

## Sustaining tropical pastures — summative address

B. WALKER

*Agricultural Consultant, Buddina,  
Queensland, Australia.*

### Abstract

By the year 2000 over 95% of the pastoral areas of northern Australia will still consist of native pastures. Previous studies show, that in Queensland, about 50-60% of native pastures are in good condition; 30% require low key management inputs to improve them and the remainder will need a major capital outlay to restore them. Research inputs into native pastures fall well below those required. In addition to current work described at this Conference, an assessment of the present condition and health of the grazing lands, together with an ongoing program to monitor trends, particularly in high risk areas, is urgently needed. Management packages directed at specific needs for local areas are required.

An optimistic scenario for development of introduced pasture over the next decade is that sown and naturalized pastures will increase from the present 9.8 to 13.4 m ha. Areas of fodder crops will increase from 500 000 to 1.0 m ha and clearing of woodlands and control of woody weeds will continue at least at the present level of 500 000 ha per year. Most of this development will be on the more fertile soils in the above 600 mm mean annual rainfall areas south of Townsville. Research emphasis should now move away from species development to developing management systems for optimal productivity and stability.

Scientists and advisors have not been successful in developing sound guidelines on the development and management of pastoral systems sustainable on a whole property basis up to the present time. Producers are more advanced in

their thoughts and actions on sustainable systems and their knowledge and experience should be accessed before any new work is undertaken.

An over riding influence on long term work on sustainable pastoral systems is the shortage of funds and resources. Administrators and research leaders will need to make some tough decisions on research priorities.

### Resumen

*Para el año 2000 más del 95% de las áreas de pastoreo del norte de Australia serán aún pasturas nativas. Estudios previos han mostrado que, en Queensland, aproximadamente 50-60% de las pasturas nativas están en buenas condiciones; 30% requieren un manejo sencillo clave para ser mejoradas y las restantes requerirán de una inversión grande de capital para su restauración. La contribución de la investigación en pasturas nativas esta por debajo de lo requerido. Además del presente trabajo descrito en esta Conferencia, se requiere urgentemente una valoración de la condición y salud de las tierras de pastoreo, juntamente con un programa continuo para supervisar las tendencias, particularmente en las áreas de alto riesgo. Se requieren paquetes de manejo dirigidos a las necesidades específicas de las áreas locales.*

*El incremento de las pasturas introducidas y naturalizadas de 9.8 a 13.4 M ha para la próxima década es una posibilidad optimista del desarrollo de las pasturas introducidas. Las áreas de cultivos para alimentación del ganado se incrementarán de 0.5 a 1.0 M ha y el clareo de las áreas forestales y el control de las malezas leñosas continuará cuando menos al actual nivel de 0.5 M ha por año. La mayor parte de este desarrollo tendrá lugar en los suelos más fértiles de las áreas con un precipitación media anual mayor de 600 mm al sur de Townsville.*

*El énfasis de la investigación actual debiera ubicarse en el desarrollo de sistemas de manejo para una productividad óptima y sostenida y alejarse del desarrollo de especies. A la fecha, los científicos y los asesores no han tenido éxito en la ampliación de principios sensatos para un desarrollo y manejo de*

Correspondence: Dr B. Walker, 3 Mungala Street, Buddina, Qld 4574, Australia.

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*los sistemas pastoriles sostenibles basados en la totalidad de la propiedad.*

*Los productores están más avanzados en sus pensamientos y acciones hacia los sistemas sostenidos y su experiencia debería ser consultada antes de iniciar un nuevo trabajo.*

*La escasez de fondos y recursos influye fuertemente sobre el trabajo a largo plazo en los sistemas pastoriles sostenibles. Los administradores y los líderes de la investigación tendrán que tomar algunas decisiones duras sobre las prioridades de la investigación.*

## Introduction

This has been a very enjoyable and rewarding Conference and the vigorous discussions have been an important feature. The papers have made a significant contribution to our knowledge of sustainable farming systems. Some have already been reviewed (Burrows 1991) and I do not intend going over the same ground again. What I would like to do is to highlight a number of issues that I think are important, issues which have so far not been addressed. Using data from Queensland, I would like to outline some of the major features concerning the pasture resource and possible development scenarios over the next 10 years.

Even though a body of general knowledge and principles on the ecology and management of native pastures (*viz.* — Harrington *et al.* (1984) and Burrows *et al.* (1988)) exists, a major deficiency remaining is the development of this knowledge to provide advice and management packages for specific local needs.

Two major issues not adequately covered at this Conference were—

1. An assessment of the health and condition of the pastoral lands of northern Australia.
2. The development of whole property management options for sustainable pastoralism.

Additional issues impinging on sustainability, which were not covered, include drought management strategies, feral animals, property size and economic scenarios.

