Snapshot report

AMPC
AUSTRALIAN MEAT PROCESSOR CORPORATION

# Veritide BluMax Scanning System: On-site Validation & Process Integration

## Bovine carcase Inspection/Contamination Management


Project code
2023 - 1051

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## Project description

Cattle and sheep are ruminants, thus faecal samples contain green plant material. At a cellular level, green plant material contains chlorophyll. Chlorophyll is an optically active compound that yields strong fluorescence signals when exposed to particular excitation wavelengths of light.

Veritide have developed sensors and models which can identify chlorophyll present in faecal material, which is strongly correlated with the presence of E. coli and other pathogenic and spoilage bacteria. Several international export markets have zero tolerance for such contamination. If detected, carcases are cleaned and trimmed or condemned, with costs borne by the exporter. Bacterial contamination like E. coli is responsible for the majority of the meat industry recalls.

A previous proof-of-concept (PoC) project sponsored by AMPC illustrated the technical and scientific credibility of the technology platform in a large format configuration. This was done by leveraging the technology found in the handheld 'BluLine' scanners, which Veritide have been selling internationally for 6 years.

With the BluMax technology (Figure 1) now ready for commercialisation, this project has focused on its operational deployment and has taken a "deep dive" approach to explore where the value proposition lies for this technology within the bovine processing environment.

**Figure 1: The latest commercial version of Veritide's BluMax Scanner and Industrial Monitor System**

## Project content

When we set out, the original objectives of the project were to:

- Send BluMax scanned partial carcase images to an industrial monitor that precisely informs and guides a designated and trained operator to specific contaminated locations for manual removal via knife or steam-vac.
- Send BluMax scanned partial carcase images to Augmented Reality lenses that precisely informs and guides a designated and trained operator to specific contaminated locations for manual removal via knife or steam-vac.
- Compare and contrast the two potential solutions in terms of operator preference, efficacy, speed, accuracy, line integration, etc. Validate the various techniques by applying the Veritide BluLine Scanner and laboratory testing for the microbiological status of carcases before and after contamination detection and intervention.
- Build a database of images and reports that enables processors to “track and trace” their specific contamination risk profile (by carcase/hour/day/mob/shift according to the processors requirements); whereby operational and quality control staff have actionable data for lowering contamination risks over time, improving operational outcomes.
- Determine if this Industry 4.0 system of digital contamination management delivers on the core operational improvement objectives and primary goals (detailed below).

I. Reduce labour or utilise labour more efficiently.

II. Reduce trimming of the carcase and lower trim waste.

III. Reduce energy and/or chemical and/or water utilization, improving environmental and sustainability outcomes.

IV. Lower pathogenic and spoilage bacterial cell counts, improving food safety outcomes and extending product shelf-life.

V. “Track and Trace” the specific contamination risk profile of the plant (by carcase/hour/day/mob/shift according to the processors requirements); whereby operational and quality control staff have actionable data for lowering contamination risks over time and improving operational outcomes.

## Project outcome

While we were able to deliver on many of the projects core objectives, as we progressed, we discovered that the trial site was starting to contemplate operational uses for the technology that we hadn't necessarily considered earlier. Of course, with any new and disruptive innovation, the best laid plans/ideas often get recalibrated once the technology gets placed in the hands of the customer; this was certainly the case at this trial facility when the BluMax was deployed on site for a longer term.

One of the core elements that the trial site started to focus on was the "sensitivity" of the BluMax Scanning System. The theory proposed on site, but untested prior to this operational deployment, was that the BluMax technology could be modulated to differentiate between "clearly visible, near visible or invisible" faecal contamination or ingesta.

With this directive from the trial site, and with the support of AMPC, the Veritide technical team explored ways in which we could manipulate the "sensitivity settings" of the BluMax Scanner. The processor determined that being able to separate out and display "clearly visible and near visible" contamination detections only, would assist them to better manage and/or mitigate any risks associated with positive BluMax contamination detections.

Contained within this major learning, the stakeholders in this trial realised that the power of the Veritide BluMax technology was not limited to its ability to illuminate and detect faecal contamination (in real-time, at line speeds); we collaboratively discovered that the underlying data and analytics platform is where substantial residual value and operational utility lies. Commercially, there is a substantial Data-As-A-Service (DaaS) offer that can be delivered to the bovine processing industry; it's embedded within the BluMax technology now, and can be leveraged for strategic and operational purposes in the future.

