

# **Australian Wool Exchange**

## **E – Bale Project**

Technology and cost/benefit assessment  
of electronic bale ID

In conjunction with  
**Australian Wool Innovation**

### **Executive Summary**

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## ***Disclaimer***

All information, statistics, analysis, projections, comment and opinions in this report are based on information believed to be reliable.

Some information presented in this report has been taken from material published by developers and marketers of certain technologies as well as consultants previously used by AWI to evaluate electronic bale ID. The consultant cannot warrant the accuracy or otherwise of such information.

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Those acting upon such information do so entirely at their own risk.

## Terms and Acronyms

AWI	<b>Australian Wool Innovations</b>
AWEX	<b>Australian Wool Exchange</b>
AWH	<b>Australian Wool Handlers</b>
AWTA	<b>Australian Wool Testing Authority</b>
EBID	<b>Electronic Bale Identification</b>
ECR	<b>Electronic Classers Report</b>
EPC	<b>Electronic Product Code</b>
ESP	<b>Early Stage Processor</b>
DF	<b>Dual Frequency</b>
FDX	<b>Full Duplex</b>
HDX	<b>Half Duplex</b>
HF	<b>High Frequency</b>
ISAC	<b>Industry Services Advisory Committee</b>
LF	<b>Low Frequency</b>
MEMS	<b>Micro Electro-Mechanical Systems</b>
NLIS	<b>National Livestock Identification System</b>
RFID	<b>Radio Frequency Identification</b>
UHF	<b>Ultra high Frequency</b>
SAW	<b>Surface Acoustic Wave</b>
WDO	<b>Wool Delivery Order</b>

## Project Objectives

### The AWI Project TD043 – Technology and cost/benefit assessment of electronic bale ID

Key wool pipeline stakeholders, as represented by AWEX's ISAC committee, made an 'in principle' decision undertake a review of electronic bale ID. The key objectives of this project were identified as:

- Identify available and preferred electronic ID technologies that meet performance standards required by the wool pipeline.
- Develop a cost and benefit analysis of the additional costs and qualitative/quantitative benefits at all stages of the pipeline that may use bale ID.

It was envisaged that the recommendations of this project may be followed by additional bale ID implementation projects, including at least one large scale trial. The commercialisation of the outcomes of the project will be subject to further project proposals.

This project identified the key drivers of adoption of electronic bale ID as:

- Wool and bale traceability and quality control.
- Potential logistical savings through the pipeline. The cost/benefit analysis will assess where these accrue.
- Improved information flow from farm to processor.

The emphasis of this project was on keeping the solution:

- Simple, reliable and scalable;
- Tailored to the financial justification which is based on improving logistics efficiencies rather than creating a new marketing system;
- Whilst not sacrificing reliability, focus on building off existing infrastructure where appropriate such as the introduced sheep and cattle ID system (NLIS) and not necessarily adopting the latest technology;
- Uniform technology across the industry where appropriate.

## **Executive Summary**

The wool industry has been investigating machine readable systems for the past fifteen years. This technology has delivered significant improvements to other material handling businesses around the world.

However, the requirements of the wool industry differ from most other industries, especially in the dumping area and technology simply cannot be transferred from other industries with an expectation of achieving similar results.

The frustration has been that whilst the cost of tags and readers have dropped significantly over the past few years the environmental issues within the wool industry, particularly in the dumping process, remain. These issues have in the past prevented a “one solution fits all” approach for most technologies.

During this study only one technology was demonstrated to work successfully in all areas of the supply chain. This was the dual frequency tag from iPico. However this product can only be described as an emerging technology as only 12 million tags are being produced world wide annually. The company supplying the product is small and is currently in the process of being listed on the Canadian Stock Exchange.

The company’s ability to support the introduction of the technology into the wool industry can be better assessed during the proposed trial period.

Other technologies such as low frequency and ultra high frequency work well in most applications but fall short in the dumping process necessitating a potentially costly procedural change to “work around” these deficiencies. This fact should exclude them from further trials unless the recommended technology fails in the full-scale trial and a fallback option is required.

R.F.I.D. technology is being rapidly developed by a number of global industries far larger than the wool industry and ultimately a viable solution which is more reliable and cheaper than is currently available will present itself to the industry in the future.

However this fact should not stop the industry from moving to a R.F.I.D. solution in the short term. The operational and financial benefits are clear from such a strategy. A workable system can be developed from one of the technologies being recommended for further trials.

### ***Industry need for and response to EBID***

The response to the prospect of introducing EBID is highly positive across the industry players interviewed and generally consistent with one respondent’s comment “Anything which can reduce costs and improve efficiency would be welcome.” The following points identify the key issues and observations that arose during the consultation process:

- Support for the introduction of EBID was conditional upon industry wide adoption of the new technology.

- The general view was that EBID should be focussed on driving logistics efficiency and not be seen to impact on existing marketing arrangements or to cut across any commercial relationships. This is consistent with the project design and objectives.
- There are numerous examples of where the need can be established based on potential cost savings however an issue to be addressed prior to implementation of EBID is the willingness of downstream participants to share the benefits that EBID will generate with wool growers who will bear the largest proportion of the cost through tagged woolpack acquisitions.
- A key innovation required to drive the benefits of EBID is the introduction of Electronic Classers Reports. The savings from this initiative generate approximately 25% of the savings from EBID in the wool handling sector (refer table below).
- An objective of any further large-scale trial will be to verify the potential savings and develop a commercial model to equitably apply these savings.

