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RICHMOND RIVER COUNTY COUNCIL
Floodplain Services

RURAL Landholder Initiative

BOOK.

02

Beef grazing and dairying

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PART A: FARM HEALTH ASSESSMENT TOOL

Introduction to Book 2: Beef grazing and dairying

Book 2: Beef grazing and dairying is the second in a four-book series for the Rural Landholder Initiative. This initiative aims to help rural landholders achieve a number of social, environmental and economic benefits by **conserving and improving biodiversity** on farms and rural lifestyle properties.

Book 1: Healthy Landscapes and Waterways provides information relevant to **all** rural landholders across the Lismore Local Government Area (LGA), while Books 2, 3 and 4 are specific to the main agricultural industries in our region:

Book 2: Beef grazing and dairying

Book 3: Macadamias and other orchards

Book 4: Floodplain cropping

The book is in three parts:

Part A - Farm Health Assessment Tool

Part B - Summary of threats to biodiversity and stock health

Part C - Management practices you can implement on your property to conserve and improve biodiversity.

Farm Health Assessment Tool

In each book there is a 'Farm Health Assessment Tool' that was developed by Southern Cross University in partnership with Council. The Tool is based on the 'ABCD management framework' first used by the Queensland sugarcane industry. Each book describes 5–10 land management practices that can benefit biodiversity. Each land management practice is scored as either:

A = Aspirational **B** = Best Practice **C** = Common **D** = Dated

The Farm Health Assessment Tool, which starts on page 7, highlights how you as a landholder can progressively adapt your land management practices to conserve and improve biodiversity and 'ecosystem services'. The importance of biodiversity and the current threats to biodiversity in our region are explained in more detail in Book 1: Healthy landscapes and waterways.

Table 1 below introduces the Farm Health Assessment Tool A, B, C and D classes. It includes a general description of practices; and a description of the property and regional scale effects that these practices have on native vegetation, wildlife and ecosystem services.

Table 1: Management classes and definitions for the Farm Health Assessment Tool

Class[1]	Description of practices	On-property effect of practices on biodiversity and ecosystem services	Regional effect on biodiversity and ecosystem services where practices are widely adopted
Aspirational	• New and innovative practices that go beyond best practice • Balance biodiversity and agricultural outcomes • Integrated farm management plans in place	• Self-sustaining, resilient and diverse native vegetation communities requiring minimal maintenance • Ecosystem services are strengthened and become more resilient to change	• Medium- to long-term benefits • Ecosystem services are improved at a landscape scale
Best practice	• Current 'best practice' • Manage for biodiversity with agricultural production benefits • Farm management plans incorporate biodiversity outcomes	• Diverse native vegetation communities requiring minimal intervention • Ecosystem services are enhanced	• Short- to medium-term benefits
Common	• Common practices meet only basic environmental expectations in the community • Farm management plans are focused more on agricultural outcomes	• Existing native vegetation communities are maintained • Unlikely to substantially improve biodiversity and ecosystem services	• Unlikely to achieve short-term benefits
Dated	• Superseded or unacceptable practices that do not meet current environmental expectations and community standards • No farm management plan in place	• Existing native vegetation communities are maintained or degraded • The condition of biodiversity and ecosystem services continues to degrade	• Likely to degrade the condition of biodiversity and ecosystem services

[1] Note: Over time, changes in knowledge, technology, costs and market conditions may result in an 'A' class practice becoming more widespread and accepted as a 'B' class practice.

What are benefits for landholders?

Each management practice in the Farm Health Assessment Tool states what the benefits of implementing A and B practices are to landholders and agriculture. By looking after biodiversity and ecosystem services, you can reduce your property management costs. For example, providing habitat for insect-eating birds may reduce costs for pesticides and increase numbers of insect pollinators. Excluding stock from river banks reduces soil erosion and stock losses caused by injuries.

What are the benefits for biodiversity?

The Farm Health Assessment Tool aims to improve biodiversity in the Lismore LGA, however, it is relevant across the entire Northern Rivers Region. Each management practice has a corresponding green leaf symbol which indicates the level of benefit that a particular management practice provides to biodiversity (see Table 2). The more symbols the larger the benefit for biodiversity.

Table 2: Biodiversity benefits scoring

Biodiversity benefit score	Benefit to biodiversity
	These management actions are the most beneficial to biodiversity as they improve habitat and native vegetation connectivity across the landscape, and increase resilience to change.
	These management actions have moderate benefit to biodiversity.
	These management actions have a small beneficial impact on biodiversity.

Land management practices for beef grazing and dairying

There are six management practices that relate to improving and conserving biodiversity across our beef grazing and dairying land. These practices can help address the types of threats described in Part B of the book and can increase agricultural productivity at the same time. They are:

Practice 1: *Minimising livestock access to native vegetation and waterways*

Practice 2: *Managing surface drains to improve water quality and biodiversity outcomes*

Practice 3: *Grazing practices for soil health*

Practice 4: *Soil health monitoring and fertiliser application*

Practice 5: *Controlling soil erosion in natural areas and grazing country*

Practice 6: *Minimising pesticide/herbicide application for pasture and fodder crop pests and weeds.*

You may already be doing some or all of these practices on your property to varying degrees. The Farm Health Assessment Tool will give you an indication of which class your current management practices across the whole property fall into: Aspirational, Best Practice, Common or Dated.

