and recommend control options.

In Summary

- Thoroughly clean down machinery, vehicles and tools that have been in weed-infested areas
- Only sow seed that is certified weed free
- Request Vendor Declaration of Weed Status of fodder, hay, topsoil and feed grain prior to purchase
- Insist that any contract equipment or service vehicles (eg: electricity, telephone) be cleaned before coming on to your property. Provide a washdown area as near as possible to your farm gate
- Use integrated weed management techniques to increase your chance of success and reduce the risk of herbicide resistance and other problems associated with single strategy approaches
- Keep access roads, easements and yards weed free
- Move livestock to frequently used holding areas after they've been grazing on weedy paddocks. This will limit the spread of weeds and allow easy control of new seedlings which may emerge from animal waste
- Hold new stock in yards or quarantine paddocks for seven days before allowing them out onto the rest of the property
- Plant bushes and trees along boundaries to prevent seed spreading from neighbouring properties

Further Information

Cooperative Research Centre (CRC) for Australian Weed Management. 2003. Weed management. University of Adelaide, Adelaide. Available online at www.weeds.crc.org.au

Department of Agriculture and Food WA. 2001. A weed plan for Western Australia Bulletin 4490. Available online at www.agric.wa.gov.au

9.1.1 DEVELOPING A WEED ACTION PLAN

Weed management is an essential part of sustainable land management. You, as a land manager, must manage weeds on your land and not allow them to infest neighbouring properties. This includes all land under your control, whether it is in active use or not. The term "land" also includes associated water resources that may be at considerable risk from aquatic weeds.

The National Weeds Strategy, released in 1997, aims to "exclude the introduction of new weeds and strengthen action against those that are already established". The strategy focuses on Weeds of National Significance (WONS) that have been prioritised based on their virulence, location and current impacts on agricultural profitability, environment and social values. Local weeds on this list include blackberry (Rubus fruticosus agg.), willows except weeping willows, pussy willow and sterile pussy willow (Salix spp. except S. babylonica, S. X calodendron and S. X reichardtiji) and bridal creeper (Asparagus asparagoides).

The economic losses caused by weeds are through loss of production that results from competition between pasture plants and weeds plus the cost of weed control programs (herbicides and machinery).

The environmental impact of weeds is mainly through the displacement of native species and providing a safe haven for animal pests such as rabbits and foxes. The threat to remnant vegetation is greater in higher rainfall areas and in riparian, wetland and open forest ecosystems.

The greatest social impact of weed infestation is the dissent caused between neighbours. Rural residents are often frustrated by absentee landholders who tend to neglect their weed management. Unchecked woody weeds can be a fire hazard.

Implementing Good Practice

Prevention and early intervention are the most cost-effective strategies against weeds. You should do all you can to control your weeds and prevent their spread onto neighbouring properties.

Start your weed action plan by asking yourself:

Do you have enough information of the current weed status of your property? If you don't you should take a walk and map all your weed infested areas. Be sure to document

- the location of weeds
- evidence of animals who are potential carriers of weeds
- fire history (fire can either encourage or limit many weeds)
- indigenous flora and fauna, especially those at risk
- surrounding land and water uses that may be contributing to weed infestation
- other values or features under threat

This investigation will allow you to give priority to those weeds that are the most threatening and develop an action plan for their demise.

Who are the players?
Identify who owns and manages the land/water resources around you. What is the level of community involvement in the use, care and management of the area and what is their level of awareness and understanding of the risks posed by weeds - they can be your best allies.

What do you want to achieve?
This is probably the hardest question to answer. Establish your goals and objectives early in the process.

What course of action are you prepared to take?
It is essential you identify and address the cause of the weed infestation rather than just treating symptoms. For example, rather than routine spraying of new recruits every year, identify and eliminate point sources. Another decision is whether you should tackle one weed species at a time across a large area or take on all the weeds in a small area before systematically moving to another small area.

Your weed action plan should constitute part of your overall farm management plan. Your local Landcare centre, CALM and DAFWA are all involved in activities to control existing weeds. Contact them for advice.

Further Information

Enright, K, S Lloyd, R Delane. 2001. Weeds affect everyone-development of a state weed action plan. Department of Agriculture and Food Western Australia.

State Weed Plan Steering Group. 2001. A weed plan for Western Australia. Department of Agriculture and Food Western Australia.

Thorp, J R and R Lynch. 2000. The Determination of Weeds of National Significance. National Weeds Strategy Executive Committee, Launceston. Available online at www.weeds.org.au

9.1.2 VOLUNTEER GROUP WEED CONTROL PROGRAMS

Despite the high-level environmental threat posed by weed, large scale programs to combat them have not been adequately supported by the wider Australian community. This has driven local volunteer groups to play a vital role in environmental weed management.

Projects developed by local groups concerned about environmental weed problems in their own backyard empower communities by giving them greater ownership of and responsibility for their environment. A co-ordinated approach involving numerous landholders has a greater chance of success in the long term than individuals working in isolation because the likelihood of re-infestation between neighbouring properties is reduced.

Implementing Good Practice

If you are contemplating establishing a volunteer weed group, it may help to tackle small areas of weed infestations first to give your group the satisfaction of a job well done. Taking on too much too early often leaves people with a feeling they are wasting their time and should give up. If a group survives this initial phase, they are likely to have learnt lessons from previous experience and realistically plan for the eradication of larger areas of weeds. Also, to effectively manage any environmental weed problem, your group needs to plan strategically and allow for a long-term monitoring and maintenance program. A concerted effort can successfully eliminate a weed in a given area, but without ongoing monitoring and management it is highly likely the weed will re-established itself within few short years.

Experience has shown that the most successful and persistent volunteer groups are those that maintain:

- regular contact with government officers for support, training and education when dealing with major infestations or difficult weeds
- locally trained support staff that can assist with advice, coordination and planning
- chemical free weed management techniques to reduce costs
- coordinated programs between agencies and community groups to improve strategic management of weed infestations
- group development and management training to build skills
- recognition for successful work undertaken by its volunteers

Having a co-ordinated approach with neighbours will combat weeds more successfully.

Further Information

Environment Australia. 1997. Community Involvement in Off-reserve and On-reserve Management of Environmental Weeds. Environment Australia, Canberra. Available online at www.deh.gov.au/biodiversity/invasive/publications/weeds-involvement/summary.html

9.1.3 SOURCING CERTIFIED SEED AND FODDER

A majority of dairy farmers regularly purchase fodder and re-seed pastures. It is therefore important you known exactly what you are buying.

Implementing Good Practice

When purchasing seed, make sure what you are getting is certified. This guarantees the stated variety and minimum percent germination. It also provides assurance the seed does not exceed maximum tolerance levels of weeds and other crop seeds. Ask for a certificate of analysis and the dealer must provide you with one.

Make sure you know about any particular weeds stated to be present in the seed. Each weed seed means an unwanted plant in competition for your nutrients so make sure it isn't on the declared list, highly competitive or known to be herbicide-resistant.

