DOES FERTILISER HAVE A ROLE IN CONTROLLING GIANT RAT'S TAIL GRASS AND OTHER WEEDS IN PASTURES IN COASTAL CENTRAL QUEENSLAND?

John Reeve[1] and Bernie Shore[2]
Biosecurity Queensland, Department of Agriculture Fisheries and Forestry
[1]PO Box 6014, Red Hill, Rockhampton QLD 4701
[2]PO Box 1143, Bundaberg QLD 4670

INTRODUCTION

In combating pasture weeds in coastal Central Queensland since 1970, we have identified competition as an important factor. Where weeds have no competition from desirable pasture plants they thrive.

Recent experience in the Bundaberg area showed that fertiliser use on pasture containing weedy *Sporobolus* species (i.e. giant rat's tail grass) followed by a high stocking rate of cattle, removed the weed's advantage. The experience suggests that more knowledge about the effect of fertiliser at high levels on dryland pastures will help us manage a whole range of weeds. The aim of this paper is to summarise local observations involving the use of above-maintenance levels of fertiliser to improve pasture production in coastal Central Queensland, and thereby combat weeds.

A good starting point is the relationship between improved soil fertility after fertiliser application and grazed pasture production. In most areas of Queensland with greater than 900 mm rainfall, the two main soil elements nitrogen and phosphorous control grass growth. However, the ability for these elements to enhance grass growth depends on the genetic potential of the grasses concerned. For example, Australian native grasses generally do not have the genetic potential to respond to improved soil fertility enough to warrant the cost. To utilise the extra grass following fertilisation also requires manipulation of stocking rates (cattle and/or horses).

Knowledge of fertiliser and grass responses in tropical pastures as opposed to temperate pastures, and consideration of financial return gained through increased animal liveweight, while creating greater competition for weeds, will also be important considerations. Our proposed work for 2013/14 involves three trial plots in coastal Central Queensland investigating the potential for high levels of nitrogen fertiliser to control weedy *Sporobolus* species.

FERTILISER AND GRASS

In understanding the relationship between fertiliser use and grass production there is a principal that needs to be considered. Liebig's Law of the Minimum states that growth is controlled not by the total amount of resources available, but by the scarcest resource. Before pasture can respond to addition of elements such as nitrogen, certain levels of other elements are required. For example, phosphorous in soil needs to be above about 30 ppm before pasture can respond to nitrogen application.

How does this relate to weed control? If we fertilise an improved pasture (e.g. Rhodes grass in Bundaberg) with phosphorous and nitrogen we can expect a grass response of up

to 40 kg dry matter (DM)/kg of nitrogen applied. If we use only phosphorous, or only nitrogen, we may see no response at all. With a response of 40 kg DM/kg of nitrogen then, depending on the amount of nitrogen and phosphorous applied a large increase in pasture biomass per hectare is possible. A rule of thumb is often two to three times more grass per hectare (Figures 1 and 2). Along with increased biomass of grass there is an improvement in the quality of grass in energy and protein. The greater pasture biomass competes more strongly for other resources such as space, soil moisture and light limiting weed growth.

Figure 1. Variation in grass growth response, with fertiliser applied (grass on left) and no fertiliser applied (grass on right).

BEEF PRODUCTION FROM FERTILISED PASTURE

Evidence supporting the use of nitrogen on grass in Central Queensland comes from pasture production from fertilised grass in rainfalls from 625 mm to 1660 mm. The dry matter response varied from 17-40 kg DM/kg nitrogen with most values ranging from 25-40 kg DM/kg nitrogen applied (Teitzel *et al*. 1991).

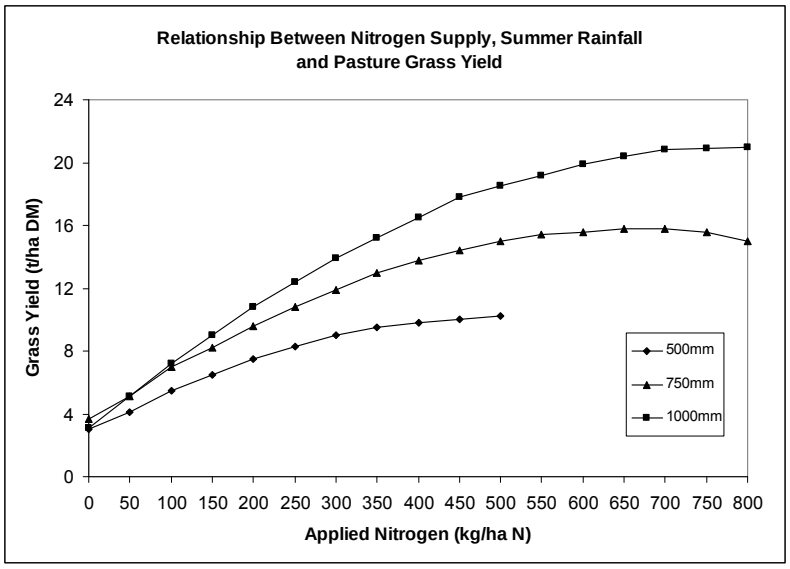

Figure 2. Grass yield (t/ha DM) response to fertiliser application rates in different summer rainfall areas. Modified from Teitzel *et al*. (1991).

