

Pasture and Range Health FACTSHEET

PASTURE DESIGN

A well designed and managed pasture can improve productivity, extend the grazing season, increase pasture life, distribute manure more evenly, and improve animal performance. This factsheet will focus on pasture design; for information on pasture management, including livestock distribution, grazing frequency and utilization and designing a grazing management plan, refer to Factsheets No.1, 2, 3 in this series and section 3 of the *Grazing Management Guide*.

Design Considerations

When designing a pasture, the initial overview should consider the following:

- Vegetation types, such as grass, shrubs, trees
- Riparian areas and water courses
- Topography
- Overall size of the pasture area.

After completing an assessment of these existing physical characteristics, the design also needs to consider:

- the size and number of paddocks to meet management objectives
- how to fence the paddocks, that is temporary or permanent fences
- stock watering sources; natural or man-made
- protection of sensitive areas, such as riparian vegetation, watercourses and treed areas.

Other considerations may include identifying resting areas, managing manure distribution, the season of use, (e.g. growing season and/or dormant season grazing) and the number and type of livestock that will be grazing, such as beef, dairy, sheep, yearlings, cow-calf, horses.

Vegetation Type

The vegetation in the pasture will affect how the pasture is grazed. If the vegetation is primarily comprised of pasture forage species, then achieving uniform grazing should not be too difficult. However, pastures frequently contain a number of different vegetation types, often related to soil types, moisture differences, past history of use and pasture age. Trees are often advantageous to have in a pasture, as they provide shade and shelter, but may require additional management to protect them and avoid manure build up in this area. The location of your paddock fences needs to consider the different vegetation types. For example, if the pasture contains both forested areas and tame forages, you may want to consider fencing them as separate paddocks, thus increasing management flexibility.

As a general rule, pasture management is easier if the paddocks are comprised of primarily one vegetation type.

Riparian Areas and Watercourses

If the pasture contains a riparian area and a watercourse, pond or lake, the same principle of fencing areas of similar vegetation applies. Riparian areas typically have more diverse, greener, and moister vegetation, which is attractive to most classes of livestock. This can result in overuse of these areas, especially if they are part of a larger pasture that consists of drier and less palatable upland vegetation. In order to manage the riparian area effectively and to make productive use of the vegetation, it is often advisable to fence this area separately from the upland area of the pasture. Refer to *Riparian Pasture Design* (Factsheet No.5 of this series).

Topography

Level or gently sloping pastures generally do not have topographical restrictions. Steeply sloping pastures those with combinations of rolling and level areas however will pose problems and thus it is essential to be aware of livestock preferences. Typically, most species of livestock prefer the easiest access to forage, which requires the least expenditure of energy, and thus often congregate on the flattest land.

Attracting stock up steep slopes may require the use of both fences and other attractants, such as water and salt. Depending on weather and insect conditions, stock may show a preference for either exposed hilltops to capture a breeze and escape insects, or valley bottoms in search of shelter. Fence location needs to ensure that stock will not be trapped at the bottom of steep slopes. This is accomplished by allowing some level terrain at the bottom of slopes.

Topography and aspect can also affect the type of vegetation (eg. shrubs and trees on north facing slopes) and the timing of forage readiness, with south facing slopes starting growth earlier in the spring, but drying up sooner than north facing slopes. Pasture design and management needs to consider these effects when developing a grazing system.

Size of Pasture

The intensity of the grazing management plan often determines how many grazing cells or paddocks are required. The lowest management intensity is a one pasture, continuous grazing system; next is a rotational grazing system that may have a few paddocks (e.g. 4-6), with livestock moves largely based on a calendar schedule. This is typical of many range use grazing plans. The most intensive is a multiple paddock system, with moves based on forage utilization and required rest periods.

Large pastures (e.g. 50 or more hectares) are likely to have many variables in vegetation, topography, etc. as discussed above. More intensive management of large pastures will usually involve sub-divisions into paddocks. However, in order to be practical the lower the productivity, the larger the pasture needs to. Large areas of productive pasture land, with uniform forage cover, will benefit from the more intensive management that is practical with a greater number of paddocks.