Going forward, it is envisaged that the BluMax DaaS offer (or specific sub-components contained within it) will provide powerful operational, quality management, product verification and traceability insights that will cascade value throughout the supply chain. Initially, this will be engineered to the needs of executive and senior level managers and on-site, operational processing personnel. Later on, specific elements of this reporting/analytics programme could be shared with industry auditors, regulatory agencies and downstream supply chain clients.

## Benefit for industry

This trial has proven the benefit of using Veritide's technology to identify chlorophyll-based contamination - the main source of E. coli and other bacteria present in Bovine primary processing facilities - in real time. Given the number of results which had not been predicted at the project outset, but which have been identified using the BluMax scanner, this could suggest that additional benefits are yet to be discovered. It is difficult to predict what further benefits could result over time, since no precedent has been set for how this new and groundbreaking technology could be used.

Augmented reality technology has not yet matured such that it can be integrated as a safe and commercially viable precision trimming tool. However, as this technology evolves, AR-assisted trimming will likely warrant further investigation in the future.

The quality of the BluMax scanner continues to improve, as does the confidence in the results. Cross checking identified contamination with BluLine handheld scanners demonstrates the high accuracy of both devices. The work completed to improve sensitivity and visible contamination detection is a clear indication of the system's robustness.

The use of data generated by the BluMax scanner continues to be a growing area of interest. How this data is displayed to both management and operational staff has evolved significantly over the course of this project. More work is still required to enable full integration across multiple facilities, and for people to be able to customise the data they see. Additionally, quality alerts could be sent to supervisors on the detection of significant shifts in contamination rates.

With the experience and knowledge gained through this trial, the bovine facility has identified a new location and test methodology that will produce tangible benefits for them. At the start of the trial, this location and use case was not something that AMPC or Veritide had considered. This highlights the potential benefits of industry trials of new technologies - such as those offered by Veritide and AMPC - for the purpose of enhancing the operational performance and international competitiveness of the Australian bovine processing sector.

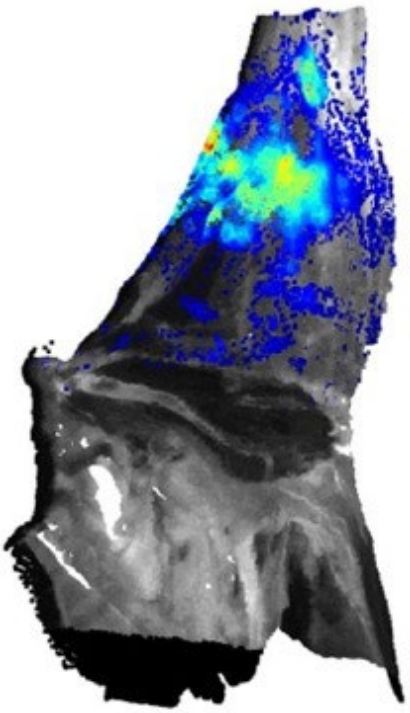
Three areas of work that support wider industry benefit have been identified and described below.

## Recommended Research Area 1: Integration of the BluMax on to the bovine trim floor for real time process improvement assessments across harvest floor operations

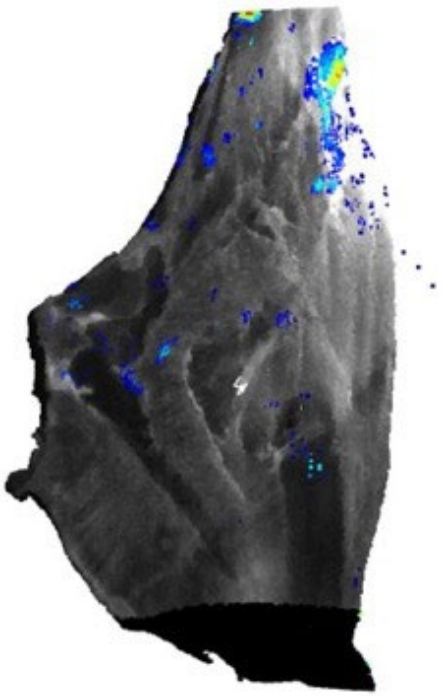
Rather than assessing the contamination status of carcasses just prior to chiller entry, this revised approach would aim to integrate the BluMax technology more actively into operations across the harvest floor (from hide removal and evisceration right through to trimming and CCP assessments.

This could be done by direct trimmer guidance (using the industrial monitor for immediate and individual carcass x carcass contamination removal).