Published beef production information is for different rainfalls and pasture types to that of coastal Central Queensland (Teitzel *et al*. 1991). However, the indicated liveweight gain responses are greater than those derived from local information (Reeve, unpublished data, 1995).

The likely results from fertilising a mix of improved grasses in coastal Central Queensland are summarised by two case studies (Table 1). Both case studies assume sufficient phosphorous levels in the soil. The level of liveweight gain, in both cases, is above what is normally expected from that pasture. Furthermore, if nitrogen costs $0.35/kg ($700/tonne of urea) then a profit at prices above $1.40/kg liveweight should be achieved. Current cattle prices vary from $1.20-$2.50/kg liveweight.

Table 1. Productivity of pasture fertilised with nitrogen for two case studies in coastal central Queensland (Reeve 1995).

Parameters	**Case Study 1**	**Case Study 2**
1 kg nitrogen	25 kg DM pasture response	35 kg DM pasture response
180 kg nitrogen/ha	4,500 kg DM	6,300 kg DM
Pasture eaten	50%; 2250 kg DM consumed	80%; 5040 kg DM consumed
10% conversion	225 kg liveweight gain	504 kg liveweight gain

DISCUSSION

Recent interest in managing weeds with fertilised pasture is due to two issues. The introduction of a pelletised herbicide for ease of application of flupropanate on a large scale, especially aerially, and the example from Bundaberg where local government pest officers noted a good result from fertilising Rhodes grass pastures containing weedy *Sporobolus* species (Anderson 2012).

Bray (2004) showed that *Sporobolus* species were susceptible to competition, particularly as seedlings. He also reported the need for healthy competitive pastures for several years to reduce the potential for re-invasion by *Sporobolus* species. There has also been a study showing what happens to cattle gut fill in Queensland, as forage availability and quality changes (Panjaitan *et al*. 2008). The better quality the feed, the bigger the gut fill and the longer the feed stays in the rumen, so digestibility is higher and explains why we get improved liveweight gain, with better quality tropical pasture. This is of significance for tropical pastures as they have relatively low digestibility compared to temperate grasses and cultivated fodder crops.

The opportunity exists to match pasture production knowledge with a new weed treatment option in such a way as to reduce the cost of weed control, while possibly showing a profit in the short, as opposed to long term.

There is no doubt that more intensive management will be needed to ensure the success of this option, so it may not suit everybody. However, we believe application of fertiliser offers a viable alternative to long-term pasture spelling and limited livestock production in older coastal pastures.

The real benefit from this system comes in the case where the landowner tries to maintain a certain stocking level as part of his enterprise. There is good evidence to show that

growing his own pasture instead of seasonally buying fodder to fill an annual feed gap will reduce costs substantially (Chopping 2013). In addition, hand-feeding livestock with fodder brought onto a property often increases the risk of weed introduction. Therefore, careful consideration of high input pastures has many advantages.

The aim of this project is to find three sites in below 900 mm rainfall areas that have significant *Sporobolus* weed species present, with some improved pastures but no recent history of fertiliser use. The sites will also need to be able to vary the stocking rate to suit the grass response to the fertiliser. Two hectare blocks will be sufficient to show a physical and livestock difference over a 12 month period. We plan to identify some four hectare blocks, treat half with flupropanate herbicide and fertiliser and treat half with flupropanate herbicide only. After waiting for a significant pasture response to the applied fertiliser, the two blocks will be stocked at an agreed rate with cattle liveweight gain measured over time.

ACKNOWLEDGEMENTS

The authors would like to thank the pest management officers from the Bundaberg, Gladstone and Rockhampton Regional Councils for their encouragement and commitment and to Granular Products for their financial support.

REFERENCES

Anderson, J. (2012). Pest Officer, Bundaberg Regional Council. Personal comm.

Bray, S. (2004). Life Cycle of Giant Rat's Tail Grass, PhD Thesis, University of Queensland, School of Agronomy and Horticulture.

Chopping, G. (2013). Principal Scientist, Intensive Livestock, DAFF (retired), Personal comm.

Panjaitan, T., Quigley, S.P., McLennan, S.R., Swain, T. and Poppi, D. (2008). The intake and retention time in the rumen of grasses varying in crude protein content fed to *Bos indicus* steers. *Proceedings of the Australian Society of Animal Production* 27: 58.

Teitzel, J.K., Gilbert M.A. and Cowan, R.T. (1991). Sustaining productive pastures in the tropics 6. Nitrogen fertilized grass pastures. *Tropical Grasslands* 25: 111-118.