Later in the book we provide you with an outline of the types of techniques you can build into your farm management activities over time to help you transition from one class to a higher class. There are also many more detailed resources and guides available to help you that are included in the Resources section, or you can talk to Council or other agencies (see Contacts list).

How to use the Farm Health Assessment Tool

When using the Tool consider three things:

- your vision and knowledge of your property
- your whole property – although not every management practice in the Tool will apply to all land uses and physical characteristics
- any project sites or individual actions you wish to highlight.

To use the Tool we suggest you do the following:

1. Read the numbered Management Practice in the left hand column and the way the practice can benefit agricultural production. Think about how the practice can improve productivity by improving and conserving biodiversity on your property.
2. Think about how and if these benefits are currently being achieved on your property. Are they relevant to you?
3. Look across the coloured columns and decide which of the property descriptions or types of practices apply to your property. There may be a few in each column that are relevant to your property. Place a tick in all the boxes that are relevant to your property.
4. Some sections may not apply to your property. You can make a note of this in the 'Your self-assessment notes' section of the table.
5. Make notes if there is a particular site to which a practice applies, or any conditions that influence your decision.

If you don't know enough to make a decision, make a note in the 'Your self-assessment notes' section of the table.

Certain terms in the Tool have certain meanings as follows:

Term	Meaning
Low pasture species diversity	Only 1 or 2 naturalised and native pasture species are dominant across the property. Naturalised species include Setaria and Kikuyu, native pasture species include Water Couch, Basket Grass and Kangaroo Grass.
Moderate pasture species diversity	Pasture with a mix of 3 to 5 naturalised and native pasture species.
High pasture species diversity	Pasture with a mix of 6 or more naturalised and native pasture species.
Herbs and forbs	Herbs and forbs benefit soil microbe diversity and soil structure as they have different roots systems to grasses. Herbs are often native and include sedges, rushes, orchids and lilies. Forbs are broad-leaved herbs such as native geranium, viola and glycine.
Colloidal soil particles	Soil colloids are extremely small particles of soil with particle sizes of 2 micrometres in diameter or smaller suspended in a soil with larger particles
Legumes	Legumes are nitrogen fixing species such as Lucerne, clovers, vetches, glycine and vignas
Cultural control methods	Management practices to control pests or weeds that do not require pesticide or herbicide application such as slashing or manual removal of weeds before seeding, or stock rotation to manage cattle diseases
Standard soil chemical testing	Chemical tests to determine nutrient levels for pH, P, K, Ca, Mg etc.
Groundcover	Any organic cover on the soil surface including living pasture, litter or mulch
Rotational grazing	A grazing technique best done with high stock or mob (part of herd) density to mimic natural grazing patterns of wild herds.

Farm health assessment tool: ABCD for beef grazing and dairying

Land management practice	Dated	Common	Best	Aspirational
1/ Minimising livestock access to native vegetation and waterways  **Production benefits of A&B practices:** • Better stock health and safety with off-stream water and no access to steep/eroding land • Improves water quality • Reduces loss of soil and runoff • Increases soil permeability and soil moisture content • Creates drought refuge • Stabilises stream banks	☐ Livestock have continuous and unrestricted access to native vegetation and waterways ☐ Livestock access is ongoing during wet and waterlogged conditions	☐ Livestock have mostly continuous access to native vegetation and waterways ☐ Livestock are occasionally removed during wet and waterlogged conditions ☐ Livestock access is partially restricted by fencing and off-stream watering	☐ Livestock are restricted from accessing native vegetation and waterways ☐ Livestock are regularly removed during wet and waterlogged conditions ☐ Livestock access is controlled by fencing around most of the significant native habitat and most of property has off-stream watering ☐ Livestock and vehicle crossings are constructed in accordance with guidelines	☐ Livestock have planned and controlled access to native vegetation and waterways ☐ Livestock are completely removed during wet and waterlogged conditions ☐ Livestock access is controlled by fencing around all native habitat and entire property has off-stream watering ☐ Livestock and vehicle crossings are designed and constructed with no impact on water quality
Your self-assessment notes				

Farm health assessment tool: ABCD for beef grazing and dairying

Land management practice	Dated	Common	Best	Aspirational
2/ Managing surface drains for water quality and biodiversity outcomes **Production benefits of A&B practices:** • Improves water quality • Reduces loss of soil and runoff • Increases soil permeability and soil moisture content	☐ Existing drains lack vegetation throughout the wet season	☐ Existing drains are vegetated through most of the year with common and wet-tolerant pasture species	☐ Existing drains are vegetated throughout the year with wet-tolerant pasture and wetland species (e.g. *Lomandra hystrix*) ☐ Native trees are established along larger drains ☐ Wetlands are created and maintained in drains handling large volumes of runoff	☐ Existing drains are vegetated throughout the year with wet-tolerant pasture and wetland species ☐ Extensive coverage of native trees and shrubs along larger drains ☐ Drains discharge into sediment barrier traps or constructed wetlands before runoff enters waterways ☐ Redundant drains are filled in or shallowed and natural creek drainage re-established
Your self-assessment notes				

