

2002/Q12



Producer Research Support

Review of *Acacia georginae* Research and Management Options

Gidyea Answers Group



This literature review of management options for *Acacia georginae* concludes that there are no easy answers, but grazing management burning is the best current practice to reduce gidyea.

The use of genetically modified organisms in the rumen of cattle to make them immune to the poison from the gidyea tree is discussed, but the threat to markets of a GMO solution is acknowledged.

The project

Gidyea poisoning was first reported in 1910, was positively identified as the cause of highly fatal disorders in cattle in 1955.

The poison gidyea tree (cause of fluoroacetate poisoning), Georgina gidyea (*Acacia georginae*), is confined to the Georgina River basin in northwestern Queensland and the adjacent eastern region of the Northern Territory. There are approximately 200,000 head of cattle in the Georgina River basin. Depending on the season, the annual loss of production due to gidyea poisoning varies from \$1.7 million to \$4.1 million.

In 1987 a project to introduce a new gene into the bacteria that live in the rumen of cattle was started. These genetically modified bacteria (GMOs) were to be tested for their ability to detoxify fluoroacetate in the rumen. The fluoroacetate is contained in the leaves and pods of the gidyea trees. The bacteria were designed to eliminate gidyea deaths prompted by mustering or drinking but would not necessarily prevent sudden deaths caused by ingesting large amounts of highly toxic gidyea.

Over the 14 years since the start of the project, many companies have been involved in funding the research and development associated with this project. The total contribution is around \$1.85 million. This investment illustrates the impact of the problem on the northern Australian cattle industry. Due to poor public reception and acceptance of GMOs involved in the food chain and the lack of commercial results after all this time and money has been spent, it was decided to look for alternative methods to manage gidyea poisoning.

This project provides a literature review of the available research into management options for gidyea reduction.

Objectives

1. improve conditions and profitability of properties in the Georgina basin, where *Acacia georginae* occurs; and
2. develop alternative management strategies and/or predictive tools for safe and effective use of areas where *Acacia georginae* occurs.
 - a. reduce stock losses as a result of fluoroacetate poisoning;
 - b. increase property management and development options;
 - c. make more area available for sustainable grazing management; and
 - d. reduce grazing pressure on previously limited grazing areas.

Contact details

Ted Callanan
PO Box 506, LONGREACH QLD 4730
Tel 07 4658 0261 or 07 4658 2891
tedcal@bipond.com

2002/Q12

Producer Research Support

MLA Producer Research Support offers support funding of up to \$15,000 over three years for groups of producers keen to be active in on-farm research and demonstration trials.

These activities include:

- Producer Initiated Research and Development
- More Beef from Pastures demonstration trials
- Prime Time Wean More Lambs demonstration trials
- Sustainable and productive grazing grants.

Contact Gerald Martin
Producer Research Support Coordinator.
Tel 08 8556 2900 or
producersupport@mia.com.au

What was discovered

In early research many producers claimed that the simple fix was to remove *Acacia georginae* from the land, although in some instances where this was done the financial and environmental costs were devastating. Much of the clearing re-grew either as dense or thicker than previously after 7-10 years. Many other ideas for controlling the gidyea have been considered. Poisoning the trees proved to be costly and extremely testing on the environment where the trees were destroyed. The concept of developing a type of rumen bacteria to break down the fluoracetate compound and reduce toxicity of the trees was considered.

A field trial was held in Werribee, Victoria in 2003 where researchers monitored the effects of fluoroacetate on animals that have been injected with strains of bacteria developed from breaking down the compound.

The Werribee trial will lead research on cattle tolerance to fluoroacetate when subjected to rumen bacteria. As a result of this trial, data will be able to be used to determine the possibility of drenching animals with bacteria that will allow them to graze *Acacia georginae*.

Some of the options for gidyea management explored in the literature are detailed below:

1. Near Infra Red Spectroscopy

The consumption of poison gidyea has been associated with the dry season of the year when protein feed levels drop so animals begin to chase the trees (pods and leaves) as an alternative source of protein. This meant the breeder trials on Lake Nash using the NIRS analysis system could identify the best time to make stock movements. The NIRS system analyses the nutritional qualities of pastures using faecal samples and gives measurements at different times of the year. If faecal samples could be taken monthly or at even shorter time periods, this would track protein and feed digestibility levels, therefore allowing managers the opportunity to forward plan stock movements before the animals chase the trees in search of high protein sources.

2. Strategic use of supplements in combination with NIRS and time control grazing

Information from the NIRS analyses could be used to develop a feeding program for protein supplements when faecal protein levels drop, thereby minimising deaths from consumption of poison gidyea. Using this type of feeding system animals would have access to feed sources when they would normally be chasing the trees as a source of protein. Using time control grazing in conjunction with NIRS could enable landholders to use country that is not currently acceptable.

2002/Q12



MLA also recommends EDGEnetwork

EDGEnetwork offers practical field-based workshops to improve productivity and profitability for the long-term.

Workshops cover breeding, nutrition, grazing management, marketing and selling.

Call MLA on 1800 993 343 or
www.edgenetwork.com.au

3. Time control grazing

Large tracts of pasture on the Berkeley tablelands are poorly utilised due to lack of infrastructure, in particular water, and herd control. This management strategy would allow landholders the opportunity for intensification of grazing management and pasture utilisation. Areas of sweet country have been over utilised while the downs country is under utilised. This has resulted in diminishing pasture diversity and condition and allowed the spread of weeds. By excluding cattle from these areas during vulnerable times, ground cover will return providing a more conducive environment for the return of perennial pastures that provide a natural defence against weed infestations. Additional benefits for the producers would have included increased utilisation rates and increased return per hectare.

