



Making More From Sheep

MODULE 12

Efficient Pastoral Production



A joint initiative of Australian Wool Innovation and Meat & Livestock Australia

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Efficient Pastoral Production

What does this module do for you?

Efficient Pastoral Production is designed to help pastoral sheep producers increase the productivity and profitability of their enterprise, as well as contribute to the personal satisfaction of operating a successful pastoral business.

This pastoral-specific module has been developed within the context of Australia's pastoral zones, taking into consideration issues and management perspectives pertinent to these areas.

Through this module, pastoral sheep producers can expect to find information on:

- The key issues that impact on pastoral sheep business profitability, natural resources and controlling risk
- Key decisions, important procedures and critical actions that could be implemented to achieve a more profitable and sustainable sheep and wool enterprise in the Australian pastoral zone.

This material will help you to:

- Increase your capacity to improve your business and achieve your personal and business goals
- Challenge yourself to achieve targets that you set for yourself
- Invest time in exploring innovation that you could apply to your business and property
- Identify the need to invest in yourself – you are a key to the success of your business, and recognising that you need to be exploring 'better' or 'easier' or more efficient ways to do things will help you realise the success you strive for.



INTRODUCTION

Efficient Pastoral Production

This module contains seven procedures. Each procedure contains critical 'must do' activities, tools to assist you in managing the issues identified in the module, and signposts which direct you to further information and assistance on the particular topic.

The seven procedures in this module are:

- Know your property
- Establish a vision and plan for success
- Efficient pastoral production
- Determine a grazing management approach
- Match grazing pressure to feed supply
- Manage feral animals
- Obtain best production from rainfall received.

How was the module developed?

This manual, jointly developed by Australian Wool Innovation (AWI) and Meat & Livestock Australia (MLA), brings together all the relevant information for running successful wool and sheepmeat enterprises in the pastoral areas of Australia.

The material was devised by a team of technical experts and sheep producers regarded as industry leaders. The team identified the critical procedures for each component of a sheep business and the tools needed to make a start on changing enterprise practices.

The manual was road tested by sheep producers from all pastoral areas of Australia, as well as public and private service providers who operate businesses in the pastoral areas of Australia.

Importantly, due to the vast nature of the pastoral zone, not all information signposted may be entirely pertinent to all pastoral areas in Australia.

The pastoral zone

The pastoral area extends across low rainfall areas, including semi-arid, and arid, and also some seasonally high rainfall zones. The pastoral zone is generally defined as an area in which native pastures and shrubs are grazed by introduced domestic herbivores (sheep, cattle, goats), feral herbivores (goats, donkeys, horses, camels, rabbits) and large native herbivores (kangaroos).

As is the case for all agricultural enterprises, pastoral grazing enterprises have a range of management requirements. With the ultimate aim of maintaining a productive and financially viable grazing enterprise, a successful pastoral grazing manager must achieve a balance between a number of different elements:

- Maintaining productive pastures
- Matching grazing pressure to the available feed
- Maintaining biodiversity
- Managing weeds and pest animals
- Balancing livestock needs with available feed
- Managing and maintaining fences, water and other property infrastructure
- Monitoring the business and production system
- Managing seasonal variability
- Meeting administrative and legislative requirements
- Planning and undertaking development on the property.

These tasks are made more challenging due to the large land areas managed and the distances that need to be covered to undertake an effective management program.

Procedure 12.1

Know your property



Background information



Pastoral production relies on a high level of organisational efficiency and planning, to optimise the productive output from each hour invested in managing the business. It also requires an ability to think both strategically and tactically, as well as the ability to respond in both strategic and tactical ways.

This procedure introduces the principles and processes of compiling an inventory of your property's attributes, which will allow you to strategically analyse these attributes, and determine the strong and weak points which may impact upon your business. It also allows you to undertake a more formal process of documenting the inventory, which you can use in the more tactical areas of business planning.

This inventory may assist newer/younger business partners or employees in understanding the property's attributes.

Hint: Before you embark on the process, take some time to think about the difference between strategic and tactical decisions, and the way you might approach each.

Strategic is the long term stuff, future plans and goals, and tactical is the here and now, in response to what's happening on the ground now, such as weather, markets, etc.

Key decisions, critical actions and benchmarks

At its most basic level, the aims of your business will include utilising your natural and man-made resources, livestock, labour skills, and management, and turning these into profit. How you put this combination together to do this is critical. Taking note of the property's natural features, and infrastructure is one part of developing a vision for the property. This process should include discussion and assessment of all aspects of the property and will contribute to the process of developing action plans for the improvement of infrastructure, land condition and other land management aspects.

There are three must-dos in procedure 12.1:

- Develop a property inventory
- Develop a property plan
- Perform an audit on your water resources.

Develop a property inventory

A property inventory is a stock take of what's there for you to make use of, to undertake your business. Importantly, this process will allow you to identify any critical items which are not there, which will enhance your business activities and lead to higher production.

This inventory should ideally be updated on an annual basis. This can assist with creating development plans for the property.

AT A GLANCE



- Develop an inventory of your property's natural and built assets, including water resources
- Prepare a property management plan
- Review and update your plans regularly to reflect changes

Consider both natural features and assets, as well as man-made assets and features, such as plant and equipment. You can also include livestock in this inventory, however it is recommended to undertake a livestock management plan as a separate exercise. Use tool 12.1: *Prepare a property inventory* to draw up a comprehensive list of features of your property.

Develop a property plan

An important step in the process of creating a dynamic plan of action for your property and its natural resources is the development of a property plan. Ideally, such a plan is created with the input of all members of the business, and employees.

A property plan is most accurate when developed utilising satellite or aerial imagery. These images can be purchased from government departments that specialise in map products; they may be Google Earth® images; or photos taken

from an aircraft. These images can be enlarged and laminated, or overlaid with sheets of plastic. Software packages are also available, and these utilise a digitised aerial photo. These tools enable you to insert details of different attributes of the property as identified in the property inventory. Include things like land classes, rivers and drainage lines, water points, plantations, remnant vegetation and pasture types as well as overlays for staged planned improvements to infrastructure and land use.

Contact your local or state based natural resource management (NRM) organisation for details on local programs, and opportunities to undertake planning processes appropriate to your region. Tool 12.2 **Prepare a property plan** provides information on getting started in the process of developing a property management plan.

Signposts



Read

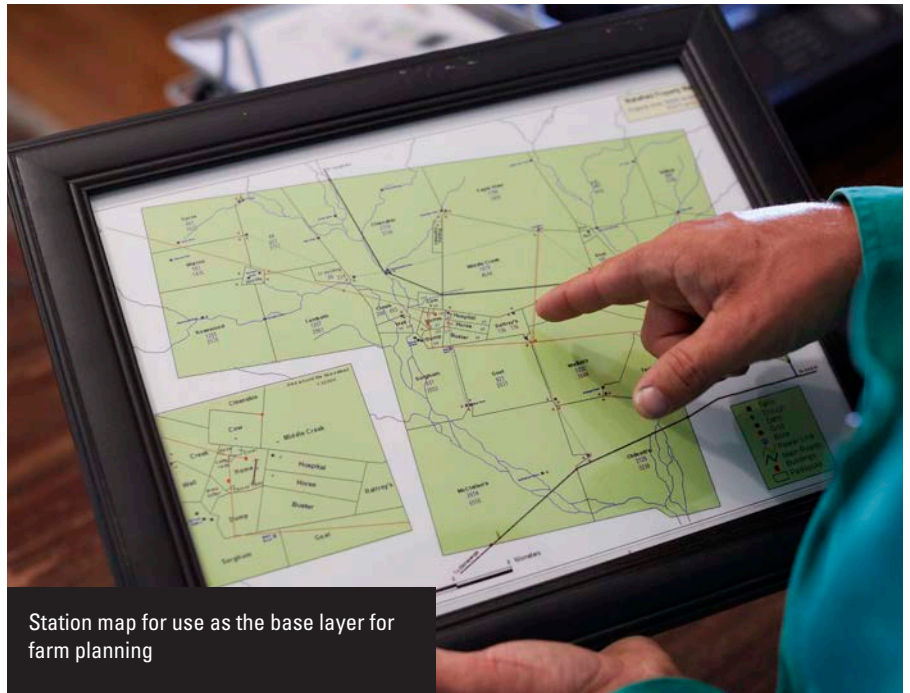
Hacker R, Beange L, Casburn G, Curran G, Gray P and Warner J (2005) **Best management practices for extensive grazing enterprises**, Agdex 320/16, NSW DPI. <http://www.dpi.nsw.gov.au/agriculture/pastures/pastures-and-rangelands/rangelands/publications/best-mgt-ext-graz>

This publication describes, in broad terms, those arid and semi-arid areas of New South Wales commonly referred to as rangelands and the management principles that underlie the sustainable utilisation of these areas by extensive grazing industries.

MLA has a series of **Tips and Tools** available at MLA website: <http://www.mla.com.au/News-and-events/Publications>

Grazing land management – sustainable and productive natural resource management. (May 2006) Meat & Livestock Australia ISBN 1 74036 9343

AgGuide – Property planning. Learn how to plan your farm layout so you can manage soil types and land capabilities to achieve sustainable production. Plan nature conservation measures to



Station map for use as the base layer for farm planning

improve biodiversity and farm viability. **Property planning** takes a simple, step-by-step approach.

→ You can purchase this book online at: <http://www.dpi.nsw.gov.au/aboutus/resources/bookshop/property-planning-book>

View

Look up different sources of maps which will be useful for your planning processes.

Look up on the internet **Property Management Planning**, or **Property Planning**, to find locally relevant resources and service providers to your business and area.

Grazing Land Management (GLM) at www.mla.com.au/

Total College website, for information on the online **Property management planning course**: <http://www.dpi.nsw.gov.au/agriculture/profarm/courses/develop-a-whole-farm-plan>

Visit

Your local NRM organisation, about what products, incentives and services exist in your local area to assist with planning processes.

Local agribusiness consultants about how they may guide you through the process of a **whole farm plan**.

Further readings

Land, Water and Wool (2006) **The ABCD pasture condition guide – Mulga and Mitchell grass** Queensland Government

Hacker RB, Alemseged Y, Carberry PM, Browne RH and Smith WJ (2006) **Betting on rain – Managing seasonal risk in Western NSW**, NSW DPI

Land, Water and Wool (2005) **Informing decisions of pastoral woolgrowers for country and profit**, AWI

Land, Water and Wool (2006) **The ABCD land condition guide**, QDPIF

Smyth A, James C and Whiteman G (2003) **Biodiversity monitoring in the rangelands – A way forward, Volume 1**, Centre for Arid Zone Research, CSIRO Sustainable Ecosystems

Pasture degradation and recovery in Australia's rangelands (2004) Department of Natural Resources, Mines and Energy, Queensland ISBN: 1 92092 0552

Perform an audit on your water resources

Farm water comes from a number of different sources. These may be natural sources such as rivers, creeks and channels, or they may be constructed in the form of dams, ground tanks, wells or bores. Whatever the sources, the suitability of water you have now and the water you need for the future depends on its quantity, quality and reliability. In the process of knowing your property, and developing a fully operational property plan, it is important to define and understand the water resources on the property in terms of both *quality* and *quantity*. Water quality can vary considerably across properties and can have a significant effect on many elements of pastoral sheep production, including wool, reproductive performance and meat production. Your water audit is an important element of your property plan.

You need to consider the following with regard to your water resources:

- Source (groundwater, rain fed)
- Quantity
- Quality
- Water requirements – daily and maximum
- Location and proximity to other sources

Whatever the sources, the suitability of water you have now and the water you need for the future depends on its quantity, quality and reliability

- Costs (time and labour) associated with providing it to stock
- Impacts of non-domestic animals on watering points
- Condition of source and its associated infrastructure, and delivery mechanisms
- Reliability and amount of ongoing monitoring required
- Risk assessment – consider the likelihood and consequence of various risks such as equipment failure, or blue green algal bloom.

Use tool 12.3 to undertake a water audit on your property.

Signposts



Read

James C and Bubb A (2008) **WaterSmart Pastoralism™ Handbook: A practical guide to stock water management in desert Australia**, Desert Knowledge CRC, Alice Springs

Meaker G, Leech F and Rogers M (2007) **Stock water – a limited resource**, Primefact 269, NSW DPI

This publication is a concise publication which outlines a detailed process for performing a water audit on your property. This Primefact contains information on how to assess your water resources:

- Water stocktake: quantity
- What size are your existing dams?
- Water stocktake: quality
- Water stocktake: reliability – meeting the water demand
- Water salinity
- Algal identification (including blue-green algae)

It is available at the following web address: <http://www.dpi.nsw.gov.au/agriculture/emergency/drought/managing/stock-pasture/water/stockwater-limited-resource>

Laffan J (2012) **AgGuide – Farm Water**, NSW DPI. ISBN 978 1 74256 2612.

This book is for anyone who wants the best from their water supplies in a rural area. It gives an introduction to the technical problems involved in domestic and livestock water supplies, but is written for the non-engineer.



Procedure 12.2

Establish a vision



Background information



Successful businesses navigate through their challenges because they plan for success. Effective planning delivers the following benefits:

- Concentrates effort and investment on the important things – the importance of something is determined by its relevance to your objectives and its ability to deliver on those objectives.
- Avoids investment on distractions – distractions are a cost to the business and only a disciplined approach to identifying them will prevent this waste.
- Job satisfaction – through clear progress towards your goals and objectives, and confidence in your ability to adjust to new challenges.
- Avoids losses from the real risks to your business – adverse circumstances cannot be avoided but, if you are prepared, they can be managed to minimise their impact on your business
- Avoids lost opportunities as a result of perceived risks – aversion to risk, or overestimation of individual risks, can lead to inertia, which, in turn, leads to missed opportunities.

Introduction

Business planning is a challenging process for enterprises facing a high degree of operational variability. This challenge often results in the overlooking of important business planning processes that underpin what you do, why you do it and other important facets that shape your business.

This procedure outlines the importance of establishing a shared vision. It covers steps and tools to help make this process simple, workable, and most of all a reflection of where the business is heading. *Module 1 Plan for Success* also contains five procedures and 12 tools that can help you navigate through this process.

Module 4 Capable and Confident Producers also provides information about managing the people that work in your business.

Key decisions, critical actions and benchmarks

Before starting the business planning process, it is important to recognise the long term nature of these activities. Depending on your age and plans for the future, it is possible the next generation will see more of the benefits than you do.

Be mindful that these plans are not set in stone – they are dynamic plans, and are constantly changing to reflect the visions of those who are making them. Process is equally important as the plan itself.

AT A GLANCE



- Devise a list of core values that your business and those operating it have.
- What is your vision for your business?

Strategic planning will help you take a long-term view of your activities on the property. Use it to also account for the personal aspirations family members may have for the property in the future.

Once you have developed a ‘shared vision’, move to creating an operational or business plan to determine how the resources (people, time, skills, money) will be assembled to allow you to turn it into reality. In some cases, having an external set of ‘eyes and ears’ provided by a consultant or advisor can also assist in this process.

Getting the strategic planning right with your team will save you effort and time when developing the ‘how to’ part in the next step.

Developing a Vision Statement

The business planning process starts with creating a vision for your business. Your business vision statement is a statement which describes its aspirational goals, its values and what the business stands for.

The purpose of a vision statement is best described by three main points:

- It provides direction – focuses everyone’s attention on the future of the business and determines the path the business will take to get there.
- Determines decisions – the vision influences decisions by providing the underpinning aspirations of what the business aims to do.
- Motivates people – a clear vision excites and helps spring people into action.

To give you a couple of examples:

The vision of MLA is:

Respected provider of marketing and research and development services to the Australian cattle, sheep and goat industries.

AWT’s vision is for it to be:

...a significant contributor to a vibrant, stable and profitable wool industry providing the world with the best natural fibre.

The mission statement generally focuses on a target, which then breaks into usually six core values which form the foundation of strategies of the business.

Signposts

Read

There are a number of tools in the *MMFS Module 1 Plan for Success* that can assist in the vision and planning process.

State agricultural department **business management planning** publications.

Contact

Your local business advisor, who will ably assist you with the **business planning process**.

View

There are many web based tools available that will help you write a **vision statement** for your business. Conduct a web search to find these.

Once you have developed a ‘shared vision’, move to creating an operational or business plan to determine how the resources (people, time, skills, money) will be assembled to allow you to turn it into reality.



Procedure 12.3

Efficient pastoral production



Background information



With modern business constraints at play, agricultural businesses are continually being pressured to improve the efficiency of their operation. Pastoral businesses are particularly given to a need to devise efficient ways of performing management operations.

“Just as energy is the basis of life itself, and ideas the source of innovation, so is innovation the vital spark of all human change, improvement and progress.”

Ted Levitt 1925-2006.

Key decisions, critical actions and benchmarks

Pastoral properties are generally large in size and long distances are regularly travelled to achieve effective property and livestock management. Such operations are often characterised by limited labour resources. Routine activities, such as water runs, can add significant time and fuel costs to the pastoral operation. Labour-hungry activities, such as mustering for shearing and crutching, are also substantial contributors to enterprise costs.

There are a number of approaches that have evolved, or been developed to aid in improving the efficiency of day-to-day operations. Some of these are unique to a particular operation, or type of operation, however many have been adopted throughout the entire pastoral industry. These approaches include the use of equipment, technology, infrastructure, labour, and management options that contribute to more efficient and effective livestock management and performance.

There are four ‘must-do’ procedures, which form a process for allowing you to make way for efficiencies in your operation:

- Assess current production and handling systems
- Review innovation across the industry
- Determine where greatest opportunities are to benefit from innovation and efficiencies

AT A GLANCE



- Benchmark your business against others of similar nature – know key benchmarks and set goals to achieve these if you are not yet achieving them
- Evaluate where labour savings can be made in your operation to improve efficiency

- Decide on ways to incorporate efficiency and innovation into the system.

There are always emerging ways to do things in a more efficient way, it is up to you to seek them out, evaluate their relevance, cost effectiveness, and fit within your business.

Assess current production and handling systems

Do you know what industry best practice is? What are the benchmarks for production systems in your area? How are the more successful producers achieving their levels of success? Are there ideas you can adapt to your operation?

These are some questions you can ask yourself when considering your production system and how it is performing:

- Could you be targeting a different market for your young stock, which may enable higher numbers of breeders?
- Could you introduce another enterprise which might increase enterprise flexibility – whereby you can exit it once seasonal trigger points are reached?
- Are there smarter ways of doing certain things in your operation?

