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Producer Research Support

Cattle Death from Grass Tetany

Beef Technology Group

Surveys show that in excess of $20 million dollars is lost to the beef industry each year to grass tetany, in Victoria $13m, NSW $7m and SA $3m.

If the processes tested in this producer research support project were introduced through the affected areas then the impact could be drastically reduced which in turn increases the economic viability of the individuals concerned and leads to a greater economic output from the national beef herd.

The project

The rapid rise of potassium in the leaves of grasses occurs when air temperatures of 8C (night) and 16^{o}C (day) last for four to six consecutive days on soils where temperatures of 6^{o}C to 7^{o}C have been sustained for at least a week. Under these conditions plant roots (grasses and cereals) change from passively absorbing to actively absorbing potassium (K). As a result, high levels of K become available in the leaves of the plants.

Soils with high levels of K will be more dangerous than soils with a better balance of K compared to calcium (Ca) and magnesium (Mg).

New grass shoots on dangerous soils will also have inordinately high levels of K.

The same process occurs in legumes, but the K/Mg and Ca does not rise as dramatically because the legumes have naturally higher levels of Ca and Mg.

Cattle under stress from lactation, mustering or first oestrous during cold weather immediately after warm weather need critical amounts of Mg to sustain normal physiological functions. Cattle can ingest plants containing high levels of K, which will effectively cut Mg absorption in the rumen, leading to an acute Mg deficiency, which in turn leads to death from grass tetany.

Objectives

1. Have all cattle producers (13) trained in factors that cause grass tetany;
2. Have all cattle producers (13) trained in measurement and reporting of air and soil temperature over a period of two grass tetany seasons (2 years);
3. Have one controller who will analyse soil and air data;
4. Have 13 producers manage grass tetany conditions when notified by controller;
5. Significant reduction of cattle loss due to grass tetany (below 60/1000);
6. Comparison of results of 13 cooperating properties against historical data; and
7. Increase economic returns by reduction of cow losses (below 60/1000).

What was done

Five producers from the Riverina in new South Wales, and five producers from north east Victoria participated in the project.

Field days were held at Mundarlo (east of Wagga Wagga 7/3/02) and Myrtleford (north east Victoria 8/3/02) to explain to group participants the background of grass tetany and the significance of temperature monitoring.

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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.

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The field days setup the following project protocols:

1. Standardised thermometers were distributed to group members at both field days sites and standard measuring procedure explained to measure soil temperature in the 0-10cm root zone area;
2. Data collection sheets were distributed to be filled in by producers then faxed to NSW Agriculture - Taree by 12.00pm each Friday of measurement period;
3. Data sheets were recorded each week than analysed for temperature trends likely to precipitate grass tetany outbreaks; and
4. Soil samples were requested from participants at 0-10cm depth and 10-20cm depth to undergo laboratory tests for mineral content especially potassium, magnesium and calcium for conversion to K/Mg and Ca ratio for each property.

Warnings were sent to the group if two properties were experiencing potential dangerous weather conditions. Cattle deaths were recorded, comparing the alerted property with a paired non-alerted property in the same location for statistical purposes.

Measurement and analysis commenced 25/5/02 and continued till 14/9/02 giving a total of 17 weekly periods for temperature analysis. This was cross-checked with the soil chemical analysis.

A soil field day was held at Mundarlo on 9/10/02 to explain the influence of soils on grass tetany conducted by Dr Mark Conyers (noted soil scientist).

What happened?

Seventeen weekly analyses were received from participants, with eight properties keeping accurate records – a total of 952 individual readings.

Two alert periods were identified and alerts were sent to properties to take remedial action to prevent grass tetany deaths (eg. feeding causmag etc.).

Losses of animals recorded in the Tumbarumba district included 14 deaths in the first alert period 6/7/02 on non-alerted properties and then 25 deaths in the second period on non-alerted properties, compared with two deaths on alerted properties.

Statistical analysis differentiating between the alert and non-alert properties shows that the prediction method worked for participating properties.

Soil samples were received from 12 sites and included the sites where cattle deaths were recorded on matching non-alerted properties.

Analysis shows that grass tetany deaths were closely connrected to soil type and the temperature variation predicted to trigger grass tetany outbreaks.

High risk conditions for grass tetany were identified as:

1. **Soil**
   K/Mg + Ca ratio > 0.07 - 0.08.
2. **Weather**
   Cold soil temperatures <6^{o}C - 7^{o}C followed by air temperatures of 8^{o}C night and 16^{o}C day for four to six days to warm the soil.
3. **Plant**
   Rapidly growing grass or cereal pastures with little or no legumes. Warming soil causes roots to uptake lush levels of K.
4. **Cattle**
   - Usually older milking cows under additional stress such as cold weather, mustering or first oestrous after calving.
   - Angus and Angus-derived cattle are the most ‘at risk’ breed types.
   - Grass tetany susceptibility not necessarily related to milk production.

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Discussion

Understanding the cause of grass tetany

Cattle can ingest plants containing high levels of K which effectively blocks Mg absorption in the rumen, leading to an acute Mg deficiency, which leads to death from grass tetany.

Cattle under stress from lactation, mustering or first oestrous need critical amounts of Mg to sustain normal physiological functions.

The rapid rise of K in leaves of plants occurs when soil temperature rise above 6^{o}C after having maintained cool temperatures (<6^{o}C) for 6 days.

Under these conditions the roots of grasses and cereals change from a slow passive absorption of K to a rapid active absorption of K which rushes to the leaf tips.

The rapid concentration of K also occurs in new fresh grasses and in both cases is exacerbated by high K soils.

Legumes have a high concentration of calcium and magnesium in their leaves therefore dilutes the high K effect and makes them safe for ruminants to eat at these critical times.

Understanding the implications of high K soil tests

Producers need to correctly interpret soil tests to determine a potential danger area on their property.

Temperature monitoring of weather conditions allows producers to identify danger periods and be able to take remedial action to protect their livestock.

Soil diagnosis to determine grass tetany risk, is easier for producers to carry out and does not require the complicated conversion equations of leaf analysis. Soil tests are already being carried out on better managed properties for pasture improvement.

Next steps

There is no doubt that adoption of the prediction model will reduce annual losses of cattle in grass tetany prone areas.

Manual reading of temperature could be improved by electronic and remote recording on distant areas. This could form the basis of future trials and research.

The trial highlighted the use of soil tests to determine grass tetany risk. Soil tests are already used in better management systems to determine soil and plant health. The added benefit of utilising them to determine grass tetany risk is an extra economic benefit.

MLA also recommends

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