It is an offence under the Agriculture and Related Resource Protection Act 1976 (ARRPA) to sell or transport produce or other material contaminated with Declared Plants. All offences under ARRPA should be reported to the nearest DAFWA office. Details of all current Declared Plants in Western Australia and how they are to be treated can be accessed via the DAFWA website or a copy can be sent to you on request to your local DAFWA office.

Get a vendor declaration of the weed status of fodder, hay, topsoil and feed grain prior to purchase.

A partnership between key industry groups, the Department of Agriculture and Food WA (DAFWA) and the Agriculture Protection Board has resulted in protection strategies against pests, diseases and weeds through the GrainGuard™ and StockGuard™ initiatives. These contain bio-security plans that identify key threats and outline preventive and response strategies. By adopting your industry's protection plan, you can achieve high levels of bio-security and safeguard your business.

DAFWA is vigilant in reminding seed importers that strict procedures must be adhered to. The most important step in the process is the seed analysis prior to shipment to WA. Seed analysis certificates must be faxed to the WAQIS Seeds Officer to ensure transported stocks have been tested by an accredited seed laboratory and certified to contain only seeds listed as Permitted Species. In addition, some plant species have disease restrictions. For example, sorghum must be fumigated prior to shipment to kill the sorghum midge. Similarly, all imported lucerne must be certified it was grown in a bacterial wilt-free area.

Consignments arriving in WA without an accompanying seed certificate must be sampled by WAQIS and analysed at the DAFWA Seed Laboratory in South Perth, all at the importer's expense. Bulk seed stock consignments arriving by road must be declared at the WAQIS checkpoint in Eucla where drivers are directed to a WAQIS-registered premises for inspection. The seed analysis certificate must be presented and the sample must be inspected for insect contamination and weeds.

Further Information

For a current listing of Declared Plants in WA visit www.agric.wa.gov.au and click on the Declared Plants tab.

Agriculture Protection Board. 2005. Agriculture and Related Resources Protection Act 1976. Department of Agriculture Western Australia. Available online at www.agric.wa.gov.au

Department of Agriculture and Food WA. Barley crop establishment: seed selection. Department of Agriculture and Food Western Australia. Available online at www.agric.wa.gov.au

Delane R, J Edwards and R Gwynne. 2002. Farm Biosecurity. Farmnote No. 71/2002. Department of Agriculture and Food Western Australia. Available online at www.agric.wa.gov.au

Cooperative Research Centre for Weed Management. Weed Management: Preventative management. Available online at www.weeds.crc.org.au

Department of Agriculture and Food WA. 2004. Bio-security in Agriculture newsletter; Regional Model: control for pests and weeds. Available online at www.agric.wa.gov.au

9.1.4 IMPORTED FODDER MANAGEMENT

Commonly, weed seeds can come on to your farm via purchased fodders. In addition to the environmental and economic damage, once germinated and grazed, some weeds can also produce strong undesirable flavours and tainting of milk at various times of the year.

Implementing Good Practice

Having designated areas where newly purchased supplementary fodder can be fed out will help you spot the presence of noxious weeds and allow you to deal with them in a confined smaller area.

You should also

- Always check the origin of fodder before you buy to avoid importing from heavily weed infested areas
- If possible, buy feed which is locally grown to reduce the chance of introducing new weeds that are not already present in the area.
- Reduce the likelihood of seed being spread throughout a property by feeding out in a confined area or in one paddock
- Be suspicious of unfamiliar plants that germinate in the areas where introduced feed has been put out. Identify any unfamiliar plants and control quickly
- ensure that weeds are controlled early when establishing a new pasture and, if possible, eradicate a problem as soon as it has been identified
- If you experience tainted milk and the culprit plants cannot be eradicated, exclude the milking herd from the contaminated area
- When weeds are sprayed, ensure the manufacturer's withholding time instructions are observed

Further Information

Tenni A and M Mewnham. 2000. Information note LC0254 How weeds spread. Department of Primary Industries, Victoria.

Bell I and S Gallagher. 1999. Feed quality and safety for dairy cows. Farmnote 35/99 Department of Agriculture and Food Western Australia. Available online at www.agric.wa.gov.au

9.1.5 VEHICLE AND CLEANING PROTOCOLS

The movement of machinery and vehicles around the farm and for road maintenance is a major factor in the spread of weeds. You can spread weeds from paddock to paddock during your daily routines. The potential for weed spread has also increased with the use of contractors and equipment that travels vast distances between jobs. Weed seeds and fruits can adhere to tyres of machinery and enter equipment cavities. Fine seeds can be difficult to remove as they can penetrate deep inside moving parts.

Implementing Good Practice

- Make it known to all concerned that any machinery, vehicles, bins and boxes coming onto your property must be clean
- Inform suppliers and contractors that all machinery, vehicles and trucks must be cleaned of soil and plant residue. Put a big sign up on your farm entrance
- Make it easy for contractors and visitors to clean machinery, equipment and boots when they come onto, or before they leave your property. Site the cleaning area so it is not on your main thoroughfare
- Turn away or clean anything that does not meet your cleaned standards
- Ensure that agricultural machinery, plant and equipment are cleaned of plant material and soil before being moved to a new work site. Tell contractors in advance of your requirements.
- Advise crop consultants and field officers that their vehicles, boots and hand tools must be clean of potential pest, disease and weed threats.

Machinery and equipment that cause major weed contamination

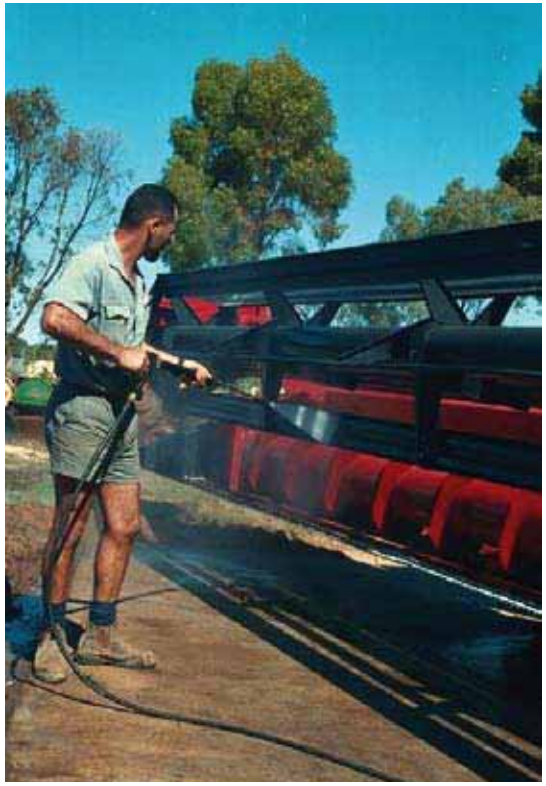
- Harvesting equipment
- Tractors and implements (eg. Slashers, cultivators)
- Cars, trucks and motor bikes
- Earthmoving machinery (eg. Bulldozers)
- Backhoes and other digging equipment
- Graders

Areas requiring special attention

- Slashing and ripping equipment
- Radiators
- Ledges and frames where dust collects
- Inside drivers cab
- Front and back of any blades
- Wheel tyres, axles, and mud guard areas

Machinery Clean Down Options

The level of contamination risk will often determine clean-down requirements. The most effective options include wash-down, air blast, vacuuming and physical removal. All dirt and plant material should be removed from machinery.



