

Electronic animal husbandry

It's the Matrix meets the old fashioned muster and it could be coming to a town near you.

Virtual Fencing (VF) is an innovative alternative method for controlling grazing animal movement without conventional wire fencing.

It involves invisible fences and the ability for farmers to move their stock from one location to another by computer, not horseback.

The concept of VF has been proved in the USA where wireless fencing was pioneered during the 1980s by researchers driven by the need for a cheaper means of keeping cattle away from sensitive river frontage.

Early American trials have demonstrated that animals can be trained to alter their direction of movement in response to audio-electrical stimuli delivered by an on-animal receiver. More recent trials have shown that audio stimuli alone can be used to condition animals.

The concept is set to become a reality here in Australia in the not too distant future, with the drive coming primarily from the Western Australian Department of Agriculture's Farming Technology Solutions (FTS) project.

The FTS project aims to consolidate technological

innovations from various sources into management systems that are fully automated, remote-controlled, durable, and cost-effective to achieve precise grazing with minimal stress to livestock, and natural resource protection.

The Department of Agriculture, Land and Water Australia, and Environment Australia's Biodiversity Group have been the primary investors in the development of VF technology in Australia.

At this point, VF technology here includes a single radio-wire type fence that transmits signals to create an exclusion zone, a programmable remote herding vehicle (RHV) that transmits signals to create an inclusion zone, and an on-animal receiver device that complements both virtually fabricated zones.

"It's really all about virtual herding rather than virtual fencing," says Dr Robert Rouda, the Department of Agriculture's Southern Rangelands Development Coordinator.

In the current conceptual Australian design, a virtual exclusion zone may be created using a single radio wire hung on two to three metre high posts along a riverbank. As animals come within a certain distance of the radio wire, they are signaled to turn around and move in the opposite direction. The virtual inclusion zone may be created using animals equipped with the same receiver device configured to receive signals transmitted from a mobile RHV.

"In this mode, the animals are encouraged to stay within a set distance of the RHV. The RHV may be programmed to move its assigned animals to any location at any given speed, eliminating the need for mustering and ensuring sensitive pastures are never over-grazed by domestic stock."

Dr Rouda says rapid developments in Global Positioning System (GPS) applications may soon be incorporated in VF, creating a cost-effective option that would eliminate the need for any ground-based transmitters as momentum directors.

"The inclusion of a GPS chip in the on-animal receiver would eliminate the need for any ground-



Photo courtesy of Kalgoorlie Miner.

Dr Robert Rouda says VF is the future.

based transmitters, making the system more flexible and cost-effective.”

The deterrent applied to the animal would be designed to ensure no pain whatsoever was inflicted on the animal.

“The situation that we are proposing is far less damaging than an electric fence and more cost-effective. In 1999 the operating costs for an electric fence designed to contain an average herd size of 538 cows was close to \$23,000 per year, including equipment upgrades and labour. In terms of mustering alone, the potential savings to production costs could be as high as \$110,000 per annum.”

Other advantages of VF include greater control over free-ranging animals, as producers will know where their animals are and can move them to wherever they like with a few strokes of the keyboard.

“It is envisaged that VF will offer maximum grazing efficiency through the utilisation of satellite intelligence to fully exploit seasonal conditions resulting in up to a 50% increase in animal productivity, and the potential for a 100% increase in vegetation productivity over 15 to 20 years in semi-arid rangelands as a result of uniform and proper use of natural resources,” he says.

Other electronic management modules currently being developed include the Remote Information Management System (RIMS) and the Electronic Livestock Passport (ELP).

RIMS will serve as the office-based communication platform for the transfer of information between and across FTS component technologies.

The early development of RIMS by the Communications Technology Research Group at Curtin University of Technology and the Department of Agriculture Western Australia uses remote camera units connected to a radio network.

Further development will result in a cost-effective video surveillance and telemetric control infrastructure for remote area applications, and will also establish linkages to global communication networks and other add-on devices located at watering sites, such as medicators, weighing scales and physiological detectors.

The on-animal ELP tag will not only contain the necessary electronics to support regular management recording and satisfy the requirements of the National Livestock/Flock Identification Schemes and milking parlour management, it would also serve as a means for precise animal movement.

Near Infrared Reflectance Spectroscopy (NIRS), DNA mapping, collaboration with CSIRO’s remote assessment of food-on-offer (FOO) and Nippidrink (a closed system that uses nipples connected in series to supply stock water) will address the complex issues of forage and water availability and quality. ■

Contact

Dr Robert Rouda

☎ 08 9088 6033