Farm health assessment tool: ABCD for beef grazing and dairying

Land management practice	Dated	Common	Best	Aspirational
3/ Grazing practices for soil health **Production benefits of A&B practices:** • Improves retention and cycling of nutrients • Improves pasture productivity and carrying capacity • Improves resilience against extreme events e.g. drought • Promotes regrowth of diverse mix of native grasses • Protects water quality	☐ Paddocks are grazed so that pasture is fully depleted and roots damaged ☐ Bare patches without any groundcover are visible ☐ Property has only naturalised pasture species (e.g. Seteria) with no native pasture ☐ Pasture is grazed continuously with no rest periods	☐ Paddocks are grazed so that pasture is depleted and less than 5cm in places ☐ Small bare patches are visible with groundcover around 95% ☐ Property has moderate diversity of naturalised pasture but limited diversity of native pasture ☐ Pasture is occasionally rested but not fully recovered before stock re-enter paddock	☐ Paddocks are maintained with a minimum of 5cm of pasture year round ☐ Groundcover is maintained at 100% ☐ Paddocks have moderate diversity of naturalised and native pasture species e.g. water couch used in wet areas ☐ Rotational grazing is used and pasture has adequate rest period to fully recover before stock re-enter paddock	☐ Paddocks are monitored for 5cm minimum pasture and rested until 15cm (Kikuyu) to 40cm (Setaria) of regrowth, or seed set for native species ☐ Groundcover is maintained year round at 100% ☐ Paddocks have high native and perennial pasture diversity with forbs/herbs and legumes (e.g. clovers, vetches and vignas) ☐ Rotational grazing with high stock density and additional paddocks per herd or mob to achieve pasture recovery before stock re-enter
Your self-assessment notes				

Farm health assessment tool: ABCD for beef grazing and dairying

Land management practice	Dated	Common	Best	Aspirational
4/ Soil health and fertiliser application **Production benefits of A&B practices:** • Improves retention and cycling of nutrients on site • Improves pasture productivity and carrying capacity	☐ No standard soil chemical tests are carried out for either improved or non-improved pastures ☐ Fertiliser application rate for the entire property relies on historical rates ☐ No use of Soil Health Card	☐ Standard soil chemical tests for improved pastures are carried out rarely (every 5–8 years) with no testing of non-improved pastures ☐ Fertiliser application rate for entire property is determined using old soil tests or historical rates ☐ Soil Health Card tests are carried out occasionally but actions for improvement are rarely undertaken	☐ Standard soil chemical tests for improved pastures are carried out regularly (3–5 years) and non-improved pastures are carried out rarely (5–8 years) ☐ Fertiliser application rate for entire property calculated using recent soil test results ☐ Soil Health Card tests are carried out yearly and actions for improvement are undertaken	☐ Standard soil chemical tests are carried out regularly (1–3 years) in each improved and non-improved paddock ☐ Soil tests are carried out regularly on soils from a variety of sites on different soil or pasture types ☐ Fertiliser application rate is calculated using recent soil test results for individual paddocks ☐ Soil Health Card tests are carried out yearly in each paddock and actions for improvement are always undertaken
Your self-assessment notes				

Farm health assessment tool: ABCD for beef grazing and dairying

Land management practice	Dated	Common	Best	Aspirational
5/ Controlling soil erosion in natural areas and grazing country **Production benefits of A&B practices:** • Reduces runoff • Retains soil and nutrients on site • Improves water quality • Reduces damage to farm infrastructure including roads, tracks, fences	☐ Degraded areas are evident (e.g. hill slopes are slumping, gully erosion) and are left alone ☐ There are no dairy stock laneway systems present on the property ☐ Paddock subdivisions are based on historical fencing lines	☐ Degraded areas are evident and some attempt at remediation occurs to prevent problem from worsening ☐ Some dairy stock laneways are present throughout property ☐ Paddock subdivisions based mostly on historical fencing lines with some improvements	☐ Degraded areas are actively remediated and revegetated using native species ☐ Dairy stock laneways are present throughout the property ☐ Paddock subdivisions and fencing lines are based on soil and land capability	☐ Degraded as well as vulnerable slopes and channels are revegetated using native species ☐ Dairy stock laneways are strategically located throughout the property to minimise soil erosion and runoff ☐ Paddock subdivisions and fencing lines based on soil and land capability
Your self-assessment notes				