Alternatively, at a more consolidated “trend-analysis” level, real-time data could be fed back to floor supervisors, operations personnel or QA teams (through a digital platform or industrial monitor interface) that informs them of the hygiene status of carcasses scanned over specified/longer periods of time. For example, illustrating a “carcass hygiene heat map” that shows the contamination trend over the last 10, 20, 50 or 500 carcasses scanned.



**500 Carcass Scan Heat Map**



**100 Carcass Scan Heat Map**

The examples above of trend-analysis/carcass hygiene heat maps could provide powerful operational insights for the hide removal team, evisceration personnel, trimmers, floor supervisors, QA and management with regard to the efficacy of SOPs, individual staff behaviours, training opportunities, etc.

A 2025 project that delivers this commercial outcome within an Australian bovine processing facility is currently being scoped with the collaborative support of AMPC and a primary processor.

## Recommended Research Area 2: Identification of other zero tolerance contaminations

Faecal matter is normally the largest of the zero tolerance contaminations found on ovine carcases. To detect other contaminants, various spectroscopic techniques could be used in combination with a hyperspectral camera. This would enable a wider range of precision trimming and removal of the other contaminations.

## Recommended Research Area 3: Develop Veritide automated inspection and automated carcase cleaning

Removing contamination from carcases is a laborious process, even after Veritide technologies identify which areas require trimming. The Veritide system generates x/y/z coordinates for each carcase scanned, and therefore the exact locations within the three-dimensional space that require cleaning. The project proposes to investigate how this three-dimensional data could be used to drive some form of automation that removes contaminants.

## Useful resources

BluMax Promotional Video – Vimeo Link
https://vimeo.com/930067617

Introductory Daily Reporting Template/Sample (see below): to be made available in a readily accessible cloud-based platform in 2025.

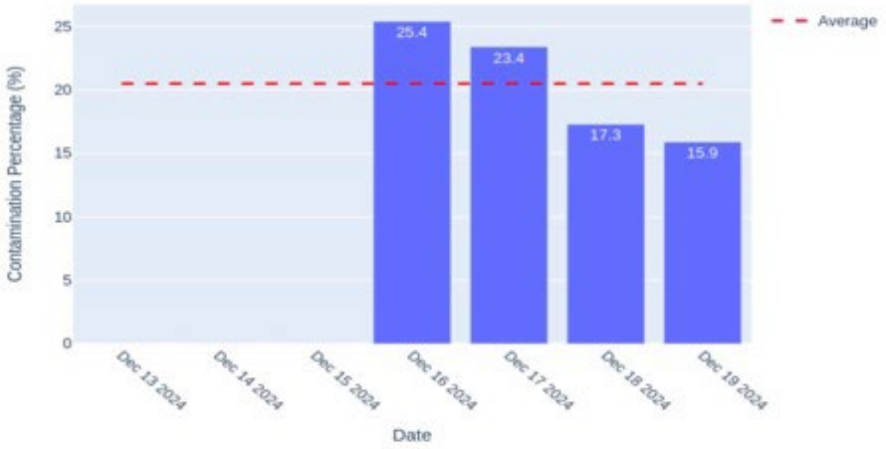
# BluMax Report

VERITIDE
BIOLOGICAL DETECTION AND IDENTIFICATION

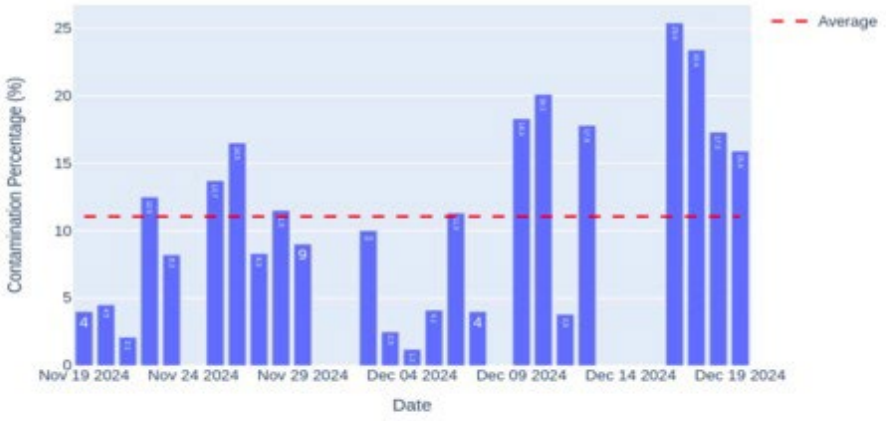
## ---- BluMax Scanner Report ----

| | |
|---|---|
| Reporting From Time | 2024-12-19 00:00:00 +1100 |
| Reporting to Time | 2024-12-19 23:59:59 +1100 |
| Total Number of Sides Scanned | 958 |
| Number of Sides Detected | 152 |
| Detected Side Percentage | 15.9% |
| Average Detections Per Detected Side | 1.151 |
| Average BluMax Sensitivity Setting | 4.0 |

