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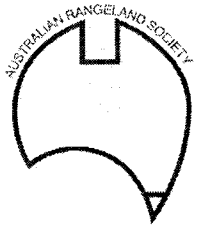

The Australian Rangeland Society

INTENSIFICATION OF PASTORAL LANDS IN NORTHERN AUSTRALIA

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DEFINING INTENSIFICATION IN PASTORAL LANDS

The extensive grazing lands of northern Australia for the most part rely on relatively natural ecosystems that are still structurally intact i.e. the main assemblages of trees, shrubs and herbaceous plants are still in place. For the purposes of this discussion, pastoral intensification is defined as increasing the level of external inputs and management to increase animal production while maintaining the integrity of these essentially natural landscapes. It does not include landscape transformation activities that may involve tree clearing, planting introduced pasture species, applying fertiliser or using irrigation. External inputs in pastoral intensification may include increased fencing and water point development, increased use of supplements in combination with dietary diagnostic tools such as near infrared spectroscopy (NIRS), and greater use of electronic and computer technologies to assist remote management. Increased management inputs that occur as part of pastoral intensification may include implementation of advanced grazing systems, herd management strategies such as controlled mating or early weaning, and strategic use of fire. Intensification will often, but not necessarily, involve increased numbers of cattle.

DRIVERS OF INTENSIFICATION

Pastoral landscapes in northern Australia are undergoing rapid change as momentum builds to intensify production. There are a number of drivers of this push to intensify production. Like all other parts of agriculture, costs are rising faster than returns. During the 1980s and 1990s, improvements in herd management, supplementary feeding and infrastructure development provided the platform for the northern pastoral industry to intensify its production. Sustained good prices for cattle and beef from the late 1990s until the present time (Figure 1) have provided the economic means to implement more intensified production. Farm cash incomes in northern Australia seem to have particularly benefited from these improved prices, with a noticeable gap in farm cash incomes emerging between beef properties in northern Australia and southern Australia in recent years (ABARE 2005). The main market for northern Australian beef is the live export trade into south-east Asia. Over recent years the demand for beef from this market has been stable and this has provided a base to the market and given the northern pastoral industry added confidence. Although northern Queensland has experienced more El Niños than normal over the last 25 years, which has resulted in below average rainfall compared with long-term averages, much of the remaining northern Australian rangelands have had above average seasons during the same period. These favourable seasons are also

influencing some of the plans to intensify production. It is still not clear whether these 25 year rainfall trends are just part of natural variability or reflect longer term climate change. There is some evidence that the increased rainfall trend in the tropics is associated with increased aerosols in the northern hemisphere (Rotstayn and Lohmann 2002).

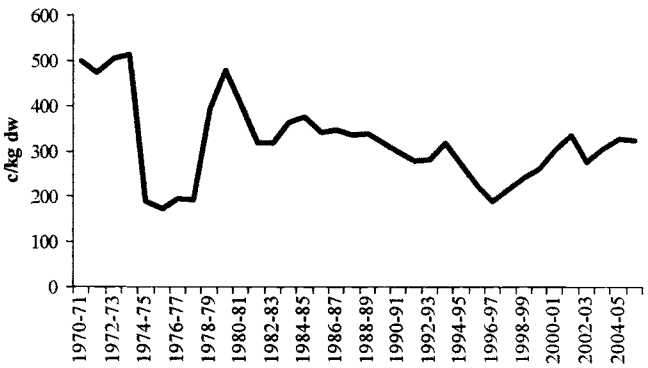

Figure 1: Australian saleyard beef prices
(averaged over all animal types and expressed in cents per kilogram dressed weight in 2005-06 dollars). Data courtesy of ABARE.

This buoyancy and confidence in the northern beef industry has contributed to rapidly increasing land values, particularly in the northern pastoral zone, which is based on beef production (ABARE 2006, Figure 2). Demand for land has come from large family properties looking to expand their operations and also as a consequence of the drought of 2001-03, which resulted in many affected producers actively seeking additional land to spread climatic risk. The good cattle prices in the lead-up to this drought provided the cash flow necessary to acquire additional land. These rapidly increasing land prices have also created pressure to increase production and minimise costs to achieve reasonable returns on capital. The rapid increase in land prices means that it is now more economic on more extensive properties to improve infrastructure to lift productivity than acquire additional land.