## Resource overview

### *Native pastures*

If the present rate of sown pasture development and expansion of areas of naturalized pastures continues over the next 10 years, 89% of the pasture resource in Queensland will still be

occupied by native pastures by the year 2000. In the Northern Territory and the north of Western Australia the area will be over 99%, which means that over 95% of northern Australia will continue to be occupied by native pastures. There is little doubt that, despite their size and importance, research on native pastures has been relatively neglected in the past.

### *Overview of native pasture and land condition*

An overall assessment of the health and condition of the grazing lands of northern Australia, on which to base research priorities, is not available. Two studies in Queensland provide some indications of the magnitude of the problem. Weston *et al.* (1981), with the help of local experts, subjectively assessed the condition of the native pastures of 35 vegetation zones, into good, fair and poor condition. In a Commonwealth and State Government Collaborative Soil Conservation Study (Anon. 1978) carried out in 1975, the land degradation status of all the grazing lands was rated into 7 classes. This information has recently been reworked and brought together into three degradation classes (C. Gillies, personal communication).

Neither study related vegetation condition to soil degradation status in the different vegetation communities and so it is not possible to bring results of the two studies together. Nevertheless, whereas these two independent studies are not strictly comparable, there is broad agreement between the two sets of data, which shows that—

1. The area of pastures and land in good condition is in the range of 50 to 60%. Although these areas are in good condition, a watch must be maintained on them to identify those areas most likely to deteriorate into pastures in only fair condition.
2. The area in fair condition, which could be improved by simple management practices, is of the order of 30% of the total, that is about 48 million hectares. It is this area which offers the major challenge to us to develop practices and systems of management which result in improvement. This is where our efforts should be mainly concentrated and especially on pastures and soils which are moving into the poor condition class.
3. The pastures and land in poor condition occupy between 8 to 17% of the pastoral areas, and the extent of these total areas was the main difference in outcome between the

two studies, due to the different criteria used. Many of these areas will require major earth-works and will be expensive to restore. Most of the techniques for this kind of restoration are known and so it is largely a question of economics and the development of suitable commercial practices.

It is unlikely that there are native pasture areas or communities improving in condition. At the very best the condition of some native pastures is being maintained.

The inescapable conclusion has to be that the basic pastoral resource is declining and will continue to decline. Our success will be judged on how well we can slow down or correct this decline. In this context a first priority has to be a current and more accurate assessment of the present condition of the grazing land resource and a refined identification of the areas most at risk. This should be followed by the establishment of a well structured monitoring programme to determine trends and responses to management variables.

#### *Sown and naturalized pastures*

Walker and Weston (1990) have defined the potential for sown pastures in Queensland in terms of ease and likelihood of development and have estimated that of a gross potential of 41 m ha, there are 21.6 m ha which could be easily sown to introduced pasture species. A maximum potential of 6 m ha is estimated for the rest of northern Australia (Weston and Harbison 1980). In Queensland, already 4.8 m ha have been sown to introduced species, with 71% sown to grass-only pastures and 29% to legume-based pastures (Table 1). A further 5.0 m ha have been occupied by naturalized species, the main ones being *Bothriochloa pertusa*, *Cenchrus pennisetiformis*, *C. ciliaris* and *Medicago* spp. (Walker and Weston 1990). This total of 9.8 m ha represents 45% of the easily-attainable sown-pasture potential.

The last four years (1986/87 to 1989/90) have been a period of record pasture development, with the annual pasture sowings averaging 361 000 ha (Table 1). However, the net annual incremental increase in the total area of sown pastures has been only 210 000 ha, indicating that there is a substantial area of sown pasture (151 000 ha) going out of production or being re-sown each year. Whereas about 55 000 ha per year can be attributed to pastures being ploughed out for

crops, the balance (96 000 ha) is probably due to pastures dropping out to a variety of causes, loosely referred to as "pasture decline".

Problems associated with stability of sown pasture, sustainability of production and management, except for nitrogen decline and woody weeds, have received little attention from researchers and institutions, who have favoured short-term work. The present practice appears to be for many of these pastures to be re-sown, particularly on the more fertile soils of central and southern Queensland. Without the inclusion of legumes into these predominantly grass only pastures, there will be an inevitable decline in total soil nitrogen.

#### **Pasture development to year 2000**

To assist with planning research and setting priorities it is useful to speculate on a possible pasture development scenario for the next 10 years. The following forecasts are based on present levels of development (Table 1) and are probably the upper limit of what could be achieved.

**Table 1.** Sown pastures and fodder crops in Queensland ('000 ha) for 1989-90 and averages for the period 1986-87 to 1989-90<sup>1</sup>

	1989-90	4 year average sown or increase in net area
<b>A. Annual sowings</b>		
Lucerne	14	9
Legume-based	184	121
Grass	302	231
Total sowings	500	361
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Fodder crop	456	535
Pasture ploughed out for crop	47	55
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<b>B. Total sown pastures<sup>2</sup></b>		
Lucerne	40	3
Legume-based	1335	86
Grass	3446	121
Total sown pasture	4821	210

<sup>1</sup> Data from Walker and Weston (1990) and E.J. Weston (personal communication).