Farm health assessment tool: ABCD for beef grazing and dairying

Land management practice	Dated	Common	Best	Aspirational
6/ Minimising pesticide and herbicide application for pasture and fodder crop pests and weeds **Production benefits of A&B practices:** • Reduces cost of chemicals • Reduces potential to contaminate waterways • Improves pasture and crop productivity	☐ Applying pesticide/herbicide when pest damage causes fodder crop loss and using the same rate and strategy across whole property ☐ Spraying broad-spectrum pesticides/herbicides with no regard for impact on beneficial insects or bees	☐ Applying pesticide/herbicide when pest damage causes fodder crop loss using a variable rate and strategy in different paddocks ☐ Spraying broad-spectrum pesticides/herbicides with some consideration of impact on beneficial insects or bees	☐ Alternatives to pesticide/herbicide are sometimes used (e.g. biological and cultural control) ☐ Applying pesticides/herbicides only when pest damage causes economic loss and using variable rates and strategies within a paddock (e.g. removal before weed flowering or seeding) ☐ Substituting broad-spectrum with selective or alternative environmentally lower risk pesticides/herbicides, to reduce impact on beneficial insects and bees	☐ Pastures are managed for increased plant density and 100% ground cover to reduce the potential for weed establishment ☐ Alternatives to pesticide are always used if available and suitable (e.g. biological and cultural control) as well as implementing preventative measures ☐ Only environmentally low risk pesticides/herbicides used with minimal or no impact on beneficial insects and bees
Your self-assessment notes				

PART B: THREATS TO BIODIVERSITY AND STOCK HEALTH

Impacts of grazing on biodiversity and catchment health

The Northern Rivers Region has a long history of dairying and beef grazing. These industries occupy a large portion of the rural landscape and about 38% of the Lismore Local Government Area. In the 567 square kilometres of the Wilsons River catchment that is a source of town water for the region, 50% of land area is used for beef grazing.

In *Book 1: Healthy landscapes and waterways*, the threats to biodiversity and catchment health across the Lismore landscapes were outlined. To recap, these threats included:

- very high levels of nutrients washed into waterways from adjacent lands
- nutrients from stock defecating and urinating in waterways
- low dissolved oxygen
- native vegetation being smothered by exotic vines
- Coral trees, Camphor, Lantana and Privet inhibiting native vegetation
- grazed and bare river and creek banks
- grazing pressure on natural regeneration
- soil erosion from cultivated and grazed land
- bank erosion.

At the property level, beef and dairy cattle can degrade soil, water and vegetation so that productive land and ecosystem services are lost. Patches of native vegetation and individual paddock trees provide shade and shelter for livestock, and creek banks provide a source of lush pasture and access to water. If given unrestricted access, cattle can do considerable damage to these areas.

Soil compaction and pugging will reduce water infiltration, damage soil structure and increase runoff and erosion. Bare, grassed or sparsely vegetated creek and river banks can give way under the weight of cattle resulting in substantial volumes of soil being washed downstream. Soil disturbance combined with increased nutrient levels from dung and urine create good conditions for weeds to grow, and also pollute dams, wetlands and creeks. Dung and hooves also transport weed seed around paddocks.

Cattle grazing on a bank – Leycester Creek Catchment.

Sediment from eroding slopes and pastures may be deposited in downslope areas including the drainage lines that feed into creeks. Fine ‘colloidal’ material in soil that enters waterways as a result of erosion may remain in suspension indefinitely, leading to a muddy appearance in dams and watercourses. Soil nutrients (phosphorus and nitrogen compounds) bind to fine clay particles affecting aquatic biodiversity and favouring weeds and algae.

Cattle health and safety

The health and safety of your cattle can also be affected when they are accessing or drinking from waterways, for example:

- cattle are exposed to bacteria and viruses when they drink from waterbodies polluted with faeces, urine and carcasses
- lactating cows can develop mastitis by standing in dirty or polluted water
- pregnant cows, in particular, can become stuck in muddy creek banks
- cattle can break their legs on eroding or steep banks, leading to starvation and death.

Cattle are at risk of injury when grazing on eroded creek banks – Wilsons River Catchment.

PART C: MANAGEMENT PRACTICES FOR BEEF GRAZING AND DAIRYING

If the majority of your land management practices fall within the Dated or Common classes there are ways you can improve your management practices over time to transition into the Best practice or Aspirational classes. The types of techniques that can help you improve practices are outlined in this section of the book. More detailed resources are listed in the Resources section and are available from Council or other agencies. Many of them are available online as downloadable documents.

The following six land management practices from the Farm Health Assessment Tool are relevant across all beef grazing and dairying properties.

1. Minimising livestock access to native vegetation and waterways

Excluding stock from patches of native vegetation and waterways will have a number of benefits:

- improve vegetation condition and habitat values
- improve water quality (vegetation filters water before it enters waterways)
- reduce soil loss from erosion and runoff
- improve soil stability on banks and slopes
- reduce risk of stock injuring themselves on steep creek banks.

