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Healthy Land, Healthy Horses

A guidebook for small properties

A report for the Rural Industries Research and Development Corporation

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Foreword

Particular difficulties exist with horses grazing on small and agistment properties around urban areas. In many of these situations, the land area available is insufficient to provide enough pasture feed, even under optimum management conditions, for the number of horses accommodated. Land care issues, such as weeds, erosion and dust, often become major considerations on these properties due to lack of awareness of suitable pasture and grazing management practices.

There is no reason why healthy horses and good land use cannot exist harmoniously together if some attention is paid to covering the land with good pastures, thereby protecting the land and providing feed for horses at the same time. This booklet establishes guidelines for optimum, pasture based, land management strategies to ensure sustainable land use, more economical feeding and healthier horses.

The information contained will be of value to those involved with a range of horse activities who have limited land available for housing their animals. A more widespread understanding and implementation of sustainable, pasture based, grazing management for horses will have long term benefits in more effective and sustainable land use, economy of horse management and improved appearance of horse properties.

This report, a new addition to RIRDC's range of over 1000 research titles, forms part of our Horse R&D Program, which aims to assist in developing the Australian horse industry and enhancing its export potential.

Simon Hearn
Managing Director
Rural Industries Research and Development Corporation

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Introduction

Horse paddocks, particularly in and near urban areas, are often seen, conceptually and visually, as "exercise yards" with varying attempts made to use the designated land for feed production. The general lack of attention to pasture composition and vigour in these situations results in greater reliance on purchased feed (with extra cost). This inattention is also reflected in haphazard grazing systems, overfeeding, or excessive grazing pressures due to underfeeding or uncontrolled grazing. These circumstances can lead to weeds (some noxious), soil erosion, horse health problems, and an unfavourable environmental impact from dust, flies, weed transfer and property appearance.

The problems are particularly noticeable on small holdings and agistment properties around urban areas. Many of these properties are leased, some have absentee land-owners and some agistment is unsupervised. Good pasture management on small properties presents a particular challenge but is quite feasible as is shown on many dairy farms. Horse nutritional requirements are not dissimilar to those of other grazing animals on Australian farms, whose feed needs are most economically met by improved and well managed pastures.

A few horse property owners have applied knowledge of good grazing management, appropriate stocking rates, fertiliser use, species selection and weed control. There is little general application of these practices but great potential exists for improvement of pasture and land management as evidenced by the interest shown by many horse owners on small properties.

This booklet assumes that readers have an interest in combining the best possible practices in land care, horse health and economy of feeding. It is primarily intended for the horse owner on smaller properties (usually less than 10 hectares) around urban or semi-rural areas, with from one to a few horses, and typically a member of a pony, equestrian or horse riding club. The guidelines also are very applicable to agistment properties. *Horses, pasture and land can indeed be a win/win/win result.*

Preamble

A recent project funded by the Rural Industries Research and Development Corporation established guidelines for optimum, pasture based, grazing and nutritional strategies for horses on small properties around urban areas, to ensure sustainability of land use and economy of feeding.

The project, "Sustainable Land Use for Depastured Horses", was based on a 1997 survey of horse owners and agisters on small properties around urban areas in New South Wales, Victoria and South Australia. It was designed to examine current knowledge and experience of pasture and grazing management, feeding practices, approach to land care, problems encountered and priorities needing attention.

Respondents covered a range of horse owners, including land owners, agistees and agistors, mostly on small (less than 10 hectares) properties around urban areas, and included members of Pony Clubs and the Equestrian Federation. Average number of horses per respondent was 3.3 and there was a considerable range in horse ages and breeds.

Land Use

Nearly all respondents were intent on using their available land for provision of pasture feed for their horses through grazing. Topography and nature of the land, fencing, and paddock accessibility for farm machinery (for fertilising and general pasture management activities) were usually conducive to this purpose.

The major obstacle to increasing pasture feeding was the prevalence of horse stocking rates in excess of those considered capable of providing horses with pasture feed all year round. This situation was aggravated where horses in more than one ownership shared the grazing area, most commonly found under agistment. Poor quality and quantity of pastures in most cases was also an important inhibiting factor. Despite these limitations, nearly half the respondents thought that the land area available was "about right", perhaps due to reliance on hand feeding for the bulk of horse feed needs.

Pasture

Respondents' answers to this part of the survey and subsequent field investigations revealed the basis of the problem confronting sustainable land use and more pasture feeding. In the majority of situations, pastures were mainly comprised of poorer grasses, a little clover, native plants and weeds, and plant nutrition was inadequate. Knowledge of management techniques for growing vigorous, dense pastures was fairly limited, not surprisingly because this is an area of horse husbandry and education that receives little attention. However, there was a general desire amongst respondents to provide more pasture feed for horses, particularly during the colder and drier months.

Although most land did contain a smattering of the better grasses and clovers, lack of optimum fertilising appeared to inhibit their profusion and growth such that less nutritious plants and weeds become prevalent. Where fertiliser or soil conditioner was used, and that was in less than half of cases, it was generally applied in insufficient quantities, too infrequently, and often appeared unsuitable in type with regard to supply of required plant nutrients. This state of affairs was underlined by the lack of soil or pasture sampling undertaken.

The main pasture management activity was cited as manure removal, however the worm control aspect of this practice appears to be perceived at least equally as important to respondents. Regular harrowing of paddocks was a significant but not standard practice, and primarily done for manure management. Slashing was the next most common pasture management activity, to control rank pasture growth on manure and urine patches, and weeds in most cases.

Weed species were well recognised by most respondents, and are a fairly constant norm in horse paddocks although, surprisingly, a slight majority did not consider them a specific problem for horse health or pasture management. Nevertheless, weeds were rated as the main land care matter needing attention, one of the most important general problems and a priority for research. Spraying and hand hoeing were widely practised to control weeds.

Grazing

There was a high level of satisfaction with the grazing system practised, which in most cases was rotational, usually justified for reasons of resting paddocks for worm control and pasture regeneration. However, the range of paddock sizes and numbers, despite fairly common use of electric fencing, appeared to make systematic, even rotations very difficult to achieve. Strip and block grazing , the more effective forms of rotation for pasture rationing, were rarely practised. In the majority of situations, horse owners had access to feeding yards or stables which indicated potential for better grazing control.

Land Care

The major land care issues reported were connected with weeds, pasture quantity and quality, which are themselves interrelated. Issues included pasture cover, quality and damage, overgrazing, drainage, erosion and dust, which in most cases are all symptoms of inadequate or unhealthy pastures which, in turn, allow weeds to intrude and flourish. Fencing was a relatively significant land care issue and was perhaps related to grazing control and pasture supply, as well as being important for horse security and safety.

Feeding

There was a prevalence of supplementary feeding amongst respondents, and the range of feeds provided in many cases, which included hay, chaff, grains, minerals and mixes, was surprising. Such combinations of feeds raises the question of whether convention or fashion takes the place of necessity. Many respondents sought advice on feeds and feeding requirements from a range of sources and justified feeding according to work, condition and pasture supply.

Frequent (usually daily) hand feeding of horses was the norm and may have been partly due to reasons other than nutritional needs, eg., catching horses, "reward", but came at an average cost of $880 per year.

Agistment

Agistment services, where provided, appeared to be primarily involved just with frequent supervision and feeding of horses, and to a lesser extent, rugging and stabling, however a significant proportion of agistees attended to these tasks themselves.

Horse Health

Attention to horse health was a high priority for respondents with good vaccination and parasite control programs, and paddock treatments for worm control, widely practised. However, in agistment situations where health standards should be a major concern there appeared to be some laxity.

Health and disease problems and incidence, as reported, did not appear abnormal. Most common problems were physical injuries and the usual feed related problems of colic and founder. Attention to horse health, apart from dental treatment, cost $259 per year on average.

Costs

Costs of keeping a horse varied a little between States but the separate cost categories were reasonably consistent in proportion to the total. In the survey sample, the annual average cost was $1,875 per horse, of which 47% was feed ($880), 20% saddlery ($384), and 17% farriery ($316). Means of reducing the amount and cost of supplementary feeding would be of significant economic benefit to horse owners.