Wash-down is achieved by first removing dirt and plant material with a stiff brush and then applying water using a pressure cleaner or spray tank and pump. Cleaning detergents should be added to water to remove built up grease, dirt and mud containing weed seeds. The critical areas on equipment must be rigorously targeted and thoroughly washed clean.

If you plan to construct a washdown facility on your farm, the wash down pad should have an impervious surface (concrete or bitumen) and be properly graded and sloped to contain the wash water and guide it to a sump away from watercourses and drains, cropped areas and dams. Try to site the facility as near to the farm entrance as possible so all entries can be scrutinised and treated as they arrive. Any materials that come in and are stored without immediate treatment are likely to be used untreated.

Air blasting can be used to decontaminate those hard-to-reach areas such as cavities and joints. A compressor with hose and suitable nozzles is required

Vacuuming can remove contaminants from vehicle interiors (driver's cab carpet)

Physical removal with hand-held tools such as brooms, brushes, shovels and scrapers are the best way to get rid of spiny burrs and other plant materials that can attach themselves to tyres. Physical removal can be done prior to or after pressurised water spray or air blast. It may be labour intensive, but it will ensure that contaminants are removed and disposed of correctly.

Some other useful practices include:

- Time and coordinate works prior to weed seeds maturing
- Ensure machinery operators are familiar with hygiene protocols and weed identification
- Map and monitor weed infestations
- Strategically designate clean down sites to minimise weed spread
- Work from non infested areas into infested areas
- Use the most appropriate machinery for the job to minimise soil disturbance and physical contact with seeds eg. offset mowers
- Avoid work during inclement weather

In addition to cleaning machinery, other measures you should consider include:

- Where possible, use your vehicle to carry visitors around the farm.
- Putting up signs that tell farm visitors of your bio-security expectations.
- Restricting farm access so visitors keep to the homestead or central laneways.
- Do not allow visitors near stock unless they have clean boots and clothes. If possible, supply visitors with boots and overalls (that stay on your farm).

Further Information

Delane R, J Edwards and R Gwynne. 2002. Farm Biosecurity. Farmnote 71/2002. Department of Agriculture and Food Western Australia. Available online at www.agric.wa.gov.au

Floyd, R. 2001. Soil Borne Diseases in horticulture. Farmnote No. 79/1990. Department of Agriculture and Food Western Australia. Available online at www.agric.wa.gov.au

Pratt. R and J Pierce. 2002. Skeleton Weed (Chondrilla juncea L.) Best Practice Guidelines. Department of Agriculture and Food Western Australia. Available online at www.agric.wa.gov.au

Tyers G, C Grech and N Baldyga. 2004. Machine Hygiene. Factsheet LC0425 Department of Primary Industries, Victoria

9.2.1 RABBIT MANAGEMENT

Rabbits compete directly with livestock and native animals for food. Rabbit grazing tends to be concentrated near refuge areas, resulting in severe localised degradation of both pasture and bush reserves and can cause significant soil erosion. They also attack domestic gardens and undermine farm sheds and other buildings.

Implementing Good Practice

You are legally required to control rabbits on your land. Rabbit presence is usually obvious by their scratchings, dung heaps and active burrows or warrens. Because they are predominantly nocturnal, you may only see rabbits hopping about late in the day or at night using a spotlight.

There are several methods of control available. These are discussed below and detailed in Table 9.1. Your keys to success will be persistence and choosing the best combination of control methods for your particular situation. Generally, best results are achieved in late summer when rabbit numbers are decreasing and feed is limited. One-off efforts produce only short-term results as rabbits are highly prolific and populations can recover quickly. District-wide campaigns and cooperation between neighbours will reduce the extent and speed of reinfestation.

Baiting is the most cost-effective way to reduce rabbit populations over large areas, but some conditions apply. You must undergo the necessary training and be granted Baiting Approval by the Department of Agriculture and Food WA. You may be eligible for free baits by becoming involved in a community baiting program.

- ***1080 baits*** are quickly broken down in the environment. Many native animals have developed a high degree of tolerance to 1080. Domestic stock and pets are very sensitive to the poison in both baits and dead rabbits and there is no antidote. Several types of 1080 (sodium fluoroacetate) rabbit baits are available and you can purchase these from rural suppliers
- ***Pindone*** is an anticoagulant and works similar to many rat poisons. Unlike 1080, an antidote is available making it less of a risk to pets

Warren fumigation is the best method to use when a few rabbits live in widely scattered warrens or inaccessible areas. Phostoxin® fumigant tablets are dropped into burrows where they release poisonous phosphine gas.

Warren ripping is achieved using a tractor-mounted ripper to penetrate the soil to a depth of at least 60 centimeters. Areas where warrens have been destroyed by cross-ripping the soil are much less likely to be re-colonised by rabbits.

Harbourage destruction involves the removal of materials such as rock piles, deadfall timber and stumps, abandoned buildings and old farm machinery used by rabbits as refuges. These should be removed, buried or surrounded with rabbit-proof fences.

Rabbit-proof fencing can be effective in preventing animals moving into or re-infesting an area. Well-maintained fences can provide a permanent solution to rabbit problems. Fencing can also be used to contain rabbits in an area where they can be more efficiently destroyed.

Myxomatosis and Rabbit Calicivirus Disease (RCD) are viral diseases introduced to help reduce rabbit numbers.

Other methods such as shooting and trapping can be useful when rabbit numbers are low.

Table 9.1 Rabit control methods

Method	When to use	Benefits	Liabilities
1080 baiting	Late summer and prior to seeding or regeneration efforts	Most cost effective method for large areas. Most native animals can tolerate 1080.	No effective antidote putting livestock and pets at risk. Rain detoxifies baits.
Pindone baiting	Late summer prior to seeding	Antidote available making it less of a hazard to domestic animals & pets.	More expensive than 1080. Native animals highly susceptible.
Warren fumigation	Late summer prior to seeding. Follow up to ripping	Effective in inaccessible or scattered areas. Follow up after baiting, ripping. Does not cause erosion.	Labour intensive.
Warren ripping	In summer for sandy soils, in winter for clay soils, prior to seeding.	Long term solution for large paddock infestations. Reduces re-colonisation.	Labour intensive. Can cause soil erosion. May destroy native vegetation.
Harbourage destruction	Prior to seeding.	Good follow up method	Labour intensive. Cannot be used in native vegetation areas
Rabbit proof fencing	Prior to seeding.	Long term effect, stops reinvasion	Very labour intensive. High initial cost. Needs regular checking.
Biological Control using Myxomatosis and Rabbit Calicivirus Virus	Year round	Naturally spread. Effective in reducing numbers before other controls are used	Timing and effectiveness unpredictable
Shooting and Trapping	Best late summer	Must be used in conjunction with other methods.	Very labour intensive Only appropriate for low rabbit numbers. Trapping and shooting not suitable in built up areas Need permit to use many traps.

