The realities of pasture establishment

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Abstract

In the past 50 years, large areas of fertile grazing lands have been developed for grain and forage production. With fertility decline and increase in cost of inputs, profitability has declined and return to permanent pastures seems warranted.

This paper discusses the critical practical issues to be considered in establishing these pastures. Adequate soil-seed contact, stubble retention, effective weed control and strategic use of slashing are essential for successful establishment. However, equally important are the human characteristics of patience and commitment to the task.

Introduction

Approximately 50 years ago, pastoral grazing became unfashionable through the western division of NSW, the south-west and central-western areas of Queensland. This was predominantly due to fertile grazing country being developed for grain production, followed soon after by the farming of forages for grazing.

Although the development of this country proved to be very profitable over several decades, the eventual degradation of the shallow, fragile soils and fertility decline in many of these areas have contributed to a sharp increase in inputs such as fertiliser. This, along with the increase in the cost of chemicals, fuel and seed as well as low grain prices, has resulted in a decline in profitability for many producers and renewed interest in pastures.

The farming areas I have just described are predominantly heavy clay soils in regions with unreliable rainfall. Trying to establish subtropical grasses in this situation without an understanding of the problems and consequences associated with soil degradation caused by years of farming can often end in failure. In this paper I will outline some of the realities of pasture establishment on old cultivation and virgin country, drawing on 40 years experience as a grazier and pasture adviser.

Virgin country

Soil structure

When planting into virgin soils, there are few variables to consider other than the weather, and we have no control over that. The only real problem that could be encountered is panning or scalding, which is more likely a result of stocking pressures. Virgin soil is generally unspoilt with a low level of weeds and a high content of organic matter and, because sheet erosion has not been a problem, there is a higher percentage of fines and silt in the soil structure.

The fines and silt are an important part of successful pasture establishment. They create good seed-soil contact, and also assist in holding the moisture in the top 20 mm of the topsoil, helping form a barrier against excessive evaporation. Since pasture seed is generally planted on top of the ground and most species require up to 4-days moisture to trigger the germination process, evaporation is a huge problem. The evaporation rate on course clays is much higher than on sandy loams or sands, with the result that establishment on lighter soil types is faster and success rates are higher.

Weeds, preparation and planting

In most cases, virgin country will be relatively free of ‘farming weeds’, i.e., weeds such as annual grasses like urochloa and barnyard millet and broadleaf species. In the absence of these
weeds, one working is sufficient with either of the following implements:
- Heavy offsets
- Blade plough
- Cutter bar

When planting with any of the above implements, it is important to ‘seed as you go’ from the same machine. A light shower of rain between ploughing and seeding will create a crust in the surface of the soil and subsequently the advantage of good seed-soil contact has been lost. Two or 3 rainfall events may then be required to bed the seed, in which case the seed can be removed by seed-gathering ants, and some native species may start to return, creating competition for the improved species. The following seeders can be mounted directly on to the above implements:
- Roller drum
- Sea Brook seeders
- Pasture air seeders

**Returning old cultivation back to grass**

Over the years, the following comment has been made to me many times: ‘This country is too worn out to continue to crop; we want to turn it back to grass’. I have a standard reply: ‘If the country is worn out for cropping, then it is not suitable for grass’. Pastures are no different from grain or forage crops; they have similar nutritional and water requirements and weeds have the same negative impact. The establishment of subtropical pastures on old cultivation requires hands-on management and specialised pasture advice. Unfortunately, both of these important requirements have been in decline for the last 15 years.

**Soil structure, evaporation and runoff**

Continuous cultivation of soils over a 20–50 year period undermines the integrity of the soil structure. With each working, clouds of dust float into the atmosphere and water runoff and sheet erosion also remove the fine soil particles. Eventually, the coarse clay particles dominate the upper topsoil structure and can be much larger than the kernel of the grass seed you have planted. The result of this is very poor seed-soil contact.

We have to remember that pasture seed is surface-sown, so seed-soil contact is difficult to achieve if there are pockets of air around the seed. The coarse soil structure also allows for increased moisture loss through evaporation in the top 20mm of soil, which can take place over a few hours, long before any of the subtropical seeds have germinated. In this harsh environment of predominantly storm rain followed by hot weather, evaporation and runoff are the biggest obstacles to successful pasture establishment.