Problems and Research Priorities

The main emphasis given by respondents in all States concerned growing better pastures and reducing weeds. Lack of pasture quantity and quality, pasture improvement and management methods, and weed control were the major issues raised. These are all closely inter-related although respondents may not have been fully aware of the degree of the connection. Drainage and erosion, also cited as prominent problems, in turn are often a side effect of poor pastures and weed infestations. This reflected answers to questions on pastures, weeds and land care issues and indicated the major thrust of future work to assist small property owners.

Fences were rated as an important issue, mainly for security and safety. This was contrary to the general survey response that indicated a very high level of satisfaction with fencing, except where barbed wire was used. Worm control, despite the apparent careful and effective attention to this aspect of horse husbandry, was also listed as a significant problem. This may be a reflection of the ongoing vigilance needed for this practice. Other matters of understandable concern were the decreasing availability of land for horse keeping around urban areas, and aspects of horse and rider safety, particularly on roads and in public areas.

Summary

It was apparent from the study that there is considerable interest amongst this sector of horse owners in growing better pastures. Potential benefits are clearly seen in better land care from reduction of weeds, erosion and dust, and improved drainage. Feed and cost benefits are also seen as an important result of increased pasture vigour and availability.

Despite the keen interest, it is also apparent that there is limited knowledge of the accepted principles of good pasture and grazing management but a willingness to learn more. The following chapters will help to fill these gaps in knowledge.

1. How Many Horses?

1.1 How Many Horses?

How many horses can you run on your property – how long is a piece of string? The answer to this question depends on several factors, as described in the following sections and later chapters. However there is considerable flexibility. Many horse owners on small properties are trying to fit in as many horses as possible. This can be achieved with success *provided* the property and horse grazing management system is adjusted to cope with the land type and horse numbers.

1.2 Local Government Regulations

A wise precaution before deciding how many horses you intend to run on your property is to check with your local Council, Shire or similar body, to see if there are any regulations concerning horse-keeping. The likelihood is that they will not be too restrictive. However with the increasing attention being given to care of the environment, and in the interests of the wider community, it is prudent to establish what you can and can't do. Many Councils have regulations regarding smell, flies, disposal of manure, and drainage onto neighbouring properties.

Additionally, you may receive valuable advice about best horse-keeping practices in your district and/or be referred to sources of expert information on a range of aspects of horse management and land care.

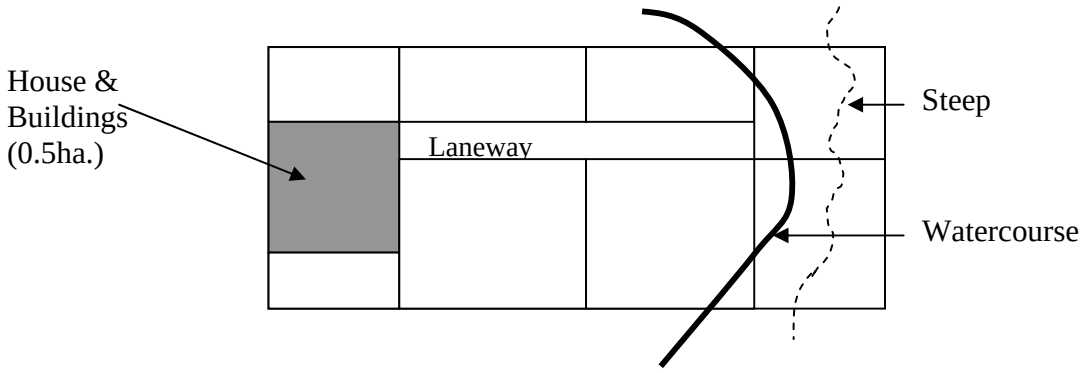
1.3 Area Available

What seems like a simple answer at first glance is not as straightforward when you consider the variations in the type of land and its use on your property. Very few situations exist where the area available is all flat, treeless, well drained, and without tracks, yards and buildings.

You should look at your property from the point of view of what *grazing* land is left over after you exclude the unavailable areas. These areas would include those used for buildings, stables, yards, tree belts, driveways and lanes, plus areas that are unsuitable such as watercourses, wetlands, heavily treed or rocky areas and steep slopes.

Grazing land should then be classed according to its year round accessibility and soil type. For example, low-lying parts of the property can become waterlogged in winter, and sandy soils may need protection from grazing in summer.

For example, a property of 6.0 hectares total area may include 0.5 hectare of land unavailable for grazing and 1.0 hectare where year round access is not possible, leaving 4.5 hectares available for grazing at all times. From this assessment you can then calculate the feed potential of your property.



1.4 Feed Potential

"Feed potential" of a property is the amount of pasture feed that can be grown in an average year if soil fertility and rainfall is not limiting and pasture species are the best available for the location. On many small properties, these two factors do limit the feed potential. However they can be optimised, as discussed in the next chapter.

Calculating your property's feed potential will give you a guide to how many horses can be run and fed *mainly* on pasture, depending on the average size and work requirements of your horses (how much feed they need). This approach assumes adoption of a "maximum grazing" management system where the number of horses that can be kept is limited by the amount of feed that can be grown and grazed without land damage.

Feed potential of a property is not a limiting factor to the number of horses under more intensive management systems, as described in the next section. However, it is a starting point in every situation because whatever grazing land is available should be used to its full potential, not only for maximum production of cheap, nutritious pasture feed, but also for the land care benefits resulting from healthy, vigorous pastures.

In the example property referred to in the previous section, there were 4.5 hectares available for year round grazing and 1.0 hectare available for part of the year (say 50%). This gives a total of 5.0 (4.5 + 1 x 0.5) hectares of year round grazing. In higher rainfall areas (above 700mm per year), where it is possible to carry one horse per hectare on good, perennial pastures, this property could fully support five average horses (or about eight ponies) on sustainable pastures with little need for supplementary feed. If there were ten horses on this property, then about half their feed needs could be met from pasture with the other half having to come from supplementary feed.

Feed potential of your property is calculated by reference to district carrying capacities or annual dry matter yields (available from Departments of Agriculture and other organisations – see Appendix 1) which are based on best possible conditions. These measures are then converted to "horse equivalents", according to the type of horses you are keeping. More information on feed requirements of horses is given in Chapter 4.

1.5 Management Systems

There are two, main alternative management systems on the typical small property, referred to as "maximum grazing" and "limited grazing". The "maximum grazing" system can be used if the available grazing land has the feed potential to support the number of horses carried, with minimal hand feeding, eg., perhaps in winter and summer. The "limited grazing" system *must* be used where feed potential cannot match the total horse feed requirement. This situation can occur due to a high number of horses *or* where the land has not reached its feed potential, perhaps due to low fertility, poor seasonal rainfall, inadequate pasture species and weed infestation.

"Maximum grazing" implies maximising the opportunities for horses to graze to ensure that they get most, if not all, of their feed requirements from pasture. However, it does not mean free, uncontrolled grazing, or set stocking in one paddock, as these practices often defeat the objective of making full use of the feed potential of a property. Good grazing management procedures are dealt with in a following chapter.

"Limited grazing" means just that. Horses are allowed to graze pasture for a limited time, according to the number of horses and pasture feed available. The more horses on a property, and the poorer the pasture, the less grazing time is possible, and the more hand feeding required, to preserve pasture ground cover yet have some pasture feed input to the horses' diet.

On the 5.0 hectare example property discussed earlier, the "maximum grazing" system can be used for up to five average horses. If there were more than five horses, the "limited grazing" system must be used. Both systems require the use of yards, and/or stables, fencing (ideally electric), and appropriate water supplies for control of grazing to ensure efficient use of pasture feed.