Contact your local DAFWA Office for advice on which control methods best suit your situation

Further Information

Department of Agriculture and Food:

- Guide to the safe use of 1080 poison. Farmnote 32/2003.
- 1080 Summary Information. Misc. Publication. 11/2002.
- Landholder use of 1080 One Shot oat rabbit bait. Farmnote 63/2005.
- Fumigation for rabbit control. Farmnote 20/2004.
- Rabbit warren and harborage destruction. Farmnote 63/2003.
- European rabbit. Farmnote No. 39/2003.
- Options for rabbit control. Farmnote No. 89/2001.
- Use of rabbit proof fencing to protect crops and pastures in bush remnants. Farmnote 82/2002.
- Current listing of Declared Animals in WA

Available on the website at www.agric.wa.gov.au or contact our Head Office on 08 9368 3333.

Rabbits dig burrows and ruin pastures and crops.

9.2.2 FOX MANAGEMENT

Foxes are declared pests that prey on livestock and carry diseases that can spread to domestic dogs. Under the Agriculture and Related Resources Protection Act 1976 all landholders on rural zoned land are responsible for controlling foxes on their properties regardless of whether you are growing crops or keeping livestock.

Implementing Good Practice

Baiting with 1080 poison (sodium fluoroacetate) is a very cost-effective way to reduce fox numbers, but some conditions apply. You must undergo the necessary training and be granted Baiting Approval by the Department of Agriculture and Food WA. You may be eligible for free meat baits by becoming involved in a community baiting program.

1080 baits are quickly broken down in the environment. Many native animals have developed a high degree of tolerance to 1080. Domestic stock and pets are however very sensitive to the poison in baits and there is no antidote. Several types of 1080 baits are available and you can purchase these from rural suppliers.

You should always notify your neighbours and put up warning signs as precautionary measures when using baits. Handle, store and dispose of baits safely, securely and responsibly.

The most effective fox control is achieved during late winter and spring when they are rearing young and their food demand is highest. Foxes tend to be less mobile during this time so reinfestation of baited areas is delayed.

A district-wide campaign can reduce the extent and speed of reinfestation and is also more cost effective. Community baiting drives are usually organised by DAFWA in conjunction with local community groups.

The recommended density for Western Australia is 5 baits per 100 hectares and should be strategically placed where fox tracks are observed, along watercourse, tracks and fence-lines and near rock piles and posts (Figure 9.1). Individual baits should be laid at least 200 metres apart to reduce the likelihood of one fox finding and eating more than one bait.

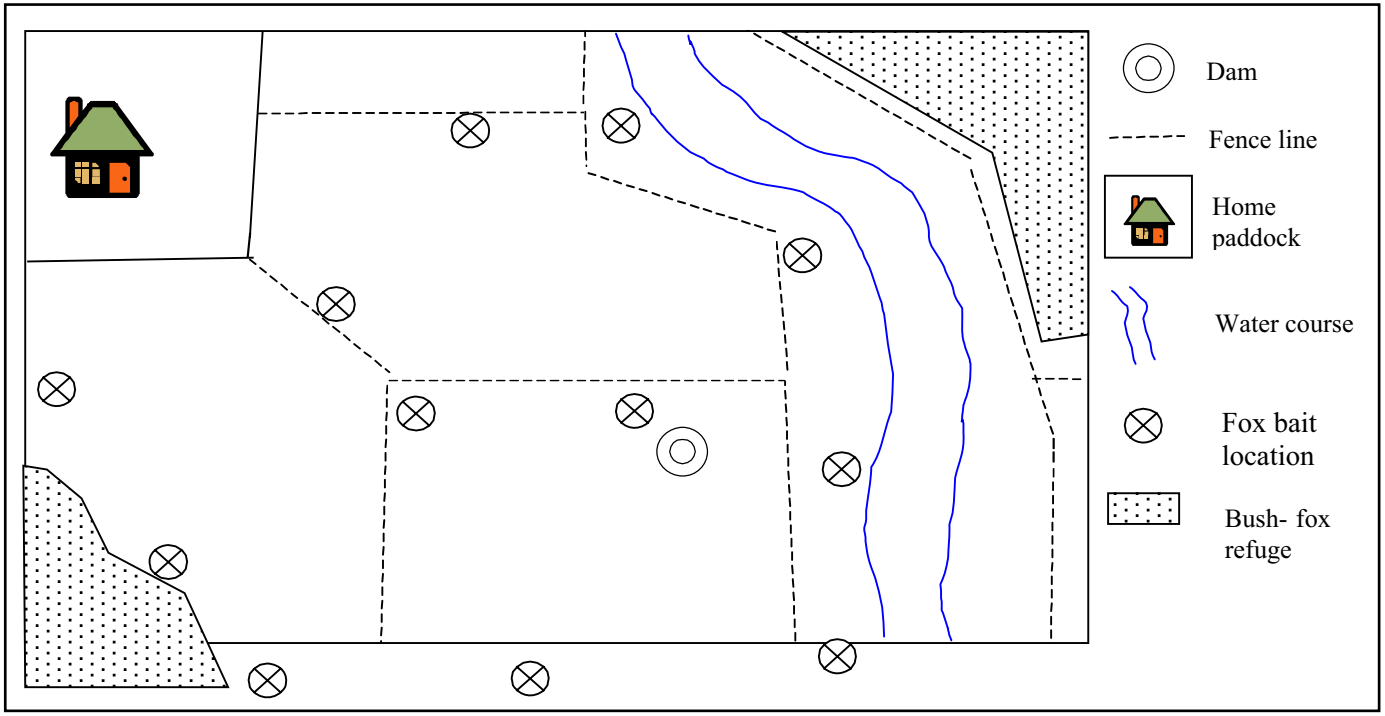


Figure 9.1. Appropriate locations for fox baits on a farm.

The location of all baits laid should be marked with tape, pegs or something similar so meat baits can be easily retrieved as required. Burying meat baits 10 to 20 mm below the soil surface to reduce the risk of poisoning non-target animals and attaching the bait to an anchored length of light wire will prevent them from carried away by birds. Egg baits should always be buried 20 to 100 mm below the soil surface to decrease hazards to non-target animals.

You can improve the likelihood of baits being taken by checking at least every two days to assess 'take' and replacing any missing baits. Keep replacing baits until no more are removed. Move uneaten baits to areas where others have been taken Bait potency normally lasts for 10 days in the open.

Foxes poisoned with 1080 are seldom located. This can give the false impression that you have been unsuccessful. If you lay and mark your baits correctly, a count of those taken can give you some indication of probable fox kills.

Further Information

Department of Agriculture and Food:

- Guide to the safe use of 1080 poison. Farmnote 32/2003.
- 1080 Summary Information. Misc. Publication. 11/2002.
- Fox Baiting Farmnote 61/2003

Available on the website at www.agric.wa.gov.au or contact our Head Office on 08 9368 3333.

