Charles Sturt University

AGRIPARK

We3

Transforming livestock management with vision AI monitoring

Charles Sturt Feedlot of the Future


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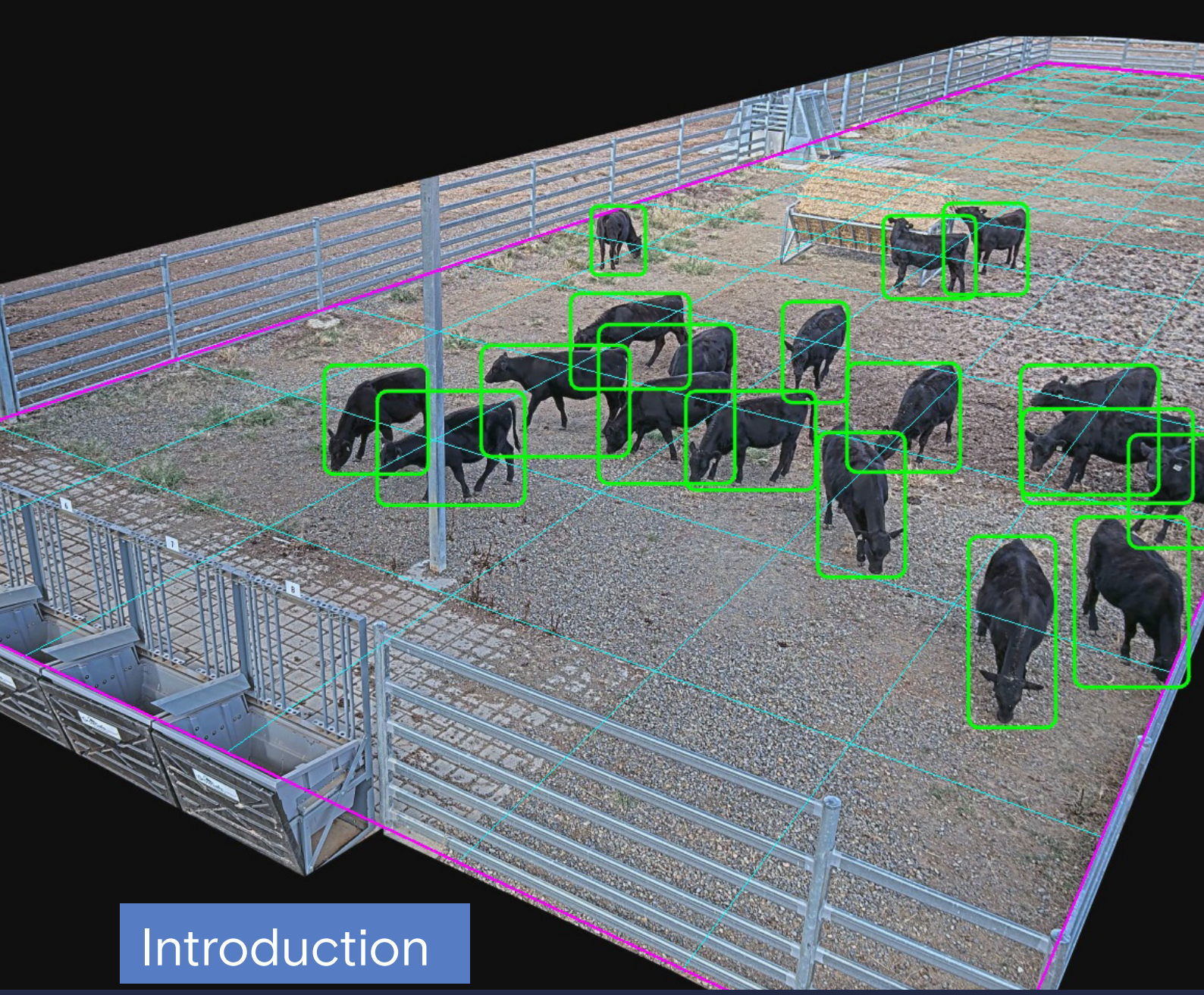

Introduction

Charles Sturt University's (CSU) Feedlot of the Future in Wagga Wagga, NSW, has partnered with We3, a joint venture comprising Artificial Intelligence (AI) and agriculture technology experts - Ben van Delden, Piers Hogarth-Scott and Professor Phil Bolton - to implement an advanced AI-enabled Computer Vision solution designed to automate livestock monitoring.