1.6 Horse Size

The final matter to be considered in working out how many horses it is possible to keep on your property is how much feed they need. This is going to depend primarily on their size, condition, state of pregnancy, and amount of work they are having. The concept of the "average horse" is obviously not valid when you consider that two ponies can be run for every showjumper. Table 1.1 shows average weight ranges for the more popular types of horse.

Actual weights will vary according to horse dimensions and can be estimated from measurements of girth, length and height. Methods for making these measurements are described in most books on horse keeping.

A fairly accurate estimation of horse weight can be made from the following formula:

$$\text{Weight (kg)} = \frac{\text{Girth (cm)} \times \text{Girth (cm)} \times \text{Length [point of shoulder to point of pelvis] (cm)}}{12{,}000}$$

Table 1.1 Average Weight Ranges for Adult Horses

Horse Type/Breed	Average Weight Range
Thoroughbred	450 – 550 kg
Standardbred	400 – 500 kg
Stock Horse	450 – 500 kg
Hunter	450 – 600 kg
Pony	200 – 350 kg
Polo Pony	400 – 450 kg
Arab	400 – 500 kg
Warmblood	500 – 650 kg
Draught Horse	650 – 850 kg

Table 1.2 gives a rough guide, over four typical Australian rainfall zones, for determining how many horses the example property (5.0 hectares of year round grazing) could carry under the "maximum grazing" system if pastures have reached the stage where their feed potential has been achieved. You can make similar calculations for your property according to your locality and property size.

Table 1.2 Guide to Horse Carrying Capacities on 5.0 hectares according to Rainfall

Average Rainfall (mm/year)	**How Many Horses** (450 kg average)	**How Many Ponies** (300 kg average)
500	3 – 4	5 - 6
600	4	7
700	5	8
800	6	9

More detail is given in a later chapter on the calculations needed to determine feed requirements of horses, which will enable you to “do the sums” more accurately for your own property.

1.7 Summary

- There is considerable flexibility in *how many horses* can be run on a small property, mainly determined by the grazing management system used.
- The first step is to check what Council regulations apply to horse-keeping in your locality.
- Then determine the *year round* grazing area you have available.
- Calculate the feed potential of the grazing area according to rainfall and soil fertility.
- Decide what grazing management system best suits your objectives and current situation: “maximum grazing” to ensure the bulk of feeding is from pasture; or “limited grazing” to allow for more flexibility in horse numbers but greater reliance on hand feeding (the extreme situation in this category is intensive stabling with no grazing area at all).
- Factor in the size and general activities of your horses to determine their feed needs.
- Make maximum productive use of the available grazing land, no matter how small, to achieve the lowest feed costs and to protect your land.

2. Growing Pasture

2.1 Why Pasture ?

Good pasture is the key to optimum land use and land care on small properties, *and* is the most natural feed for your horses. Pasture is able to make maximum use of the fertility of the soil on your property and the rainfall it receives, and provides ground cover to exclude weeds and prevent erosion. Moreover, pasture cannot be equalled as a cheap, nutritious, well balanced feed for your horses, supplying their energy, protein, mineral and vitamin needs.

The cost of one kilogram of dry pasture (after removing all the water), which includes fertilising and occasional renovation, has been calculated at about four cents. This is nearly *a tenth* of the cost of the next cheapest feed, pasture hay. Table 2.1 shows the quality and some of the nutrients in a typical white clover/perennial ryegrass pasture. Pasture also contains minor minerals and a range of vitamins in varying quantities.

Table 2.1 Quality and Nutrient Content of Typical Pasture in Gippsland, Victoria

Quality/Nutrient	Annual Range in Level
Digestibility (% digestible dry matter)	65 – 79
Fibre (% neutral detergent fibre)	25 – 40
Metabolisable Energy (megajoules per kg dry matter)	9.0 – 11.4
Crude Protein (% dry matter)	18.0 – 23.0
Phosphorus "	.38 - .41
Potassium "	2.27 – 2.73
Calcium "	.43 - .55
Magnesium "	.28 - .32
Sodium "	.18 - .47
Chlorine "	1.23 – 1.45
Sulphur "	.24 - .34
Manganese (parts per million)	234 – 265
Iron "	339 – 545
Copper "	12 – 20
Zinc "	39 - 43

Every usable square metre of land available on your property for growing and grazing pasture should be put into pasture. The alternative is usually weeds, dust, mud and erosion.

2.2 Pasture Types

The location of your property will determine what type of pasture can be grown. However there are very few situations around urban areas in Australia where a vigorous, nutritious, hard wearing pasture, based on *perennial* (long-living) plants, cannot be grown. Annual pasture plants are useful additions to pastures for the feed they provide, but, as their name indicates, they come and go each year, are absent in dry periods, and do not compete successfully with weeds.

The best perennial plants for horse pastures on small properties include the grasses: perennial ryegrass, phalaris, cocksfoot, tall fescue and kikuyu; and the clovers; white and strawberry. Subterranean clover is a vigorous annual plant, commonly found in many pastures in medium rainfall areas (400 – 600mm), and is very useful for its feed value. Varieties of these plants are available to suit different climatic zones and soil types (see Appendix 1 for sources of advice). Kikuyu is generally less nutritious and has poorer winter growth compared to the other grasses, but it is particularly useful because of its ability to spread over the ground via underground runners, and its persistence.

Many small or subdivided properties used for grazing horses, where pastures were originally established, already contain some quantity of these better pasture plants. They are nutritious, productive and resilient plants that respond quickly to improved soil fertility and seasonal rainfall.

2.3 Pasture Feeding

Good pastures need to be fed, just like good horses, otherwise they become weak, unhealthy, and unable to withstand weeds and poorer plants that can survive in low fertility situations. *The aim should always be to grow and maintain a healthy, vigorous "pasture crop" on the grazing area, using your horses to "harvest" the crop from time to time.*

To find out how much "feed" the pastures need it is necessary to check their feed supply - the soil – to see if it is adequate. "Testing" the soil gives a direct answer to the basic question of soil fertility or plant feed supply. Soil testing also reveals the nature and condition of soils, such as their acidity and salinity.

Soil test kits are available widely from soil testing agencies, fertiliser companies and some State agricultural departments, and include detailed instructions about how to take soil samples and send them for analysis. These soil testing services return reports, which give ratings on the adequacy of plant nutrient (feed) levels and soil condition, and recommendations on amounts of fertiliser and soil conditioner to apply. It is advisable to seek some guidance (Appendix 1) about the most reliable soil testing services as recommendations should be based on extensive experience of pasture requirements and knowledge of your locality.

The most limiting plant nutrient in Australian soils is phosphorus, which can be supplied in a readily accessible and cheap form by superphosphate fertiliser. As a bonus, "Super" also contains sulphur and calcium, two other essential plant nutrients which may be in short supply in some areas. Annual rates of application up to 200 kilograms of superphosphate per hectare can help increase the vigour and productivity of pastures where the soil is deficient in phosphorus.

After phosphorus, the next most important nutrient that often limits pasture growth is potassium, although the need for this more expensive fertiliser should always be checked by soil testing. Other, less frequently limiting but important plant nutrients such as calcium, magnesium, sulphur, copper and molybdenum, may be required in some situations, but should only be applied if soil tests (or plant tests which are required for some nutrients) reveal that they are limiting plant growth.

Pasture plants should *only* be "fed" the nutrients they are lacking, otherwise it is costly, wasteful and can cause run-off pollution. If just phosphorus is required, then superphosphate is the best choice. If just potassium is limiting, then apply "potash" fertiliser at the appropriate rate. There are fertiliser mixtures that supply combinations of nutrients, eg., super/potash mixtures, and some which combine a number of plant nutrients in various proportions, the most common being so-called compound fertilisers containing phosphorus, potassium and nitrogen, eg., "5,2 &1". These mixtures are more expensive than straight fertilisers and should only be used if *all* the nutrients they contain are lacking in the pasture. Mixtures containing nitrogen are rarely necessary on good clover/grass pastures because clovers supply nearly all the pasture's nitrogen needs. If nitrogen is needed, eg., to boost grass growth in winter, it is best applied just as a straight nitrogen fertiliser such as urea or ammonium nitrate.