9.2.3 RODENT MANAGEMENT

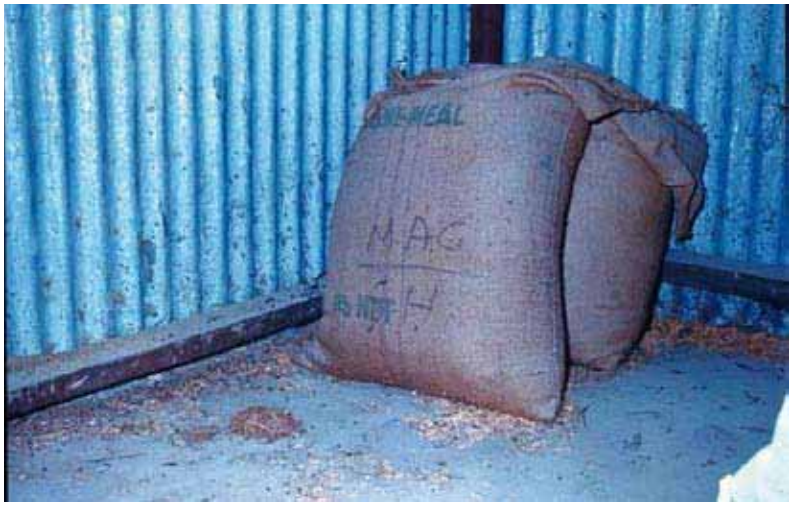
Rats and mice are two of the most widespread and destructive pests in the world. They feed on practically any food and their droppings and urine contaminate what they do not eat. They can spread diseases such as meningitis and food poisoning bacteria by contaminating food and utensils. Although rats and mice are not often obvious, they are almost always present in cities, towns and farming areas. They can cause damage in all seasons but the extent of damage and economic loss often goes unnoticed. We need to pay continuous attention to both rat and mice control.

Rodent droppings contaminate food as the rats move in and around stored food. Rats may also cause physical damage to material, food containers, packaging, wires and cables.

Droppings, gnawings and sounds of gnawing, scuffling and squeaking are often the first indications that rats and mice are present in buildings. Runs alongside walls and fences and under vegetation are signs to look for outdoors. If rats and mice are seen in the daytime you can be sure they are present in large numbers.

Implementing Good Practice

The first and most important action to take is to deny these pests food, water, shelter and places to breed. Hygiene and general tidiness are the most effective methods of keeping rat and mouse numbers down. Household rubbish, timber, long grass and weeds provide ideal harborage and nesting sites for rats and mice. Protect stored products by always keeping them in rodent-proof containers.



Options for rodent control

Trapping is recommended in and around recently constructed brick structures with concrete floors. The number of rodents is usually small making the use of poisons unnecessary. The best traps to use are of the spring back type. Traps should be set under cover at right angles to walls, with the trigger adjacent to the wall. Bait the traps with vegetable oil, peanut paste or pumpkin seeds.

Poisoning using an anticoagulant is an option when rodent infestations are large because of the type and purpose of the construction, such as farm sheds. Baits containing anticoagulants can be readily obtained from retail stores. Anticoagulant baits cause death by internal bleeding. Rats and mice die after eating treated food over a period of three to ten days. Anticoagulant baits are usually readily accepted by rats and mice, however, bait-shyness can develop. Alternating between first (Warfarin) and second (Bromadioline, Brodifacoum) generation anticoagulants can help to prevent bait-shyness developing. Strict adherence to the safety precautions on the labels of poison containers is essential when carrying out poisoning, especially with regard to accessibility of bait to children, domestic animals, pets and wildlife.

Bait and trap stations should be placed near burrows, harborage and areas where the rats and mice normally travel. They have a habit of running along the skirting boards and avoiding open spaces. Therefore place your baits and traps along side these, behind objects, in dark corners and under shelter.

One of the main causes of failure of rodent control programs is lack of hygiene and tidiness that provide rats and mice so much food they are not interested in the bait.

Rats are generally wary of new objects in their surroundings, so you will need to have the traps or bait stations in place for sufficient time that the rats become accustomed to them. Mice are the opposite, and are quite inquisitive of new objects.

Another reason for rodent control failure is you may have too few bait stations located too far apart. As mice and rats do not travel large distances, the distance between bait stations should be less than fours metres for mice and ten metres for rats.

Bait stations must be inspected and replenished regularly to ensure that sufficient bait is always available. Baiting must be continued until no more bait is taken. For safety reasons all baits should be placed under a protective cover. This will also provide shelter for rats and mice and encourage them to feed there.

Further Information

Caughley, J, M Bomford, B Parker, R Sinclair, J Griffiths and D Kelly. 1998. Managing Vertebrate Pests: Rodents Bureau of Rural Sciences.

L Twigg and G Martin. 2000. Rat and mouse control in and around buildings. Farm Note 114/2000: Department of Agriculture and Food Western Australia. Available online at www.agric.wa.gov.au

9.2.4 INSECT MANAGEMENT

Regular surveillance is the key to the management of most insect pests. The first step in managing pests is to establish what insects are present and why and if they are in large enough numbers to cause economic damage to pastures and crops. Pests are usually present but, in most instances, in numbers too low to cause economic damage or warrant control. Monitoring avoids unnecessary use of pesticides and allows informed decisions to be made based on actual pest numbers and damage levels, rather than guesswork. Monitoring involves counting insect numbers in a given area at several sites throughout the field.

Paddocks can be surveyed by close inspection of plants, the use of a sweep-net to collect any insects present and by removing the surface layer of soil for observation of subterranean species.

If large infestations of insects that pose a potential threat to a planned crop are found in summer or autumn up to a month prior to expected seeding date, the destruction of their habitat may be considered. However, summer populations may not carry over into the growing season if conditions deteriorate. If large infestations are found around the time of seeding, an insecticide treatment can be applied very economically along with herbicides.

Controlling summer weeds is likely to reduce numbers of insect pests such as webworm, lucerne flea, mites, slugs and beetle larvae.
Beneficial insects such as predators and parasites are important natural control agents and play a major role in reducing pest numbers. Only when natural control is absent or pest numbers grow beyond the capacity of natural agents, do other control measures become necessary. Beneficial insects are a vital part of integrated pest management and include beetles, bugs, ants, wasps, spiders, earwigs, flies, mantids, lacewings and damselflies.

Pest Species and their Control

Bluegreen aphids *(Acyrthosiphon kondoi)* are relatively large (up to 3 mm), matt blue-green, with a pair of slender tubes like exhaust pipes, projecting from the back to beyond the tip of the abdomen (Figure 9.2). Winged aphids fly into pastures and start colonies of wingless aphids that cause damage. Overcrowding or plant deterioration triggers the development of new winged aphids that migrate to establish new colonies. Winged aphids can spread viruses.

