Where to for Tropical Pasture Improvement — Silver Bullet, Weed or ……

JOHN CHILDS

Program Coordinator — Resource Management, MLA Northern Beef Program

Tropical pasture improvement has an impressive record of achievement, having been a major focus for development of the beef industry in the more productive grazing areas of northern Australia, and a major basis for research programs designed to increase beef production and productivity. It has provided a number of researchers with enviable reputations.

Despite the ups and downs of Townsville lucerne, and the difficulties associated with any technology that does not achieve its claimed potential, tropical pasture improvement has by and large delivered considerable benefits and gains to the northern beef industry.

Current situation

Given its achievements, it is surprising that there has been a continuing decline in tropical improved pasture research and development. Staffing and programs have been decimated. There is even debate over the maintenance of genetic stocks and the provision of services providing genetic material. This change is typified in the ongoing renaming of the CSIRO Division of Tropical Pasture Production to Tropical Agriculture to Sustainable Ecosystems.

The tropical pasture improvement technology did not always live up to the claims made for it, and it did have unintended ecological consequences, particularly in relation to the water grasses (Para grass, Hymenachne), and those grasses significantly increasing the fire fuel load (Gamba and Buffel). The relative significance of the contribution from improved pastures was also influenced by the increasing availability of alternative cattle production technologies such as infusion of *Bos indicus* and provision of feed supplements.

While the relative influence and impact of improved tropical pastures has declined, the perception that pasture improvement has nothing to offer and is a dying technology is probably somewhat premature. Provided it can meet environmental requirements and provide economic benefits, it may well have a role.

Issues to consider

We need to understand where cattle grazing and pasture improvement fit in the context of the wider landscape ecology.

There is an increasing emphasis on landscape health as a means of defining the attributes and indicators of healthy use and the basis for assessing and monitoring the health of the landscapes.

The Tropical Savannas CRC has developed a concept of landscape health, which incorporates issues of use and a range of scales. There are three components to the definition of landscape health.

A healthy landscape:

- maintains basic functions at all spatial scales including nutrient cycling and water capture;
- maintains viable populations of all native species of plants and animals at appropriate spatial and temporal scales; and
- reliably meets the long-term needs (material, aesthetic, spiritual) of people with an ongoing interest in the region.

The particular attributes of a healthy landscape differ in relation to use and scale. The attributes will be quite different between landscapes used for pastoral production and those used for traditional aboriginal purposes or for conservation. The scales will be influenced by the area and habitat required to maintain healthy populations of native plant and animal species.

Within a broader regional or bioregional context, each separate use cannot meet all the health requirements of the landscape on its own. There needs to be a differentiation of landscape health requirements within a region or bioregion based on use, provided that all environmental values can be met at the region or bioregional scale.

Within the context of a grazing land use, significant issues need to be considered. The terms of trade, or relationship between prices received and the cost of inputs, have continued to decline. As for other commodities traded on a world basis, this trend will continue. To counteract this, producers need to continually increase their economic efficiency of production. In addition, the requirements for economic viability have changed over time. What was once a sufficient property size for economic viability is often now far too small. Economic profitability can be maintained only by the use of appropriate technologies, an increase in scale of operation or by mining the natural resources on which the enterprise depends.

The following sayings are well known. "You can't be green, if you're in the red". "If you're not green, you'll never get in the black". While both are somewhat true, they represent the dilemma that, in many circumstances, ecological sustainability and economic viability are not compatible. The work of McIntyre, McIvor and McLeod in south-east Queensland demonstrated this.

Pasture improvement in context

These pressures for economic viability, when economic circumstances are declining, require a consideration of how technology can be utilised to increase productive efficiency while sustaining environmental and natural resource values. Pasture improvement may well have a role.