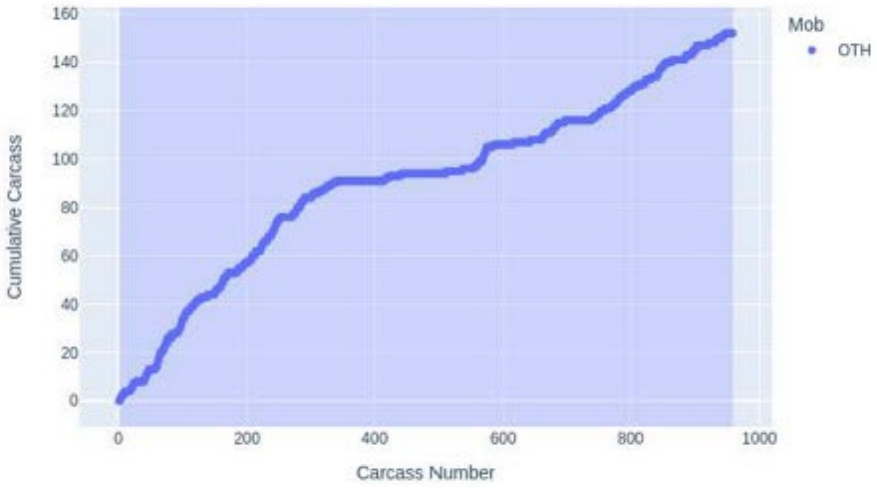
Contamination Percentage (Last 7 Days)



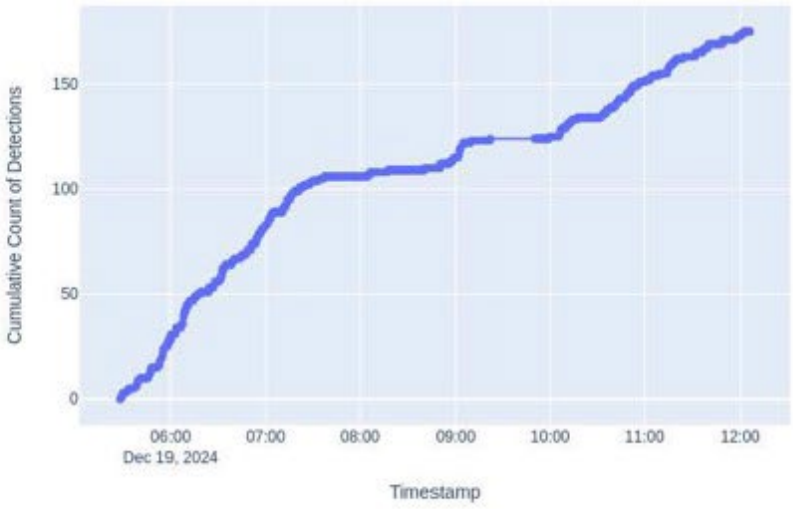

Contamination Percentage (Last 31 Days)