Once stock are excluded, natural regeneration will improve soil stability over time. Additional tree planting to fill in vegetation gaps together with weed control will help repair past damage such as eroding slopes, gullies and banks. If there are steep erosion zones on river banks, earthworks to reshape and create a more stable and accessible bank may be needed. Natural rock or other hard 'armouring' along bank scours or slips can be used to protect areas where flood flows will continue to cut into banks, however, such works will require approval from the Office of Water (see Contacts). On creek banks in the slopes or midland landscape (see map in Book 1), the use of logs and re-snagging may be an option. Book 1 lists Resource and Contacts for riparian and stream bank stability.

Excluding stock from native vegetation and waterways will also mean healthier soil and vegetation because soil health improves with less compaction and better water infiltration. Weeds may be an issue due to high nutrients from stock wastes, so by removing the source of nutrients, weeds will become less of a problem.

The establishment of a good mix of riparian species along waterways and in wetlands will stabilise highly erodible sandy or heavy clay soils common throughout Lismore (see species list in Book 1 appendix). A combination of fencing styles (e.g. some standard fixed and electric or drop fencing) and alternative water sources for livestock may be required. Once vegetation is mature and resilient, fenced areas can provide for crash grazing and a drought refuge when paddocks have dried out, however, it is best if cattle can be excluded permanently.

Fencing

More than 75 Australian animals are occasional or regular victims of barbed wire fences, especially nocturnal animals such as bats, gliders and owls. New fencing options that reduce the impacts on wildlife are proving that control of stock is possible without the use of barbed wire. For example, high tensile plain wire with wooden posts every 500 metres with star pickets in between are being used successfully by graziers and dairy farmers. Another approach is to simply replace the top and bottom strand of barbed wire with plain wire.

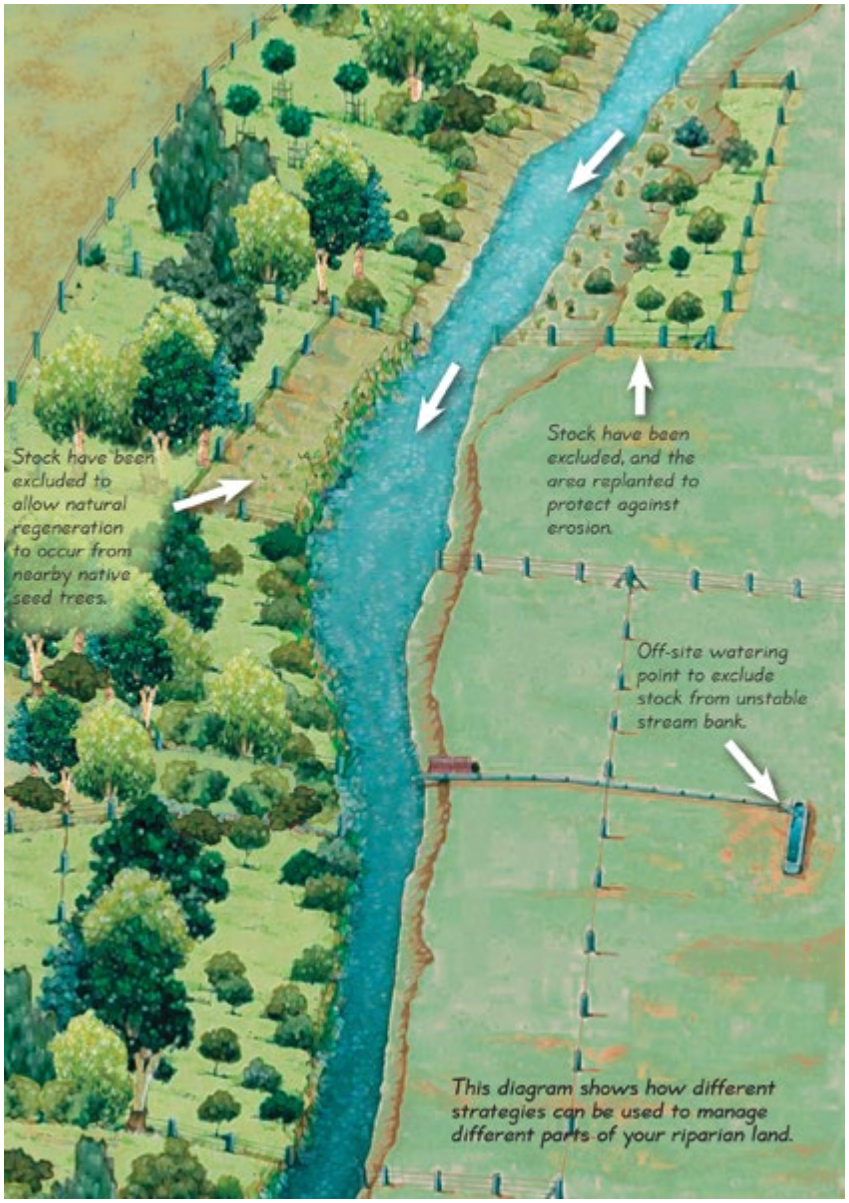
The location of fence lines should work with the paddock topography, bends in creeks and rivers and flooding patterns to minimise overall length and cost of materials and labour. Drop down and star picket or 'sacrificial' fencing can give way under the pressure of flood flows to lay flat on the ground. They can be easily re-erected after floods and are simple to construct (see Resources).