If pasture improvement is to have a role, it needs to meet certain requirements:

- It needs to be compatible with ecosystems function and health.
- It must maintain and enhance nutrient cycling and flows and water dynamics.
- It must do this within the context of maintaining the ecosystems as a whole.
- It must also be beneficial for the habitat and food chain requirements of biodiversity such as soil biota.
- It must impact positively on those industries dependent on it.
- It must meet certain economic imperatives.
- At the same time, it must not adversely impact on other land uses and their health, including conservation, cropping and aboriginal use.
- It must be compatible with native pasture species and ecosystems. Diversity in plant populations is crucially important in maintaining a resilient system, which will respond to adverse impacts and challenges and adapt without outside interference. Diversity is the key to adaptive survival.

There will continue to be an ongoing increase in the intensity of use of natural resources by grazing industries. In achieving this, the industry will need to meet certain requirements in maintaining landscape health and be subject to monitoring and scrutiny by the wider community. This will apply to both on-property and off-site impacts and landscapes.

Pasture improvement potentially can make a major contribution. It will need to actually deliver sustainable increases in productivity while maintaining landscape health within a regional context.

Resource management priorities

The northern beef industry has defined the following major issues in natural resource management, which it believes it must address to maintain industry viability and resource sustainability at property, regional and industry scales:

- Grazing management, including increased utilisation, resource protection and production efficiency;
- Water quality, both on-property and downstream;
- Tree-shrub management, including the use of fire;
- Monitoring of landscape health and trend conditions;
- Weeds and their management, both native and exotic;
- Greenhouse gas emissions by the grazing industry;
- Dryland salinity; and
- Environmental Best Practice Management, the establishment of benchmarks and adoption of appropriate packages.

The MLA Northern Beef Program through its Sustainable Northern Beef NRM Strategy is addressing these issues. Projects being conducted within this Strategy will contribute technologies and guidelines of assistance to the grazing industry in maintaining sustainability and economic viability.

New rules for improved pastures

Given the context of landscape health and what is required to achieve it, the economic and efficiency pressures to intensify natural resource use, and the context of pasture management and improved pasture development, there are a number of guidelines or rules which will apply to improving tropical pastures.

- There must be no harmful off-site effects, such as sediment movement, habitat degradation or weed establishment and expansion.
- Use of Genetically Modified Organisms will be very, very difficult if not impossible, because of the potential for contamination of the environment.
- Pasture improvement must not be a threatening process, as defined in the Environmental Conservation & Biodiversity Protection Act.
- The introduction of pasture improvement should result in minimal soil disturbance to avoid increasing soil acidity and dryland salinity.
- There will be major restrictions on tree clearing, both areas cleared and the layout of clearing and remnants, which will influence pasture improvement within the landscape.
- Monitoring landscape health will enhance the effective management and use of the pastures and may well be a requirement for meeting performance targets in environmental management.

The way forward

Given the situations faced by the grazing industry, there is a logical and increasing role for the use of pasture improvement technologies in northern Australia. This will be based on the best options for sustainable production while meeting certain landscape health and environmental requirements.

This will involve, first and foremost, not breaking the rules and guidelines described above. Systems will need to be put in place to ensure best management practice is implemented and performance of these systems monitored and evaluated.

Tropical pasture improvement will need to be implemented within the concept of a healthy landscape and its design. This will be of benefit to the sustainability and performance of the grazing industry.

The best management practices determined by experiential knowledge and science will need to be implemented if the production and economic efficiencies from introducing the technology are to be achieved while meeting sustainability requirements. Processes of benchmarking and monitoring will need to be readily usable by graziers and provide meaningful information for management.

The Leucaena Network provides a sound model on the process and requirements of managing pasture improvement with an introduced species. They have developed a code of practice and are addressing production efficiency and resource management requirements.

Tropical pasture improvement can not deliver a silver bullet; the technology and context are too complicated for that and sound, intelligent management will always be required. Pasture improvement need not be the cause of environmental weed invasions, if properly and appropriately implemented, with well considered criteria and processes for monitoring, management and containment.

Tropical pasture improvement can be an important component in increasing production from natural resources, maintaining economic viability while contributing to the maintenance of healthy and responsive landscapes.

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