Like other aphids, all bluegreen aphids are females and can give birth to live young without having to mate. Reproduction rates are very high so numbers increase rapidly when conditions are favourable. Bluegreen aphids survive hot dry summers in low numbers on sheltered host plants, usually as winged aphids. Migration into germinating annual legumes or lucerne occurs in autumn, and large colonies can develop if it is warm and mild. Winter cold slows reproduction until spring, when populations grow rapidly on favourable plants. During heavy infestations, plants can be covered with white speckles that are cast-off aphid skins. The number of winged aphids flying between paddocks also increases throughout spring; these can be caught with “sticky” traps.

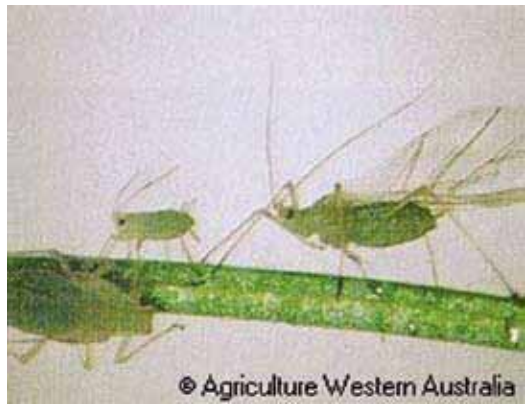


Figure 9.2 *Bluegreen aphids*

Annual medics, lucerne and subterranean clover are susceptible to bluegreen aphid where heavy infestations cause stunted growth, leaf curling and leaf drop. Dry matter production can be reduced. In subterranean clover, leaves wilt before turning grey-brown and dying, becoming dry and "crisp". Pastures take on a patchy-burnt appearance. Seed yield of annual species can be reduced by 20 - 80 per cent. The higher the legume content and the lighter the grazing pressure from flowering onwards, the greater the risk of aphid damage. Ungrazed swards with more than 50 per cent legume dominance are at greatest risk in spring. Bluegreen aphids favour growing tips of medic or lucerne, while in subterranean clover they are widely dispersed under the canopy.

The best way to control bluegreen aphids in lucerne is to sow resistant or tolerant cultivars. Parasitic wasps, ladybeetles, lacewings, hoverflies and fungus diseases can exert useful biological control. Aphid resistant annual medics and subterranean clover are not common, so insecticides may be needed in lightly or ungrazed spring pastures, if maximum seed-set and spring dry matter production is wanted. Redlegged earthmites can cause similar spring losses, and may also be present. If bluegreen aphids are the predominant pest, use insecticides that do not kill aphid parasites and predators; for mixed infestations, systemic chemicals that control aphids and mites should be used.

Spotted alfalfa aphids *(Therioaphis trifolii)* are yellow-green and about 1.5 mm long (Figure 9.3). It has rows of tiny black spots on its back, just visible to the naked eye. Winged and wingless forms occur. When disturbed, adult aphids jump in "showers" from plants. Forty or more aphids per stem or per seedling may be found.

All spotted alfalfa aphid are female and can reproduce without mating. Reproduction rates are high and numbers can increase very rapidly. In summer, aphids feed on lucerne and other summer green legumes. Winged aphids can migrate into autumn-germinated medics or subterranean clover.

Spotted alfalfa aphid damage occurs when warm to hot weather conditions have prevailed in spring, summer and autumn. Medics and subterranean clover are winter growing annuals, so spotted alfalfa aphid damage occurs in autumn in early germinated pasture, or in spring if growth extends through warm to hot weather and grazing pressure is light. In lucerne, leaves turn yellow, wilt and drop. Damage proceeds from the base of the plant upwards, until only stems remain standing. These become sticky with "honey-dew" exuded by the aphids then turn black as sooty mould grows on the honey-dew. Susceptible varieties such as Hunter River are severely affected. Hay cutting and baling can become very difficult due to the stickiness of the plants. Medic plants become stunted, yellow and sticky, eventually dying if aphid numbers become too great. Swards show yellowed and dead patches. In subterranean clover, seedlings and young plants become stunted. The outer leaves turn mottled and reddish-grey, while the younger inner leaves become pale and yellowed. Plants can die and those that survive are slow to recover and are unthrifty well into winter. Spring infestations have not yet been observed.

Figure 9.3 *Spotted alfalfa aphid on subterranean clover*

Biological control by wasps, lady beetles, lacewings, hoverflies and planting of aphid-tolerant species have kept spotted alfalfa aphid numbers very low. Systemic insecticides are effective and biologically "soft" aphicides that do not kill beneficial insects are preferred. Resistant lucerne varieties are readily available and most annual medics are tolerant.

African black beetles *(Heteronychus arator)* are shiny black and cylindrical (not flattened), up to 12 mm long (Figure 9.4). Infants are brown, darkening to black as they mature. Occasionally, large numbers fly into paddocks, but usually they walk slowly over the soil surface. Larvae live in the soil and are typical white "curl grubs", up to 25 mm long, with a brown head and three pairs of legs. The rear is swollen, baggy and blue-grey due to food and soil they have eaten.

Adults become active and feed over spring and summer. As egg laying occurs at this time, adults and young larvae can be found together. Larvae feed till early autumn, and then change into pupae in earthen cells. They emerge as adults and feed until cold winter weather prompts them to burrow down and be dormant till spring.

African black beetle adults and larvae feed on many non-legume crops and plants. Grasses with runners, such as kikuyu and couch, and tufted perennial grasses, such as perennial rye and paspalum may be damaged. Adult beetles chew stems just below ground level, leaving frayed edges. Plants or tillers may fall over. Small larvae feed on decaying organic matter, changing to root feeding as they mature. Brown or dead patches result and the grass is easily pulled out. African black beetles are a major pest of annual ryegrass, particularly in lower South West pastures. They also damage tree seedlings.

Insecticidal control is difficult and expensive since the banning of persistent chlorinated hydrocarbon insecticides. Rotations of pure legume crop or pastures may reduce numbers, but these are usually not feasible.

Figure 9.4. *African black beetle*

Rutherglen bug *(Nysius vinitor)*. Adult bugs are 3 - 4 mm long and narrow bodied (Figure 9.5). They are greyish brown with darker markings and have prominent black eyes. The wings are folded flat when the bug is at rest. Immature bugs are dark red and more swollen in shape than are adults.

Rutherglen bugs are sap suckers and damage to susceptible plants is similar to that caused by aphids. As the bugs can readily re-invade a sprayed area, insecticide application will not guarantee a clean sample.

Figure 9.5 *Rutherglen bug*

Redlegged earth mite *(Halotydeus destructor)*. Adult mites are about the size of a pinhead (up to 1 mm). They have velvety black bodies and eight bright orange-red legs (Figure 9.6). The mites are often found clumped together in large numbers but disperse quickly when disturbed.

Mites hatch in autumn when adequate moisture and low temperatures occur. Eggs produced through the season are thin-walled and hatch immediately. Several generations may develop over winter and spring. As pastures begin to reach maturity, the mites produce thick-walled eggs that resist drying over summer and carry the mite through to the next season.