Some common benchmarking examples:

- Gross income per DSE
- DSE managed per labour unit
- Gross income per labour unit
- Return on investment %
- \$ income from wool (\$/head)
- \$ income from meat (\$/head)
- \$ income from surplus sheep sales
- Split of wool:meat ratio.

Management calendar

How does your management calendar look?

Do you have a management calendar?

A management calendar is a dynamic resource, which outlines key management dates, timings and things which are for the most part key operations for the business. They are usually marked on a calendar, wall planner or a planning tool on a computer.

Management calendars document key operations, as well as personnel required to perform these operations, and provide the opportunity to easily see where

any opportunities for undertaking improvement activities when they fit into the program.

Take the time to regularly review your management calendar, irrespective of how many people are involved with the running of the business. Check it for areas of overlap that exist, which may place stress on your labour units, or other key deadlines, such as administrative deadlines.

Do this in a formal way – use tool 12.5 to formalise the process and include all members of the business in the process as they may see stress points that you may not.

Sheep productivity

Have you ever wondered about the following:

- How well do your sheep stack up by industry standards?
- Are they well suited to your environment, management style, and markets that exist in your area?
- Are they a profitable flock in the majority of years?
- Could they improve with better management or genetics?
- What is the district average (long term) for weaning rates of lambs?
- Do you pregnancy scan your ewes?
- Do you know where the weak points are in your ewe management?

Ask yourself these questions, and attempt to answer them with as much

data and fact as part of the process as possible.

Maintaining an objective approach to your sheep performance and focusing on processes within that enterprise, as a means of producing a product(s), will assist you in undertaking a more critical assessment of your management and genetics of your enterprise.

Equipment

Having suitable equipment is essential for smooth running of any operation, and sheep management is no exception. Many inventions have changed the way pastoral sheep production is conducted and enabled significant efficiencies to be made.

Crutching trailers can dramatically reduce the time and labour costs required for mustering sheep for crutching through reductions in mustering distance and time.

Developing purpose-built areas for holding sheep whilst drought containment or production feeding assists with labour efficiency and animal production, whilst maintaining groundcover in dry times. These facilities are not widespread throughout the pastoral areas of Australia.

Supplementary feeding, although not widespread throughout pastoral areas due to economics, can be greatly assisted by using:

- Feed out trailers; there are options for self-weighing trailers which allow accurate amounts to be fed out



- Paddock self-feeders
- Utilising or constructing containment areas for drought management close to where storage facilities are located.

These options allow you to manage your resources in the most efficient manner possible, whilst also optimising the productive capacity of your sheep.

Precision sheep management – utilising Radio Frequency Identification (RFID) electronic ear tags – is a technology which is growing in prevalence in the sheep industry.

RFID ear tags assist the recording of individual animal information. These records can then be used for developing more detailed decision making processes, or facilitating management ease. For example, walk-over weighing systems can be used to record the weight of individual animals crossing over a weigh platform. This allows the monitoring of bodyweights and also can be used to determine weight categories for stock sales. These systems have been used in pastoral areas to monitor stock weights, and plan selling of livestock.

An auto-drafter allows animals to be automatically drafted into determined weight classes. This significantly reduces the labour requirements and errors when selecting sale stock. It reduces operator fatigue and removes the risk of the draft gate operator being injured by jumping sheep.

Working dogs

Man's best friend can be a significant asset to efficient pastoral production. The presence of a team of good working dogs can easily account for the wages of

Crutching trailers can dramatically reduce the time and labour costs required for mustering sheep for crutching through reductions in mustering distance and time.

employees with the work that they can perform. With labour shortages which often exist in agriculture, it is essential to have a competent team of working dogs for your operation.

Prices vary for dogs, and well trained dogs can easily recoup their purchase price in productivity and efficiency in mustering, or yard work.

Ensure that your working dogs are well cared for, kept in good health, and their vaccinations are kept up to date, and, importantly, you have sufficient numbers of dogs available to allow for rest during peak work periods, or if an injury occurs.

Signposts

View

Results of wether trials, for benchmarks on wool cut, quality, and performance.

Gross margin of key enterprises.

Look up: 'gross margins' on state department of primary industries websites.

Cost of production calculators

Lamb:
<http://www.mla.com.au/News-and-resources/Tools-and-calculators/Cost-of-production-lamb>

Sheep and wool:
http://www.makingmorefromsheep.com.au/plan-for-success/tool_1.13.htm

The use of electronic calendars – and other similar innovations using technology. Many computer programs and smart phones are compatible and can update calendars between nominated devices, thus keeping all in the loop and up to date.

Apps that are available for management calendars, and other recording opportunities.

Lambing planner. MLA have a lambing planner available in their publications store.

→ Find it at: <http://www.mla.com.au/News-and-resources/Publication-details?pubid=4787>



Attend

Learn more about: **Lifetime ewe management courses** and consider joining one.

→ Look up this web address for more information: www.wool.com/Item

→ Contact: RIST to register for a course near you on (03) 5573 0956.

Working dog schools. There are many sources of training for owners of working dogs, and how to train them.

→ Contact your dog breeder, look up your breed association, or use your search engine for details of working dog training schools near you.

Read

Books on the topic of training and caring for working dogs. There are many others available.

Lithgow S (1991) **Training and working dogs – for quiet confident control of stock.** University of Queensland Press, ISBN: 0 70222 3948

Williams T (2007) **Working Sheep Dogs – A practical guide to breeding, training and handling.** Landlinks Press, Format: softback. ISBN: 9 48064 3093 Product Id: 2739

Review innovation across the industry

Background information

Well maintained, and appropriate infrastructure, is paramount to an efficient operation. Pastoral properties have led the way with much innovation in the way of infrastructure, as a consequence of labour shortages that exist.

Having the right infrastructure in place, and keeping it well maintained, saves countless hours each year.

Many operations have praised the introduction of innovative methods of doing things, in their operation. These include:

Modifications to shearing sheds including: raised boards, changes to yard design – internal and external, loading ramps, self-mustering yards for managing both livestock and feral animal (goat) control, improvements to paddock gates, stock grids, development of raceways (laneways), water systems – telemetry systems to allow remote monitoring of tanks and troughs, pumping systems – solar pumps to provide pumping assurance and potentially a reduction in maintenance costs.

There are many options available to pastoralists, and being aware of what is out there and on the market can provide capacity to make significant gains in efficiency in your operation.

Management options

There are number of management options that can contribute to more effective management and potential labour and cost savings. Some examples are:

Three shearings in two years, depending on individual circumstances, can:

- Remove the need for one crutching operation
- Lead to an increase in wool harvested
- Improve sheep growth rates
- Spread marketing risk (three sale periods rather than two)
- Maintain price (wool must still be combing length).

Bear in mind that shearing three times in two years does increase costs, as shearing is more expensive than crutching. Also, in a poor season, wool staple length may be insufficient, and incur heavy discounts. Be sure to do your homework regarding embarking on such a change, and consider costs and prices.

Telemetry systems and remote water management have been developed and tested for pastoral areas, with significant success and savings of labour in monitoring of watering points, in particular. The case study outlined below demonstrates the main issues in setting up of such a system.

AT A GLANCE ←

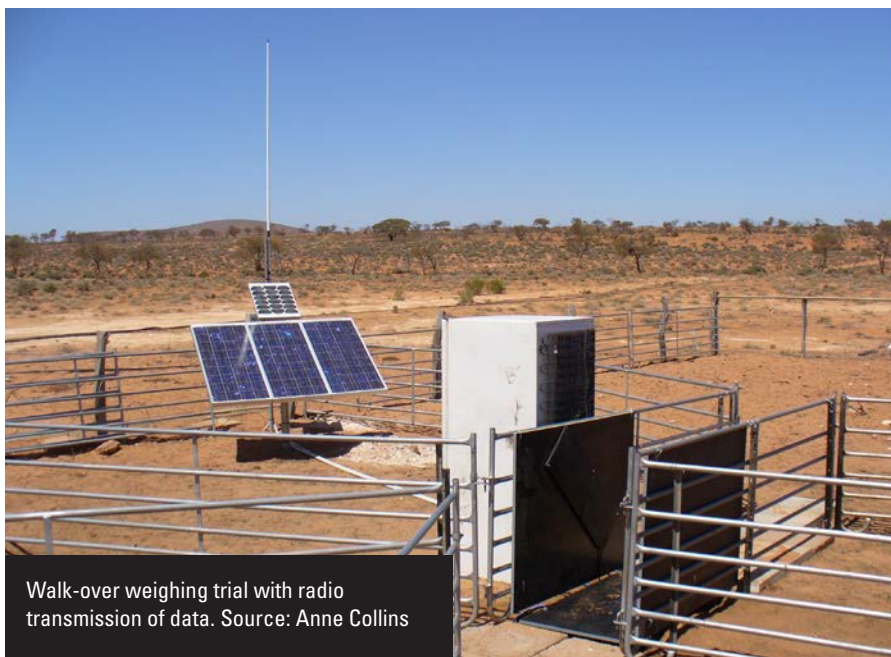
- What's going on around the industry which you could adapt to work in your operation to improve efficiency?
- What are the successful operators doing that you could be doing to improve productivity or efficiency?
- What management options are they using?
- What infrastructure innovation are they using?
- Are they using remote technology, and how does it perform for what is it being used for?
- Are they doing some great natural resource management work?
- Are there some innovations in non-pastoral areas that you could adapt to your area?

Case study example

A Producer Demonstration Site project was undertaken in NSW in 2012 to test the potential of a telemetry system for a pastoral business.

The trial showed that:

- Telemetry systems can create considerable savings in time and worry in relation to water management and monitoring
- Telemetry systems are viable cost saving technology with a relatively short payback period on the capital invested
- Phone alarms or text messages can be set to provide a warning of low water levels
- A remote camera can be used to monitor stock accessing a water point (Gardner 2013).



Walk-over weighing trial with radio transmission of data. Source: Anne Collins

Remotely monitoring production and land systems

Satellite imagery is becoming more readily available, and costs are reflected by this availability. In addition to property development maps, these images are being developed for such functions as seasonal monitoring.

An example of a project involving the use of remote monitoring is the Northern Gulf Resource Management Group, which is utilising spatial information systems to remotely monitor land condition, ground cover and pasture density. This assists their grazing management and seasonal decision making. This information and the software is accessed via a partnership developed with ESRI; a large commercial provider of mapping software.

Determine where greatest opportunities are to benefit from innovation and efficiencies

Background information

The obvious opportunity to bring about efficiency in your operation exists with saving in costs of production, or improved price for your product.

It is not always possible to make significant and direct change in these two areas of your enterprises, however, looking for areas to save time, combine activities, improve safety or add infrastructure to assist with operational tasks can have immense impact on efficiency of tasks.

Cost of production is an important benchmark which can highlight where efficiencies can be made within your enterprise. Utilise the tools which AWI and MLA have developed to assist with calculating these important benchmark figures for your business. Use tools 1.13 and 1.8 to assist with calculating your cost of production.

Once you have your cost of production calculated, compare it with the average sale price of your commodities, e.g. wool, meat. This will give you an immediate indication of the performance of your business.

Benchmarking your business performance is important in understanding and monitoring your business health. Use tool 1.9 to compare your business with indicative industry benchmarks.

The use of a partial budget can aid the decision making process of implementing a new technology or practice into your management. Use tool 1.11 to prepare a partial budget for a proposed change.

Combining activities to reduce labour costs and improve efficiency is an area where careful planning and time management can save significant amounts of time as well as other input costs, such as fuel.

Try to combine jobs so that one trip or activity covers more than one objective. This can be as simple as running waters with monitoring bait stations for feral animals. Try to situate baits in places where it is readily manageable to monitor and replenish regularly.

Try to combine jobs so that one trip or activity covers more than one objective. Group dog control activities may improve access to funding as well as being more effective through targeting a larger area at the same time.

Sheep performance is an area where opportunities often exist to improve efficiency of production, and boost performance.

Bear in mind the running costs of each and every ewe on your property is the same irrespective of her performance. By taking a little time to undertake activities which can fit easily within other operations (e.g. wet and drying at lamb marking), you can easily identify which

ewes have not reared lambs and make decisions about the role of these animals in your flock into the future. Some producers have benchmarked wool cut in their flock and discovered that a large portion of their breeding ewes were not meeting their cost of production. While this sounds like a large undertaking, and may not necessarily be the benchmarking activity for you, it serves as a very good example of the importance of knowing costs of production, and identifying and dealing with poor performing animals in your flock.

Some key figures which you should know about your flock are:

- Conception rate (foetuses scanned/ number of ewes joined) – consider scanning if your lambing rates are not meeting local averages or better.
- Failed to rear numbers (from wet and dry at marking)
- Lamb marking (lambs marked/ewes joined)
- Weaning rates (how many lambs make it to weaning)
- Weaner mortality rates
- Wool cut (kg/head)
- Fleece value (\$/head)
- Cost of production per kg of wool or meat.

You may have others that you like to measure.

Diversification and innovation in your current operation

Are there opportunities for you to diversify your operation?

Are there further ways you can be innovative with your current operation?

Organic production is one method which has proved useful to some pastoral sheep operators, to boost productivity through access to organic markets and thus higher prices, in some cases.

Risk management

The very nature of sheep enterprises in pastoral areas of Australia sees risk management strategies built into the fabric of the business. However, it is still worthwhile keeping up to date on how others in your industry are managing risk. This may be through strategies such

AT A GLANCE



- Benchmarking your business against industry standards is a helpful way of gauging how your business is performing
- You may need to engage a professional to help with this process

as insurance of livestock, or infrastructure to allow you to return to normal production after a serious event such as fire or flood. There are other insurance products on the market that may suit your business, depending on the risk factor and cost of insurance.

Risk may also be managed through early identification of trigger points, which will turn on strategies for reduction in stocking rate to allow maintenance of core breeding stock in tough times. Similarly, you may have a mob identified for quick sale in the event of poor seasonal conditions. Quite often the key to managing prices with seasonal risk lies in the timing of sale stock. Again, these decisions need to be made with sound information to hand and in consultation with professionals advising your business, such as stock agents, or agricultural consultants.

Signposts

Read

Mellors C, Morley N and Muster C (2009) **Australian Pastoral Property Innovation Manual**, Caring For Our Country and AWI

Gardner, M (2013) **Telemetry Systems PDS S1001 Final Report**, Vanguard Business Services, MLA

Peters, G (July 2012) **Biannual shearing pays dividends**, Farming Ahead

Wilkinson F and Vale M (March 2012) **Production from shearing sheep once or twice a year**, Ovine Observer

Ware S (ed) (Spring 2012) **Western Division Newsletter**, Edition 142, ISSN 0314 5352. http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0007/442537/WDN-spring-2012.pdf

Organic Livestock Production, NSW DPI has a range of publications on the topic. Visit: <http://www.dpi.nsw.gov.au/agriculture/farm/organic#Organic-livestock-production>

Attend

Wean More Lambs and **Lifetime Ewe Management** are programs that have requirements for monitoring sheep at key parts of the reproductive cycle. This may include linking body condition scoring ewes with other operations, such as pregnancy scanning or crutching, and identifying 'wet' and 'dry' ewes at lamb marking or weaning.

Decide on ways to incorporate efficiencies and innovation into the system

Taking a look 'over the fence' so to speak is a highly effective method of evaluating the merits of an innovation. Seeing how a new idea will work in reality is very important for many agriculturalists. Attending events locally and out of your area are valuable ways to meet new people, and hear about innovative ways they are addressing productivity issues of their own properties.

Whether it be increasing the use of selected technology in your operation to cut down on labour costs, providing more detailed information to you as part of the decision making process, or doing a better job managing your breeding flock, in terms of management, each operation will have unique needs, and areas for improvement priority.

Consider innovations which might seem out of your reach, or a bit far off in your timeframe. You may find pathways to efficiency from incorporating part of these efficiency measures into your management. They may not be immediately able to be incorporated into your management, but ensure you research new technologies/techniques and plan to implement suitable ones into your management sometime in the future.

AT A GLANCE

→ If you are thinking 'is there a better way of doing things' you will continually find improvement in your approach to your business.

Signposts

Read

Alchin M, Addison J, Shrubb V, Cockerill Z, Young M, Johnson T and Brennan G (2008) **Pastoral Profits Guide**, Department of Agriculture and Food, Western Australia Agricultural Authority

Gardner M (2013) **Telemetry Systems PDS S1001 Final Report**, Vanguard Business Services, Meat & Livestock Australia

James C and Bubb A (2008) **WaterSmart Pastoralism™ Handbook: A practical guide to stock water management in desert Australia**, Desert Knowledge CRC, Alice Springs

Mellors C, Morley N and Muster C (2009) **Australian Pastoral Property Innovation Manual**, Caring For Our Country and AWI

Squires V (1981) **Livestock Management in the Arid Zone**, Inkata Press

Procedure 12.4

Determine a grazing management approach



Background information



Key principles need to be considered and applied when you are deciding what grazing management approaches best suit the needs of your business and property.

The tools which accompany this procedure will allow you to make some informed decisions as to what benefits different approaches may bring to your business, and where the merits of these approaches can be utilised.

This procedure will help you combine your knowledge with key principles of grazing management for the best possible outcome.

Key decisions, critical actions and benchmarks

“A few basic principles, combined with grazier’s knowledge of their own property can allow the formulation of a grazing management program that will address issues of pasture productivity and sustainability in a local context”
(Tactical Grazing Management)

Any grazing management approach needs to be responsive and flexible enough to manage with variable land systems and seasons, along with the other forces which impact on decision making; hence, systems based on standard approaches or calendar-based programs of management are unlikely to be successful in the long term.

Importantly, the approach that you choose to adopt in your business needs to capture the values which are important to your business health, livestock productivity and the environmental goals you have identified for your property.

There are many grazing management approaches that you can learn about and consider implementing into your operation. Rather than cover the specifics of each approach this procedure is focused on what the key ‘must do’ tasks are to enable you to decide which approach, or combination, of more than one approach, that you choose to combine will best suit your operation.

It is important to consider that an approach may involve a combination of facets of different formal approaches into your customised approach.

AT A GLANCE



- Be proactive in seeking information about how to best utilise your feedbase in a sustainable way
- Be open to the idea that some elements of some approaches may suit your needs
- Think about the elements of your grazing management that need working on and set about improving these areas

The four must-dos in this procedure are:

- Identify goals for your grazing management approach, including multiple benefits
- Assess systems and approaches to grazing management based on sound grazing management principles
- Learn/adopt/adapt a grazing management system/approach and develop associated infrastructure
- Monitor and adjust performance.

Identify goals for your grazing management approach (including multiple benefits)

Successful pastoral systems

Grazing management systems that are likely to be successful will have a series of principles which need to be applied to achieve the management objectives and targets. These principles need to allow a grazing manager to capitalise on opportunities offered by good seasons – for example, one strategy may be to respond by increasing stocking rates to match available feed levels and ideally achieve above average production, and at the same time allow natural resource management values to be realised.