Other ground dressings that are used to supply plant nutrients, and in some cases organic matter, such as poultry manure, compost and fish emulsion, should be evaluated primarily on the basis of the *cost* of the plant nutrients they contain. If nutrient analyses are not supplied with the product, tests can be requested from soil test laboratories. These materials are *rarely* a cheaper or more effective source of plant nutrients than conventional fertilisers. Their organic matter content is irrelevant because the topsoil under any reasonable pasture contains an abundance of organic matter or humus. They can also cause horse health problems, and in some cases, eg., poultry manure, the residual smell causes horses to neglect the pasture.

Lime may be needed as a soil conditioner to correct excessive soil acidity, which can "lock up" some plant nutrients in the soil, making them unavailable to the pasture. Lime, which is mainly calcium carbonate, or dolomite, which also contains magnesium carbonate, can be used with equal effect to decrease soil acidity, the choice being dependent primarily on cost and ease of supply, except in the rare cases where magnesium is lacking. Soil conditioners are generally only needed every 5 –10 years, subject to soil acidity changes as revealed by soil tests.

Salinity, or excess salt, can be a problem in some areas of a small property, usually in lower lying areas or where there is seepage coming to the ground surface. In these situations the better pasture plants are either absent or very sparse, and in their place are salt tolerant plants which are usually low growing and of low productivity. The only way to reclaim these areas is to fence them off from all grazing animals (who may show a preference for the salty areas) and allow the salt tolerant and other plants to gradually cover the bare ground, thereby reducing the surface moisture and its evaporation which causes the salting. Better pasture plants can then be sown in these areas.

Annual application of the necessary fertiliser, in the appropriate quantity, and at the right time (usually autumn or spring), is essential to the growth and maintenance of healthy, vigorous pastures for provision of cheap, nutritious feed for your horses, and sustainable land use.

2.4 Pasture Establishment

It is often not necessary to sow seeds of the better pasture plants into your paddocks if there are some of these plants already present. Liberal fertilising, and perhaps liming, in many cases will encourage these plants to grow stronger, gradually spread through the paddocks, and achieve the aim of a dense, vigorous pasture, faster and cheaper than introducing new seeds with machinery. This approach may be helped by hand spreading some pasture seed onto barer areas when the soil is moist in autumn and spring.

If you are in doubt about the ability of your paddocks and pastures to respond to fertiliser, the simplest method of introducing new plants should be chosen, and expert advice sought on techniques. Oversowing or sodseeding, which is done by sowing seed (and a little fertiliser) directly into the existing pasture using special, tractor drawn machinery, is the first option to consider. It is less damaging to the soil profile whilst aiding moisture penetration in compacted areas. Ploughing and resowing can be resorted to if required, but this method of pasture establishment is expensive, often difficult to get contractors to do in the confines of small paddocks, and takes a year or more to achieve a good, dense pasture sward on firm ground.

2.5 Summary

- Growing good pasture on every available piece of land that is not used for buildings, yards, lanes, shelterbelts and water supply is the first step in good land use and land care on your property.
- Pasture is the cheapest, most nutritious and well balanced feed for your horses and provides a protective ground cover which is the first line of defence against weeds, erosion and dust.
- Determine what pasture plants best suit your property locality to give the maximum amount of feed and be able to persist from year to year.

- Check your soil with soil tests to see what plant nutrients or other soil conditions may limit pasture growth and correct any limitations with fertilisers.
- Encourage good pastures and vigorous pasture growth by the simplest and least costly methods commencing with liberal fertilising, then sodseeding if necessary.
- Pasture is the foundation of a property of which you can be proud.

3. Managing Pasture

3.1 Managing Pasture

Once better pastures have been grown, they then have to be managed so that they remain *good* pastures. Any collection of plants will soon deteriorate if let to grow unchecked, or if they are cut or grazed too heavily. Examples are the overgrown garden, tussocky grass in fenced off areas, and at the other extreme, the typical "horse-sick" paddock with bare ground and weeds.

Young and short pasture needs protection, whereas mature and long pasture needs abuse. The aim for a horse pasture is to maintain an *even* ground cover varying between 5 – 15 cm at all times. Although pasture growth varies naturally between seasons during the year, it is possible to achieve this even ground cover using a good pasture base. When pasture is growing slowly or not at all (eg., winter and summer) it needs protection from grazing, by limiting grazing or even completely excluding horses for periods. When growth is good (eg., spring and autumn), frequent and extended grazing periods are necessary to keep pasture in check and at a desirable height.

The most efficient and effective method of managing pasture is by getting your horses to do the job for you. Horses, by nature, are very good four legged "mowers", and if controlled properly will not only manage your pasture well, but will also be rewarded with a nice, nutritious green pick. Sometimes they have to be helped with pasture management, particularly when spring growth "gets away" from them, by using other grazing animals such as cattle or sheep, or by topping or mowing the pasture to bring it back to a productive and nutritious height. At other times they may need to be "coaxed" to eat pasture they might otherwise selectively avoid, such as slightly rank patches, by use of movable electric fencing to control their grazing area.

The aim at all times is to sustain maximum ground cover by growing a "crop" of pasture, but increasing the consumption of pasture feed by horses for as long as possible. Calculation of the feed requirements for your horses, and balancing this with pasture feed available and amount of hand feeding needed, is the recommended goal to assist with economy of feeding. On some highly stocked properties this may result in horses spending much of their time in yards or stables, however this may be necessary to sustain pasture cover. In more lightly stocked situations, control of pasture growth, particularly in spring, may require some topping on occasions to avoid excessive pasture height (above 15 cm) and over mature pasture, which can cause horse nutritional problems.

3.2 Grazing Control

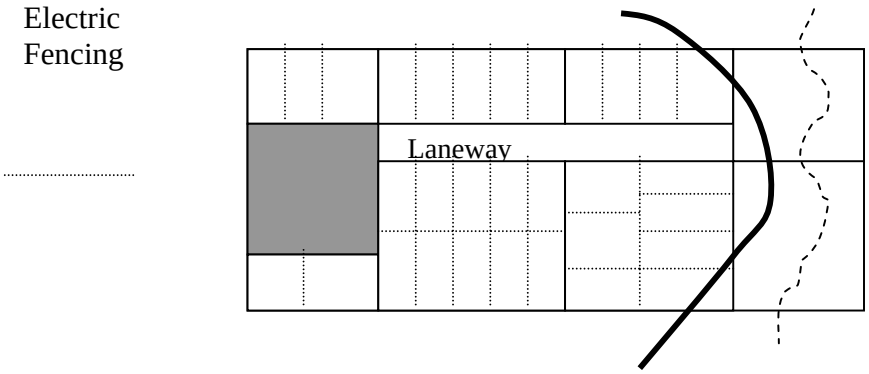
The amount of grazing land available on a small property is generally fixed, and the number of horses kept usually does not vary much during a year. The two main variables are the vigour of the pastures, which depends on the pasture plants and how well they have been fertilised, and the season of the year. Horse feed requirements are usually fairly constant through the year, but the ability of the grazing area to supply the feed requirements will fluctuate from time to time.

Strict control of horse access to pasture areas on the typical small property is usually necessary to prevent uneven or over grazing. On some properties, where grazing pressures are relatively high due to the number of horses for the area available, strict control may mean yarding of horses and exclusion from pasture for considerable periods of time to maintain the pasture at a satisfactory height.

Grazing opportunities should be rationed to ensure that even grazing occurs and pasture height is maintained above the desirable minimum level of about 5 cm. Rationed grazing provides the best balance between maximum pasture feed for horses, and pasture management for sustaining pasture growth and ground cover. This *rationed grazing* strategy will usually require feeding yards, and necessitate the use of electric fencing as an economical means of dividing the available paddock area(s) into uniform "grazing blocks" commensurate with grazing pressures. Frequent shifts of grazing blocks, at least weekly or fortnightly, is a desirable aim, however this will be dependent on paddock area available, number of horses and the seasonal conditions. Such an approach can overcome selective grazing, and the resultant "lawns"(closely cropped areas) and "roughs"(tall, rank growth), by minimising pasture availability at any one time.