The illustration over shows a variety of fencing options that can be used along waterways for various management outcomes. This is especially important for floodplain paddocks where flood flow and debris can cause considerable damage to fences. Generally fencing along flow lines will survive floods while damage to fences crossing flow lines is dependent on flow velocity. A post flood inspection is required to remove debris from fences and make any repairs before stock re-enter.

Rock ramps or water troughs

Rock ramps that provide stable and safe access to creeks for cattle may be suitable on smaller upper catchment creeks or dams. However, in floodplain paddocks on clay or sandy soils, providing off-stream water sources is the better option. Clay soils are highly erodible, so traffic from cattle will cause damage to banks. Water from a spring or other clean source pumped to a trough is not only better for cattle health, they also prefer to drink this way. Solar powered technology for pumps is now economically viable and ideally suited to remote water supplies.

Techniques and strategies for fencing, water crossings and off-stream watering systems can be found in a range of beef grazing and dairying guidelines listed in the Resources section.



Excluding stock from waterways with fencing for revegetation *(Source: The Interpretive Design Co)*

2. Managing surface drains for water quality and biodiversity outcomes

In combination with other activities, well-managed drains help regulate surface water flow and groundwater levels, trap and filter run-off, and minimise top soil loss. This improves overall farm productivity and sustainability.

Poorly drained and waterlogged soils restrict nutrient availability and aeration. A lack of oxygen (i.e. anaerobic conditions) can affect soil organisms and severely damage pasture and other plant roots. This makes good drainage (both surface and subsurface) in low-lying pasture areas very important. Vigorous, deep-rooted pastures help maintain soil porosity (i.e. space between soil grains) and high water infiltration rates. Root growth creates channels through the soil that remain when the roots decay. Wet pasture is an alternative grazing system for low lying soils where native wetland grasses such as water couch can be grown and grazed when inundated.

Vegetating larger drains with a diverse range of trees, shrubs and groundcovers (especially focusing on the northern side of the drain) helps to bind the soil with a mat of roots that extends below the waterline. This limits slumping and in-stream scouring, traps sediment, and enables uptake and cycling of nutrients. The vegetation also shades the water which can help to reduce invasion by weeds and can regulate water temperature. This provides better habitat and corridors for fish, turtles, frogs, lizards (e.g. water dragon), dragonflies, birds and many other animals. Smaller drains can be vegetated with native grasses and sedges to help with sediment and chemical filtering.

If your land has low lying areas or historically filled or drained wetlands, these are the perfect locations to reconstruct a wetland plant community. Wetlands will attract water birds and other wildlife which can also add to the beauty, amenity and value of your property. Book 1 contains species lists for wetlands and dam edges, as well as an extensive list of trees and shrubs in the appendix.

3. Grazing practices for soil health

Biological or holistic approaches to grazing involve managing stock and strategically grazing pasture to maintain full groundcover at all times of the year. This approach improves soil health and in turn, cattle health. Healthy soils retain moisture and nutrients, are more resilient to extreme weather conditions, and grow nutritional pasture with a higher stock carrying capacity. The two main strategies are

- Having the right mix of pasture species. This involves introducing a good mix of native and improved pasture species including legumes (clovers, vetches and vignas) to fix nitrogen. Allowing for a variety of other non-pasture species (e.g. herbs and forbs) improves soil structure and the diversity of beneficial soil microbes.
- Good stock rotation practices. This involves monitoring pasture height and moving the herd or mob regularly to mimic the natural grazing of wild herds. This means that paddocks receive a good input of manure but plant roots are not damaged.

To achieve good stock rotation, additional fences may need to be erected and more watering points established. Single plain wire electric fencing on steel posts 30 metres apart will allow for the division of land into smaller paddocks. The aim should be to graze each paddock several times each year ensuring pasture is fully recovered before allowing stock back in.

