Fact sheet 2

Intensive livestock farming and space-based technologies

Historically, space-based technologies in the agriculture sector have primarily been deployed in broadacre cropping and extensive ruminant grazing enterprises. However, recent developments in satellite-based technologies offer advances that intensive livestock operations can benefit from.

Satellite technologies can reduce farm labour and waste, and improve profit margins. Satellite technologies fall into three main categories:

- **Remote sensing:** Uses sensors and cameras to monitor an area from a distance
- **Connectivity:** Allows sensors, devices and computers to communicate with each other
- **Geolocation:** Provides information on positioning and navigation, for example GPS

For intensive livestock operations that also have cropping enterprises, the broadacre cropping fact sheet from the AgriFutures Australia space-based technologies series provides information on cropping-specific applications.

Remote sensing

Intensive livestock farming operations often have small land footprints or are mainly in sheds. Remote sensing imagery can be used for many purposes, such as site mapping and pasture monitoring. Currently, unmanned aerial vehicles such as drones generally provide higher-resolution images than satellites for farms with small footprints, and they are likely more cost-effective. However, with existing commercial satellite-enabled products providing 3 m^2 image resolution[1], and future offerings likely to have better image resolution and become cheaper over the next five to 10 years, space-based remote sensing may become a cost-effective alternative to drones for intensive livestock operations.

Connectivity

Connectivity via satellite is useful for farms in remote areas that do not have reliable access to local land-based internet or mobile networks.

There are a variety of sensors that can improve the profitability of an intensive livestock operation if there is available connectivity to transmit data. Sensors can monitor the temperature in sheds, animal movement and health, water quality in effluent ponds, the amount of water in tanks and dams, and the amount of feed in silos.

While a private local area network can provide connectivity between sensing devices and the homestead or office, if data needs to be accessed offsite or management decision support tools require internet-based applications and software to run, satellite internet access may be a viable connectivity option. Depending on the application and use case, it may be more cost-effective for intensive livestock operations to set up a local area network with satellite backhaul, rather than using a direct-to-satellite service.

Low-bandwidth connectivity may be an adequate solution for devices that send small packets of data (e.g. via LoRa, SigFox), but broadband solutions are needed for more data-intensive applications like video streaming.

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Geolocation

Geolocation technologies have several potential applications for feedlot, dairy and free-range pig and poultry production systems. These include monitoring animal health and behaviour, animal tracking and virtual fencing, as detailed below.

Animal behaviour and tracking

GPS collars and ear tags have been successfully deployed to remotely monitor animal health in cattle and sheep production systems. In the absence of video monitoring systems deployed in sheds and feedlot pens, GPS-enabled animal movement data, including the frequency and duration of foraging and rest periods, can be used to indicate changes in an animal's behaviour and health status[2]. Collars and tags connected to a management system can send alerts if management interventions are required. As this technology matures and costs continue to fall, there are potential applications in intensive ruminant and free-range pork enterprises.

GPS tracking has also been used to monitor and control feral pig populations. The New South Wales Government's "Western Tracks" project uses GPS collars to better understand seasonal feral pig movements, so that management interventions can be targeted to specific areas at the right time, increasing the effectiveness of control measures[3].

Virtual fences

Virtual fences use GPS and smart collars to confine or move livestock without using actual/physical fences. A recent trial of the eShepherd™ virtual fence on a beef cattle farm in NSW found it was effective at keeping livestock where the farmer wanted them within a field.

Created by CSIRO and commercialised by agri-tech startup Agersens, the eShepherd™ works by giving cows an audio cue as they approach the virtual fence, and a small electric pulse if they 'touch' the fence. The pulse is less than the shock of an electric fence.

Reference

[1] Pasture.io, https://pasture.io/satellite

[2] Barwick J, et al (2018) Predicting Lameness in Sheep Activity Using Tri-Axial Acceleration Signals, Animals, 2018

[3] Townsend, S, GPS collars to track feral pigs, The Land, 5-1-21.

[4] King, RH, Enhancing the profitability and productivity of livestock farming through virtual herding technology, Dairy Australia, 2020

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→ Find out more

Read the full report *Space-based technologies – opportunities for the rural sector.*

Please note: *Some commercial products have been named in this fact sheet to provide examples. The number of examples is not exhaustive and is not meant as an endorsement of any particular product or business.*