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Producer Research Support

Tick resistant 'Adaptaur' genes will benefit northern beef

Taurus Technology

Through the Hereford and Poll Hereford Societies' joint venture technology company, Taurus Technologies, this Producer Research Support project was conducted to evaluate the transfer of genes for tick resistance to cattle populations of varying susceptibility. It was also designed to monitor the performance of economically desirable traits of the target animals.

The project

Tick resistant British Breed cattle bred by CSIRO at Rockhampton, Queensland, will be commercialised soon.

The CSIRO has called for expressions of interest in the commercialisation of the gene technology that underpins the 'Adaptaur' tick resistant cattle breed.

The contract will involve the licensing of the technology to the successful applicant, who will then work with CSIRO on a fouryear research project to identify the gene marker for tick resistance. The intention is to market the technology locally and internationally.

Objectives

Define the level and effectiveness (in terms of effects on growth rate) resulting from the transfer of the genes from homozygous bulls (produced by the CSIRO/Taurus/MRC joint venture in phase 1 of the project) to animals of different background resistance — industry Herefords from coastal, inland and southern Queensland, and Belmont Reds (bos taurus of mixed British/African sanga origins and of higher resistance than Herefords).

What happened?

About one billion cattle world-wide are at risk from various tick species or tick-borne diseases. Most are in the tropics.

Ticks are not easily controlled. The use of acaricides (dips and sprays) and resistant bos indicus cattle breeds are the main tools.

However the use of acaricides always results in resistant ticks.

Resistant ticks, consumer concerns and market pressures for higher quality beef and greater productivity are driving the commercialisation of the Adaptaur.

The Adaptaur cattle were bred at the Belmont Research Station near Rockhampton, Queensland — the same place and from the same root stock from which the Belmont Red was bred. The difference is that the Adaptaur does not have an infusion of Afrikander blood. It is a selected Hereford-Shorthorn (HS) hybrid.

The introduction of British Breed cattle into northern Australia in the 1870's coincided with the accidental introduction of cattle ticks from Java. The devastation caused by cattle ticks prompted a search for methods to control them. In 1895, a Queensland grazier developed an acaricide based on arsenic. This acaricide was initially very effective but within 40 years ticks had developed resistance to arsenic.

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Key points

- The resistance to ticks is genetically transferred to animals of varying susceptibility.
- Resistance to internal parasites appears to be favourably correlated with resistance to ticks.
- When crossed with high grade Brahman herds, significant increases in both growth rate and fertility of the Adaptaur crossbred animal is observed.
- When crossed with purebred Herefords, tick resistance is significantly improved without any recorded effect of growth rate.

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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From that moment the history of the continual development of new acaricides and the continual emergence of new acaricide-resistant ticks had begun.

Over time, ticks have developed resistance to each group of acaricide, including organochlorines, organophosphates, carbamates, amidines and synthetic pyrethroids. The Ultimo strain of ticks from Rockhampton has high resistance to all these chemicals.

As ticks have developed resistance, new acaricides have been developed. This has avoided the need to improve other control methods.

But according to Dr John Frisch, recently retired from the CSIRO Division of Tropical Animal Production and who worked on the Adaptaur breed, it can be expected that repeated exposure of ticks to the newest and future chemicals will result in resistant strains.

"Acaricides are a short-term solution to an immediate problem but they do not provide the long-term solution to tick control," Dr Frisch said in a paper published in the International Journal of Parasitology in September 1998."

He said that if the effort directed at the development of acaricides over the last 100 years had been directed instead toward the development of breeds with extreme tick resistance it is doubtful if there would now be any significant need for acaricides.

High host resistance was the principal method used to control ticks throughout the tropics yet the genetic improvement of this trait has been almost entirely neglected.

The Adaptaur anti-tick gene is very powerful in its effect. Over several years at Belmont the mean number of ticks carried by HS cattle with two, one and no copies of the gene were 7, 36 and 128. This means that each copy of the gene sequentially reduces tick count by 75%, Dr Frisch said. The frequency of the gene in the Adaptaur is about 25%.

Hereford cattle can carry more than 100 ticks each side. A single cross with Adaptaur genetics reduced the mean tick count to 32 ticks while the Adaptaur HScross carried only seven ticks on average.

Dr Frisch said a DNA marker for the Adaptaur anti-tick gene would serve two purposes. It would allow identification of heterozygous and homozygous cattle.

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Only homozygous cattle with the desired production traits would then be used for breeding. Secondly, a DNA marker would allow screening of other populations, including temperate dairy breeds, for the presence of the anti-tick gene.

In 1997 a group of Central Queensland beef producers, who had been cooperating with the CSIRO in evaluating Adaptaur bulls, formed an incorporated association of Adaptaur breeders. The performance based breed records growth, fertility, resistance to cattle tick, resistance to pink eye, coat type, resistance to nematodes and teat and udder conformation.

MLA also recommends

BeefPlan

BeefPlan is a non-traditional approach to learning. Groups of like-minded beef producers, work together as a management team to focus on property management. Importantly the learning agenda is set and controlled by the group.

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