Similarly, successful grazing management systems enable producers to manage and reduce risk in poor seasons – for example, to respond by decreasing stocking rates to match available feed levels, and protect the production base by prioritising the maintenance or improvement of the most productive paddocks and areas prone to degradation, e.g. risk of erosion.

As with any management approach that you adopt, constant and ongoing monitoring and management are required. You will need to continue to monitor seasonal conditions, and take action according to what conditions are prevailing, with respect to historical observations, and be decisive with your management.

Before any paddock or land system can be managed, it is important that a business plan is created, (see Module 2) and then management objective is set. Whilst paddocks are the basic management unit, they sit on top of different land systems that may or may not neatly fit the dimensions of the paddock. This may require consideration when establishing objectives for the paddocks. In some cases, it may be necessary to consider realignment of paddock boundaries to better fit the land systems. However, in most cases the management objective will focus on existing paddocks considering the most productive land unit and the feed species that contribute to the productivity of these land units and the paddock.

When appraising paddocks and determining management objectives, there are essentially two options that a pastoral manager can consider:

→ The paddock is judged to be in good condition with acceptable levels of productivity and general systems health.

- The management objective would be to *maintain* the current condition of the paddock.

→ The paddock has developed one or a number of issues of concern, such as:

- Significant areas of bare ground
- Emergence of invasive native scrub or weeds
- Reduction in productivity of important grazing species
- Erosion is occurring
- There is very little recruitment of new grazing species.

→ The paddock is generally in good condition but has the potential to increase productivity by manipulating species composition or allowing key species to set seed, benefit from rest at strategic times.

- The management objective would then be to *improve* the current condition of the paddock.

Establishing the objective should consider larger scale influences (i.e. property, catchment and region factors) to ensure that the basic unit of management is viewed as part of the overall system.

Setting management objectives is a key part of all formalised grazing management approaches, and involves constant revision and updating of the objectives as conditions change and plans develop.

Multiple benefits

The concept of multiple benefits (sometimes described as dual outcomes) seeks to provide environmental benefits in ways that combine with improved production, and ensures that production focused activities also deliver positive environmental outcomes.

In order to make every post a winner, when making management decisions, it is imperative that new management delivers multiple benefits wherever possible.

Signposts



There are many government programs available to producers which assist with the costs of undertaking such improvement with a focus on supplying environmental benefits to pastoral businesses.

A first point of contact is your local **NRM organisation**. They can advise you on what programs are operating in your local area that may be relevant and useful to your business.

→ Look up the following link:
<http://www.nrm.gov.au/regional/regional-nrm-organisations>



Assess systems and approaches to grazing management

There are many approaches of managing the grazing component in the pastoral environment, and for all intents and purposes, they have similar goals and objectives: to facilitate a profitable business, whilst taking care of the natural resources upon and with which the business is operated.

Assessing approaches to grazing management will require you to have completed your business planning followed by identifying specific NRM goals for your property. Once this is done, determine what changes in operations at the farm and paddock level will assist in achieving the goals.

Compromise is required

There are many factors influencing what grazing management system or part thereof you employ in your pastoral business. The reality is that many factors are on the table and trade-offs are often required from one part of the business to achieve the desired outcome.

Achieving a balance between the different objectives will require compromise and the ideal management outcomes may not always be achieved; however, if the principles are adhered to over time, then progress towards the stated objectives will follow.

Case study: Comparison of grazing management approaches

An MLA funded project conducted between June 2008 and August 2010, compared the grazing management systems of nine farming businesses, to determine what impact they had on livestock, land and feed. The grazing management systems that were compared were cell grazing, rotational grazing and continuous grazing. See Signposts for reference to this project.

The findings of the project support other work that has been undertaken and include the following points:

→ The underlying driver of successful grazing management is the ability to manage stocking rates to the feed

resource, regardless of the system that management is framed within.

→ All participants had an interest in maintaining land health so even the continuous grazing system involved periods of pasture spelling and changes to herd numbers based on season.

→ The findings supported the principle that indicates that stocking rate management and not grazing system, is the major driver of pasture and animal productivity and natural resource health.

→ The more intense systems had higher infrastructure investments (e.g. fences, water). If the landholder is a skilled pasture manager to begin with, it is unlikely that the intense system infrastructure costs will pay off in terms of improved pasture or livestock productivity.

All successful grazing management systems incorporate a combination of managing the following elements of their system:

- Rest period
- Graze period
- Stock pressure
- Soil fertility
- Location of watering points
- Fire
- Weed management and control.

The table on the following page outlines the findings by Fisher et al (2005) and covers the basic features and management issues pertinent to the following grazing management approaches:

- Set stocking
- Seasonal tracking
- Set utilisation
- Rotational grazing and spelling
- Opportunistic
- Tactical grazing.

You can use a similar format to come up with your own summary table.

Signposts



Read

There are a number of publications, programs and service providers that can assist you determine which grazing management system and principles best fit with your own business goals and pastoral property.

Hall T (2011) *Investigating intensive grazing systems in Northern Australia, Volume 1*, Meat & Livestock Australia

Fisher A, Hunt L, James C, Landsberg J, Phelps D, Smyth A and Watson I (2005) *Management of total grazing pressure*, Natural Heritage Trust

Nicholls K, Earl J, Kahn L, Lovett S, Price P (2007) *Planned grazing management*, Land, Water and Wool factsheet

Alchin M, Addison J, Shrubbs V, Cockerill Z, Young M, Johnson T and Brennan G (2008) *Pastoral Profits Guide*, Department of Agriculture and Food, Western Australia Agricultural Authority

Visit

→ Service providers:

State Departments of Primary Industries

Agribusiness advisors and consultants

→ Programs:

Graze for Profit™

Tactical Grazing Management (NSW Government)

Ecosystem Management Understanding (EMUTM)

Holistic Grazing Management

Planned Grazing Management (Land, Water and Wool)

Grazing Land Management (Queensland Government and Northern Territory Government)

Table 12.1 Features and management issues associated with different grazing strategies*Grazing Management Practices* Fisher et al (2005)**SET STOCKING**

Features	Management issues
<ul style="list-style-type: none"> → Stock levels set at conservative rate, i.e. a level where forced destocking is only rarely required (1 in 10 years). → Most common in southern areas; widely used in the chenopod shrublands and mulga woodlands/shrublands of South Australia and Western Australia – where ephemeral and annual species provide forage when sufficient rain has been received, and the perennial shrubs are relied upon to provide feed at other times. 	<ul style="list-style-type: none"> → Knowing the best time to destock or reduce numbers in worsening conditions. → Common problems include leaving stock on too long when going into drought which causes declines in perennial shrub density. → Can lead to increased and irreversible impact in practical terms in areas surrounding water points. → Can be managed using simple plant-based indicators and spatial monitoring.

SEASONAL TRACKING

Features	Management issues
<ul style="list-style-type: none"> → Tracking of seasonal conditions occurs and livestock numbers are varied depending on seasonal conditions and forage availability. → Usually some livestock is maintained on properties even in the worst years. → Commonly used in the semi-arid woodlands of New South Wales and South Australia. 	<ul style="list-style-type: none"> → This can have short and long-term financial benefits for pastoral enterprises when used to moderate extent, as very conservative stocking rates may not provide satisfactory economic returns in the short term. → This approach is associated with higher economic and ecological risks and good managerial skills are required to implement this approach properly to minimise these risks.

SET UTILISATION

Features	Management issues
<ul style="list-style-type: none"> → Practiced in tropical and subtropical savannah systems where there is a distinct summer growing season and perennial grasses dominate pastures. → Stock numbers are set by forage available at the end of the growing season and the defined safe use levels for this forage. Once livestock have been allocated to paddocks at the end of the growing season, they usually remain in place until the end of the next growing season. 	<ul style="list-style-type: none"> → Use rates of between 10% and 30% of standing forage at the end of the growing season are recommended, with the actual rate depending on the ecosystem and management context. → Computer-based modules of pasture growth based on rainfall received during the growth season are sometimes used to estimate the appropriate livestock number to achieve the specified safe utilisation level. → While the system is a form of continuous grazing, it is 'set use' rather than set stocking.

ROTATIONAL GRAZING AND SPELLING

Features	Management issues
<ul style="list-style-type: none"> → Rotational grazing and spelling systems take many forms but they usually involve multiple paddock systems. → Many rotational grazing systems use regular spelling (or grazing) on a calendar basis or on the basis of the number of days grazing or spelling. → Numerous systems are in use in the rangelands in the United States but few have been tested in Australian rangelands – some principles might be relevant. 	<ul style="list-style-type: none"> → There is growing interest in this system in recognition that most native pasture species are not well adapted to continuous grazing, and some form of pasture resting/spelling is needed to let plants recover from grazing and complete their life cycle processes. → However, there is little objective information to support or challenge the claimed benefits of rotational grazing, or the pros and cons of alternative rotational grazing schemes, so their value remains unproven. → In systems where rainfall and plant growth are unreliable and unpredictable this approach may not offer any benefits. → These systems (including cell grazing) can operate on recommendations that we consider inappropriate, such as the use of very high stock densities, often well above usually accepted limits. Despite a lack of explicit scientific evidence with which to refute them, they are contrary to normally accepted practice for protecting the soil surface and limiting plant defoliation.

Table 12.1 Features and management issues associated with different grazing strategies
Grazing Management Practices Fisher et al (2005)

OPPORTUNISTIC

Features	Management issues
<ul style="list-style-type: none"> → Other less formal or rotational grazing systems can sometimes offer benefits for natural resource condition. These can include opportunistic spelling (often with forced destocking due to drought and/or deferring the build-up of stock numbers following drought-breaking rains), or rotation of stock between water points in a paddock (especially where forced to do this due to seasonal waters drying up). → Resting can also involve taking advantage of exceptionally good seasonal conditions to rest a few paddocks at a time. 	<ul style="list-style-type: none"> → One problem with resting is that it is rarely done for sufficient time. Resting should occur for long enough to allow plant responses to reduced grazing. One difficulty in applying resting is a lack of indicators and rules for resting strategies. → Where there is a variety of range types with differing plant communities and growth habits available within a single property, then it can be useful to devise rotational systems that take advantage of seasonal differences in growth, forage availability or resistance to defoliation.

TACTICAL GRAZING

Features	Management issues
<ul style="list-style-type: none"> → Tactical grazing involves adjusting stock numbers in accordance with changes in seasonal and climatic conditions and plant growth. The key principle underpinning tactical grazing is the need for grazing to be managed in a way that recognises the critical importance of perennial plants. These species must be able to complete all life cycle stages to ensure the persistence of plant populations. → Decisions are made, based on plant condition scores, to alter stock numbers or destock. For example, in the semi-arid woodlands of New South Wales or wherever seasonal conditions are unpredictable, minimum stubble height (grazing residue) for perennial grasses is 10cm. The mortality of the grasses increases dramatically during drought by grazing beyond this limit. 	<ul style="list-style-type: none"> → For regions where the climate (and rainfall in particular) is erratic and unreliable, tactical grazing is recommended. → An important part of applying tactical grazing is the identification and definition of objectives and strategies on a paddock-by-paddock basis (Campbell and Hacker 2000). → Tactical grazing acknowledges the potential for plants to be killed by grazing and for recruitment to be limited because grazing can limit growth, flowering and seed production. → Regions with an erratic and unreliable climate are most likely to benefit from tactical grazing since many plants do not complete life cycle processes on a regular or annual basis.

Learn/adopt/adapt a grazing management approach and develop associated infrastructure

There are many processes, and products available to assist you in optimising your grazing management and resource base. The challenge lies in identifying the key points of each approach and determining which elements will facilitate outcomes which relate to your property management plan and business plan.

Do some research into the various approaches, (table 12.1 above is a good place to start) and determine which elements are most applicable to your situation. One way of doing this effectively is to list the priorities of your plans, as well as the components of your grazing management approach, and then evaluate each grazing management approach according to the values and priorities in your plans. This will help you narrow down which approaches are the most suited to your business, and in doing so,

will allow you to save time by not needing to do in depth research of all approaches.

Sometimes a certain component of an approach will be particularly well suited to your operation – it is perfectly acceptable to find a way to adapt this into your current approach.

Upon identification of your desired approach to grazing management, you will need to assess how your current infrastructure will accommodate this approach. You may find that you need to enhance infrastructure in one area to adopt your approach, and this will need to be incorporated into your property planning process. Development may take several years, and a gradual approach may be required to avoid unnecessary risk during the development phase of implementing your approach if it is different to your current one.

Lookup your local Natural Resource Management Authority to find out if there are any financial incentives available for NRM projects that align with development of your grazing management approach.

Monitor and adjust performance

It is extremely important that processes are developed to monitor the grazing system by considering the pasture, soil and landscape condition. Two key reasons to monitor are:

- To track progress
- Collect information to make tactical decisions.

Other elements of monitoring your business, which are important to monitor are:

- Animal performance
- Financial performance
- Systems health.

These performance indicators are excellent indicators of how your plans are being implemented, and how your overall business goals are being met.

When monitoring the system, the indicators that are assessed can be split into two broad groups:

Lead indicators

These indicators tend to be seen earlier than some others; they are generally a precursor indicator, rather than an end result. For example, in some regions lower than average autumn rainfall will delay the germination of feed and a key date for assessing rainfall received can be an alert to assess feed on offer and stocking rates.

Lag indicators

These indicators tend to be seen later; they are generally an end result. For example, a low body condition score is the result of lower than ideal feed availability, relative to the number of animals grazing in the paddock. By the time feed quality and quantity have fallen enough to impact on body condition score, management options are reduced.

A large number of tools are available to assist you with monitoring the performance and condition of elements of your business.

To assist in assessing change in condition of paddocks and resources on the property, it is useful to adopt a formal monitoring system.

These systems will allow objective assessment of different factors affecting productivity including: the balance of palatable and less palatable species, recruitment of new palatable species, the level of bare ground, the level of grazing utilisation of key grazing species, condition of watering points, and changes in weed populations or density.

Maintain a photo record

Monitoring progress is critical in long term projects because it is impossible to remember what things were like at the start and how much 'progress' is being made despite the ups and downs of the seasons.

A sequence of photos taken over a period of time can provide a rich source of information to monitor short and longer term change resulting from management decisions, climatic conditions/impacts and natural events. Use tool 5.8 to establish and maintain photopoints.

The 'before and after' photos in tool 5.9 show how well photos can visually record progress towards your vision over the years.

... photos taken over a period of time can provide a rich source of information to monitor short and longer term change resulting from management decisions, climatic conditions/impacts and natural events.

Set up your monitoring site(s) in a logical fashion, and record their coordinates, or include their locations in your Property Management Plan, so that others are aware of the location of these.

Commit to regular monitoring

Define the best month/s to assess the condition of your natural resources, pests and weeds, then take measurements (photos, assessments, counts, etc.) at that time. The timing will vary according to your rainfall pattern (see procedure 8.1 in *Turn Pasture into Product*):

→ Winter and uniform rainfall zones: late autumn (before the break) is often the 'worst' for vegetation, groundcover, birds and insects, while mid spring is the 'best'

→ Summer rainfall zones: spring and autumn can also be the most appropriate periods, but autumn will sometimes be 'better' than spring.

Seasonal variations can modify the times, but experience has shown that the twice-per-year/stronger-and-weaker approach is fairly robust over time.

Use the tools suggested in this and other procedures to monitor change in soil, pastures, salinity, soil pH, remnant vegetation or any of the key resources you have identified.

Whichever tool or combination of tools you use, clearly identify your monitoring sites and come back to the same areas each time you monitor.

Monitor long-term impacts

Use the monitoring tools repeatedly over time to determine if the condition of your key resources is moving towards or away from your management objective. Collect information over a number of years so you can clearly see trends over time.

Don't commit to a program that is too demanding over time. The most important thing is to monitor the priority sites at about the same time each year to establish trends. Write these dates in your calendar or diary and commit to implementing your strategy over time.

Monitoring performance

To ensure that progress is made towards your business objectives, it is important that monitoring is undertaken on a regular basis. The factors monitored should include animal performance targets: lambing, weaning, wool cut, wool strength, adult sheep mortality rates; land system and catchment health: erosion, bare ground, scalded areas, wetlands health; and grazing system: productive plants, weeds, recruitment, and feed on offer.

Signpost

The Glovebox Guide to Tactical Grazing Management for the semi-arid woodlands (NSW DPI) has a step by step process of how to set up and maintain a monitoring system on your property over time.

Procedure 12.5

Match grazing pressure to feed supply



Background information



Estimating feed supply is an important part of determining stocking rate in a paddock or for a particular land system.

The amount of feed available will depend on a range of factors, including:

- Land units and the land system
- Seasonal conditions
- Land condition, how well the land is managed and how responsive the system is to rainfall
- Different plant communities
- Diversity of species

Animal production depends on quantity and quality of forage available. During periods of active growth, green grasses and forbs that have a high digestibility provide energy and protein to sustain higher levels of animal production. As these plants mature and become more fibrous, digestibility decreases and the amount of metabolisable energy and protein decreases, resulting in lower levels of production. Therefore the amount of forage required to meet requirements increases as quality decreases. Poor quality feed may not be adequate to maintain some classes of sheep.

Key decisions, critical actions and benchmarks

This procedure outlines processes and issues that relate to measuring available feed for your animals, feed quality issues, seasonal considerations and how to use this information to manage supply and demand.

There are four must-dos in this procedure:

- Know your seasonal feed supply
- Calculate total grazing pressure
- Match production cycle to feed quality and quantity
- Manage grazing pressure and monitor feed supply.

Know your feed supply

Feed availability

The amount of forage available determines what stocking rates you are able to run and for how long this feed will last. Seasonal conditions will govern what regrowth occurs, and this also impacts on the stocking rate and grazing period. In order to make basic decisions regarding your grazing operation, it is essential that you have a solid understanding of how long current forage will last.

Estimates are made by calculating the amount of dry matter per hectare. This can be done using photo standards, or by measuring forage directly. Photo standards are available for all pastoral areas.

AT A GLANCE



- Identify your feed supply throughout the year
- Calculate your total grazing pressure for key times of the year
- Consider the impact of non-domesticated species on your total grazing pressure
- Are there any opportunities to alter your program to better align supply and demand?

Look up pastoral photo standards at: <https://futurebeef.com.au/knowledge-centre/pastures-and-forage-crops/pasture-photo-standards/>

Tactical grazing photos

Once you know the standing dry matter, or available dry matter, you can then utilise the standard intake requirements that are well known for sheep. These are outlined on the following page in *Calculate Total Grazing Pressure*.