Fencing

- Permanent fences have the advantage of requiring less management and maintenance once installed. The disadvantage is initial costs are higher than for temporary fences, and flexibility is reduced.
- Temporary fences (e.g. moveable electric fences) are relatively inexpensive to install and have great flexibility. Disadvantage is an increase in management, maintenance, and labour.

Key points

- Low productivity pastures often need to be larger.
- Greater uniformity of vegetation may be managed as large units, but subdivision into paddocks allows for better management, rest, and uniform manure distribution.
- Highly productive pastures, which re-generate a number of times during the growing season, benefit the most from intensely managed small pasture cells.

Number of Paddocks, Size, Layout

“Pinwheel” or Spoke Layout

Advantages

- only 1 water system required; stock handling facility can be located in the centre

Disadvantages

- large amount of stock trailing impacts; area near center heavily impacted.
- more fencing required than other systems

Grid Design

Advantages

- less fence required than spoke system
- reduced impact from stock trailing
- straightforward layout and construction

Disadvantages

- requires more than 1 water location, unless a central alley is constructed, which increases fence length and trailing impacts
- if constructed with permanent fences, reduces management flexibility if stock numbers or types change

Topographic Layout

This is a more typical ‘on the ground’ situation where the land is not uniformly flat and square. Under this type of scenario, fence layout needs to consider hills, creeks, riparian areas, etc. (see above).

Watering options are often used as a management tool and may include a combination of controlled access to a natural water source, as well as developed water sources.

Rule of thumb for water sources – stock should not have to travel more than 300-400 meters. Greater travel distances result in overuse of forages near the water source.

Paddock Stocking Rates

The number of days a paddock can be grazed, or the number of head it can support, is calculated based on the number of livestock as well as the forage productivity (e.g. lb/acre). When developing a grazing management plan, it is important to know how many head can be grazed for how many days. This determines how much total pasture area is required.

Example formulas:

A. How many animals will a paddock support ?

$$\text{Number of animals} = \frac{\text{pounds of dry forage/acre} \times \text{No. of acres}}{\text{individual animal weight} \times \text{utilization rate}^* \times \text{days to be grazed}}$$

* Utilization rate (consumption, trampling, and buffer) is .04 (i.e. 4% of body weight) (a 1000 lb animal is allowed 40 lbs/day).

B. How many days can my herd stay in a paddock ?

$$\text{Number of days} = \frac{\text{pounds forage/acre} \times \text{No. of acres}}{\text{daily herd forage requirement}}$$

Key points to know when designing paddock number and size :

- Number and size of animals to be grazed.
- Forage productivity.
- Planned length of grazing period (days) for the paddock.
- Required forage rest/re-growth period.

Water Sources and Systems

Consider the following points regarding watering livestock :

- Try to keep travel distances to water under 400 m.
- Clean water in troughs has improved animal performance compared to water from earthen dugouts.
- Gravel or similar material should be placed around troughs in order to reduce mud.

Refer to *Livestock Watering Handbook* for more information.

Lanes for Livestock

In some situations, lanes may be needed to move livestock to water, corrals, etc.

- Lanes should be 5 – 8 meters wide. Wider lanes are not necessary and generally remove more land from production.
- Gates from paddocks into lanes should be in the corners of paddocks. This allows animals to move more naturally and facilitates safer stock movement.
- Gravel or other materials should be considered in wetter areas in order to reduce mud.

Protection of Sensitive Areas

Water courses, wetlands, clumps of trees, etc. may need protection from livestock impacts, especially under intensive grazing management systems. While exclusion fencing is one option and may be required in some cases, other options exist. Alternatives such as alternate water sources, back scratchers, salt/mineral and shade or shelter can also draw livestock to other areas of the pasture. These may reduce impacts on sensitive areas to acceptable levels.

Summary

Pasture design needs to be integrated and developed based upon an assessment of the physical site characteristics, the number and type of livestock, and the expected level of management. Returns from pasture can increase as management intensity increases. It is also important however to be realistic regarding the level of management required so that it will be maintained.

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