Rationed grazing can be achieved by several methods known as rotational grazing, strip grazing, and block grazing, the latter two just being more intensive methods of rotational grazing. All these names just mean concentrating grazing on a particular area of land for a period of time whilst the rest of the paddock or property is rested. The best for your property will depend on the number and size of paddocks you already have, or intend to have, the total number of horses, and the number of horses per paddock. It is generally difficult to achieve rationed grazing successfully with fixed fencing and paddocks unless the paddocks are very close to the same size and are relatively small, say a half hectare. This tends to be the exception on small properties, however electric fencing or tape can achieve the same result, simply, safely and cheaply.

For example, the 5.0 hectare property drawn in section 1.3 has seven permanently fenced paddocks of varying size, most of which are close to one hectare in area. For five horses in a high rainfall zone, this size of paddock is too large to achieve rationed grazing successfully, whether the horses are grazed together or separately. It would be best in this situation to use electric fencing to further divide the grazing area into at least twenty portions to allow horses access to a fresh grazing area about every fortnight, according to season.



The overall aim in rationed grazing should be to keep the pasture between about 5 – 15 cm and reasonably even in height at all times. Once the average pasture level is down to about 5 cm, the horse(s) should be moved to a fresh grazing strip or paddock. This process is repeated over and over, around and around the paddock or property, with the frequency of rotation being dependent on the rate of pasture growth and thus the season. The horse is being used as a very efficient and effective mower, and is rewarded with as much choice feed as possible.

3.3 Surplus Pasture

At times on most properties, unless the grazing pressure is constantly heavy, the pasture will "get away" from the horses and become too long and less palatable. This usually will occur in spring, and occasionally during a wet summer or good autumn. There are several ways of managing this surplus pasture growth: forced grazing with horses; grazing with cattle or other animals; topping or mowing.

Forced grazing with your horses is a realistic option provided it is done with a rationed grazing approach, ideally using electric fencing for greater control over the areas to be grazed. Although horses are selective in their grazing habits, like all other grazing animals, they too can be "persuaded" to eat pasture that they might otherwise choose to avoid. This approach is not being unkind to your horses. It is simply managing their grazing to give them as much pasture for as long as possible.

In some situations, forced grazing with horses is not a possibility due to lack of horse numbers for the area concerned, or even with some forced grazing the pasture still gets away. In these cases the options are to graze with a mob of cattle, sheep or similar foragers, often called "cross grazing", or to top or mow the paddock(s). Cross grazing is more beneficial for your land due to the recycling of plant nutrients from the pasture, through the grazing animals and back to the soil. It also helps with worm control as discussed in a later chapter. However, this option is only available where you own, or can "borrow" or agist, other grazing animals, and your fences are cattle or sheep proof.

Topping and mowing are the last resorts for control of surplus pasture in terms of best pasture management practice as they are the least effective methods of recycling plant nutrients. Topping is generally more helpful than mowing for pasture management and regrowth because the aim is to cut the pasture back to a desirable 15cm in height. A problem to avoid with topping is smothering the underlying pasture with the toppings in situations where the pasture has grown to a height where it probably should have been mown at an earlier stage.

If mowing is necessary, because of the height of the pasture, or because silage or hay making had been planned anyway, it is important to allow the pasture plenty of time to regrow, and to replenish the plant nutrients that these procedures take out of the land. Every tonne of hay cut from a paddock removes 20 kg of potassium, 9 kg of phosphorus, plus other nutrients, and these must be restored to the mown land at the next fertilising. The mowing height should not be too

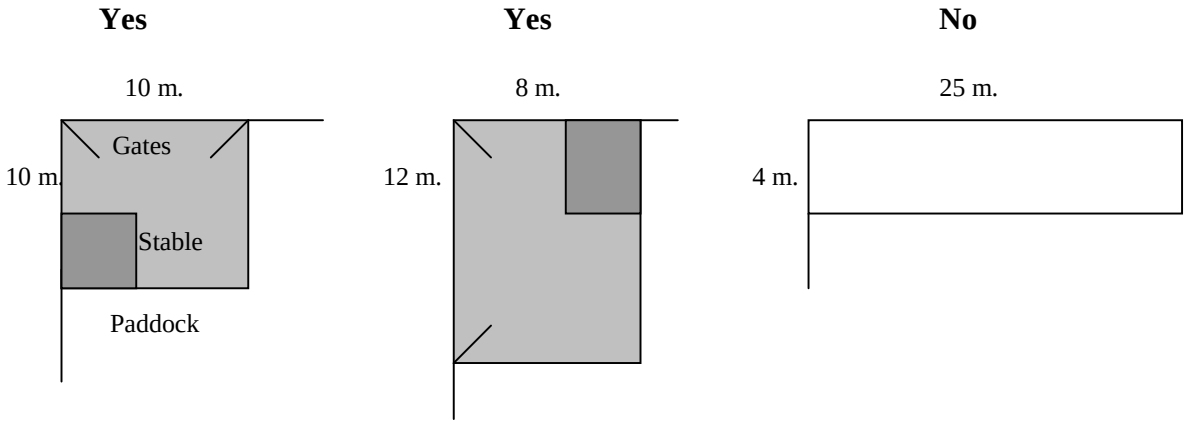
low, particularly with a late hay cut, otherwise short pasture suddenly exposed to hot, dry conditions can be killed.

The requirement of machinery for hay or silage making may preclude this option from some paddocks, but topping can be done anywhere with garden equipment if necessary.

3.4 Yards & Fencing

Feeding-yards, in association with stables or by themselves, are almost essential for managing pasture on small properties. Yards enable the confinement of horses from the grazing area, for as long as required, and are beneficial in concentrating hand feeding, containing any introduced weed seeds, and manure deposits into a small area. Where the grazing area per horse is limited, as on smaller, more heavily stocked properties, and particularly some agistment properties, the time horses spend in yards may have to be greater than the time spent grazing. The benefit will be twofold, by allowing horses some "green pick" from nutritious pasture, and by ensuring good, sustainable ground cover to eliminate weeds and bare ground. Horses in light work may have to be confined to yards from time to time to avoid them putting on too much condition grazing lush pasture.

Yards should be about 100 square metres in area per horse, square or rectangular, but not too long and narrow to avoid paths being worn (see below), and have a well drained, non-erodable surface composed of fine rubble and sand, similar to the ground cover used for menages. Stables may serve a similar purpose, but the important objective is to have a "confinement area", with a hard wearing and steady surface able to cope with plentiful "hoof traffic" without degenerating into dust and mud.



Fencing options are many and varied, ranging from the traditional, but expensive, wooden post and rail structure to the more economical electric wire or tape. The type of fence to use depends on its purpose, eg., boundary, yard, laneway, or subdivision of grazing area into paddocks, and the suitability for your horses. Boundary, yard and laneway fences are usually fairly permanent structures and preferably built of wooden post and rail or wire to provide security and safety for horses. Barbed wire should never be used with horses, and steel posts avoided if possible, because of the obvious risk of severe injury.

Subdivisional fencing is most effectively and economically done with electric wires or tapes in combination with wooden, insulated metal or plastic posts or stakes. Most horses adapt readily to electric fences and very quickly learn to avoid the "hot wire". The ease of movement of these barriers is ideal for rationed grazing by strip or block, or even relatively large areas. Electric fencing can be used quite well in conjunction with other fixed fencing, and for protection of any damaged areas along permanent fencelines, in corners, or around trees. The best approach to subdivision of the grazing area is to have the bare minimum of fixed fencing and maximum use of electric fencing.