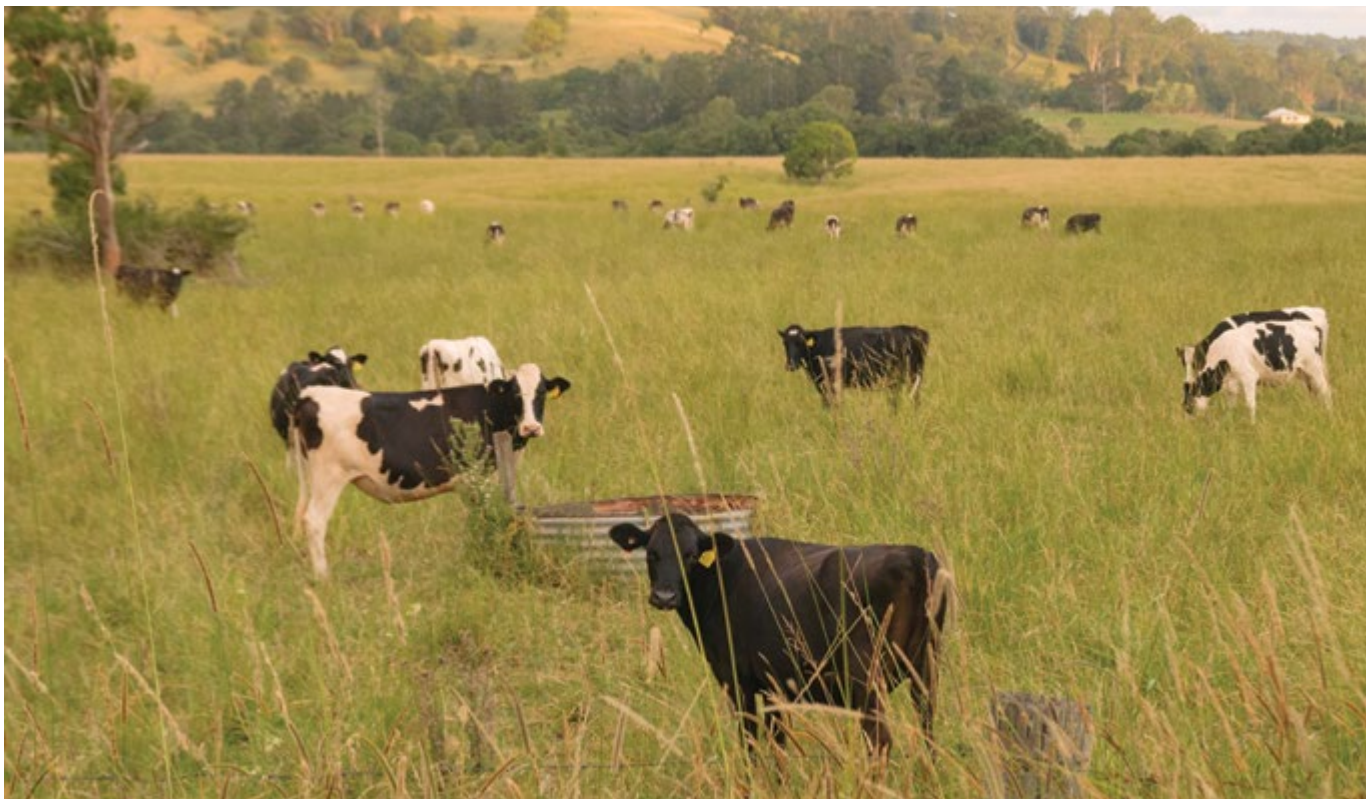
Introducing dung beetles to clean up pastures and recycle nutrients in the soil may be an option if your property is lacking an active beetle population, or you have few dung beetle species throughout the year. However, be aware that insecticides used for tick control can kill dung beetles.

If you would like to learn about holistic grazing and biological farming approaches or you would like to enrol in a short course, contact North Coast Local Land Services or Richmond Landcare (see Contacts section).

4. Soil health monitoring and fertiliser application

Monitoring soil health and determining fertiliser requirements has been made easy by the *Northern Rivers Soil Health Card for Coastal Grazing* – see Resources section. The 15-page guide was developed locally to provide a simple tool to audit the physical, chemical and biological health of your soil. It's designed to be used in the paddock using homemade equipment to measure 10 indicators: groundcover, diversity of soil life, soil depth, infiltration, root development, soil structure, aggregate stability, earthworms, pH and pasture diversity.

For a full picture of various soils across your paddocks, select the best and worst sites in each paddock and test every 1–3 years. Over time you will build a record of your soil and understand the effect of management practices on soil health. Using the results, you can accurately tailor the right fertiliser or compost requirements, whether lime or dolomite to balance pH, or simply the need for organic matter such as compost for soil nutrient retention and cycling. By monitoring soil health and applying the right fertilisers you will increase pasture productivity and carrying capacity.



5. Controlling soil erosion in natural areas and grazing country

Surface cover is the key to erosion control on grazing land. Surface cover can be pasture or other groundcover vegetation, or hard manmade surfaces like concrete paths. Vegetation cover prevents soil erosion by maintaining the soil so it can absorb rainfall and retain nutrients as well as maximising filtration. A well-managed pasture with good cover will ensure that runoff spreads rather than concentrates. Drains, tracks, roads and fences can concentrate runoff, so careful planning is required to ensure that these are located where they will not contribute to erosion.

Trees play a vital role in grazing landscapes by providing shade, shelter and recycling nutrients. Tree roots penetrate deeply into soils breaking them up and improving soil porosity which allows rain to infiltrate and be released slowly into streams as groundwater flow. They also provide stability to stream banks and prevent landslip on susceptible steep slopes, however, trees provide little protection from erosion caused by raindrop impact and overland flow. In the control of erosion, surface cover is essential and bare areas beneath trees are vulnerable.