Be mindful to remember when making your calculations, that the total dry matter present in a paddock is not all made available to your sheep. In the pastoral areas, a conservative utilisation rate of dry matter is adopted, to ensure that there is sufficient biomass remaining after grazing. This is often set at 20 to 30%. See *Match grazing pressure to*

feed supply later in this procedure for more information about utilisation rate. This residual biomass is useful for ensuring adequate groundcover remains to:

- Protect soils from wind and water erosion
- Allow water to infiltrate when rain falls
- Ensure efficient nutrient cycling (good soil cover means more soil water and nutrients available for pasture growth).

Signposts



Read

Alchin M, Addison J, Shrubbs V, Cockerill Z, Young M, Johnson T and Brennan G (2008) **Pastoral Profits Guide**, Department of Agriculture and Food, WA Agricultural Authority

Campbell T and Hacker R, (2000) **The Glovebox Guide to Tactical Grazing Management for the semi-arid woodlands**, NSW DPI

Bell A (2007) **Measuring herbage mass – the median quadrat technique**, Primefact 324, NSW DPI

Jessop, P, **Estimating the Edible Dry Matter of Bluebush and Bladder Saltbush**, NSW DPI

View

Pasture Photo Standards

<https://futurebeef.com.au/knowledge-centre/pastures-and-forage-crops/pasture-photo-standards/>

Calculate Total Grazing Pressure

Total Grazing Pressure (TGP) is the total demand for forage by both domestic and non-domestic animals relative to forage supply

TGP is determined by calculating the total grazing pressure exerted by domestic and other grazing animals. This provides the most realistic indicator of the number of grazing animals and the grazing pressure being exerted on a paddock. The grazing pressure is

specified using the standard measure of a Dry Sheep Equivalent (DSE).

The grazing pressure from domestic livestock can at times be equaled or exceeded by grazing pressure from other animals including:

- Native species: kangaroos, euros, wallabies
- Large feral animals: camels, horses, donkeys, pigs
- Wild goat herds
- Small feral animals: rabbits.

The grazing pressure from these animals can be significant and needs to be included when assessing the total grazing pressure of stock in the paddock. Determining a realistic estimate for the non-domestic animals can be difficult as some of the species listed are quite transient and will move within and between properties, depending on levels of feed, water and disturbance.

Approaches to determining pressure from non-domestics are described in this section. Grazing management is difficult when there is a proportion of the grazing pressure that is unmanaged, as producers often have limited control over non-domestic herbivores. Hence, it can be an important step in grazing management for you to quantify and make an assessment of the issue on your property.

Dry Sheep Equivalents

The Dry Sheep Equivalent (DSE) is a standard unit used to compare the feed requirements of different classes of stock

One DSE is based on the energy required by a 50kg wether (i.e. a dry sheep) to maintain condition and body weight.

Animals that have a higher feed requirement than 1 DSE (a lactating ewe) will have a higher DSE rating.

To estimate a DSE figure for stock, an estimate of liveweight and the class of stock is required. Standard DSE tables assist in determining the relevant DSE value for each class of grazing stock.

There are DSE ratings for non-domestic animals. These can be found later in this procedure in *Manage grazing pressure and monitor feed supply* and in tool 12.15.

Calculating DSEs for your property

Use the tables in tool 12.14 to calculate the DSE ratings for the different classes of livestock on your property. Bear in mind that your DSE's will vary according to class of animal throughout the year. A breeding ewe will have varying DSE rating over the year, according to her reproductive status.

Signposts



View

MLA Stocking rate calculator

<http://www.mla.com.au/News-and-resources/Tools-and-calculators/Stocking-rate-calculator>

Read

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Match production cycle to feed quality and quantity

In order to meet productivity targets in your livestock enterprise, it is important to know when your feed supply and feed demand are at their highest, and identify any shortfalls that may exist.

Pastoral properties are often governed by access to markets, and other significant factors as well as seasonal feed availability in determining when key livestock operations are carried out, and therefore demand and supply may not match up perfectly.

Nevertheless, it is essential that you undertake a fodder budgeting activity to increase your awareness to key periods of peak demand, and endeavour to align these with peak supply where possible.

Feed demand is calculated based on:

- The number of stock grazing, including non-domesticated animals
- Their physiological state (dry, pregnant, weaned)
- Production requirements (maintenance or finishing).

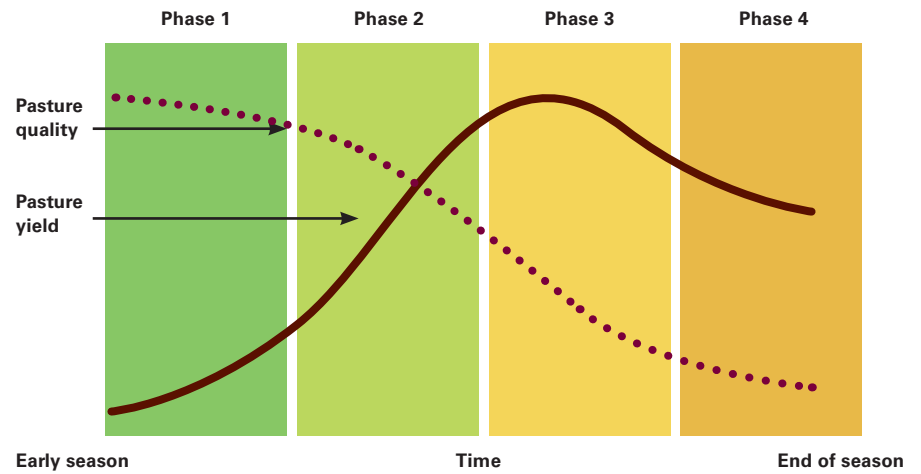
Production cycle

The annual production cycle, or 'program', is very much unique to individual properties and is usually based around seasonal conditions and feed supply, markets and accessibility to the property. These factors are innately considered as they are logical factors in determining the timing of key operations and events on the property.

Ideally programs align key finishing times, selling times or lambing times with highest levels of available feed. This ensures optimum productive outputs from the resources available at the time. An important part of this process is to understand the feed requirements at these key times by all classes of stock on your property.

By recording rainfall and stocking rate over time, you will build up a profile of how your property's stocking rate is tracking according to rain received, and this will enable you to make informed decisions regarding stocking rates and

Figure 1 Phases of Pasture Growth (MLA, 2005)



formulate strategies to manage tight periods. This activity may be of limited use in areas with aseasonal rainfall patterns (where there is no seasonality to rainfall patterns, such as a wet season).

A mixture of species is indicative of a stable and productive grazing system and will give sheep access to a reasonably balanced diet.

There are a number of different factors that influence feed production from native pastures, and these include the following:

- Land systems type
- Seasonal conditions
- Rangeland condition
- Available grazing area
- Grazing preference
- Stocking rate.

Pasture plants follow a similar pattern of growth, which determines quality and quantity of herbage mass at a given time. Figure 1 illustrates the changes in feed quality and quantity from the beginning to the end of the growing season. Performance of grazing stock is impacted significantly by both quality and quantity of feed on offer.

Another way to consider the quality and quantity issue regarding feed availability is to consider their relative stability and quality. An exception to the quality and quantity table above is where shrubs and browse species are concerned. Despite being lower in quality, generally their quality and quantity is less variable over time. These species are of high value because of their stability in the grazing environment. Ephemerals and browse are at opposite ends of the spectrum. In variable arid and semi-arid environment both attributes are desirable. Perennial and annuals are not inferior or superior to one another, but have complementary qualities.

In a pastoral grazing system, grazing animals will generally preferentially select pasture components in the following order:

- Forbs (herbs)
- Green annual grasses
- Green perennial grasses
- Dry herbage
- Copperburrs (*Sceroleana spp.*) and annual saltbushes (*Atriplex spp.*)
- Bluebush (*Maireana spp.*)/Saltbushes (*Atriples spp.*)/Tree Browse.

Figure 2 Continuum from Ephemeral to Browse species (Harrington et al 1984)

Ephemerals – Annuals – Biennials – Perennials – Browse



The information presented on quality and dietary preferences is general and site specific information should be sought on quality and characteristics of specific species in your pasture. The composition of livestock diets will change considerably between paddocks and seasons.

Energy

Energy is the main limiting factor to animal performance, and survival. The amount of energy contained in feed varies throughout its life cycle, and can support different levels of production.

The amount of energy derived from a feed is related to the digestibility of the feed. Digestibility is the percentage of the feed that is converted to energy. The higher the digestibility, the higher the energy in the feed. The lower the digestibility, the lower the amount of energy in a feed, and more is passed through the animal and removed as waste products.

Think of the feed requirements similarly to a vehicle and what is needed to run the vehicle. To drive around, you need fuel. You cannot get very far either, without oil for the engine.

In using this analogy, prioritise animal requirements starting with energy. Energy in feed is assessed as megajoules of metabolisable energy per kilogram of dry matter. When addressing nutritional requirements, energy requirements should be addressed first. If pastures are deficient in digestible energy this will be the most limiting nutrient.

Lower than ideal levels of energy will lead to performance issues for sheep flocks:

- Low conception rates due to rams and/or ewes being below optimal body condition scores (3–3.5) at mating
- Body condition scores will fall rapidly for pregnant ewes, leading to:
 - Lower than ideal birth weights for lambs and increased losses
 - Increased ewe mortality due to pregnancy toxaemia
- Poor growth and increased mortality of weaners and replacement stock
- Not meeting key marketing opportunities due to not being finished, or sale ready.

Quite often, what is growing between the shrubs and trees is providing the required energy for grazing stock.

As a rule of thumb, a 50kg wether will need to eat approximately 1kg of dry matter per day with an energy level of 8MJ/kg and a protein level of 8% for maintenance.

Tool 11.1 provides a summary of the requirements for other classes of livestock.

To calculate the feed requirements of livestock grazing, the digestibility, metabolisable energy, and protein content of the feed needs to be determined, as this will impact on the amount of feed that can be eaten and utilised by livestock. This information can be obtained by sending feed material to a feed testing service to undertake a test to calculate the levels of dry matter, energy, protein, digestibility and minerals. You can also consult your local advisor who will be able to provide you with any local data on feed quality. This local knowledge will be a useful guide in the absence of actual feed test results. It should also be noted that stock will selectively graze plants and hence may accumulate higher levels of protein or energy than an 'average' feed test result will indicate.

You can also learn to estimate digestibility by observing pasture characteristics such as:

- availability of green material

- are plants in a reproductive phase
- the colour of dead material.

The figure below illustrates the relationship between feed quality, (digestibility and energy) and the capacity of pasture to sustain various production levels in grazing stock as the plants mature. It shows that as a plant matures, the digestibility and metabolisable energy decrease.

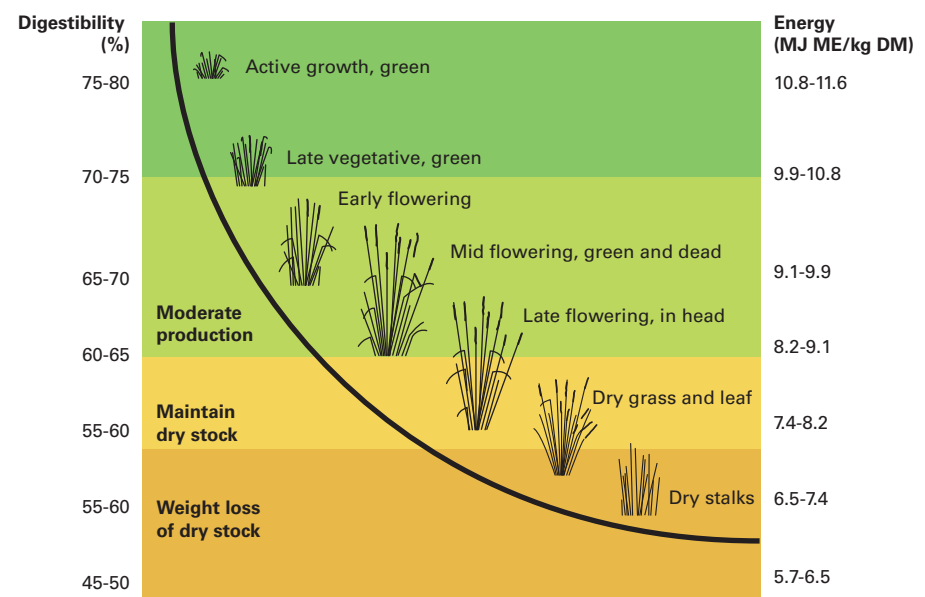
Protein

Protein is an essential component of the diet of sheep. Just like energy, the level of protein in different species will also vary through the growing season. Many of the pastoral grazing species have high levels of protein.

As is the case for energy, the level of protein in grazed plants will vary due to growth stage, rainfall, season and the area in which they are growing. Green plants generally contain sufficient protein for ruminants. When pastures dry out, protein decreases to sub-optimal levels for maintenance of sheep.

Animals selecting leaf over stem will also achieve higher performance than a 'whole plant' feed test will indicate. When interpreting feed test results, you need to consider the growth stage, and plant growth habit in context with what part of the plants the animals are utilising.

Figure 3 A guide to the decline in digestibility as temperate pastures mature (Harrington et al 1984)



Stock will selectively graze plants and hence may accumulate higher levels of protein or energy than an 'average' feed test result will indicate.

Different types of perennial grasses

Perennial grasses are extremely important in grazing systems and are a key focus for grazing management and landscape function; they assist in reducing wind and water erosion, provide litter for recruitment of new seedlings and are often the most responsive species to rainfall.

Native perennial grasses can be divided into warm and cool season grasses. Warm season grasses do most of their growing and seeding in the summer and are better adapted to high temperatures and light intensities. They are susceptible to frost and can be winter dormant. Cool season grasses grow and seed in the cooler months (winter/spring). They are frost tolerant, provide green feed during winter when temperatures are low and moisture is not limiting. In summer they have reduced growth and survive high temperatures and low rainfall by entering a drought-induced dormancy.

Cool season species tend to generate less bulk than warm season species. However, feed quality of cool season grasses is often higher than warm season grasses.

The different types of perennials are responsive to rain at different times of the year. A pasture with both warm and cool season perennials will be rain ready throughout a greater part of the year, than a pasture which is characterised by one type of perennial grass, which will be responsive at the time that best suits the single type of grass, e.g. winter.

Warm season perennials

Mitchell grass (*Astrelba spp.*)

Curly Windmill grass (*Enteropogon acicularis*)

Neverfail (*Eragrostis setifolia*)

Wire grass (*Aristida spp.*)

Cool season perennials

Wallaby grass or White Top (*Austrodanthonia caespitosa*)

Speargrass (*Stipa spp.*)*

* In drier regions and seasons this species can perform more as an annual.

Minerals and trace elements

Another important nutritional factor regarding the nutritional value of grazing plants is the level of minerals and trace elements that the plants present contain.

Even though old man saltbush has good levels of energy and crude protein, stock may not perform as well as expected due to the mineral and trace element imbalance. For example, the high salt level will require energy to be expended to excrete this through the kidneys. This issue can be further exacerbated when sheep are drinking water with a moderate or high salt content. Other saltbush species may lead to similar outcomes.

In a situation where lower production has been observed, consider the potential for mineral imbalances, and possible courses of remediation/supplementation, to avoid significant production losses.

When stock are grazing species known to be of lower quality, e.g. speargrass, it is important that other species with higher levels of protein and energy are available to ensure high levels of production. It is widely known that when dry feed is available, only relatively small levels of green leaf are required to have significant impacts on the weight gain and wool growth of sheep. This is associated with the higher levels of metabolisable energy and protein present in the green material.

In the rangelands, this is often achievable, if the plant community contains a mixture of annuals, perennials, grasses and shrubs.

Signposts



Read

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Revell D (2012) **Perennial forage shrubs providing profitable and sustainable grazing: Key practical findings from the Enrich project**, Future Farm Industries CRC

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View

The ENRICH perennial shrub project.
<http://www.futurefarmonline.com.au/research/future-livestock-production/enrich.htm>

Manage grazing pressure and monitor feed supply

It has been observed that the underlying driver of successful grazing management is the ability to manage stocking rates (grazing pressure) to match carrying capacity, regardless of the system that management is framed within. Also, stocking rate management (i.e. grazing pressure management) and not grazing system, is the major driver of pasture and animal productivity and natural resource health.

In addition to actual grazing pressure, other elements of grazing management that are important, can be managed and will influence the productivity of the animals and plants in the system include:

- Rest period: the time when pastures are able to recover, build reserves and set seed
- Graze period: the length of time that grazing pressure occurs
- Utilisation rates: how much of the food on offer that is consumed
- Grazing variability: how evenly feed is consumed across all parts of the paddock.

Of course this is all dependent on when the rain falls, which species are present, the growth habit and pattern of the favourable species.

Utilisation rate

Utilisation rate is the proportion of pasture available which is grazed by the animals present.

Managing utilisation rate is an important part of grazing land management, particularly so in pastoral areas where vegetation communities are diverse, yet fragile, if not managed well. Utilisation rate has a direct impact on both land condition and diet quality. Hence, good grazing management should focus on improving land condition, improving the evenness of use and improving diet quality of the animals grazing.

A rule of thumb regarding safe utilisation rate for perennials in the pastoral areas is 20 to 30%. The remaining 70 to 80% will allow recovery post-grazing and ensure that the community of plants remains adequately resourced through root reserves, and biomass remaining to recover after grazing, and especially in the event of a dry season.

There are photo standards for utilisation rates of perennial grass species in the ***Glovebox Guide to Tactical Grazing Management***.

Monitoring total grazing pressure

There are a number of ways of monitoring total grazing pressure:

- Total grazing pressure is determined by attributing a Dry Sheep Equivalent (DSE) rating to the different species grazing in a paddock. The ***Glovebox Guide to Tactical Grazing Management*** uses the ratings for different species as follows:

- 50 kg wether = 1 DSE
- Kangaroo = 0.75 DSE
- Goat = 1 DSE (see table in tool 12.13 for detailed DSE rating for goats)
- Rabbit = 0.1 DSE
- Grazing pressure can be determined by conducting
 - A 'step – point transect' process to assess the levels of dung for different grazing species
 - Spotlight survey at night for kangaroos, goats and rabbits
 - Aerial survey for kangaroos.

A method of recording, such as a paddock management book or an electronic recording system (PC, tablet or smart phone) can be used to record dates and numbers of animals recorded in different paddocks. There are a number of smart phone apps available that are designed to assist in the recording process from the paddock. These can be readily found by searching the App Store or Google Play.