3.5 Managing Manure

The ideal solution to managing manure is to let the horses do it for you. This can be achieved by a combination of yards, rationed grazing, vigorous pastures, and some "harrowing" if required. Manure removal from grazing areas, which is widely practised mainly for worm control, removes some plant nutrients and organic matter from the pastures. Ideally, the aim should be to let the horses return to the soil and pasture the nutrients and organic matter that are surplus to their needs. The worm problem can be controlled by a combination of good pastures and rotational grazing

Rationed grazing on vigorous pastures, in combination with harrowing if needed, is the most efficient and beneficial method of managing manure. This is, after all, close to the natural method on "free range" whereby the horses do their own manure management, moving from area to area at will. On small properties some control or rationing of grazing is necessary for spelling grazing areas in rotation to achieve the same effect. During the spelling period manure breaks down, pasture grows and freshens, and, although there may be some unevenness in pasture height, the horses will then again do a very effective job of taking from the pasture what nutrients they need and returning the balance. For best worm control, grazed areas should be spelled for 2-3 weeks in summer, 5-6 weeks in winter, and 3-4 months in autumn and spring.

Harrowing breaks up the manure clumps, eliminating this protective covering for worm eggs and larvae, and spreads manure evenly over the grazing area. This should occur straight after an area has been grazed, while the pasture is short and the manure is still fresh, to spread plant nutrients and organic matter most effectively.

If some of the manure clumps have dried out, wait for light rain or dew to moisten the clumps before harrowing. Harrowing can be achieved by conventional machinery, or where this is not available or possible, by dragging a piece of weldmesh, or logs tied together, by vehicle or by hand.

Dung beetles are another aid to managing manure. They lay their eggs in manure clumps and their larvae feed on the organic matter, breaking it down and dispersing the clumps, also exposing worm eggs and larvae to the elements. They generally have to be introduced onto a property and supplies can be obtained from the source listed in the Appendix.

3.6 Managing Weeds

The basic long-term strategy to managing weeds is to grow healthy, vigorous, long living pastures that will occupy all the grazing area and not leave any space for weeds to exist. Pasture plants are deliberately chosen to be the fastest growing and longest lasting (and most nutritious) for any particular region. Any other plants can be called weeds, including those that provide some horse feed like fog grass and capeweed.

However some are more troublesome or potentially toxic than others, eg., Paterson's Curse/Salvation Jane, Fireweed, docks, thistles and mallow.

However, even the best pastures often cannot be maintained at a level where no weeds are ever seen. The most sensible approach is to minimise the weed content of your pastures by constant scrutiny and quick attention to weed control. Weeds are best "nipped in the bud" before they have the chance to become too established and cause concern. This can be effectively achieved on a small property by spot spraying with the appropriate herbicide and/or hand hoeing. Sprinkling pasture seed in the resulting vacant areas and lightly raking to provide a seed bed will help to exclude any further weed growth.

Slashing weeds can help to reduce excessive weed growth, and seed set if done at or before flowering, but this practice is never more than a temporary solution. Unless the weed infested areas are reclaimed with vigorous pasture, by sowing seed and fertilising, the weeds will surely return in a very short time.

3.7 Summary

- Manage pasture growth by treating it as a crop to be mown regularly to keep it short, but not too short, and nutritious.
- Aim to have an *even* ground cover at all times with dense, vigorous pasture ranging between 5-15 cm average height.
- Horses are the best mowers to use and can be trained to manage pasture well, and be rewarded for good management with a daily "ration".
- Control grazing by *rationing* through frequent rotation of grazing areas to prevent uneven or over grazing.
- Guide grazing with portable, flexible electric fencing, and yards for spelling pastures from horses when required.
- Reclaim long pasture by forced, rationed grazing with horses, grazing with cattle or sheep, topping or mowing.
- Manage manure as naturally as possible by rotational grazing, vigorous pastures and harrowing.
- Crowd out weeds by growing healthy, vigorous, long living pastures.
- Recycle plant nutrients as simply and naturally as possible through pasture management with horses.

4. How Much Feed ?

4.1 How Much is Enough?

Despite the limited amount of land, horses on many small properties are generally too well fed rather than underfed! This occurs because owners have a tendency to overdo the hand feeding; to compensate for the (usually) limited amount of pasture, often due to poor pastures; to follow the fashion of supplying a range of feeds; and to be "kind" to the horses. Health problems from overeating, such as "founder" (laminitis), are much more common than those from undereating or underfeeding.

Horses, like humans, are healthiest and perform best if they eat just enough of the right feed for their weight and their activity. Who ever saw a "fat" racehorse win? You do your horses and yourself a favour by being careful about their diet. The horses feel and look better, you feel better and you won't have to spend any more than is required. It is just a matter of doing some sums to calculate what amount and type of feed is needed according to horse weight, condition and activity.

Table 4.1 gives average weights and basic daily feed needs for horses for maintenance. Extra allowances, particularly protein, will be needed for pregnant mares, growing foals and yearlings, or horses in work (obtainable from books and other sources of advice on horse nutrition). After calculating the feed needs of your horse(s) you then should work out the simplest and cheapest way to provide that food (see Table 4.2).

Table 4.1 Daily Nutrient Needs & Feeds for Horse Maintenance

	Daily Needs		**Alternative Feeds**	
Horse Weight (kilograms)	**Digestible Energy** (megajoules)	**Crude Protein** (grams)	**Grassy Pasture** (kilograms)	**Pasture Hay** (kilograms)
200	29	300	14.5	3.2
300	42	420	21.0	4.7
400	55	540	27.5	6.1
500	67	660	33.5	7.4
600	80	780	40.0	8.9

Table 4.1 shows that either grassy pasture or pasture hay, fed in the quantities listed according to weight, can adequately supply the major daily nutrient needs of horses. These feeds supply a range of other required nutrients and minerals as well.

As a rule and subject to cost, the basic maintenance feed should have a composition that matches the required energy/protein ratio as far as possible, which in the conventional measurements given above is about 1:10 (megajoules of energy: grams of protein). The ratios for the more common basic feeds (see Table 4.2) are: pasture – 1:20; pasture hay – 1:11; oaten hay – 1:7; lucerne hay – 1:18; oats – 1:9.

4.2 Horses are Grazers

The starting point in supplying feed to your horse(s) is how much pasture can be supplied. Pasture is the cheapest food source and happens to have the ideal combination of nutrients on most occasions for grazing animals (see Table 2.1). And after all, horses are grazers by nature so, by maximising the amount of grazing and pasture intake, you are letting the horses do what they were built for and avoiding interference with the natural system as little as possible. A horse can eat enough to sustain itself in four hours grazing on good pasture. Side benefits are contented horses with freedom to exercise and better teeth with less sharp edges due to the naturally abrasive action of grazing pasture "dusted" with soil particles.

Once feed needs, and the capability of your property to supply those needs from pasture (as discussed in an earlier chapter), have been calculated, taking into account seasonal variation in supply, you are then in a position to budget for any additional or supplementary food needs. Care should be taken to avoid supplementary feeding becoming "substitution" feeding, whereby horses are given too much handfeed at the expense of pasture. This is the easy way, but it is more costly, less beneficial to your horses, and more harmful to the land.

4.3 Horses Eat Hay

If supplementary feed is needed why not choose the cheapest source of extra food. This is usually hay, because most supplementary feeding is done to supply *energy*, and hay is generally the cheapest supplementary source of energy. Horses like and eat hay too! Hay will also supply some protein and other nutrient needs, depending on its quality, but its greatest value is as an energy supplement and it should be bought on the cost of the energy contained.

Subject to palatability and digestibility, which will depend on the plant content and how it was made, pasture hay will generally be the cheapest source of energy. Cereal or lucerne hay, and particularly chaff, usually are more expensive sources of energy than pasture hay.

Cereal grains (oats, barley, corn), and grain by-products, bran and pollard, are more concentrated forms of energy. They are more appropriate when a less bulky energy ration is needed for a working or growing horse rather than as a routine energy supplement for a resting or lightly worked horse.

4.4 Mixes, Meals & Pellets

Stud mixes, sweet feeds, meals and pellets tend to be served up to horses more often than not on small properties, regardless of the amount of work to which the horses are subjected. They are very convenient, usually contain every nutrient a horse could possibly need, and often come with glowing testimonials about superior growth rates and/or performance. The bottom line should always be the cost of main nutrients required, and in almost every case, this will be the unit cost of the energy and protein.