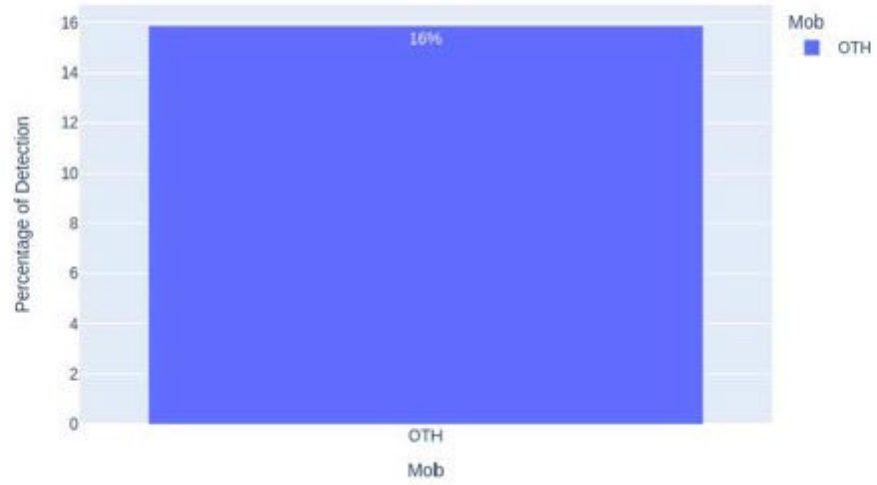
Cumulative Count of Detected Sides

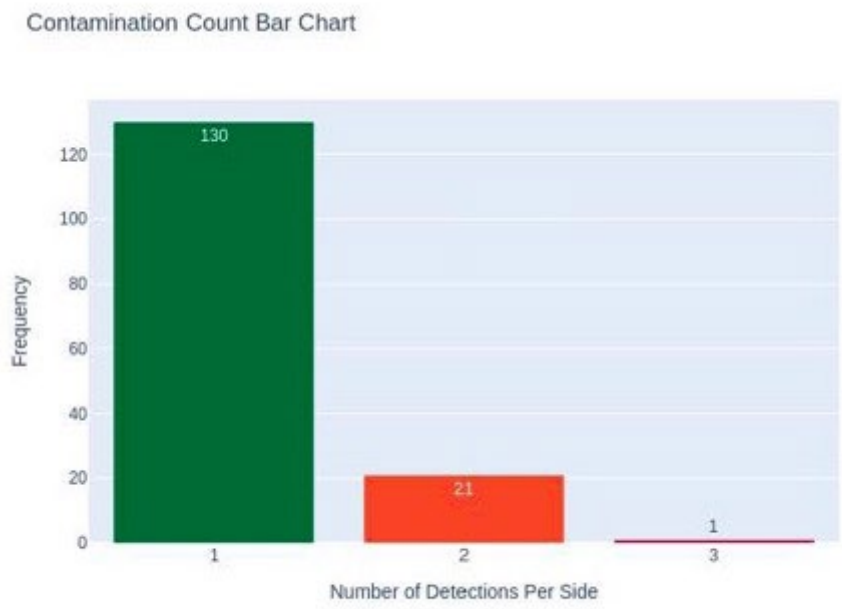


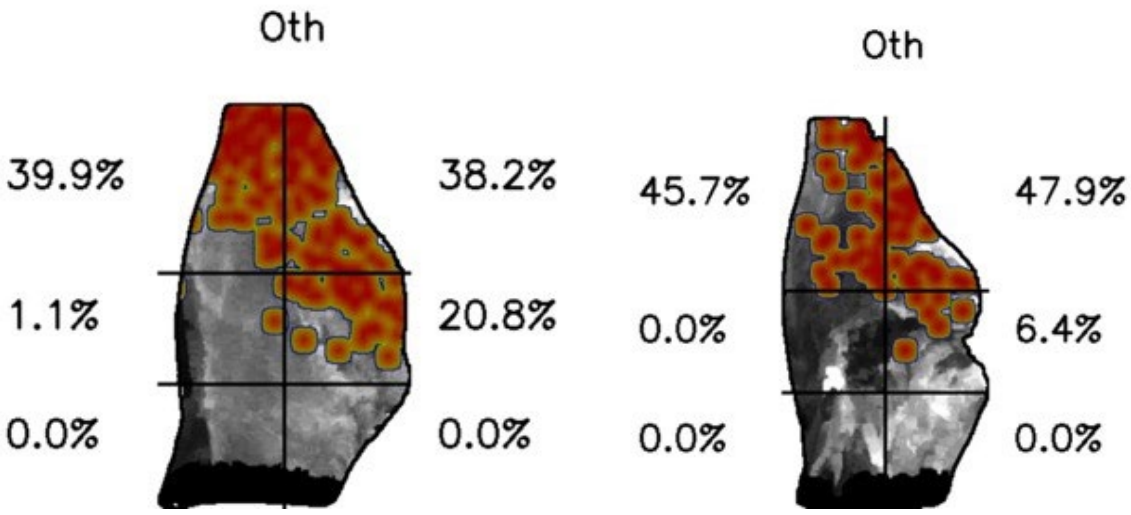

Cumulative Count of Detections on Sides




Percentage of Detections by Mob




Contamination Count Bar Chart
Frequency
130
21
1
120
100
80
60
40
20
0
1
2
3
Number of Detections Per Side


0th
39.9%
38.2%
1.1%
20.8%
0.0%
0.0%
0th
45.7%
47.9%
0.0%
6.4%
0.0%
0.0%