Initially, this innovative solution is focused on automating and enhancing animal counting efficiency and accuracy within the feedlot environment, with a pipeline of additional industry-informed uses planned to be deployed over time. In Australia, finished feedlot cattle can be worth over $2,500 each.

Even if a small percentage of animals are miscounted or unaccounted for (often due to human error / oversight/ manipulation of records, or stock escaping) the financial impact can be significant and the lost labour productivity of reconciling and remediating records is a burden for producers.

A 1% counting error can equate to hundreds of thousands of dollars in losses. For example, feedlotters handling 100,000 cattle per quarter being "1% out" in the tally (1,000 head missed) at ~$2,500 per animal could cost ~$2.5 million per quarter. That is before accounting for the downstream impacts of incorrect feed rationing, transportation and regulatory record management implications.

Approach

This Vision AI solution involved strategically mounting high-resolution cameras across the Charles Sturt cattle feedlot on existing infrastructure for an optimal field of vision.

These cameras continuously capture real-time video streams of activity in the pens, monitoring entry and exit points, water and feeding zones. Coupled with AI-powered edge computing devices also installed onsite, the system processes visual data locally, significantly reducing latency, improving real-time responsiveness and minimising data transfer and storage costs. Processed data is then securely transmitted to a highly secure cloud-based management dashboard accessible by operators, providing instant insights and monitoring capabilities.

The data is also available to CSU Researchers for enhancing their livestock research activities, providing researchers with additional primary research data for value adding projects for the feedlot industry.

The Vision AI models, developed by We3, have been trained specifically to identify and count cattle distinctly from other species and objects within the feedlot environment, such as humans, horses, and other objects. This capability ensures precise animal identification even in crowded and dynamic feedlot conditions. Scientific verification of the benefits and impact of the solution is being undertaken by CSU.

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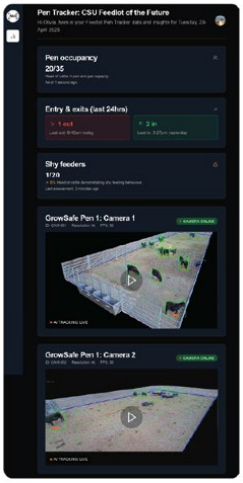
Initial use case

Animal Counting

The primary use case implemented initially is automated animal counting. By accurately identifying and counting cattle as they enter and exit the feedlot, and move within the feedlot, the solution provides feedlot managers with immediate and precise livestock inventory data on number of stock received, present at any given time, and removed from the pen, significantly enhancing operational efficiency. Future integration into farm management records and property identification code reconciliations is planned



Benefits:

The deployment of AI-enabled Computer Vision for Stock Counting offers substantial benefits:

Value Creation:

• Enhanced accuracy in cattle inventory management enables improved planning and operational efficiency for staffing and feed rationing.

• Real-time data supports better decision-making for sales, transport and logistics, supply chain management, greater accuracy in maintaining regulatory records (NLIS/ PIC, NVDs) and reducing contractual disputes between producers, transporters and processors on the quantum of stock received.

• Financially, it safeguards revenue through precise inventory control and builds confidence for accessing herd financing and data backed insurance premiums.

Cost Reduction :

• Automation reduces manual labour involved in daily cattle counting, freeing personnel for other value-adding activities and focusing on stock husbandry.

• Accurate inventory data reduces financial losses associated with miscounted or unaccounted livestock, reducing disputes between parties trading or agisting livestock.

• Reduces the manual inspection costs and improves accuracy of independent audit inspections of financed herds.