Feed composition and analyses are usually given on the bag tag or label for branded mixes and meals for horses and should list the energy content and levels of digestible crude protein and fibre. If the analysis does not state the energy content, this should be requested from your supplier. Meals, like soya bean and linseed, are protein rich feeds which have application for growing horses and horses in work, but are expensive sources of energy.

Table 4.2 gives a guide to the typical digestible energy and crude protein contents of a sample of the main supplementary feeds, and shows costs per unit of energy and protein based on current prices from one produce merchant.

Table 4.2 Digestible Energy & Crude Protein Content & Cost in Feeds

		Digestible Energy		Crude Protein	
	Price/kg	**MJ/kg**	**Cost/MJ**	**Grams/kg**	**Cost/gm**
Lucerne Hay	44 cents	9.6	4.6 cents	170	0.26 cents
Lucerne Chaff	64	9.6	6.7	170	0.38
Pasture Hay	28	9.0	3.1	100	0.28
Oaten hay	41	9.0	4.6	60	0.68
Oats	32	10.5	3.0	96	0.33
Maize	45	14.2	3.2	91	0.49
Bran	42	11.3	3.7	154	0.27
Pollard	42	13.1	3.2	156	0.27
Soya Bean Meal	87	13.1	6.6	445	0.20
Linseed Meal	70	12.3	5.7	346	0.20
Pasture (Dry)	4	10.0	0.4	200	0.02

This table shows that, of the supplements available from this vendor, pasture hay has the lowest cost of energy and protein combined, oats are the cheapest form of energy by itself, and the two meals are the cheapest sources of protein but expensive sources of energy. An evaluation like this of feeds available from your supplier will guide you towards more efficient and economical feeding.

4.5 Minerals, Electrolytes & Vitamins

Good quality pastures have a plentiful supply of minerals, electrolytes (minerals and elements in body salts) and vitamins (section 2.1) and even a limited ration of pasture provided reasonably frequently (not necessarily every day) will usually supply more than enough for resting and lightly worked horses and ponies. Deficiencies of the major minerals in resting, mature horses is rare, and there have been no reported cases of vitamin deficiency affecting horse health in Australia.

4.6 Summary

- Calculate the feed needs of your horses according to their weights and work. Don't be "unkind" and overfeed which potentially hurts your horse, your pocket and your land.
- Aim at all times with feeding to "keep it simple", maximising the pasture component of the diet, and using as little and as few supplementary feeds as possible. Horses in times gone by managed quite well on the basic feeds of pasture, hay and chaff.
- Do your sums on nutrient requirements and costs. Why waste money on unnecessary amounts or types of supplementary feed when the funds could be spent on better gear.

5. Healthy Land, Healthy Horses

5.1 Land Care

The national emphasis on land care is generally well known by now with the publicity given to efforts to contain and eliminate erosion, salinity, noxious weeds and the harmful effects of water leaching and run-off. Land care activity is usually concentrated in the rural areas of Australia where the greatest benefits from implementation of best practices can be realised. Nevertheless, the typical small horse property around urban areas is the classic case where land care is sorely needed. The benefits from following the recommended guidelines will accrue to the horse owner, the horses, and the wider community, in the gradual disappearance of the typical "horse-sick" paddock.

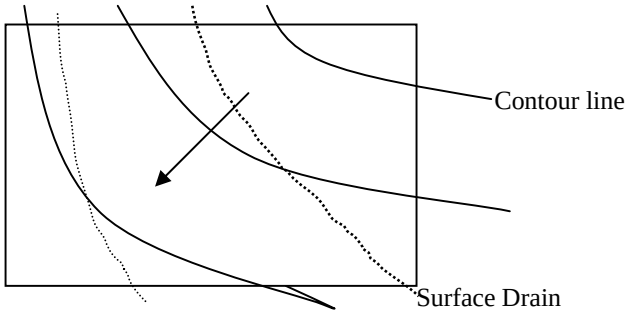
Good land care starts with establishing and maintaining strong plant cover on the ground to protect the soil from the ravages of rain, wind and "traffic", which on a horse property means the effect of hooves in creating divots and land compaction. More vigorous horse activities such as exercise and schooling do "damage" pastures and land but the damage can be managed and repaired by resting pastures from time to time, the same as happens on racecourses and grass training tracks.

The next step is to contain the nutrients within the land to avoid contamination of groundwater, nearby watercourses and wetlands. This can be achieved by a combination of adequate fertilising, vigorous pastures, rotational grazing management, and manure distribution, so that a satisfactory nutrient balance is maintained and nutrients are recycled as much as possible. Previous chapters have dealt with growing and managing pastures to achieve these fundamental steps in land care.

5.2 Drainage

In some situations on small horse properties, particularly on clay and loamy soils, extra attention to drainage is needed to remove surplus water if pasture and other plant growth cannot cope or the soil is compacted. Areas around yards, shelters and stables, along laneways, and naturally wet areas in a paddock, such as where seepage comes to the surface, need special treatment.

Drainage in paddocks can be improved, if necessary, by surface drains and/or mole drains. Surface drainage with shallow "spoon drains" or ditches, dug by implement or hand, is a simple and effective means of reducing excess water on paddocks, eg., from heavy or prolonged rain, even on very gradually sloping land. These surface drains should be run across the slope of the land similar to a contour bank, with a slight fall, and at suitable intervals according to the slope. They will soon "grass over" and become gentle depressions in the paddock causing little or no inconvenience to horses or vehicles.



Mole drains, which are underground "pipes" moulded into the subsoil with a special implement (the "mole"), can be more effective than surface drains in heavier clay loam soils, but have to be installed with a tractor. The drainage layout is the same as for surface drains.

Drainage on all sides of yards, shelters and stables, and on either side of laneways, is recommended to both prevent entry of water and to dispose of run off water from the ground surface or roofs of shelters and stables. Some seepage areas in paddocks can be constantly boggy and cannot be drained adequately by conventional means. In such situations the areas may have to be permanently fenced off and planted with water tolerant plants or trees.

All drains should empty into a perimeter or boundary drain along a laneway or fenceline, or a natural watercourse, wetland or dam. Drains along boundary fencelines, in appropriate locations, can also prevent inflow of water from neighbouring areas. *Care should always be taken to avoid any risk of causing erosion and consideration should be given to harmless disposal of surplus water, ie., don't dump it on your neighbours!*

Advice about drainage techniques can be obtained through the sources listed in the Appendix.

5.3 Erosion

Erosion starts with bare ground, and unfortunately this is not an uncommon feature of horse paddocks. Horses spend a lot of time at the usual "feeding point" in a paddock, which is often at a corner or gateway, and any pasture is quickly stamped out in these areas. The same result occurs around water troughs. Similarly, along permanent fencelines bordering neighbouring horse paddocks or areas of particular interest to horses, a path is quickly worn by the tramp of equine feet. It is not long before wind and water erosion combine with the horses hooves to remove all topsoil in these situations leaving a land care problem that is not easy to overcome.

The ideal solution is the combination of yards, for feeding and watering, and rationed grazing, to avoid the constant "wear and tear" along certain fencelines. As explained in earlier chapters, this approach yields many other feeding, "weeding" and economic benefits as well as combating erosion. If the ideal solution is not possible, or pending its introduction, the next best approach is to give some land areas special protection from horses' hooves.

In the case of feeding and watering points, a layer of material similar to that recommended for yard surfaces will provide a stabilising and durable ground cover to prevent erosion. The surface will need "topping up" from time to time as it is gradually worked into the underlying soil. For the fenceline "pathways", the only practical solution is to use movable electric fencing to prevent access and give these areas a rest before too much damage is done to the pasture.

Kikuyu grass is a valuable aid to erosion control in many situations. It has the ability to establish itself on partially eroded areas, and can withstand and recover from much more horse traffic than most other grasses. However it needs to be managed in some situations because it is a prolific grower in warm moist conditions and excessive intake can cause dietary problems in horses.