If total grazing pressure is not well managed, domestic stock will be competing for feed with a large, unmanaged feral or native grazing herd. This will have a significant effect on pastoral production. This becomes even more important in seasons when feed becomes limiting due to lower than ideal seasonal rainfall.



Procedure 12.6

Manage pest animal species



Background information



This procedure outlines what you need to know about the more prevalent pest animal species, and how to use this information to effect control of the pests which are relevant to your business.

This procedure contains links to the most up to date information on managing vertebrate pest species, to ensure you get the most effective control for investment of your time in controlling these animals. Use the links to further your level of knowledge and understanding of the pest species you are targeting.

Without a basic understanding of the key times for strategic baiting and other control agents, and the positive impacts that working in a coordinated fashion can have on decreasing populations, your time may be not spent most effectively.

Key decisions, critical actions and benchmarks

There are three must-dos in this procedure:

- Develop a pest animal management plan
- Control predator animals
- Control competing grazing species.

Develop a Pest Animal Management Plan

Pest animal control is just one part of an integrated approach to the management of grazing system production and natural resource systems. The approach taken to manage pest animals needs to be carefully planned and coordinated to ensure that maximum benefit is achieved from the effort and cost of implementing the control program.

The planning process:

- Identify the pest animal species that are present on your property – including methods of identifying and quantifying pest animal activity
- Identify if there are any pest animals active nearby, that may become a problem in the future
- Identify and cost the damage the pest species causes to your property, animals, and environment
- List times when activity is highest
- List when activity is lowest
- Identify through research when the main breeding seasons are

AT A GLANCE



- Effective pest species management requires careful planning to optimise control of animals
- Target times of the year to effectively manage one or more species in a single program
- Aim to work in a coordinated fashion in a regional context for enhanced control of predator species

- Research when the recommended times are for optimum control of each pest species
- Write down which control agents are effective, and are an option for your business, in terms of time, cost, effectiveness, availability, and non-target risks
- Record your planned activity and methods of control that you will use on your property
- Review your activities for effectiveness, and ways that might improve control in the next campaign
- Find out if there are any seasonal local or regional campaigns coordinated towards your target species, and join the group(s) if you are able.

Individual efforts

Individually, you can maintain constant pressure on the pest animal species, by employing control agents in times of peak activity, other important times (such as lambing), as well as in between times.

This could be as simple as having bait stations located along tracks which you use when running waters, that can be replenished and monitored, for the in between times, with a targeted campaign in the lead up to and over lambing time.

Sustained pressure can help keep populations at lower levels throughout the year. It is also very useful to track and control the influx of new animals after a major campaign.

Co-ordinated efforts

Depending on the species present, your individual efforts may not be rewarded if there is a high population, and no co-ordination of controlling the species.

Predator control is often more effective when coordinated around a group or district approach with neighboring properties undertaking the control program at specific times.

Make all attempts to work closely with neighboring properties to control feral animals where possible.

Community pest management groups deliver integrated management programs for wild dogs, foxes and feral pigs in some cases. These coordinated approaches may also be eligible for assistance from industry bodies, natural resource management organisations or government departments. These groups also offer a mechanism to engage individuals who are new to managing pest species in a non-threatening way.

Multiple target species

In areas where foxes and wild dogs both occur it is advantageous to conduct regular wild dog baiting programs to manage both species. Foxes are natural scavengers and will readily take and be killed by wild dog strength 1080 baits targeted for wild dogs. Wild dogs however require a higher dose rate of 1080 than used for foxes and are less likely to be killed by fox bait if eaten.

If fox numbers are high they can also have adverse effects on wild dog baiting

programs by taking the baits targeted for the wild dogs. A replacement baiting program using wild dog strength baits will manage this non-target uptake and provide increased control for both species.

There is also a need for follow up monitoring and ongoing control efforts to ensure that predator populations are maintained at low levels with a minimum impact on the grazing management system.

Be sure to know and adhere to regulations regarding use of control agents for pest species, as different jurisdictions (states) do have different rules. Your local pest management officer will assist you with this.

Understand the interactions which may occur that can have negative or positive impacts on control of particular pest animal species. Investing in this knowledge can optimize results, and prevent failed campaigns.

Control predator animals

The main predator animals found in the pastoral areas of Australia are wild dogs, foxes and feral pigs. Many control techniques for these pest species are effective across more than one pest species, which is a bonus for control programs, especially where foxes and wild dogs are concerned.

Make it a priority to understand a little about the biology of each pest species present, and when is the best time in their life cycle to target them for optimum control.

Wild dogs and foxes can cause significant impacts on grazing businesses. Wild dogs are a primary predator on young or weak stock, and a significant predator in sheep country. Foxes are most often a secondary predator, preying on animals that are injured, mistreated, sick or similar. Importantly, both of these species require control agents to keep populations down.

Feral pigs require much larger doses of 1080 to be killed and therefore can consume a number of wild dog or fox baits before being affected by the toxin. Large numbers of feral pigs can have detrimental effects on wild dog

management programmes as they will consume meat baits targeted at wild dogs. Pig numbers should be controlled leading up to wild dog control programmes in order to ensure effective wild dog management. Check with your state pest animal authorities to find out about using 'pig strength' wild dog/fox (meat or meat type) baits to overcome the potential for feral pig consumption of wild dog/fox baits during programs targeting these species. In many pastoral regions where grain growing is uncommon, feral pigs will not readily take grain based baits.

Feral pigs can cause significant levels of damage to grazing businesses through:

- Reducing lambing percentages by preying on new born lambs
- Damage to fences
- Damage to water points and contamination of surface catchments
- Having the potential to spread exotic diseases
- Competing for and reducing the palatability of feed
- Harbor diseases that may impact on humans and other animals.

There are five key messages which apply to controlling predator animals:

Predator management needs to be coordinated and applied at a landscape scale

- Community management programs have proven to be effective in pastoral regions of Australia for the management of wild dogs and foxes
- Effective predator management programs are those that involve all stakeholders, including private and public land managers
- Programs need to integrate using as many forms of control as possible in order take out a greater proportion of the predator population
- Large scale coordinated baiting programs are an effective means of reducing populations across a region but targeted on farm replacement baiting programs may be required to reduce annual impacts
- Developing community based predator management plans will assist in providing information on the

movements and habitat of predators and allow for better targeting and communication of the control program

→ If wild dogs and foxes are present in the region or on the property undertake baiting programs for wild dogs with the additional benefit of fox control at the same time

→ Similarly for feral pigs if they are present when targeting wild dogs/foxes.

Control needs to be targeted

→ Less is better when targeted

→ Be proactive instead of re-active

→ Build proactive control programs into daily or weekly property management activities, such as water runs, etc.

→ Become familiar with the signs of wild dog, fox, and feral pig activity

→ In addition to obvious signs such as tracks, scats and howling, the presence of wild dogs on the property could be suspected if stock are agitated and restless, kangaroos and wallabies have cleared out of paddocks where they are usually found or working dogs are unusually focused on scent marking and marking tussocks or trees out in the paddock

→ Actively look for the presence of wild dogs and implement control before they have an impact rather than implementing control in response to attacks

→ Wild dogs, and to a lesser extent foxes, are creatures of habit and will use the same travel routes and corridors

within the landscape regardless of where they have come from

→ Target control in areas such as travel ways and landscape features such as roadways, creek lines, ridges, stock pads and trees plantations, etc.

1080 baiting programs can be conducted while minimising risk to working dogs

→ Following the best practice guidelines for 1080 baiting will limit the risk to working dogs

→ The retrieval and destruction of baits at the conclusion of a program is critical in reducing risk to working dogs

→ Tying baits with wire to known locations and/or burying them will allow effective retrieval of baits giving the producer confidence that the bait has either been eaten or collected prior to mustering

→ Tying and burying baits prevents them being removed by non-targets improving effectiveness by ensuring the baits remain available to wild dogs

→ More is not necessarily better, a few strategically placed baits in areas of known wild dog activity often delivers far more effective control than broad scale distribution of baits in areas the dogs don't use

→ Avoid risks to working dogs by leaving them at home when checking baits or travelling to areas of the property where control is being undertaken, and use muzzles when using working dogs if a baiting program is underway.

Integrate as many control techniques as possible on farm

→ Where possible utilise trapping and shooting in conjunction with baiting to achieve better control. No one technique on its own will deliver effective control

→ Additional techniques such as fencing and guardian animals may be used in conjunction with traditional control, but shouldn't be used in isolation of conventional control tools

→ Seek professional advice to increase your understanding of the relevant techniques and their integration.

Wild dog management should be about reducing impacts rather than counting dead dogs.

→ Manage dogs to reduce impacts as eradication is unlikely in many areas.

Case study

An AWI-funded wild dog control program has contributed to control programs being conducted across 1.3 million square kilometres of country in every mainland State of Australia through 116 wild dog control groups.

Survey results of 331 participants indicated:

→ 29% intend to reintroduce sheep

→ 58% noticed an increase in native animals

→ 4% intend to increase sheep numbers

→ 85% reported better wellbeing as a result of participating.

Given these results, the Board of AWI remains strongly committed to supporting growers facing wild dog predation. Support through the **Community Wild Dog Control Initiative** continues, as does the provision of coordination of wild dog control at the national and state/regional levels.

AWI funds the National Wild Dog Facilitator; Qld Wild Dog Coordinator; Wild Dog Coordinators in Western NSW and the New England region; two Coordinator positions in Victoria's North East and in the Gippsland; an annual coordination role in South Australia's **Bite Back** program; and a soon to be announced Wild Dog Coordinator in Western Australia.



Lee Allen courtesy Invasive Animals CRC

Signposts



View

Invasive Animal Cooperative Research Centre (CRC) www.feral.org.au/

AWI provides a comprehensive source of information on their website regarding control of feral predator pests. Visit www.wool.com/pestanimals

PestSmart information on the European fox: <http://www.pestsmart.org.au/pest-animal-species/european-fox/>

PestSmart information on wild dogs: <http://www.pestsmart.org.au/pest-animal-species/wild-dog/>

Wild Dog Planning Calendar fact sheet: https://www.daf.qld.gov.au/__data/assets/pdf_file/0007/59875/IPA-Wild-Dog-Fact-Sheet-Control-Planning-Calendar.pdf

PestSmart information on feral pigs: <http://www.pestsmart.org.au/pest-animal-species/feral-pig/>

Feedback TV – **Controlling pests and predators** www.youtube.com/watch?v=Adz7z-rtl4k

Read

West P (2008) **Assessing invasive animals in Australia 2008**, National Land & Water Resources Audit and Invasive Animals Cooperative Research Centre, Canberra

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Jones R, Saunders G and Balogh S (2006) **An economic evaluation of a pest management control program: 'Outfox the fox'**, Economic Research Report No. 29. NSW DPI, Orange

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Make all attempts to work closely with neighbouring properties to control feral animals where possible.

Allen B and West P (July 2013) **Influence of dingoes on sheep distribution in Australia**, Australian Veterinary Journal, Volume 91, No 7, pp261-267

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SA Arid Lands NRM Board (2010) **Best Practice Dingo Control**, SA Government

Control competing grazing species

Non-domestic grazing species are a cost to pastoral areas through the direct competition that they place on the available plants utilised by grazing operations. Not only do the competing grazing species consume pasture that could be utilised by domestic species, they are often responsible for environmental damage.

Competing grazing species are generally thought of as the wild species which exist in the pastoral areas, such as:

- Wild goats
- Rabbits
- Camels
- Donkeys

It is also important to consider the native species which also, during certain conditions place significant pressure on the environment and plant material present.

A key challenge to the pastoral manager is to minimise the impact of the native species on the grazing operation,

keeping the impact to a manageable level, and minimise the number of feral grazing animals impacting on their operation.

The role and impact of native species on total grazing pressure is covered in procedure 12.5 **Match grazing pressure to feed supply**.

This procedure covers only wild or feral pest species.

Goats

Goats arrived in Australia with the first European settlers. Historically, wild goats were considered a significant pest species. In more recent times, an industry focusing on the harvest of goats in pastoral areas has developed, and nowadays, the Australian goat meat export industry is a significant industry and many pastoralists in Australia now consider the capture and sale of unmanaged wild goats to be an important part of their business. The added benefit of this harvest comes from improved natural resource management outcomes that removal of the goats delivers.

Specifically, the goat industry in western NSW is becoming increasingly professional and producers are developing production systems that allow improved husbandry, management and increasing control over grazing pressure.

Many producers manage the wild goat population on their properties in a similar way to how they manage their domestic animals.

Unmanaged goats contribute to the Total Grazing Pressure on a property, and as such, their inclusion in either a management program, or control/eradication program is required, to minimise the negative impacts of their presence on the property. These impacts may arise from increased grazing pressure, to the opportunity cost of mobs moving throughout the landscape and utilising your feedbase, but not contributing to the economic productivity.

Because goats, as well as other species of animal, both domesticated and wild, are proven significant causal agents of environmental damage, through soil erosion or pasture degradation, harvest programs are integral in maintaining pastoral land condition, and minimising damage caused by this species.

Wild goat herds remain a pest species in both pastoral and non-pastoral areas of Australia. Legislation varies from state to state regarding their control and you should adhere to regulations specific to your jurisdiction.

Not all pastoral areas have available an opportunity to harvest these animals in a commercial sense, and as such, control of these in a pest management sense is carried out.

Rabbits

The rabbit is a widespread pest species, which has a significant impact on grazing lands across Australia. Their distribution is significant, with the pest being present in all states of Australia, with lower prevalence in the more northern parts of Australia.

The rabbit is such a successful pest species because of its high reproductive rate, having the ability to produce five or more litters per year, depending on available food supply.

Control measures, as with other pest species, are best implemented through an integrated approach, which targets the species at key times with key practices to offer maximum impact at that time.

Donkeys

Feral donkeys can damage native vegetation, contribute to soil erosion and compete with stock for pasture and water.

Control methods include:

- Ground shooting
- Shooting from helicopters
- Use of a Judas animal
- Exclusion fencing.

Camels

Australia is believed to have one of the largest, if not, the largest wild population of camels, approximately 1 million. They occupy most of Australia's desert country including the Great Sandy, Gibson, Great Victoria and Simpson deserts, as well as much of the semi-desert lands.

What makes them effective pests is their ability to forage over very large areas, up to and exceeding 70 kilometers per day. Camels breed every second year, so their fecundity is not what makes them effective pest species. Camels are an effective pest species due to the fact that they can cover large distances, are well acclimatized and they have no predators, aside from culling operations.

Camels are selective feeders with a preference for shrubs and trees browse rather than grasses. They can go for long periods without needing to drink, but during the heat of summer they will drink every day if water is available. Camels compete for available feed and water, and may cause extensive damage to fences, important cultural sites and other farm infrastructure. They are also a potential carrier of exotic disease.

Camels are mainly controlled through:

- Trapping at water points
- Mustering
- Shooting
- Slaughter, live export or tourism
- The Judas approach (with some success).



Signposts



Read

Goats:

Going into Goats: Profitable producers' best practice guide to incorporating wild goats into a managed enterprise on your farm.

→ See following link: <http://www.mla.com.au/Research-and-development/Extension-and-training/Going-into-goats>

PestSmart information on wild goat control: <http://www.pestsmart.org.au/pest-animal-species/feral-goat/>

Rabbits:

Lookup tool 5.6 **Rabbit Control Options** see below:

→ http://www.makingmorefromsheep.com.au/protect-your-assets/tool_5.6.htm

→ <http://www.daff.qld.gov.au/plants/weeds-pest-animals-ants/educational-resources-and-careers/publications/rabbit-control-in-queensland>

→ <http://www.feral.org.au/pestsmart-glovebox-guide-for-managing-rabbits/>

PestSmart website information: <http://www.pestsmart.org.au/pest-animal-species/european-rabbit/>

Donkeys:

→ <http://www.feral.org.au/aerial-shooting-of-feral-donkeys/>

→ <http://www.feral.org.au/ground-shooting-of-feral-donkeys/>

Camels:

PestSmart information on camels: <http://www.pestsmart.org.au/pest-animal-species/camel/>

Tool 5.12 **Wild dog and feral pig control options** http://www.makingmorefromsheep.com.au/protect-your-assets/tool_5.12.htm

Procedure 12.7

Obtain best production from rainfall received



Background information



This procedure outlines some of the important principles which you need to understand in order to optimise your business performance from the rainfall that you receive. It covers both Natural Resource Management (NRM), livestock production and business related topics, each important to the ongoing sustainability of your business and property.

This procedure brings together much of the information and must-dos outlined in the previous procedures, to ensure that you have plans in place to tackle what nature throws at you, and that you are in the best possible position to deal with all situations.

Key decisions, critical actions and benchmarks

Rainfall is the key driver of production in all grazing management systems. To ensure that the rain that falls on a property is efficiently converted into sufficient quantity and quality of feed, the pastoral production system and business which operates on it must be in a 'rain ready' state. This requires that when the rain falls on the property, it soaks into the soil and the property and business are each in a state whereby they capture productivity that the rainfall will provide.

Rain stimulates growth of palatable and productive ephemeral, annual and perennial species. This plant growth provides energy, protein and key elements to achieve favorable levels of livestock production.

In this context, the level of production from the property could be measured based on both land area and rainfall received by considering:

- DSE per hectare per 100mm of effective rainfall
- Kg of meat (or wool) produced per hectare per 100mm of effective rainfall
- Other measures such as productivity per DSE, and this could be in \$/DSE, or GM/DSE, or Profit/DSE
- Other measures relating to NRM outcomes, such as groundcover at key dates.

These performance indicators can then be measured and monitored to assess annual production efficiency. Using

AT A GLANCE



- Plan for good seasons and be prepared to alter plans when seasons are poorer
- Consider what the trigger points are for your situation and location, and use these as tools for decision making
- Know your options for different seasonal scenarios, make decisions in a timely manner, avoiding hasty decision making
- Measure performance of your business and in the context of seasonal conditions

rainfall as part of a performance indicator can add valuable context to poor seasons, by allowing you to measure performance in below average rainfall seasons, in the context of rainfall received.

There are four must must-dos in this procedure:

- Be rain ready for your business and property
- Know your options – in good seasons
- Know your options – in poor seasons
- Monitor your business.

Be 'rain ready' for your business and property

Rain ready property

Landscape function provides a measure of the landscape's capacity to capture rainfall and nutrients that directly contribute to plant growth and productivity in the system. Landscape function provides an assessment of landscape condition and resilience.

A key step in ensuring you are 'rain ready' is to ensure your pasture is conditioned in a way to manage the next rain event, and just as importantly, to manage through dry times.