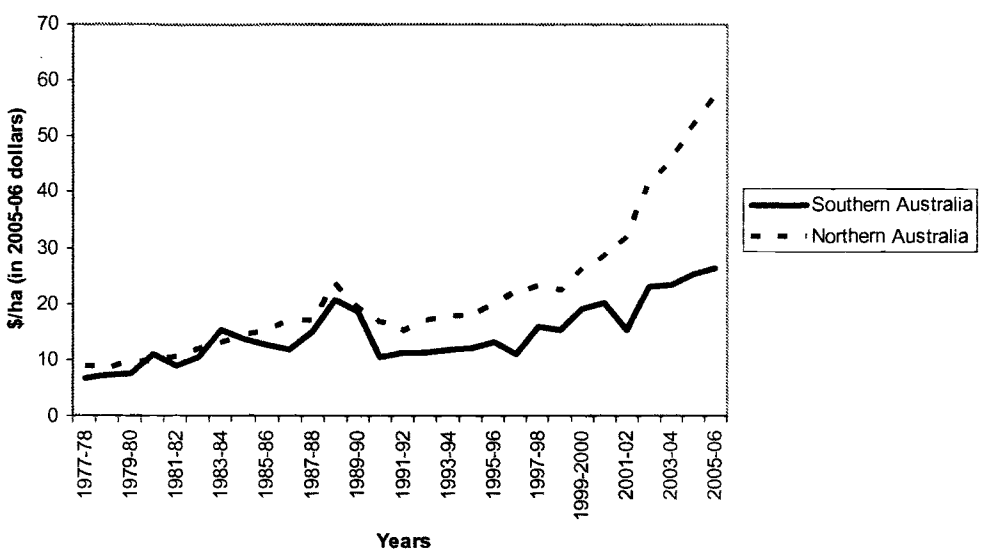

Figure 2: Land values in the pastoral lands of Australia
(expressed in $/ha unimproved value in 2005-06 dollars). Data courtesy of ABARE.

BENEFITS AND RISKS OF INTENSIFICATION

The benefits and risks of intensification have recently been discussed by Stokes *et al.* (2006). Opportunities to benefit from intensification are most apparent in large enterprises that have historically had relatively poor water and fencing infrastructure development resulting in uneven use of the available landscapes by livestock. Improving water distribution may allow stock numbers to be increased without greatly increasing effective utilisation rates across individual paddocks. As indicated above, development of water points to lift animal numbers is now more cost effective than acquiring more land e.g. water infrastructure costs are in the order of $200-$500 per beast area compared with land which is currently over $2000 per beast area in the very extensive grazing lands. Key questions that need to be answered in developing more waterpoints are:

- Can more even grazing distribution be achieved with additional water points in a paddock without subdividing the paddock?
- If not, can animal behaviour be modified to achieve more even use e.g. rotating the use of different water points or use of fire and supplements?
- If subdivision is necessary, what paddock size and distance from water is optimal in terms of cost and evenness of use?
- Given that the objective is to increase overall levels of utilisation, what are the thresholds of sustainable pasture use?

One advantage that increased sub-division provides is better animal control, which provides a number of opportunities:

- Better management of grazing pressure through rotational grazing systems. There is little opportunity to completely rest large paddocks but a larger number of smaller paddocks allows resting strategies such as wet season spelling to be introduced to improve land condition, though there can be increased management costs associated with more intensive grazing systems.
- More flexibility to successfully use fire to manage grazing pressure and overcome uneven grazing at patch scales (Andrew 1986).
- Lower mustering costs through reducing reliance on expensive helicopter mustering. This may have some additional benefits in terms of animal handling and temperament.

In summary the main benefits of intensification are in improving productivity per unit area and in having greater flexibility to improve grazing management and land condition.

However, there are also a number of risks with intensification. These include:

- Potential loss of biodiversity. The increased availability of water sources opens up previously ungrazed areas that may provide refugia for grazing-sensitive species (Woinarski and Fisher 2003). Also higher levels of utilisation at smaller spatial scales tend to homogenise the landscape and remove a more diverse grazing regime in both time and space that likely contributes to plant and animal species diversity.
- Loss of landscape heterogeneity. By reducing the spatial scale of grazing through paddock subdivision it is likely that diet choice is reduced. Large heterogenous paddocks may provide some buffering against density dependent declines in animal productivity that occur with increasing stocking rate (Ash *et al.* 2004), especially in times of drought. In addition, the greater diet choice in larger paddocks may be of benefit during the dry season when protein in particular becomes a major limiting factor in the diet.
- Decline in land condition through overgrazing. While it is argued above that increased infrastructure provides increased flexibility to better manage grazing pressure it is likely that in intensified systems grazing pressures will, on the whole, be maintained closer to

ecological thresholds. Early warning monitoring systems must be put in place to avoid the risk of crossing these thresholds when either mistakes in grazing management decisions occur or when unexpected events occur e.g. extended wet seasons preventing mustering, or unwanted fire.

- A system with more external inputs will be more susceptible to outside influences e.g. an intensively managed property may be more prone to fail if prices or demand fall (say mad cow disease occurs in Australia) as they have a higher cost structure and less capacity to adjust.

There are also other risks associated with increased fragmentation of landscapes, for example overinvestment in infrastructure with consequences for ecological and economic sustainability (Ash *et al.* 2004). The challenge for pastoral management is to make the most of the opportunities intensification offers and to avoid any negative consequences. This challenge should not be underestimated because intensification involves a complex array of changes and decisions that interact and involve strong feedbacks. A systems approach combined with adaptive management is needed to successfully address these challenges of pastoral intensification.

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