As a preventative measure, I have found that leaving the soil furrowed (deep rills) on the final cultivation following the contours creates silt traps at the bottom of the furrows. The fine particles that remain in the soil, combined with the seed and ponded water, all end up in the base of the furrow. This helps achieve seed-soil contact and holds the moisture around the seed longer. Do not harrow!!! Harrowing will help create a surface pan that in turn will create water shedding. Wherever water runs, seed will not germinate because of lack of moisture retention.

Stubble retention from a preceding cereal crop such as wheat or barley (not a forage crop) can also play a part in reducing evaporation and runoff, as long as a few simple steps are followed, namely:
- Do not graze the stubble; it will help conserve moisture and the ground needs to be left soft.
- Maintain the fallow through spring, chemically control weeds and allow subsoil moisture to build up.
- If the soil is still soft and friable, broadcast straight into the stubble and slash the stubble down over the top.
- Do not cultivate, as this will bring weed seeds to the surface.
- If there is a crust on the surface, run a set of phoenix harrows over the paddock prior to planting.

**Weeds**

The other major hurdle in establishing pastures in old farming country is the seed bank of various farming grass weeds, which has built up over time. Control of these weeds is imperative during both pre- and post plant, as no selective herbicide is available.

Pre-plant preparations should consist of 3 mechanical tillage cycles, which consist of:
- Ploughing
- Rainfall event
- Weed germination
- Ploughing
This process must be completed at least 3 times.
Do not try to cut corners by spraying instead of ploughing. If you were to spray twice and then plough to create a seedbed prior to planting, it could bring to the surface a new lot of weed seed ready to germinate alongside your pasture seed.

Post plant weed control is as follows:
- In pasture, spray applications for broad leaf weed control
- Slashing for both broad leaf and annual grass weeds.

Failure to comply with these 2 simple steps will result in moisture loss and the weeds choking out the small, less vigorous grass seedlings. Chemical applications are self-explanatory but slashing is the most under-rated tool in pasture establishment and maintenance.

Slashing

Slashing is particularly important in the early part of the phase when the established subtropical plant population is between 30% and 70%. Like weeds, these butts now provide competition for emerging seedlings by robbing moisture from the surrounding area, so:
- Keep early-maturing butts and weeds slashed; this reduces moisture demand and encourages seedling recruitment.
- Do not graze! Contrary to the message coming out of some grazing workshops, grazing at this stage does not work. Stock preferentially graze the immature plants, pulling them out of the ground and leaving the mature ones. I have personally seen whole paddocks destroyed by this management practice. Slashing is not selective.

Slashing the weeds and pasture also creates mulch or ground litter which, over time, starts a chain of events that will have the following long-term benefits for both your pasture and the soil:
- Improved soil structure
- Increased fertility
- Reduction in evaporation
- Reduction in runoff
- Increased moisture retention

Do not worry about ensuring the early-maturing grasses go to seed. Any seed drop will not germinate straight away and it is more important to encourage the seed we plant to germinate. If the slashing were done prior to the end of March, there would still be enough time for most varieties to seed. Do not graze new pastures until there has been a seed drop.

Planting rates

There are a number of issues to consider in relation to appropriate planting rates to use. Since the biggest cost during establishment is the cost of lost production and the cost of failure is even higher, it is important not to extend the time for pasture to become fully productive by cutting down on the seeding rates.
- The heavier the soil type the heavier the planting rate should be; the extra $25-38 per ha is readily retrieved if grazing can commence 12 months earlier than on a paddock planted at a lighter rate.
- Quality seed is a sound investment. Cheap seed generally ends up being more expensive.
- Do not cut corners; plant smaller areas at increased planting rates rather than larger areas at lighter rates.
- If planting coated seed, remember to increase the planting rate to compensate for the reduced seed count per kg.

Conclusion

In closing, I would like to emphasise the most important ingredients to success in establishing pastures, i.e., patience and commitment.
- Patience to work through the difficulties that we have created through years of farming marginal country.
- Commitment to stick to the task and return worn-out farming country back to improved pastures with high productivity. With the proper approach, this is achievable.