Maintaining landscape function ensures pastures are ready to respond to the next rain event. Conditioning pastures to respond to rainfall involves strategies such as maintaining adequate cover levels and managing to maintain perennial in the system. Ground cover assists rainfall infiltration and efficient nutrient cycling. By managing the utilisation of perennial grasses to the recommended rates, you are maintaining landscape function, allowing responsiveness and also keeping a mix of perennials in your pastures. Perennial grasses are important for maximising sheep production and rain-use efficiency. They respond (produce green leaf) to summer storms and survive between infrequent showers.

Similar to landscape function, the *land condition* gateway of the Grazing Land Management system, which has been developed for Northern pastoral areas, considers the capacity of the land to respond to rain and produce useful forage and is a measure of how well the grazing ecosystem is functioning; this is essentially the landscape function.

There are three components to consider in determining the level of functionality of the land system.

Soil condition

This is an assessment of the soil's ability to:

- Absorb and store rainfall
- Store and cycle nutrients
- Provide suitable conditions for seed germination
- Resist erosion.



Pasture condition

This is an assessment of the feedbase to:

- Capture and store solar energy and produce palatable green leaf
- Use rainfall efficiently
- Contribute to soil stability
- Cycle nutrients.

Woodland condition

This is an assessment of the woodland to:

- Grow pasture
- Cycle nutrients
- Regulate groundwater.

Minimise overgrazing and decline in landscape function

Overgrazing can negatively impact the rain readiness of your property. Excessive populations of domestic, feral and native grazing animals combined with dry conditions when feed levels are reduced have been primary contributors to the degradation of areas in the rangelands. From a pasture condition perspective, invasive native scrub, applicable in areas that are prone to scrub encroachment, are a non-preferred 'increaser' species that, unless well managed, will dominate the system and reduce its ability to convert water and nutrients into useful feed (palatable green leaf) and consequently animal production.

A decline in landscape function often results in poor responses following rain events.

Signposts



View

Grazing Land Management, MLA
<http://www.mla.com.au/News-and-resources/Publication-details?pubid=2914>

Landscape Function Analysis,
<http://www.csiro.au/Organisation-Structure/Divisions/Ecosystem-Sciences/EcosystemFunctionAnalysis.aspx>

Betting on Rain http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0010/69634/betting-on-rain-1.pdf

Informing the decisions of pastoral woolgrowers for country and profit, Land, Water and Wool
http://www.wool.com/globalassets/start/on-farm-research-and-development/production-systems-eco/environment/land/lww_pastoral_informing-decisions-of-pastoral-woolgrowers.pdf

Wool production in the pastoral country of inland, Land, Water and Wool,
http://www.wool.com/globalassets/start/on-farm-research-and-development/production-systems-eco/environment/land/lww_pastoral_insights-case-studies.pdf

Know your options – in good seasons

“*Make hay while the sun shines*” – these conditions don’t last forever!

Good seasons never seem to happen frequently enough, according to many pastoralists in Australia. How to capitalise on the good seasons takes careful planning, adaptive management, and risk management (and a bit of luck in some cases!).

There are many rules of thumb regarding the impact of the ‘good seasons’ on agricultural businesses across Australia, but importantly, the reality of the good season is that you need to be ready to take the opportunity to benefit from the seasonal conditions, which will help provide the capacity to buffer you against the poor seasons.

The inherent knowledge that you have developed, as to how many animals you can comfortably carry on your property in a good season, is something which you will develop through experience of good and dry times.

- Have a plan as to how to utilise the extra feed which grows in good seasons
- Know your key dates, trigger points and monitor your total grazing pressure
- State your risks and analyse risk before making any decisions.

Use the tools from other procedures to understand your feed resource and what its capacity is in good years. Use this information to develop a strategy as to

what options you will take to capitalise on the years when there is more feed to safely utilise than your stock can consume. Some options are:

- Trading
- Agistment
- Marketing to different specifications, e.g. finished stock rather than store stock
- Carrying feed over
- Allowing a portion of your property to rest for longer periods – to repair any areas which need improvement
- Accelerated lambing
- Keeping older stock for longer
- Joining ewe lambs.

There are others, no doubt, and you will have access to local information which will best fit your operation.

Be sure to utilise all available sources of information for devising your strategies and improving the number of options you have available to you.

Signposts



View

AWT’s **Planning for profit** addresses drought recovery strategies, from pasture recovery to accelerated lambing, and flock structure changes.
<http://www.wool.com/on-farm-research-and-development/sheep-health-welfare-and-productivity/sheep-nutrition/awi-drought-resources/>

Know your options – in poor seasons

Getting through a poor season, or run of poor seasons, requires patience, resilience, and a significant amount of planning.

Similar to knowing options for good seasons, and equally as importantly, knowing what options you have available to you and what trigger points exist will enable you to make decisions based on sound knowledge and careful planning, rather than snap decisions, based on emotion or panic. Some of the strategies are to be considered during poor seasons are:

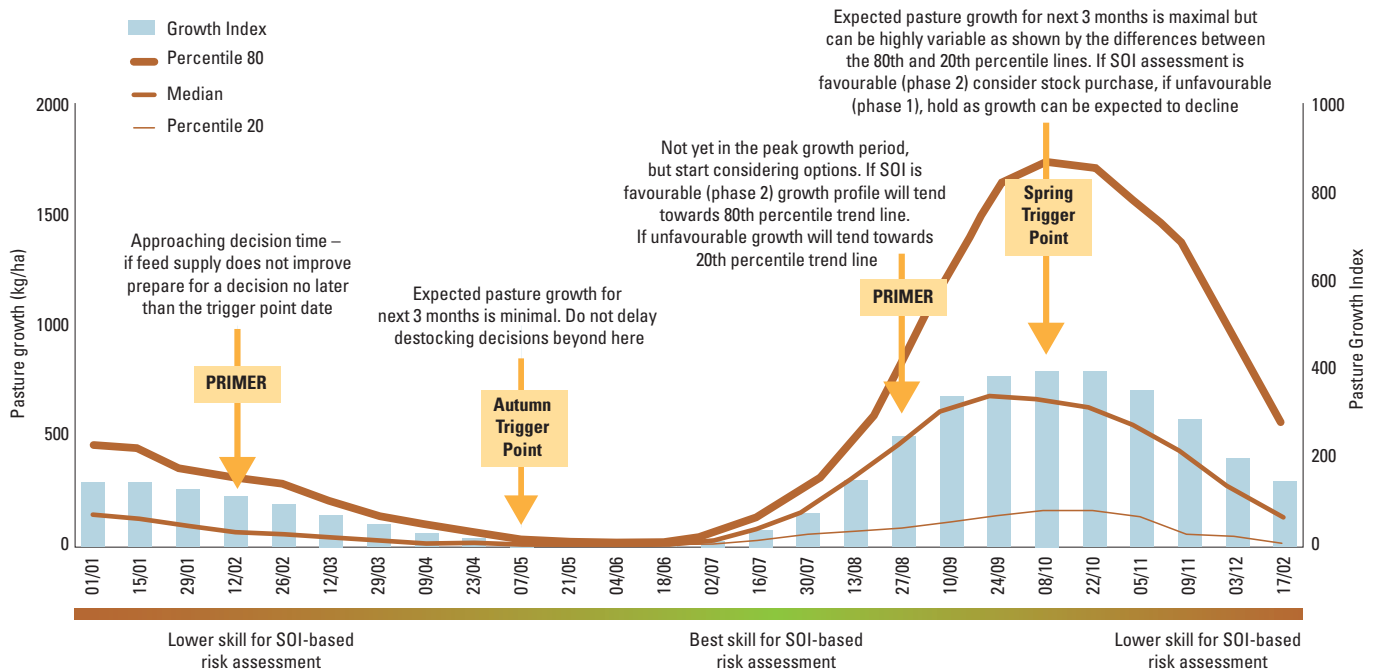
- Feed or sell
- When to sell
- What sheep to sell
- Cost of feeding
- Confinement feeding
- A mob which are always the first to go.

By having set your own key dates and trigger points, whereby you assess the current conditions, outlook, and other factors, including market, risk, resources available to the business, you can strategically work through the issues in a fashion that allows you to be in control of the situation.

Trigger points are calendar dates beyond which decisions to buy or sell livestock should not be delayed. They can be identified by summarising long term simulated pasture growth record to show when the prospects for pasture growth



Figure 4 How to determine trigger points (Source: Betting on rain, NSW DPI 2006)



Example of how to use the pasture growth profiles and critical percentile values to determine trigger points beyond which decisions that depend of future growth should not be delayed. Note the 'primer' point, some time before the trigger point, when preparation for a decision and consideration of options should start.

for the next three months are highest or lowest and the variability in growth from year to year.

Revisiting and adjusting these trigger points are an important part of the process of managing poor seasons, and indeed emerging in a resilient state, physically, mentally and financially.

Keep revisiting your plans and adjusting them, but don't put off the inevitable.

Early decisions are often the ones made with the least amount of emotion, as they are not forced decisions.

Managing your pastures and land condition appropriately will help your country recover faster. It will be more 'rain ready'. Landscape function remains important during dry times, as maintaining function will assist with recovery.

Tool 12.20 *Recognise and minimise decline in landscape function.*

Signposts



Read

AWI drought pages have a range of relevant publications, plus links to other organisations relevant to managing during a drought, as well as recovering after rains arrive.

Which sheep do I keep? (AWI)

http://www.wool.com/globalassets/start/on-farm-research-and-development/sheep-health-welfare-and-productivity/sheep-nutrition/awi-drought-resources/2013_which_sheep_do__i_keep_lr1.pdf

Managing fodder prices for droughts

http://www.wool.com/globalassets/start/on-farm-research-and-development/sheep-health-welfare-and-productivity/sheep-nutrition/awi-drought-resources/gd0389_managing-fodder-prices-for-droughts-lr.pdf

Managing sheep in droughtlots

http://www.wool.com/globalassets/start/on-farm-research-and-development/sheep-health-welfare-and-productivity/sheep-nutrition/awi-drought-resources/gd0458_managing-sheep-in-droughtlots.pdf

MLA has a number of relevant resources available relating to poor seasons, or droughts:

<http://www.mla.com.au/Livestock-production/Feeding-finishing-and-nutrition/Drought-feeding>

<http://www.mla.com.au/livestock-production/environmental-management/drought-and-disaster-management>

Visit

State Department of Primary Industries websites.

Monitor your business

Keeping a watchful eye on the performance of your property and business, will ensure that you have a strong handle on the exact position of your business, plus you can accurately forecast the next year's performance under best, average and worst case scenarios.

Monitoring of your property's assets and performance are as important as monitoring business performance and assets.

NRM Monitoring

There are a number of monitoring systems available for monitoring land condition; refer to procedure 5.4

Monitor the System. One of these monitoring systems, **The ABCD Land Condition Guide** (QDPIF, 2006) provides the methodology for assessing the soil condition, pasture condition and woodland condition. This involves assessing the landscape based on an A (high value), B, C or D (low value) rating for a number of different areas including:

- Soil cover
- Erosion risk
- Levels of bush, grasses and forbs
- Levels of recruitment of desirable species
- Evidence of grazing impact on shrubs and soil
- Palatable and non-palatable species
- Weeds.

Land condition and landscape function have a strong focus in most of the grazing management and landscape monitoring systems. Three well-known approaches to monitoring landscape condition and function are:

- Ecosystem Management Understanding (EMU™)
- Landscape Function Analysis
- Tactical Grazing Management.

These approaches involve understanding and reading the landscape and identifying indicators of better function, or poorer function and degraded parts of the landscape. These approaches highlight the importance of rangeland ecological function and how it plays an important role in key processes such as infiltration of rainfall received.

Ecosystem Management

Understanding (EMU™) considers landscape and catchment function and the processes whereby these functions can be restored through grazing management and on-ground works to alter the flow of water through the catchment. EMU involves reading and recognizing landscapes, internal linking processes (function), condition and trend (Walton J and Pringle H, 2010)

Landscape Function Analysis (LFA) is a program developed by David Tongway for both the ongoing monitoring of rangeland environments and for rehabilitating degraded areas. Landscape Function Analysis allows landholders to assess the results of their management actions and identify future priority areas. Landscape Function Analysis challenges the idea that vegetation equals a health landscape and instead focuses on soil condition as the basis for plant growth. A number of system elements are examined to determine where they are stable or unstable (Hannigan, 2007)

Tactical Grazing Management and other grazing management approaches provide a range of tools for assessing landscape to guide management decisions, e.g. assessment methods for ground cover and perennial grass utilisation. It also considers approaches to setting a stocking rate, the impact of non-domestic species and changes in shrub cover.

Weeds

All good NRM monitoring considers the prevalence, impact and cost of managing weeds. Weeds pose a significant threat to Australian rangeland systems and threaten pasture condition and woodland condition. In addition to threatening biodiversity through impacts on individual species and communities, they have the ability to downgrade key ecological processes.

The costs associated with weeds can be linked to:

- Decreases in productivity of rangeland systems
- Contamination of livestock products: fibre, meat
- Damage to livestock: toxicity, grass seeds, other
- Costs of control, containment or prevention.

There are six principles to achieving effective weed control:

- Awareness: be aware of existing and potential weed problems
- Detection: be on the lookout for new weed infestations before they become too large and difficult to handle

→ Planning: prioritise efforts and plan a strategy for successful control

→ Prevention: prevent new weed infestations and contain the spread of existing weeds

→ Intervention: control weeds early before they become out of control

→ Control and monitor: control, monitoring and follow-up are all aspects that will assist in achieving good weed control.

Weed management is an ongoing component of property and grazing systems management.

See tools 5.3 and 5.4 for weed management and control tactics

Signposts



Read

NRM Monitoring

Landscape Function Analysis.

<http://www.csiro.au/Organisation-Structure/Divisions/Ecosystem-Sciences/EcosystemFunctionAnalysis.aspx>

Tactical Grazing. <http://www.mla.com.au/Livestock-production/Grazing-and-pasture-management/Improved-pasture/Grazing-management/Grazing-strategies>

Campbell T and Hacker R (2000) **The Glovebox Guide to Tactical Grazing Management for the semi-arid woodlands**, NSW DPI

Weeds

Fensham R and Fairfax R (2007) **Talking Fire: Burning for pastoral management in the Desert Uplands**, Desert Uplands Build-up and Development Strategy Committee Barcaldine

Grice AC and Martin TG (2005) **Weed Management: Managing for biodiversity in the rangelands**, The CRC for Australian Weed Management

Myers B et al. (2005) **Fire Management: Managing for biodiversity in the rangelands**, Natural Heritage Trust

Jessop P (2009) **Management burning of invasive scrub: Principles**, NSW Primefacts 852

Jessop P (2009) **Management burning of invasive scrub: Techniques**, NSW Primefacts 853



Tool 12.1

Prepare a property inventory

An inventory of your property's assets can take a very individual form, there are no right or wrong ways to compile such a tool. You can use the following example as a guide, or template, and make changes as you see fit, and what works best for you and your business.

Asset/ feature name	Description	Purpose	Condition of asset/feature	Comments	Plan/priority for upgrade
Fencing					
Boundary Fences	Plain wire fence around perimeter of property	Keep stock in Keep stock out	Fair	Need to consider vertebrate pests which are coming from neighbouring property	Southern boundary needs attention within 2 years
Internal fencing	Plain wire	Keep stock in desired paddocks	Good – adequate for merino sheep		
Laneways					
Buildings					
Shearing shed	60 years old Corrugated iron 5 stand shed	Shearing crutching	Structure – average Shearing plant – poor	Plant is old and needs replacing	High – need to replace stands within 2 years
Sheep yards					
Water supply					
Dams					
Bores					



Tool 12.2

Prepare a property plan

Preparing a Property Management Plan will be a systematic process. Different jurisdictions, and methodologies will have different processes and systems for preparing the plan.

There is more than one way to undertake the process of preparing a property management plan:

- You can attend a course or study through published literature and complete one yourself, using documented guidelines
- You can actively participate in the process, and feed information into the plan, and have a consultant prepare the plan
- State government departments may have specified guidelines, according to laws governing use of land, or access to funding to undertake projects. Be aware of the guidelines which exist in your area, so your plan will have multiple uses – this will save on time in the future.

Key elements that make up a property management plan are:

Paddock boundaries

Knowing or determining paddock size is an important part of this process, as it will be important in determining stocking rates and management options.

Land systems and catchments

Vegetation varies widely in response to differences in soil type and land form, which in turn determines the local distribution of water and nutrients in the system. Particular combinations of landforms/topography, vegetation and soils/geology form different 'types' of country which can be easily identified in the field and mapped by aerial photography. These distinctive types of country are known as land systems or land classes.

Understanding the land units and land systems that make up a property is essential to effectively managing a grazing enterprise. A land system is an area or group of areas through which there is a recurring pattern of topography, soils and vegetation. Land systems are made up of components, and are able to be described or identified due to a unique combination of land units and their relative proportions.

Similar vegetation types have similar management requirements and hence it is usual to fence similar land systems into the same paddock. Paddocks that have a diverse mix of land systems are often difficult to manage; land systems that grow desirable plant types will be susceptible to overgrazing, whilst land systems that grow less palatable species will tend to be under-grazed. Consideration can be given to the relative susceptibility of land units and systems with respect to issues such as scrub encroachment, wind or water erosion, and consequently monitoring of these units and systems may be different.

Broad vegetation groups

The vegetation types present on your property can be documented on the map as follows:

- Plant species that are preferred by livestock or important for production
- Areas of shelter
- Areas where undesirable species may establish or increase noxious weeds or unpalatable invasive native shrub
- Areas of vegetation that have been modified by management e.g. clearing, water spreading, burning
- Areas of mulga (*Acacia aneura*) or other palatable browse species suitable for use as a drought reserve
- Areas susceptible to overgrazing, which usually contain some of the most productive and palatable species.

The location and condition of key infrastructure items

Include all key infrastructure, such as tracks and roads, houses and buildings, airstrips, livestock handling facilities, shearing sheds, yards, paddock fences, laneways, trap yards/self-mustering facilities, mills, tanks and troughs or dams and watercourses. Include in this inventory the age, condition, importance, adequacy for the task, development needs, and potential for improvement.

Land management issues

Your farm map should include any areas which cause problems, or are areas in need of remediation, as well as their priority for works to improve the paddock/area.

Given the diversity of the pastoral areas of Australia, and their unique management requirements, it is imperative that you are familiar with planning processes, and recommendations in your local area.



Tool 12.3

Conduct a water audit for your property

When conducting a water audit for your property you need to consider the various aspects to water on your property that impact on the performance of the business. These are listed below:

Water source

On your map, you will need to list where the watering points and sources are, as well as their condition, and plans for improvement/refurbishment.