Large numbers of redlegged earth mite are commonly found in annual pastures at the break of the season and may cause heavy loss of subterranean clover and annual medic seedlings but normally do not affect grasses severely. These species are susceptible throughout the growing season, and dry matter can drop 10 - 80 per cent in spring. The greater the legume-content of pastures and the lighter the grazing pressure, the higher the risk of loss from mites. Mites rupture cells on the surface of leaves and feed on exuding sap. Affected leaves look silvered, but do not have holes as with lucerne flea attack. Mite damage to seedlings is more severe if plant growth is slowed as a result cold weather or waterlogging, low seedling density after a false break or if pastures are being reseeded. Capeweed increases the reproductive potential of redlegged earth mites and legumes in paddocks with a lot of capeweed may be severely damaged, especially where mites can attack smaller clover and medic seedlings from the shelter of large capeweed plants.

Figure 9.6 *Redlegged earth mite*

Treating seeds with a systemic insecticide before sowing pastures can protect seedlings from attack. Post-emergent sprays are also effective. Use systemic chemicals if more than 60 per cent of plants have emerged. If few plants have come up and cotyledons are damaged as they emerge it is more effective to use a contact insecticide. Mite control in dense spring pastures may require higher rates of insecticide than are effective on seedlings in autumn. Hard spring grazing reduces damage. Biological control can be achieved using the anystis mite (Figure 9.7).

Lucerne Flea *(Sminthurus viridis)*, usually spring from the plants when approached, using a special organ situated underneath the body. The lucerne flea is a dumpy looking and wingless creature of varied colour, but the larger specimens of 2 - 4 mm are predominantly green or yellow (Figure 9.8).

The first soaking autumn rains usually cause the special over-summering egg batches of lucerne flea to hatch. Several generations may then develop over the growing period depending on the weather. Eggs are laid in the soil and usually hatch in a few days. With the onset of warm and dry conditions in spring, the resting stage eggs, which are able to withstand summer conditions, are laid.

Pastures and legume crops may be seriously retarded by the lucerne flea and seedling death may occur in heavy infestations. Frequently, the green leaf tissues are eaten, leaving a surface of the leaf as a whitish film. Severely affected areas appear, from a distance, to be bleached.

The lucerne flea prefers heavy soils and cannot live in very sandy situations. It is also dependent on plentiful moisture. Control in pastures may be obtained with systemic or contact insecticides, similar to the redlegged earth mite.

Two predatory mites, the bdellodes mite and neomolgus mite exert effective levels of control.

Further Information

Michael. P and M Grimm. 1996. Insect activity and control in no tillage farming. Farmnote 93/96. Available online at www.agric.wa.gov.au

PestWeb site accessible via www.agric.wa.gov.au

Timerite Program accessible via www.timerite.com.au

Figure 9.7 *Redlegged earth mites with predatory anystis mite*

Figure 9.8 *Lucerne flea*

9.2.5 INFECTIOUS DISEASE MANAGEMENT

Compared to other agricultural areas of the world, Western Australia is free of many pests and diseases that cause major production and market losses. This is because of our geographical isolation and stringent quarantine policies. More information on specific animal diseases can be accessed via the DAFWA website or by contacting you local DAFWA office.

Dairy cattle differ from other types of livestock production systems in having management factors that increase the risk of exposure to various infectious diseases. These predisposing factors include:

- frequent contact between individuals within the herd
- close confinement during milking and yarding
- moist conditions
- early weaning and
- intensive feeding.

Vaccination of dairy cattle is important in preventing the spread of numerous infectious diseases. These include:

- leptospirosis (transmissible to humans)
- clostridial diseases (tetanus, malignant oedema, blackleg, enterotoxaemia and black disease)
- botulism
- bovine ephemeral fever (three day sickness)
- vibriosis (bovine genital campylobacteriosis)
- colibacillosis (white calf scours) and
- Q fever (transmissible to humans).

The cost of vaccination programs are far less than the serious production losses, economic costs and deaths that would result from any one disease outbreak.

As a dairy farmer you are required to notify your nearest Government Veterinary Officer or Stock Inspector if you suspect or have confirmed the occurrence of certain diseases in your herd (Table 9.2).

24 HOUR DISEASE REPORTING

After hours (Emergency Mobile) - 041 791 0082;

National toll-free number 1800 675 888

DURING NORMAL OFFICE HOURS CONTACT

DAFWA Animal Health Laboratories

Perth: 08 9368 3351; Albany: 0898 92 8444

These diseases have been categorized as follows:

Catergory 1: Diseases foreign to Australia. Mandatory notification of presence or suspicion of disease. Mandatory quarantine on confirmation of presence of disease. Discretionary quarantine on suspicion of disease.

Category 2: Diseases not foreign to Australia. Mandatory notification of presence or suspicion of disease. Mandatory quarantine on confirmation of presence of disease. Discretionary quarantine on suspicion of disease.

Category 3: For areas outside the Cattle Tick Infected Area (Kimberley). Mandatory notification of presence or suspicion of disease. Mandatory quarantine on confirmation of presence of disease. Discretionary quarantine on suspicion of disease.

Category 4: Diseases not foreign to Australia. Mandatory notification of presence of disease. Discretionary quarantine on confirmation of presence of disease.

Table 9.2 Notifiable animal disease according category classification.

Category	Disease
1	Bovine brucellosis (B. abortus)
1	Bovine spongiform encephalopathy
1	Contagious bovine pleuropneumonia
1	East Coast fever (Theileriosis)
1	Haemorrhagic septicaemia
1	Jembrana disease
1	Lumpy skin disease
1	Malignant catarrhal fever (wildebeest associated)
1	Rinderpest
2	Bovine tuberculosis
3	Bovine anaplasmosis
3	Bovine babesiosis
3	Cattle tick infestation
4	Enzootic bovine leucosis

The spread of infectious diseases through dairy effluent

Dairy effluent contains many bacteria, viruses and parasite eggs and cysts. Although urine, uterine discharges, milk and saliva find their way into the effluent, by far the greatest volume of material is faecal in origin. Of the infectious microbes present, probably only those of faecal origin are capable of surviving for any length of time in dairy effluent, so that most mastitis-causing bacteria and all leptospires, for example, can be discounted as potential problems.

Most of the microbes from cow dung are quite harmless, but a few (for example Salmonella sp, Yersinia sp, Mycobacterium paratuberculosis - the cause of Johne's disease, worm eggs, coccidial and Cryptosporidium cysts and rotavirus) are potentially dangerous to cattle and can survive for long periods in moist shaded environments.

However, because cattle are constantly exposed to dung they have a high inherent resistance to infection by the microbes found in dung and adults generally have some immunity. If effluent is spread on the farm of origin, it is probably safe to assume that there will be nothing in it that the adult cattle on the farm haven't already been exposed to.