5.4 Trees

The beneficial association of trees and land care is well known by most people. Trees help to stabilise the land, are an important aid to drainage and erosion control, and provide shelter and shade for low growing plants. They also provide shelter and shade for horses. However, horses can damage young trees by chewing bark, rubbing and generally reducing their vigour.

In general terms you cannot have too many trees, provided they are placed to best advantage. Trees scattered through paddocks make grazing control and paddock treatments more difficult and are at risk of ringbarking by horses. Pasture growth under trees can also be limited or absent due to leaf fall, horses seeking cover, and trees competing more successfully for moisture.

Shelter belts of trees along fencelines or in fenced off areas within paddocks, beyond reach of horses, are the preferred methods of tree planting. This achieves the land care aims and can provide the required shelter and shade for horses. Which trees are best to grow on your property is again a matter of consulting informed sources of advice (see Appendix).

5.5 Nutritional Problems

Healthy horses are those that get the right amount, type and quality of feed for their size and work. This aim is best achieved by a *controlled* diet consisting of as much good pasture as possible, supplemented, where required, by the cheapest sources of energy and

protein, which is normally hay, as discussed in the previous chapter. Where diet is not controlled sufficiently, or where horses have access to certain plants and weeds, nutritional problems can occur.

The most common problems, as most horse owners know, are those associated with over-eating, such as *founder* and *colic*. Fat horses, and particularly ponies, have a higher risk of founder, colic and other problems of "over-indulgence". This can largely be avoided by adjusting their feed to their need. This may mean a limited "diet" for a time to correct these conditions. Controlling their diet is being kind to your horses apart from the obvious cost and health benefits.

The other usual nutritional problems are generally associated with horses eating toxic plants and weeds, not by choice, but by necessity because of limited availability of nutritious pasture, particularly in dry seasons. *Salvation Jane/Paterson's Curse, Soursob, Fireweed, Bracken, Flatweed, Paddy's Lucerne, Crofton Weed* and *Marshmallow* are some plants that, although not very palatable, have toxic effects if horses must resort to eating them. *Stringhalt* is a nervous condition in horses that is believed to be caused by a toxin in species of Flatweed and some other weeds. The lack of good, vigorous pasture in the first place allows these undesirable plants to become established and pose a continuing problem until they are replaced by pasture.

5.6 Worms

Some worms are good, some worms are bad. Earthworms in the ground are good because they eat dead and waste plant material that becomes mixed with soil, breaking it down so that nutrients are recycled to growing plants. They also aerate the soil by their burrowing. Their presence in your paddocks should be welcomed and encouraged by maintaining a good pasture cover and spreading manure by harrowing.

Stomach and intestinal (internal) worms in a horse are bad because they are *parasites* that compete with the horse for nutrients from the feed the horse has eaten, and can cause major damage to the intestines and internal blood vessels. Their presence is unwelcome, but it is inevitable that most horses will have a "worm burden" because of their natural grazing habits. This results in some intake of worm larvae that have developed from eggs which have been deposited in manure. Worm larvae hatch within a few days from the eggs and move onto pasture and scattered feed waiting to be ingested by the horses, to complete their life cycle. The small horse property often has more of a problem with internal worms due to the tendency to higher stocking rates and less resting of grazed areas, but this need not be so.

The aim should be to minimise the worm burden through a combination of drenching, grazing management and harrowing or manure removal. Periodical drenching of horses and administration of oral paste preparations are the accepted basic, essential techniques for worm control, in accordance with veterinary advice and monitoring horses for worms by faecal egg counts. *The effectiveness of these practices can be enhanced 5-10 times by ensuring that horses ingest as few worm larvae as possible through grazing, pasture and manure management.*

Spelling pasture areas after grazing, by rationed, rotational grazing, gives the grazed pasture time to regrow to a height above the normal, close to the ground, habitat of worm larvae, thereby reducing the intake of larvae. Harrowing grazed areas, as explained in section 3.5, also assists reduction of larvae by breaking up and spreading manure, exposing eggs and larvae to sunlight and dry conditions, under which they cannot survive.

Another option is to remove manure from areas inhabited by horses, particularly yards and stables, but this needs to be done *at least daily* to be effective in worm control. This frequency of manure removal is often not practical on grazed areas, and if so, then rotational grazing and harrowing should be used. Other, less generally available options for worm control, include cross grazing with other animals such as cattle or sheep, and cropping. Cattle and sheep can ingest most horse worm larvae without harm and effectively break the horse worm life cycle. Cropping serves to spell an area for a lengthy period before it is next grazed, thereby eliminating all eggs and larvae, but is generally not practical on small properties.

5.7 Summary

- Land care can be easily applied on horse properties, with great benefit to owners, horses, the community and the environment.
- Mud need not continue to be a problem, even in difficult spots, by controlling water inflow and outflow just the same as you do at home.
- Don't accept bare ground and erosion as inevitable in a horse paddock because they can be prevented with pastures and protection, and prevention is always better and cheaper than cure.
- Use trees as much as possible, as sun shades, wind shelters, drainage and erosion controllers, but place them and manage them to best advantage.
- Approach health problems positively, by controlling diet quantity and quality at all times, removing weeds as a feed option, and disrupting the worm life cycle as much as possible through grazing, pasture and manure management.
- *Healthy land and healthy horses can live together on your property* – based on good ground cover with pasture plants and trees to provide feed, drainage, shelter and shade, and for protection against erosion, weeds and parasites.

Appendix 1

Sources of Advice on Pastures, Fertilisers and Land Care

1. State Government Departments of Agriculture/Primary Industry

Department of Natural Resources & Environment (also Agriculture Victoria)
Melbourne (03) 9637 8000; or Regional Offices
Agriculture New South Wales
1800 808 095; or Regional Offices
Primary Industries & Resources South Australia (PIRSA)
Adelaide (08) 8226 0222; or Regional Offices
Department of Primary Industries Queensland
Brisbane (07) 3239 3111; 132523; or Regional Offices
Agriculture Western Australia
Perth (09) 9368 3333; or Regional Offices
Department of Primary Industry & Fisheries, Tasmania
Hobart (03) 6233 8011; 131368; or Regional Offices
Department of Primary Industry & Fisheries, Northern Territory
Darwin (08) 8999 5511; or Regional Offices

2. Major Fertiliser Companies

Pivot - Vic. (03) 9605 0400; NSW (02) 9842 9222; SA (08) 8447 5022; Q (07) 3260 2866
WA (09) 9350 6575; Tas. (03) 6331 3866
Incitec - NSW (02) 6362 6880; Q (07) 3867 9300; SA (08) 8240 0398
HiFert - SA (08) 8405 8400; Vic (03) 5282 3400

3. Soil Testing Agencies

Pivotest - (03) 9682 1040 & 1800 810 814
also refer to above State Government Departments of Agriculture & Fertiliser Companies

4. Farm & Agricultural Advisory Services

refer to “Yellow Pages” under this heading

5. Dung Beetles

John Feehan, Soil Cam, 3 Pell Place, Hackett, ACT 2602. (02) 6248 0376 (A.H.)

Appendix 2

Suggested Reading

"Feeding Horses in Australia: a guide for horse owners and managers"
by John Kohnke, Frank Kelleher & Penny Trevor-Jones. Rural Industries Research and Development Corporation

"Hoofprints: a manual for horse property management"
by Jacquie Foyel. Primary Industries & Resources South Australia

"Horse Sense: the Australian guide to horse husbandry".
by Peter Huntington & Fran Cleland.

"Pastures for Horses - A Winning Resource"
by Angela Avery. Rural Industries Research and Development Corporation

"Pasture Management for Dairy Farmers"
Victorian Department of Natural Resources and Environment.

"Sustainable Land Use for Depastured Horses: guidelines for small properties"
by Arthur Stubbs. Rural Industries Research and Development Corporation Publication No. 98/11.