4. Planting forage legumes as an alternative source of protein

By providing another source of protein cattle should not need to browse the poison gidyea trees. To provide a source that is ideal for this purpose, the planting and growing of tree legumes would be recommended. The problem with this solution is that the Georgina group of properties are located in a below 300 mm average rainfall zone and on predominantly heavy cracking clay. These two characteristics are not suited to most tree legumes. The only trees that seem to be suited to this environment are the natives such as the poison gidyea, which have higher tannin content, grow very slowly and apart from the pod, are unpalatable.

Even if the introduced trees or legumes do establish, they will be more palatable than Mitchell grass at any time of the year and either be eaten out or dried off by the time the cattle need that source of protein. The need to manage the grazing system more intensely would therefore be an issue.

5. Fire

Proactive use of fire is not being used directly, but most properties in this area are subjected to bushfires each year. In areas where the gidyea trees have been affected by the fire there appears to be a delayed regrowth stage for the trees in flowering again, with about 80 percent of them not displaying pods the following season. This practice could be adopted to develop a cost-effective and effectual policy for controlling the trees. If the burn did not effectively kill the trees it would inhibit the regrowth of the trees for up to two years. The effect of properly managed burns affecting poison toxicity levels in trees has not been identified and may form a useful research project or be managed as part of a planned fire regime.

If more research could be conducted into this management strategy the development of a cost-effective strategy to control the trees could be developed.

6. Breeder segregation

The use of higher percentages of poison gidyea paddocks for cattle with low protein requirements and reduced needs for mustering at critical times of the tree's toxicity would be a viable option for controlling the amounts of animals lost to the trees.

7. Genetic breeding of cattle tolerant to the toxin

Another management strategy that - although controversial - could be adopted is to allow animals to graze the gidyea affected to areas when the season is good with a reduce stocking rate, so they become accustomed to the surroundings. As the season deteriorates leave the cattle in there to graze the area and the animals that are kept to adapt to the country without being affected by the poison gidyea are left to breed, and in time, develop a gradual tolerance to the trees.

The major problems surrounding this type of practice are welfare related. Welfare organisations may frown upon the practice of allowing some animals to die from fluoroacetate poisoning in the hope of developing a genetically tolerant animal.

Discussion

The literature review showed that there is not one specific management practice that is ideal for reducing the effect of fluoroacetate poisoning. Existing ideas that have not been presented as part of this study are costly or not properly resolved.

The issue of injecting the genetically modified rumen bacteria into cattle to detoxify the gidyea is the technically ideal method, but operationally flawed as it could affect the marketability of products produced in this region. The GMO debate is already a focal point for many agricultural industries, so this solution could reduce consumer confidence and erode market share in today's fiercely competitive environment. Approximately 70 percent of meat produced in Australia is exported overseas. Although reports have indicated that Australians are not particularly sensitive to the use of GMOs, many foreign markets are, which means that this strategy is very risky.

This report also indicated that using fire could be a useful means of eradicating the poison gidyea. The strategic management of fire in this low rainfall environment is critical to prevent land degradation and ongoing negative biodiversity effects. Whether a controlled burn would be able to successfully target populations of poison gidyea without negatively affecting advantageous plant species needs to be considered. The use of new imaging technology would be sufficient for identifying the different populations of trees.

2002/Q12



Large paddocks containing more than 70 percent *Acacia georginae* are extremely difficult to manage. One possibility is to leave mobs of cattle in these areas and repeatedly test them to establish whether a percentage of them become genetically resistant to the toxicity of *Acacia georginae*. The animal welfare issues surrounding running cattle in highly toxic gidyea paddocks and survivors being bred to be stock in this country would clash with the welfare standards expected of Australian beef producers. Large stands of gidyea are a major problem for producers and the only possibility of utilising this land is to clear/burn or use a genetically tolerant animal for grazing.

Areas with a lower percentage affected by poison gidyea can be utilised with the development of an infrastructure like time control grazing that can segregate the animals from the most toxic parts of the property. This segregation has high initial development costs and additional needs to develop watering points. Watering points can be controlled to force cattle to move away from areas of concern during the dry season. To best assess this scenario would require detailed imagery to separate the areas with the largest concentrations of poisoned gidyea. After the amount of usable land has been identified, the cost benefit analysis would need to be done to evaluate how feasible that is to construct something of this scale.

If supplements could be used during the dry season in conjunction with the NIRS system the number of fatalities could be reduced. A combination of all these management strategies may be the most cost effective in reducing fatalities and increasing land usage and productivity.

A major focus of current research needs to be on communication with researchers overseas to assess whether techniques or practices used by other countries could be applied to Australian research and development.

Next steps

After the report was submitted and finalised it was distributed to a number of industry members and government bodies with the advice to give information and comment about the contents of the report and any areas they believed to be of concern. After following up these requests, no additional feedback has been received. The possibility of any trials being conducted from the report is unlikely until next year.

Meat & Livestock Australia

Level 1, 165 Walker Street

North Sydney NSW 2060

Tel 02 9463 9333

Fax 02 9463 9393

Free Phone 1800 023 100 (Australia only)

www.mla.com.au

Gidyea Answers Group

November 2005 / PIRD OUTCOMES