To prevent soil erosion, follow these basic principles:

- use land according to its capability – steep slopes and riparian zones unsuitable for grazing should be revegetated using native species and livestock should be excluded
- use vegetated drains to control runoff (see Practice 2)
- for dairies, install concrete, gravel or stabilised earth laneways in strategic locations
- install several watering points and shade trees and maintain dense pasture cover through rotational grazing
- remove stock from wet paddocks to prevent pugging and loss of soil structure
- isolated paddock trees or bare areas beneath trees should be fenced and stock excluded.

6. Minimising pesticide/herbicide application for pasture and fodder crop pests and weeds

Integrated pest management (IPM) can complement current chemical control methods by introducing non-chemical options, such as cultural and biological control. Cultural control methods include timing the slashing of paddocks prior to weeds seeding.

The first step in integrated pest management is to identify and understand the life cycle of the weeds, pests and beneficial insects present in your paddocks. A plan can then be developed to manage the populations of both beneficial and pest insects. Careful and ongoing monitoring and record keeping is then required to ensure that populations of beneficial species are maintained and that pests and weeds are actively controlled. Cultural controls such as slashing or rotating crops or pastures with non-host crops can reduce pest colonisation, reproduction and survival, reducing the need for chemical control.

Preserving beneficial species when using chemicals is often difficult because most pesticides are broad-spectrum and kill beneficial species as well as the pests. Impacts on beneficial insects can be reduced by using a selective pesticide that has the least impact, and by minimising the number of applications.

Planting riparian areas, vegetating drains and creating wetlands can all provide habitat for beneficial insects.

Managing pastures for high plant density and full groundcover using rotational grazing will reduce the potential for weed establishment (see Practice 3). Biological controls are available for some common weeds such as Crofton Weed and Parramatta Grass. Contact Far North Coast Weeds for information (see Contacts).

Certain herbicide application equipment can be used to minimise hitting non-target plants, for example, a wicking wand or weed wiper can apply chemicals more accurately than a spray pack or quick spray. Surfactants, penetrants and dyes are often used in combination with herbicides to make them more effective.

RESOURCES

Beef

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- Staton, J & O'Sullivan, J (2006) *Stock and Waterways: A manager's guide*, Land & Water Australia, Canberra.
- More Beef From Pastures, MLA http://www.mla.com.au/Extension-training-and-tools/More-beef-from-pastures

Dairy industry guidelines:

- Dairy Australia – Dairy Self Assessment Tool. Source: http://www.dairyingfortomorrow.com/
- Rogers, L (2008) *Environmental Management Guidelines for the Dairy Industry*, NSW Department of Primary Industries.
- Day, P & Burgi, A (2005), *Targets for Change – setting resource management targets for Australian farms*, Dairy Australia: Dairying for Tomorrow.

Fencing:

- Water and Rivers Commission (2000), *Water Notes: Flood proofing fencing for waterways*, www.water.wa.gov.au/__data/assets/pdf_file/0017/3167/12147.pdf
- www.wildlifefriendlyfencing.com/WFF/Friendly_Fencing.html

Soil health:

- Eldridge, S (2004) *Soil Management for Dairy and Beef Cattle Grazing*, NSW Department of Primary Industries.
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- Anderson, L, Baker, E, Clay, C, & Rose, H (2008) *Grazing the Coastal Floodplain – Meet the graziers who are farming the floodplain sustainably*, NSW Department of Primary Industries, Northern Rivers Catchment Management Authority.

Other:

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- Ecos (2009) *Wilsons River Catchment Management Plan* – Summary, Rous Water.
- Swinton, R and Creighton, G (2010) *Irrigation Essentials for North Coast Farmers in NSW*, NSW Department of Primary Industries.
- Ensbey, R (2009) *Noxious and Environmental Weed Control Handbook – A guide to weed control in non-crop, aquatic and bushland situations*, 5th edn, NSW Department of Primary Industries.
- Ede, FJ and Hunt TD (2008) Habitat Management Guide–Riparian: Weed management in riparian areas: south-eastern Australia, CRC for Australian Weed Management, Adelaide.
- Murphy, H (2008) *Habitat Management Guide–Rainforests: Ecological principles for the strategic management of weeds in rainforest habitats*, CRC for Australian Weed Management, Adelaide.
- Spence, S (2007) *Dung Beetles – working for you*, Primefacts, NSW DPI, www.dpi.nsw.gov.au/agriculture/pastures/pastures-and-rangelands/management/dung-beetles

CONTACTS

Department of Environment and Heritage http://www.environment.nsw.gov.au

Office of Water, Department of Primary Industries, Phone: 02 6676 7380 Fax: 02 6676 7388, 135 Main Street, Murwillumbah

North Coast Local Land Services http://northcoast.lls.nsw.gov.au
Phone: 02 6623 3900, 79 Conway Street, Lismore.

Richmond Landcare Inc. http://www.richmondlandcare.org
Phone: 02 6619 0115

Holistic Farm Management http://holisticmanagement.org/

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