Calves and yearlings are much more susceptible to infection as they have not had time to develop their immune systems. This is the reason why vets recommend that young cattle be kept separate from adult cattle and it is strongly suggested that this also be applied with respect to exposure to dairy effluent or paddocks where it has been spread within the past year. Johne's Disease is a particular threat and although WA is still considered free of this disease, many scientists believe it is just a matter of time before our first case is reported. Therefore you should never assume that this disease is not present. Not exposing calves and young cattle to dairy effluent may require forward planning and consideration as to future stock management.

Dairy effluent can be either sprayed direct to pasture or transferred to a pond system for storage and later spreading. The breaking up of dung-pats dropped in the yard and dilution with water will help to minimise the risk of disease. Pond-storage will also reduce the risk of infection as it results in the gradual death of any microbes excreted by the cows.

Besides grazing calves and yearlings well away from all dairy effluent disposal areas, a number of other actions will help to minimise the risk of cross-infection from re-using effluent. Storing effluent for extended periods will help to kill dangerous bacteria and viruses. Diluting effluent with a large volume of water will also minimise the number of harmful micro-organisms applied to an area.

Grazing pastures low before the application of effluent will ensure that they will not need to be grazed for several weeks, maximising the chances of rain washing microbes off the grass and ensuring that sunlight can penetrate to the soil surface. Spreading effluent in hot dry weather so that drying and the ultra-violet radiation in sunlight also combine to reduce the numbers of microbes will also be useful. If millet, sorghum or maize crops can be irrigated with effluent, this will also minimise the risk of disease problems. Not grazing a crop or pasture for at least seven days after effluent was last spread is recommended.

Young stock should be kept away from the main herd so they can build up their immunity before being placed in with the rest of the main herd

Dairy shed effluent should not be a threat to human heath so long as the usual hygiene measures are taken when working with the material. These include not smoking, eating or drinking while working and washing hands and clothing at the completion of the task. As aerosols can be generated by manure sprinklers and travelling irrigators, avoid areas where effluent material is likely to settle on the skin or be breathed in.

As effluent, and particularly fresh effluent, is rich in nitrogen compounds it may also be worth keeping in mind that nitrate poisoning could be a problem in heavily fertilised pastures and crops. Equipment used to handle dairy effluent should be thoroughly cleaned before it is used on another farm to ensure that microbes are not spread from farm to farm.

Diseases of young dairy calves

All calves are exposed to a variety of micro-organisms such as viruses, bacteria and protozoa as soon as they are born. These micro-organisms are part of the environment in which cattle live and calves have to develop immunity to them.

Keeping calves healthy requires good calf management which includes selecting robust calves to rear, ensuring the calves have received adequate colostrum within 6 to 8 hours of birth, having access to shelter and ensuring the calves receive appropriate feeding.

The two major types of problems seen in calves are:

1. Gut problems leading to scouring
2. Pneumonia

These two problems account for over 80% of all losses in calves, with scouring being the most common. Bloat, navel-ill, accidents and poisoning make up most of the rest.

Gut problems (scouring)

These can be divided into four major causes:

1. E. coli (white scours)
2. Salmonella
3. Rotavirus
4. Cryptosporidia

All these can occur separately or together. The visible signs you will probably see are scouring, a dry coat, dull and listless and, in many cases, dies in a short time.

Scouring is the result of changed gut function; that is, the germ makes the gut stop digesting, which increases the amount of manure and fluids the calf passes. Calves on a milk diet normally pass only a small amount of droppings. If the gut is affected, the amount passed can increase markedly. For example, the amount of water passed in a scouring calf can be 20 times normal. This extra water is mixed with salts and other food, so the calf is losing more than it can eat.

The loss of water and salts leads to dehydration. This causes shock and death. In other words, the germ that started the scour is usually not the direct cause of death. It is the shock caused by the loss of body water and salts that is the actual cause of death.

E. coli or white scours. The germ produces a poison that makes more fluid pass out than normal. This causes the shock mentioned above. On post-mortem, a calf that died from E. coli scours will often show no visible signs of having an infection.

Salmonella. These cause marked reddening of the gut wall from tissue damage so that water and food cannot be absorbed. Salmonella can readily invade the rest of the body, causing blood poisoning and rapid death.

Rotavirus and Cryptosporidia. These agents damage part of the gut so that food is not used. This particularly applies to milk, which then goes sour in the gut. The germs normally present in the gut multiply rapidly in this sour milk, producing poisons and so the gut works more rapidly to remove them hence the scouring. Water and food are also lost.

Prevention of scours

- The most important means of prevention is to provide adequate colostrum in the first few hours after birth. It is only in the first few hours or so after birth that a calf can absorb the antibodies from the colostrum it drinks to give it immunity against any infections present in the herd. A calf needs to consume about two litres of colostrum. Heifers that do not mix with the herd may not have enough antibodies in their milk to provide suitable protection to their calves. To overcome this, and problems with sick cows or cows dying at calving, a store of frozen colostrum should be kept.
- Provide adequate housing or shelter from the weather to reduce stress. Stress is important in allowing scours to develop.
- Maintain a suitable management and feeding system. Overfeeding and sudden changes of diet can cause further stress.

Colostrum is more potent than any man-made drug

Treatment of scours

The most important thing to do is to replace the lost body water and salts. This is done by providing an electrolyte solution and the earlier this is done, the better the response.

A treatment program could be:

1. Replace all the milk with electrolyte
2. Use antibiotic if necessary (on veterinary advice)
3. Gradually replace electrolyte with milk over several days

If calves are severely affected and will not drink, it will be necessary to call your veterinary practitioner to treat the calves with intravenous fluids. Force feeding can result in pneumonia, because very sick calves cannot swallow properly. Make sure affected calves are warm and dry. Exposure to the bad weather when sick will only make things worse.

Pneumonia

Pneumonia is an infection of the lungs and has many causes. Lung worms can play an important role. A calf that survives pneumonia takes a long time to recover. This usually means stunted growth and poor production as an adult. Prevention is most important and this is by having suitable housing with adequate ventilation. Stress caused by exposure to cold, wet conditions, overcrowding and inadequate feeding can cause pneumonia.

Treatment depends on the cause of the infection. If you suspect pneumonia contact your veterinarian for a diagnosis and appropriate treatment program.

Other causes of deaths

There are many other causes of losses in calves but they tend to be isolated. Sometimes these losses may be severe on individual farms and immediate help should be sought in identifying the cause.

Things like plant poisoning, lead poisoning, leptospirosis and incidental infections may occur because calves are curious and will lick or taste any object lying around. Make sure that nothing is with their reach that will cause them injury or illness.

Further Information

Turner, L and J Stephens. 2003. Vaccinating dairy cattle against disease; Economic considerations. Department of Primary Industries and Fisheries. Queensland http://www2.dpi.qld.gov.au/dairy/13252.html

Maffra, K. 1997. Dairy Effluent; Infectious diseases and animal health. Department of Primary Industries, Victoria. http://www.dpi.vic.gov.au

George, M. 1994. Diseases of young dairy calves. Department of Primary Industries, Victoria. http://www.dpi.vic.gov.au

Department of Agriculture and Food. 2005. Notifiable Stock Diseases. Available online at www.agric.wa.gov.au