### ***Technology options***

As with previous research there is a required balance between selecting established and robust technologies against emerging technologies that may better suit the operational environment. The major limitations for most technologies tested are similar to those of 10 years ago; read distance and interference from moisture and metal in the operating environment.

There is still no technology developed to the point of meeting all required criteria for full scale implementation<sup>1</sup>. The research and trial work has identified two technology options which are approaching industry requirements and are considered appropriate candidates to participate in an industry trial (refer technology section for selection criteria). These are:

- Dual Frequency RFID: This emerging technology was tested successfully during this project<sup>2</sup> and appears to meet the required read range as well as solving the LF RFID<sup>3</sup> shortcomings.
- Semi-active UHF: This technology best meets the operational requirements from results demonstrated in the small scale trial work undertaken but the price point may still remain a barrier at the end of the trial. Given the rapid reduction in RFID costs this technology should be retained as an option at this point.

These two technologies have increased in reliability and reduced in cost since the last review in EC 452. In particular the dual frequency technology has advanced but must still be considered in its infancy in the commercialisation phase with only 1 million tags being produced per month.

In relation to the potential risk of backing proprietary IP of a small company our initial enquiries indicate that tags using iPico's chips are being manufactured by the major tag manufacturers such as Sokymat, IER, and KSW Microtec and importantly, their protocols

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<sup>1</sup> Refer selection criteria in technology section; one criteria being vendor support which requires more testing with smaller and emerging companies.

<sup>2</sup> This project was not financed for large scale trials of technology however the smaller scale trials and evaluation of reports on various available technologies support this recommendation.

<sup>3</sup> LF RFID was recommended in AWI Project EC452 but fell well short of the required read ranges in wool handling and processing environments – 0.5 metres versus requirement of approx. 2.0 metres.

have been made available and are supported by major reader manufacturers including AWID, Psion, Samsys and SmartID.

In relation to LF RFID, Sokymat have advised that they are in the process of testing a tag and reader that that will allow a 2 metre read range and incorporates anti-collision but it is still in the test stage. This report recommends incorporating this technology in the recommended future trials if, as indicated by Sokymat, a working prototype is available by March this year.

### **Cost benefit analysis**

A conservative estimate has been made of the benefits accruing to the wool handling and ESP sectors. Potential benefits to AWTA have been identified but not valued in this calculation. Additionally, there is the longer term potential to remove or automate countermarking which is not only a high cost to the industry (up to \$1.00/bale) but also creates downstream quality and production issues due to the generally poor quality and inconsistency of this practice.

The high level numbers indicate a direct net benefit of up to \$1.16 per bale of wool is achievable across the industry to the point of scouring. At current production levels this indicates an **annual net benefit of approximately \$3.1M to the wool industry** at forecast production levels. This is summarised in the table below:

<b>Sector</b>	<b>\$/Bale</b>
<i>Benefits</i>	
Wool handling	\$1.73
Wool Dumping	\$0.52
Early Stage Processors	\$0.28
<b>Total Benefit (weighted average)<sup>4</sup></b>	<b>\$2.50</b>
<i>Costs</i>	
Tag	(\$1.00)
Infrastructure (readers/software etc)	(\$0.34)
<b>Total Costs</b>	<b>(\$1.34)</b>
<b>Net Benefit</b>	<b>\$1.16</b>

This estimate covers improvements in logistics only and excludes the expected ongoing reduction in tag costs. Other less tangible or measurable benefits such as enhancing the reputation of the Australian wool industry for quality and innovation have been excluded in the above numbers. However, the potential value to the Australian wool industry through improving downstream efficiency and quality management to maintain the price and position of wool in the increasingly competitive textile market should not be totally overlooked.

As improving efficiency in the supply chain continues as an imperative, a further benefit from EBID will be in its potential to shorten the wool pipeline – the days it takes from shearing to scour. While not factored into the above numbers, every week taken out of

<sup>4</sup> The adjusts for approx 5% of bales not going through the dumping process

this pipeline equates to a reduction in working capital costs of \$0.94/bale or \$2.5M across the Australian wool industry.

## ***Implementation***

The cost benefit analysis has been based on a “whole of industry” implementation and this approach for Australian wool should remain the objective.

A staged implementation is required along the following framework:

- Undertake a large scale trial to confirm the preferred technology and firm up the cost benefit analysis
- AWI (on behalf of the wool industry) to call for expressions of interest to provide a total industry solution
- Develop the appropriate business model for implementation and secure industry support for widespread introduction
- Phase implementation starting with the larger players (AWH)
- Ensure industry wide roll-out proceeds within 12 months of initial phase

## ***Recommendations***

The Australian wool industry has demonstrated throughout its history the ability to introduce innovation to improve the quality and efficiency of the wool supply chain. EBID is the next logical step and the financial benefits assumed in this paper are considered conservative but are still compelling to recommend proceeding towards implementation. This is particularly the case if EBID can be used to facilitate a reduction in supply chain working capital and enhance information flows. The following steps are recommended:

- Proceed with trials of the two technology options which offer the potential for a complete solution from farm scour. It is proposed that two small scale trials of approx 500 bales be undertaken on each of the technologies during March to coincide with the introduction of the new AWEX bale label. This should then proceed to a major trial of the preferred technology in the new wool selling season.
- Prepare specification and documentation in preparation for calling an industry wide tender
- Implement a full scale trial of approximately 100,000 bale for the preferred technology
- Engage broader industry on adoption of EBID and ECR
- Prepare detailed proposal to AWI in relation to industry wide adoption of EBID including a detailed implementation plan
- AWEX to develop a prototype ECR which is acceptable to all sectors of the industry and investigate opportunities for education for growers and wool classers for implementation of ECR