Investment in water infrastructure is not a cheap exercise, and can be time consuming, but it is an essential part of creating an effective grazing management system. There are many sources of water, and many methods of managing this valuable resource:

- Establishing systems for surface water collection in dams
- The development of bores
- Managing access to creeks or other natural water sources
- Increasing on-farm storage capacities
- Distributing water using poly pipe, tanks and troughs
- Upgrading existing systems e.g. upgrading windmills to solar pumps, changing open bore drains to piped reticulation systems, monitoring methods, etc.
- Use of telemetry and remote management systems.

Similarly, operating, monitoring and maintaining water systems is an essential and costly part of property management.

A cost that is often less recognised, is the penalty cost caused by water issues:

- Limiting the ability of stock to access grazing areas due to water quality or insufficient watering points, or dry dams
- The quality of the water impacting on reproduction or wool and meat production
- Inefficiencies as a result of travel times to start pumps, or time taken to repair ageing systems and equipment
- Inefficiencies and costs associated with undertaking routine water runs, when this could be partly or entirely replaced in a cost effective manner with remote monitoring systems.

The benefits of having well planned water infrastructure in place are immeasurable. It allows stock to water adequately in times of peak demand, with little strain on stock, or the system.

Undertaking an audit of your farm’s water resources and stock water requirements is an exercise which can provide a high level of value in formulating your strategy for grazing management, as well as managing other limiting factors at critical times, for example labour and fuel for water runs. Use the opportunity to look into new technologies in water management, such as remote monitoring. The cost saving on labour, fuel and wear and tear may be offset by establishment of such a system.

Water quality

Water quality can directly impact on livestock performance, and it is important to understand the potential impacts of poor and good water quality. Knowing the quality of your water source can identify potential problems with livestock performance, and will help avoid unnecessary penalties from water quality issues.

Water testing services are available from private companies and a number of state agriculture and environmental departments.

Use one or all of the following components, to obtain accurate information about the status of your water supply. This may then feed into your business plan and improvement schedule.

Salinity tolerances of livestock

	Maximum concentration for healthy growth	Maximum concentration to maintain condition
Salinity	6,000 mg/l	13,000 mg/l
Alkalinity	< 500 mg/l	< 1000 mg/l

(James C and Bubb A, 2008) (Manitoba Agriculture Food and Rural Initiatives, 2006)

The following table provides a guide to sheep water intake levels.

Sheep water requirements

Class of sheep	Consumption per head per day (litres)
Weaners	2–4
Adult dry sheep – grasslands	2–6
Adult dry sheep – saltbush	4–12
Ewes with lambs, rams	4–10

(Meaker et al. 2007)

These intake figures are ‘average’ figures and can be used on a planning basis to determine the levels of water storage required. Storage allowances also need to allow for:

- Wind ‘droughts’ when windmills may be ineffective and back-up pumping systems are required
- Seepage and high evaporation rates for surface catchment systems in the summer
- Lower than ideal in-flow into surface catchment systems due to poor seasonal rainfall
- Breakdowns or failures of pumps, and other water related equipment/infrastructure.

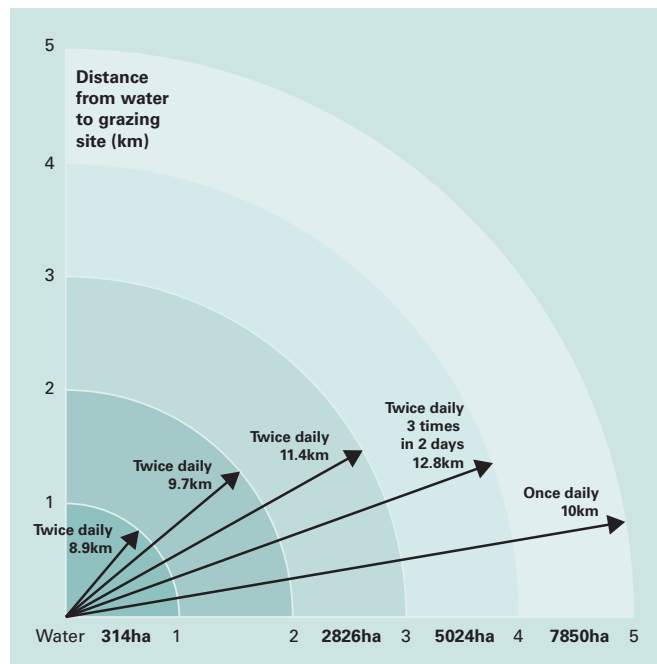
The following table provides a guide on the distances walked based on different water salinity levels:

Impact of water salinity on grazing area of sheep

	Water salinity (ppm)			
	2,500	5,000	7,500	10,000
Non-salty feed				
Grazing radius (km)	4.0	3.8	3.7	3.5
Grazing area (ha)	5,020	4,540	4,300	3,850
Salty feed				
Grazing radius (km)	3.0	2.9	2.8	2.7
Grazing area (ha)	2,830	2,640	2,460	2,290

(Western Australia Department of Agriculture, 2003) * Grazing areas indicative only

Sheep grazing on saltbush commonly need to drink twice a day and have a reduced grazing range when compared to sheep grazing grasslands. Salty diets require additional water to flush the salt load from the sheep's system (Squires 1981). When the water is saline, there is a significant reduction in the grazing radius and the utilisation of paddock feed.



Inventory of water sources

Name of source	Source type	Reliability	Flow rate/capacity	Number of watering points servicing	Maximum number of stock to water per day	Maximum daily requirements (L/day)	Capacity status (good/fair/poor)
Big dam	Dam – northern catchment	Excellent	2ML	5 – via solar pump to troughs in paddocks 1–3	5,000	50,000L with sheep lactating	Good Excellent catchment

Maximum daily requirements

Remember to calculate each class of stock requirements separately, as, for example, lactating stock will require more than dry stock. Add up the requirements for each class of stock to calculate your maximum daily requirements.

Consider the requirements at key times of the year, such as summer and when stock are lactating.

It is advisable to use the maximum potential requirements, so as to plan in a fashion that will ensure that you have ample water at critical times. Water is a resource which you don't want to underestimate your need for.

Class of stock	Number of head	Maximum number in mobs	Maximum daily requirement (L)	Average daily requirement (L)	Total amount required per day for mob (peak)	Average daily demand for class of stock (L)
Dry breeding ewes	2,000	2,000	10	6	20,000	12,000

Writing down you maximum mob sizes is useful, as it allows you to compare your peak supply with demand for paddocks or mobs. This may illustrate potential weak points in your water management, and be useful in considering risk management plans or strategies.

Use tool 5.2 to prepare a basic water inventory.

http://www.makingmorefromsheep.com.au/protect-your-assets/tool_5.2.htm



Tool 12.4

Develop a vision statement

Develop a vision statement for your business, and follow the steps below to help consolidate the process:

- What is your business about?
- What are your aspirations for your business, property, family, lifestyle
- Look up some vision statements of other businesses, that you may find inspiration from
- Try to narrow your ideas down to one statement that sums up your vision.



Tool 12.5

Management calendar

Use the following steps to map out your yearly program. Use a large white board style calendar if you can purchase one, you can erase any operations which you would like to change. These calendars are ideal for mounting on the wall of the office for all to see. You can use it to schedule leave of staff, or times when contract staff are required, and help to identify any issues that may impede efficient operations of the business before they arise. If you use computers in your business, there are many tools which incorporate calendars that may be used with the same effect as a wall planner.

Another benefit of a management calendar is that it allows those in the business to see what deadlines others have, and how these deadlines fit in with key operations throughout the year. Similarly, if your business is operated by one or two people, having the operational times that are busy on the calendar helps with further planning.

- Write down the dates which are the same year on year, such as shearing, joining, crutching, lambing, sale dates, etc.
 - Use the opportunity if you know sale dates to work backwards from, and check that you have a lead time that fits in with marketing of your livestock.
- Write down any administrative dates which you need to be mindful of – as these are often inflexible, e.g. taxation office deadlines, etc.
- Write on the calendar any family commitments that you know about as soon as you are advised of them – these are important to factor in to your work program
- If you have enterprises other than sheep, write the key operations on the calendar, perhaps in a different colour
- Check for any significant overlaps in timing, and labour requirements – discuss as a team how you may work around these choke points – it may be as simple as moving a few operational dates back or forward a little, to ease the pressure on all concerned.



Tool 12.6

Make an action plan for efficiency and innovation in your operation

- Using the template below, draw up a list of areas in your operation that you have identified which could be done better
- Provide an approximate cost of implementing the item
- Outline the proposed benefit of introducing the innovation into your business
- Prioritise the relative ease with which the item can be incorporated into your operation
- Consider and record the expected time that the innovation will last for
- Payback period for amount invested.

If you are unsure of how to calculate some of these figures, such as payback period, or benefit cost ratio, speak to your consultant, or business advisor, and they can help you with these.

Innovation/ efficiency	Approx. cost	Benefit of item	Ease of implementation, and keeping it going	Longevity of innovation	Estimated payback period	Priority of adoption
Better working dogs	\$1,000 per dog	More efficient sheep handling	High levels of ease	6 years per dog	1 year	1
Better sheep yards	\$50,000	Safer handling Better movement of animals through yards Less stress on animals and people Less stress on animals and people Less staff required to perform work in yards	One off – installation	20 years	5 years	2



Tool 12.7

Define your grazing management goals

Use this tool to think carefully about your grazing management goals, from the NRM perspective and how you can best utilise your resources. Write them down. Record reasons for why they are your goals. Date this, and put it in your business planning file, for review.

Taking an active role with stated grazing management goals relies on the understanding, and the acceptance, that the condition of the paddock or property is directly related to the grazing management that is being applied, and not simply a reflection of seasonal conditions.

Define your grazing management goals?

-
-
-

Why are the goals you have identified important to you?

What are the multiple benefits that you aim to achieve from specific grazing management goals?



Tool 12.8

Grazing management practices

Use this tool to work out how your current grazing system meets your business objectives and vision. You can also use it to consider which alternate approach, or combination of elements of more than one approach, will best suit your business if you are considering change.

Make a table with the following headings, to help you determine which grazing management practices will best fit with your business and NRM goals:

Grazing management system	Strengths	Weaknesses	Opportunities	Threats



Tool 12.9

Condition scoring of sheep

A body condition score target of 3 is a useful target for sheep. The **Lifetime Wool Project** attributed a large number of benefits for ewe and lamb survival and wool production from achieving a body condition score of 3 at key times of the year.

It is important that condition scoring in sheep is undertaken each time that sheep are in the yards. A representative group from the main flock can be run through the race and condition scored with results going onto a recording sheet, or into the **Lifetime Ewe Management app**. This provides a visual picture of the spread of condition scores across the flock, as well as an average for the group assessed. This information can then be used to assist in grazing decision making.

Download the **Lifetime Ewe Management (LTEM) app** if you have an iPhone:
<https://itunes.apple.com/au/app/ltem-lifetime-ewe-management/id941511100?mt=8>

An android version is available from <https://play.google.com/store/apps/details?id=com.ltem.main>

As discussed in procedure 3 **Efficient Pastoral Production**, it is useful to consider linking a number of livestock operations together to generate labour efficiencies. Examples how this may occur are:

- At marking or weaning time: Ewes can be assessed as being 'wet' or 'dry'
- At shearing time: Depending on where shearing sits in relation to the breeding program, steps can be taken to influence body condition score, such as putting the ewe flocks on better feed as body condition score is lower than ideal
- At pregnancy scanning: Any ewes that are at lower than ideal body condition score can be managed separately to the main ewe flock, particularly if they are twin bearing ewes. Condition scoring at this time, can inform your management of the pregnant ewes.

The gap between actual body condition score and the ideal body condition score provides an indication of the weight gain required. For example, if a ewe has a body condition score of 2 at weaning, she will need to gain one body condition score (around 7.5kg) before mating. If the lambs are weaned at 90 days (3 months) there are 125 days for this weight gain to occur. This equates to a weight gain of 60 grams per day which is achievable on moderate quality feed.

Understanding the key concepts around condition scoring and incorporating this simple tool into your routine management can assist you with early intervention when seasonal conditions are not ideal. The information you gather can help you decide, for example to sell the mob that you have ear marked for first sale. An early identification of a trigger point can allow you to make informed decisions early.

http://www.makingmorefromsheep.com.au/wean-more-lambs/tool_10.1.htm



Tool 12.10

Estimate Food on Offer (FOO)

Estimating **Food on Offer (FOO)** is one technique for determining stocking rate. It is important that FOO is estimated at key times of the season, namely the start and end of the main growing season.

FOO estimates should also be made at times of the year when stock numbers can be adjusted as part of routine management such as shearing, crutching or pregnancy scanning when there is the chance to reduce or increase stock numbers, based on the assessment of feed availability.

It should be noted that effective rainfall can sometimes fall outside the normal growing season. The effectiveness of the rain will depend on the amount, the temperature when the rain falls and the type of vegetation that occurs where the rain fell – perennials are more likely to respond to small and infrequent rainfall events.

When undertaking FOO estimates, the following points should be considered:

- The grazing radius of stock; sheep will not graze much beyond 3 km from water in the summer. Cattle will not graze beyond 5 km in the summer. Salty water or salty feed will reduce the grazing radius. In good seasons when surface water is present, the grazing radius will expand.
- Estimates should incorporate different land systems or significant changes in feed types or quantities
- Sites where FOO is estimated can be formalized using GPS coordinates and site photographs. This information can be incorporated into a paddock book of historic FOO estimates
- The palatability and quality (digestibility) of the feed that is available; if palatability of a large proportion of the pasture is low, this should be considered when undertaking the visual estimate. However, keep in mind that only a proportion of the FOO will be utilised.

Use the following tools to refine your skills in this area.



Tool 12.11

Taking quadrat or plant cuts

Cutting, drying and weighing the estimated amount of feed available for livestock provides an estimate of what livestock can potentially consume at a point in time. This technique is most useful for uniform feed such as grass and legume pasture or blue bush or salt bush stands.

Plant cuts can also be used for semi-uniform grazing systems such as mixed bluebush and saltbush, where the amount of feed that animals will consume is estimated when making the vegetation cuts. However, this is an estimate of actual consumption and needs to be validated through observation of livestock body condition score and grazing impact on the shrubs.

A standard quadrat needs to be used when taking cuts from vegetation. This would ideally be 1 metre x 1 metre for ease of conversion. Taking a number of cuts will improve accuracy of the estimates. Alternatively, if you wish, you can take a smaller quadrat area. Common sizes include a quarter of a square metre, or half a square metre. Be sure to know the size of your quadrat, and remember to convert to one square metre before making further calculations.

The 'dry' weight of harvested feed needs to be determined; this is achieved by air drying the 'wet' feed and then placing into a drying oven or microwave to obtain a dry weight.



For safety, the following process should be used for determining the dry weight:

- Record the 'wet' weight of the sample after it has been cut
- If you have a large sample, take a subsample of known weight (100g is a good amount, because it makes the sums easier later on)
- Place the sample in the microwave with a cup of water (empty the cup and replace with cold water after every sample is dried)
- Start the microwave on the 'High' setting for 2 minutes. Continue to dry the plant material for 2 minute bursts and reweigh until no weight change occurs
- Record the dry weight of the sample as grams
- Divide the dry weight by the wet weight and convert to a percentage dry weight. This can be useful for field estimates for subsequent wet weight cuts
- If you started with 100g subsample, then your dry weight is the % dry matter
- Multiply the total initial sample by the % dry matter to get the mass of dry matter for the sample you took.

Convert the dry matter figure collected from a 1 metre square to kilograms of dry matter per hectare in the following way:

- If more than one quadrat cut was taken, add up the total grams and divide by the number of quadrat cuts that were taken. This will give you average in grams per square metre
- Convert the grams per square metre to kilograms per hectare by multiplying by 10
- If required, kilograms per hectare can be converted to tonnes per hectare by dividing by 1,000

For example: $200\text{gms/square metre} \times 10 = 2,000\text{kg/hectare}$
 $2,000 \text{ kg}/1,000 = 2\text{t/hectare}$



Tool 12.12

Photo standards

Generic photo standards have been developed by a number of state governments and other organisations to assist in estimating feed availability for different plant communities and for a range of seasonal conditions. These provide a useful guide for estimating the amount of dry matter available.

However, it is important to understand the assumptions on which the dry matter figures are determined; was the estimate based on grazing down to 'bare ground' or on grazing to a level that will result in good regrowth (i.e. 30% utilisation)?

It is relatively easy to develop a customised set of photo standards for a property by combining quadrat or plant cuts with photo standards. To increase the accuracy of this process, it is best if the plant material is dried and weighed, rather than the dry weight being based on an estimated dry matter.

These photographs can then be used as an indicator of stocking rate on an ongoing basis. This assists in achieving consistency with estimates between seasons and in situations where there are a number of people involved in undertaking the FOO estimates.

Lookup photo standards on the following web addresses:

Feed On Offer Library, AWI <http://www.feedonofferlibrary.com/>

<http://futurebeef.com.au/topics/pastures-and-forage-crops/pasture-photo-standards/mulga-lands-pasture-photo-standards/>



Tool 12.13

Establishing and monitoring trigger points

Trigger points can be established for key times of the year (calendar dates) when the prospect of achieving good levels of feed is assessed compared to long term records. If the prospect of receiving future pasture growth is considered to be high or low based on long-term records, then certain decisions will be 'triggered'.

Trigger points can be identified by considering long-term simulated pasture growth records that indicate whether the next three months are highest or lowest and the variability in growth from year to year. Trigger points can both complement and enhance the use of Southern Oscillation Index (SOI) based seasonal risk assessment for seasonal livestock management decision making.

An example of some trigger points and the ensuing decisions are:

- A spring trigger point that indicates that the seasonal conditions are above average and the next three months are likely to be average or wetter than normal may result in a decision to purchase additional trading stock. This will allow some of additional feed to be utilised and stock to be purchased before higher than normal grazer demand results in a price 'bubble' developing for available stock.
- An autumn trigger point that indicates that seasonal conditions are below average and the next three months are likely to be average or drier than normal may result in a decision to bring stock sales forward by selling an age group or undertaking a higher cull of replacement stock earlier than normal. This will assist to reduce grazing pressure relative to feed on offer and potentially result in better stock sale prices that might result in a depressed market later in the season. This strategy is also assisted by maintaining a proportion of the flock that are considered to be trading stock.

This system still needs to be linked to assessments of land condition or vegetation health, but generally provides an early indicator for management decisions.



Tool 12.14

Calculate DSE's for your property

Use the following tables to calculate the total number of DSE's you are running on your property. You can further refine these calculations to determine how many DSE's are in different parts of the property, and at different times of the year.