<sup>2</sup> These are the net totals which allow for pastures going out of production.

\* Provided the present sound outlook for beef continues, present levels of annual pasture sowings will continue to range from 300 000 to 500 000 ha per year. The pure and grass:grass-

legume ratio for newly sown pastures is expected to narrow from the present 70:30 to a 60:40 ratio, because of the availability of better adapted legumes and a greater emphasis on ley farming. Over 97% of sown pasture development in northern Australia has taken place in Queensland and this differential is likely to continue. In Queensland, the main areas for pasture development over the next decade will continue to be on the more fertile soils in the above 600 mm AAR area south of Townsville.

- \* The net increase in area of sown pastures will be in the range of 100 000 to 200 000 ha per year, with an estimated total net increase by the year 2000 of around 1.5 m ha to bring the total area to about 6.3 m ha.
- \* The use of grain feeding and fodder crops will increase substantially and the present annual sowing of fodder crops of 500 000 ha per year is expected to increase to 1 m ha per year, as the demand increases for higher weight gains to meet more stringent market specifications.
- \* The area of pastures ploughed out will probably double, due to larger areas being sown to fodder crop, the need to oversow legumes into grass-dominant pastures and the move to more ley pastures.
- \* The area of naturalized pastures is estimated to increase at a rate of about 150 000 ha per year, which is roughly equivalent to the annual net increase in sown pastures. This could mean a total area of 6.5 m ha of naturalized pastures by the year 2000.
- \* In Queensland, the area occupied by sown and naturalized pastures by the year 2000 will be about 12.8 m ha. It is likely that the areas in the Northern Territory and northern Western Australia could have a net increase by 50 000 ha per year over this time, making an overall total of 13.4 m hectares.
- \* The clearing of woodlands and control of woody weeds by blade ploughing and chemical control will continue, at least at the present level of 500 000 ha per year. This activity will also be concentrated mainly in the above 600 mm AAR area south of Townsville.

It is against this background that the Research and Development into sown pasture development in northern Australia has to be evaluated and planned, particularly with regard to species development and management for specific niches and purposes. As suitable species are now available for most niches, more emphasis should

be on issues concerning the use, stability and management of these species with the objective of developing productive and sustainable pastoral systems.

Longterm grazing studies in particular are needed, yet in northern Australia there are few, if any, formal grazing studies on pasture stability which are more than five years old. It is of interest that, in the present financial climate, practically all such studies started in the last five years are receiving substantial support from rural industry funds.

### Management for sustainable production

We continually hear that pasture and land degradation are caused by the use of such technologies as supplements, legumes, chemicals, blade ploughing, clearing and Brahman X cattle. **This is not the case. It is not the technologies that are bad, it is how they are used that is the problem.**

**It is ironic, but true, that we are not presently able to offer to producers advice on how they can develop and manage their properties, and integrate new technologies in a profitable and sustainable way.** Surely this is a sorry indictment on our profession. The only people who currently have these skills and knowledge are the better, more experienced producers. We have witnessed at this Conference case studies of producers who have achieved sustainable pasture systems.

There is little doubt that in the area of sustainability we have a great deal to learn from producers, and studies such as that recently completed in the Roma District (Clark *et al.* 1990) are of tremendous value. As a prelude to conducting more work on the development of sustainable systems, a good understanding of what is presently taking place in the pastoral industry is absolutely essential.

I would like to take this point a little further, for there is a tremendous amount of knowledge, wisdom and experience in the farming community. Our challenge as scientists is to interact with producers and access this knowledge, so that we can develop, in close partnership with producers, sustainable and productive systems. **We have not yet got the consultative process right between the technocrats/academics and the farming community.** I believe that our present consultative systems, which include consultative committees, are largely ineffectual and do not help

to identify and resolve real problems. We have to look for better ways to improve this consultative process.

### Attitudes of governments and institutions

A major constraint to long term research into the development of sustainable pastoral systems, is undoubtedly the shortage of funds and resources which are declining in real terms. Coupled with this is the short term attitude of funding bodies, research organizations and government departments. Now is the time for administrators and research leaders to make tough and bold decisions in deciding research priorities and to address the real problems of sustainability.

An over-riding influence will always be the attitude of governments and their allocation of funds for research and development and their reaction to political pressures and the advantages they can obtain. We can only achieve a long-term commitment from governments, by ensuring that the sustainable ethic and concern for the land and the pastoral resource, managed in harmony with viable animal industries, becomes accepted throughout society. This is perhaps the greatest

challenge facing us for the future and we all have a part to play in meeting this challenge.

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