Compliance :

• Continuous real-time monitoring ensures compliance with stringent Australian animal welfare standards and regulatory requirements.

• Automated tracking and reporting capabilities offer transparent and verifiable documentation for audits and regulatory bodies.

• Allows us to monitor stock even if there is a biosecurity access restriction to the feedlot.

Future use case

Building on the success of the animal counting application, We3 and CSU, in consultation with key livestock industry partners, have identified a number of additional high-value future Vision AI applications for livestock in pre-processing environments such as feedlots, yards, paddocks and transportation:

Animal Health Monitoring

Early detection of diseases such as BRD, pink eye, and lameness, enabling prompt intervention to reduce disease spread and minimise associated economic losses.

Shy Feeder Detection

Identifying animals exhibiting reduced feeding activity, allowing targeted management to sustain feed efficiency, productivity, and overall animal health.

Animal Behaviour Monitoring

Real-time surveillance to identify negative behaviours promptly, facilitating timely intervention to minimise injuries, welfare issues, and productivity losses.

Optical Weight and Condition Assessment

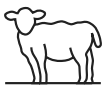
Non-invasive, continuous measurement of animal weight and condition, enhancing market compliance, profitability, and animal management decisions. The ability to reduce days on feed, accelerate delivery to market and improve valuation assessment of livestock real time.

Heat Stress Detection

Ongoing monitoring in feedlots, yards, transportation, and paddocks, rapidly detecting early signs of heat stress to reduce weight loss, illness, mortality, and ensure welfare compliance.

Fit for Loading Detection (Ramp Cam)

Real-time assessment of livestock suitability for transport against animal welfare code requirements, automating animal counts, weight verification, tag identification, and health status to enhance eNVD compliance and minimise welfare risks for staff and stock.



Stock Truck Cam

Continuous AI-based monitoring of livestock during loading and unloading, verifying animal counts and condition while ensuring Occupational Health and Safety (OH&S) compliance to reduce handling risks, verifying weight and numbers loaded and unloaded for transport and delivery compliance and eNVDs.

Worrying Livestock

Automated paddock surveillance detecting and alerting managers to threats such as dingoes, dogs, foxes, wildlife, and unexpected people on farm; reducing livestock stress, injuries, losses, and safeguarding livestock value.

Integration of Vision AI Data with EID/PIC records

Automated reconciliation of AI-based livestock counting and animal identification data with electronic identification (EID) tags and Property Identification Code (PIC) records, improving traceability accuracy and National Livestock Identification System (NLIS) compliance.

Workforce Safety Cam for Feedlots and Yards

AI-driven visual monitoring of Occupational Health and Safety (OH&S) risks and compliance, capturing near-miss incidents to inform targeted training, improve safety awareness, and reduce injury-related costs in the livestock industry.

Conclusion

The Vision AI solution at CSU's Feedlot of the Future showcases the transformative potential of AI in livestock management. Wider adoption of this technology across Australia's livestock industry promises substantial value creation, economic benefits, improved sustainability outcomes, better compliance management and animal and worker wellbeing outcomes.

For feedlot operators, these benefits translate into a more profitable, resilient, and sustainable business. They can deliver cost savings from day-to-day (fewer hours counting, less feed wasted) to long-term gains (better weight outcomes, easier audits, and sustained market access).

Government and industry bodies see value in these technologies as they improve transparency and data accuracy across the sector, aiding in policy enforcement and reinforcing Australia's global reputation in livestock production. Consumers and the public also indirectly benefit, through safer working conditions for farm workers, high welfare standards for animals, and confidence that the meat they enjoy is produced with the highest integrity levels that can be backed up with data to prove it.

As CSU and We3 continue to work together with industry to validate and expand this system, the learnings will not only refine the technology but also offer compelling evidence and pathways for the broader Australian livestock industry to follow, marking a significant step toward sustainable, efficient, and data-driven livestock management.

For further information please contact:

Nick Pagett
Executive Director, AgriPark
Charles Sturt University
0473 212 044
npagett@csu.edu.au

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