Further analysis of this information is possible to enable you to relate DSE's to rainfall, and, with time and practice, determine when critical decisions need to be made regarding stocking rates.

DSE ratings for Merino ewes (adult)

Liveweight (kg)	Dry/empty	Pregnant		Lactating	
		Single	Twins	Single	Twins
35	0.8	1.0	1.2	–	–
40	0.9	1.1	1.3	2.1	2.9
45	0.9	1.2	1.4	2.3	3.2
50	1.0	1.3	1.5	2.5	3.4
55	1.1	1.4	1.5	2.7	3.7
60	1.2	1.4	1.6	2.9	4.1
65	1.2	1.5	1.7	3.1	4.3

(Alchin et al. 2008)

DSE ratings for Merino weaners

Liveweight (kg)	Post weaning growth rate (g/day)			
	0	50	100	150
15	0.4	0.5	0.6	0.8
20	0.5	0.6	0.8	1.0
25	0.6	0.7	0.9	1.1
30	0.6	0.9	1.1	1.3
35	0.7	0.9	1.2	1.4
40	0.8	1.0	1.3	1.5
65	1.2	1.5	1.7	3.1

(Alchin et al. 2008)

Title

Class of goat	DSE rating	Approx. liveweight
Dry doe	0.75	30-40kg
Breeding doe	1.5 (assuming breeding 150% kids per year)	40-60 kg
Weaner	0.7 (weaning to 1 year old)	20-40kg
Buck	1.5	60-80kg

(Source: Going into Goats, MLA)

Complete the following table using the two tables on the previous page to get a DSE rating for each class of stock

- Write down each class of stock in the table below.
- Estimate accurately their liveweight
- Record each class of animal's status, dry, pregnant – single, pregnant – multiple
- From the tables on the previous page, record the DSE rating of each class of livestock
- Record the number of stock in each class
- Multiply the number of stock in each class by their DSE rating to get a total DSE rating for that class of stock
- Add up the total number of DSE's for your property.

Class of stock	Liveweight (kg)	Pregnancy status (dry, single, multiple)	DSE rating (a)	Number of stock in class (b)	Total DSE's for that class of stock (c = a x b)
2 year old ewes	65	Single	1.5	1,500	2,250

Once the average DSE's are known, the daily DSE figure for a paddock can be determined by multiplying the total number of stock by the DSE figure, e.g. 500 ewes x 1.5 DSE (pregnant, single, 65kg bodyweight) = 750 DSE daily grazing pressure.

NB: This DSE figure does not include grazing impact from kangaroos which have a 0.75 DSE rating, goats which are rated at 1.0 DSE and rabbits which are rated at 0.1 DSE. Refer to the next section, *Managing Grazing Pressure* and *Total Grazing Pressure*.

If you are running cattle, lookup DSE ratings for the type of cattle you are running, and add this to your DSE table.

Use the following tables to understand the different requirements that sheep have over the year, as well as the approximate energy and protein levels in some common rangeland species.

Understanding the requirements of sheep at different times throughout their breeding cycle, as well as the quality of the feed, and its energy and protein contents will be a starting point to begin a basic fodder budget for your business. This exercise will allow you to gain a greater understanding of the extent of any surplus or shortfall in animal requirements that exist, and from this information you can make further decisions regarding management of these animals.

Dietary requirements of different classes of sheep

	Metabolisable Energy (ME) MJ/kg dry matter	Crude protein (%)	Neutral Detergent Fibre (NDF %)
Ram – maintenance	8	8	30
Ewe/wether – Maintenance	8	8	30
Replacement ewe lambs	10	14	30
Ewe – mating	10	12	30
Ewe – 4 weeks pre lambing	10	14	30
Ewe – lactating	11	15	30
Weaner lambs	11	16	30

(National Research Council, 1985)

For goat specific figures similar to the above, refer to **Going into Goats** publication, MLA.

Protein and energy levels of common rangeland feed species

Common name	Scientific name	Metabolisable Energy (ME) MJ/kg	Crude protein (%)
Annual Medic (green)	<i>Medicago sp.</i>	11	19.8
Pop Saltbush	<i>Atriplex holocarpa</i>	10	17.5
Ward’s Weed (green)	<i>Carrichtera annua</i>	9.7	20.6
Pearl Bluebush (green)	<i>Maireana sedifolia</i>	9.4	17.5
Annual Ryegrass (green)	<i>Lolium sp.</i>	9.1	14
Black Bluebush	<i>Maireana pyramidata</i>	9.1	16.8
Speargrass	<i>Austrostipa sp</i>	7.6	7.5
Cotton Bush	<i>Ptilotus obovatus</i>	6.2	17.9
Tall Saltbush	<i>Rhagodia eremaea</i>	6.1	22.1

Energy and protein levels in a range of feed species (Franklin-McEvoy, 2005)



Tool 12.15

Assessing total grazing pressure

There are a number of ways of assessing grazing pressure. It is important to factor in the additional DSE's that other species are contributing to your total grazing pressure, so that you are aware of the impact of other grazing species on your country, and avoid any shortfalls that might come about from your calculations.

Tactical Grazing Management (NSW Agriculture, 2000) bases part of this estimate on the different dung that allows different species to be identified. The manual provides a method for estimating the relative grazing pressure of sheep and kangaroos. Based on the comparative levels of dung, an estimate of the kangaroo population (average number for the previous two months) can be obtained if the number of sheep in the paddock is also known. A 'step – point transect' process is used to assist in this process.

Total grazing pressure is determined by attributing a DSE rating to the different species:

- Kangaroo = 0.75 DSE
- Goat = 1 DSE
- Rabbit = 0.1 DSE

Tactical Grazing Management also provides the option of assessing:

- Rabbit numbers based on the density of rabbit warrens and the average number of open/active entrances:
 - Rabbit number = Number of warrens per paddock x average number of open or active entrances per warren x 2.4 (rabbits per open entrances).
- Feral goats numbers based on sightings:
 - Number of goats compared to number of sheep noted during paddock inspections allows a proportional estimate of goats.

Grazing pressure can also be determined by conducting:

- Spotlight survey at night for kangaroos, goats and rabbits
- Aerial survey for kangaroos.

Once the numbers of these animals are determined and the additional grazing pressure is determined, then decision can be made as to whether a control program is required to reduce this additional grazing pressure to a sustainable level. This can be achieved by:

- Rabbit control: baiting, fumigation and warren destruction
- Goat control: mustering, water-point trap yards, shooting programs
- Kangaroo control: obtain a permit for control by a licensed shooter, with meat ideally being used for pet food or human consumption.

Lookup: **Glovebox Guide to Tactical Grazing Management**, NSW DPI.



Tool 12.16

Controlling foxes

The most effective way to reduce fox numbers is to undertake a coordinated program involving a number of adjoining land holdings at key times of the year. This will reduce fox numbers and achieve a major interruption to the breeding cycle.

In pastoral areas, fox control is achieved using a combination of methods including poison baiting, shooting and trapping. All of these methods have a short term impact on fox numbers and reinvasion may occur if the control programs delivered are insufficient to control fox numbers on the property or if foxes on adjoining properties are not adequately controlled. This results in continuous migration back into the controlled areas.

Regionally coordinated fox control programs involving as many properties from within a local area are undertaken by local authorities and community groups throughout the pastoral region. These programs are designed to deliver broad scale control across an entire region by targeting the breeding period in autumn and dispersal period of young adults foxes in spring.

Producers however can also deliver regular property based control programs using various methods throughout the year to limit the number of foxes that become established on the property, between these coordinated baiting events. Through using a combination of baiting, spotlight shooting, fox drives and trapping, property owners or managers can limit the amount of re-invasion and establishment of foxes on the property and therefore manage the risk of predation during lambing.

Tool 5.7 *Fox Control Options*

http://www.makingmorefromsheep.com.au/protect-your-assets/tool_5.7.htm

Replacement baiting strategies for both fox and wild dog control

Replacement baiting strategies should be employed when fox activity is observed on the property or prior to lambing events. Keeping a close observation along vehicle tracks and fence lines will alert producers to the presence of foxes and wild dogs on the property. This method of baiting involves placing baits at known locations, monitoring uptake and replacing baits at regular intervals until the number of baits being taken stops. Baits should be placed at locations where foxes or wild dogs are likely to encounter them. This includes on the sides of vehicle tracks, along fence lines, near (but not at) watering points, stock pads and along drainage lines or creek crossings.

Foxes and dogs will take the line of least resistance to get from point A to point B so look at the landscape and property from that point of view and you will begin to identify areas where baits could be placed.

Baiting sites or 'stations' should be marked clearly to ensure they can be found again. The use of flagging tape or a GPS to mark the location are ideal for this purpose, alternatively by placing baits and known landmarks such as strainer posts or creek crossing should provide enough of a marker to ensure they can be found again. If more than one person is likely to be involved in replacing the baits use a marker to identify the site. Marking the bait sites properly should also minimise the risk of accidental baiting of working dogs as the bait stations are clearly seen and dogs shouldn't be taken anywhere near these locations.

Checking of baits should occur at least weekly and can be built into other property management activities such as water runs and fence inspections. The types of baits used should be varied if possible to entice more animals to take baits. A mix of fresh meat (various types) or manufactured baits can be used during the baiting period at different bait stations or between baiting checks.

The period of time a replacement baiting program should occur before lambing will be dependent on a number of factors including but not limited to:

→ The time between lambing and the last coordinated baiting program

- The amount of predator activity present on the property
- Local observations of predator activity local throughout the district.

Ideally a program should commence early enough so the property owner has confidence that the predator numbers and activity has been reduced to very low levels. This may take a month or two depending on the factors above. In addition to the baiting other control tools can be added to the program to further reduce numbers. Spotlight shooting or trapping at the end of the baiting program is an excellent way to ‘mop up’ those animals which didn’t take baits during the baiting program. Spot lighting prior to and after the baiting program will provide valuable information on the effectiveness of the program and in addition to monitoring bait uptake will allow the property owner to make more informed decisions regarding the level of control required on the property in the future.

Best practice options include:

- Coordinate baiting programs with neighboring properties
- Bait twice a year, approximately 6 months apart, to impact on fox breeding and dispersal
- Group baiting programs increase the number of landholders involved and hence effectiveness is increased
- 1080 ground baiting is generally more cost effective than shooting, based on the cost per fox killed (McLeod, Saunders, McLeod, and Walter, 2007)
- Bait at least a week before lambing is due to reduce impact on lambing percentages (NSW DPI, 2013).



Tool 12.17

Controlling wild dogs

As with all predator control, integrated approaches, using a variety of control techniques, are the most effective means of control. There are good examples of wild dog management programs in NSW, Vic, SA and Qld that have resulted in good levels of control. These programs are successful because they involve a coordinated approach to deliver strategic and integrated control in areas where wild dogs are known to occur. Producers also need to be proactive and deliver wild dog control programs in conjunction with neighboring properties before impacts are seen in the paddock. Becoming familiar with the signs of wild dogs is extremely important as they are much more elusive than foxes and are rarely seen. Field days demonstrating wild dog control techniques and awareness of wild dog signs in the paddock are conducted by various organizations throughout the pastoral region however additional information may be obtained from extension materials on the IACRC www.feral.org.au website.

The major forms of wild dog control are similar to those for foxes. One or two regionally coordinated programs per year with additional replacement baiting programs on farm or in conjunction with neighbors will limit wild dog numbers and the threat of livestock losses. Additional tools to control, wild dogs include trapping with soft jaw traps, predator proof fencing and guardian animals. Shooting of wild dogs is largely opportunistic, but is an effective tool nonetheless.

Wild dog trapping with soft jaw traps is time consuming however when done effectively is extremely efficient and allows the producer to target individual wild dogs that are less likely to consume baits. Information on trapping is available on the internet or from the IACRC website. First hand demonstrations are provided at field days or through some professional trappers.

Lookup: **Wild dog control planning calendar** for a calendar approach to targeting when is the best time of the year to be targeting control of wild dogs. https://www.daf.qld.gov.au/__data/assets/pdf_file/0007/59875/IPA-Wild-Dog-Fact-Sheet-Control-Planning-Calendar.pdf



Tool 12.18

Controlling feral pigs

The principles for feral pig management are very similar to that of the other predators. Coordinate management regionally to manage populations and then undertake property based management to manage impacts and protect livestock at the property scale.

The development of coordinated control plans can be undertaken in conjunction with wild dog and fox programmes and there is no reason that annual control programs can't be developed by producers and local landholder committees for all three species.

Consult with local authorities in order to undertake feral pig management as considerable differences occur between the states regarding the use of toxins such as 1080 and firearms in relation to feral pig management.

Coordinated control programmes for feral pigs generally consist of baiting or aerial shooting programmes, and when conducted across large areas in the pastoral zones, often prove very effective.

Target areas where feral pigs are most likely to be encountered, with drainage lines and swamp areas being the most heavily frequented areas.

Coordinate a localised baiting, trapping/shooting program to coincide with larger programs for maximum impact on the pest population.

Trapping and baiting are extremely effective tools when controlling feral pigs, however prefeeding is essential to improve results and ensure adequate uptake of poison bait. Pigs are particularly dependent on water sources during summer, therefore the warmer months provide an ongoing opportunity for strategic control.

Guidelines for the construction of pig traps and baiting techniques are available in the web at each of the state government agriculture department website. Further information and best practice guidelines are also available the IACRC website at www.feral.org.au.



Tool 12.19

Grazing Land Management Program gateways

Use the GLM gateways model to develop a framework for optimising production from the rainfall that you receive.

The Grazing Land Management Program (MLA, 2006) was developed and supported by Queensland and Northern Territory Governments. This program provides a useful framework for optimising production from rainfall. Known as the 'Gateways Model', it structures information around three gateways:

- The land condition gateway
- The evenness of grazing gateway considers the consumption of feed
- The diet quality gateway.

The land condition gateway: this considers how well rainfall is converted into useful feed production; known as rainfall use efficiency. This will depend on the landscape function which provides an indication of the landscapes' ability to capture rainfall and retain nutrients. A key component of landscape function is the level of cover and location of perennial plants across the system. Refer also to Section 8 *Obtain the Best Production From Rain Received*.

The evenness of grazing gateway considers the consumption of feed: this is known as the utilisation rate. Ideally grazing stock will utilise feed evenly over a paddock so that all areas have a similar level of utilisation, which is ideally not greater than 20–30% for perennial pastures. This will assist plants to recover from grazing and survive dry times.

The diet quality gateway: this considers the conversion of pasture to meat and is known as conversion efficiency. Conversion rates will depend on the quality of the feed, particularly in relation to the levels of energy and protein. The availability of key elements (deficiency or toxicity) in the feed will also impact on conversion rates and livestock production. Refer also to Section 6.1 *Carrying Capacity: Know your feed supply and quality*.

Grazing Land Management – Sustainable and productive natural resource management, 2007, MLA <http://www.mla.com.au/News-and-resources/Publication-details?pubid=2914>



Tool 12.20

Recognise and minimise decline in landscape function

A decline in landscape function involves a decline in soil condition, pasture condition and woodland condition. An example of this process is seen when a diverse woodland and productive grazing area is overgrazed:

- Grasses and forbs decline due to overgrazing of mature plants and limited recruitment by new plants.
- There is reduced soil cover due to the reduction in litter from grasses and forbs and the decline in grass butts. This increases the risk of both wind and water erosion, both of which take nutrients out of the system.
- Invasive native scrub begins to dominate the system in prone areas and gradually starve the system of more water due their deep roots.
- Soil surfaces develop hard caps with reduced rainfall infiltration which also contributes to a decline in productivity.
- Stock tracks lead to a concentration of run-off and water movement results in areas of incision developing which leads to the development of gutters. If no remediation is undertaken, eventually extreme soil erosion will occur.
- Water leaving the system takes litter and nutrients with it and the health of the system continues to wind down.

Work has been undertaken to reverse these processes by understanding and influencing the flow of water in the system – this has been achieved through a combination of grazing management and land management works to slow, hold and spread water and restore healthy landscape and catchment function.

Use your monitoring tools to assist with recognition of landscape function decline and devise a strategy to minimise or reverse the decline.



Tool 12.21

Invasive native scrub control – establish a plan of management

In addition to reducing the overall productivity of the system and carrying capacity, woody weeds also:

- Impede livestock management activities in paddocks.
- Reduce habitat diversity
- Can result in significant reductions in land values
- Lead to a reduction in perennial groundcover and increase soil erosion risk.

It is therefore important to consider management and control options in a co-ordinated and more formal way.

There are a number of management options that can be considered individually or as a combined approach to reduce woody weed numbers:

- Mechanical options: chaining, ripping, blade ploughing or grubbing.
- Management burns: the age of the plants has an important effect on the level of control

achieved, as older plants are more tolerant to fire. The density of plants will also affect the kill rate; there needs to be sufficient fuel to provide an adequate burn (Jessop, P (2009), Management burning of invasive native scrub: principles). Autumn burning is generally the safest time and shrubs are susceptible to defoliation at this time.

- Chemical control, particularly for the regrowth following other broad-scale treatments
- Grazing with goats, as they generally consume a higher proportion of browse in their diet than other grazing stock. The approach needs to be strategic and well planned to avoid over utilisation of pastures and low ground cover levels.

Incorporate your plan into your yearly operational plan so that you are making progress every year, and remaining vigilant after control efforts.

After control measures have been applied, it is important that follow-up control options are planned and implemented including grubbing and spot spraying. It is also important that grazing management allows the germination and establishment of preferred grazing species. In some cases this will require the harvest of local seed and the reintroduction of native pasture species. The management of total grazing pressure (i.e. control of all grazing animals) will be required if successful re-establishment is to occur (Hacker et al. 2005).

Remember to consider relevant regulations when considering a program of control measures of invasive native scrub. Contact your relevant authority for the latest information.

When establishing a weed inventory and plan of management follow the steps below:

- Identify the weed
- Identify where it is located on the property, what area is covered by the weed, how many plants, ha, patches etc. Do this annually. This will help you maintain a clear perspective of its spread
- Identify any factors important for its distribution e.g. how it arrived there, what soil type it is growing on, first sighting
- Identify impacts of the weed to your business e.g. wool contamination, carcass contamination, poisonous, invasive
- Identify potential control measures in the following table:

Weed	Control measure	Cost per ha	Efficacy of measure	Priority of measure
African boxthorn	Spot spraying	\$x	High	High

- Record what measures have been taken to control the weed, and how well they have worked.

For the most up-to-date Making More from Sheep information, including web signposts, products, publications and events, visit www.makingmorefromsheep.com.au

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