SIBI new on-farm technology economic case study: electronic identification and recording software

# Case study: Peter Walker of Newdegate

**Owner:** Peter Walker
**Property location:** Newdegate
**Property size:** 6500 hectares
**Stock:** 3500 merino ewes, 200 Suffolk stud ewes and 200 white Suffolk stud ewes
**Technology:** Pedigree Matchmaker, Sapien Koolcollect and Sapien Koolperform

Peter and Rochell Walker farm 6500 hectares (ha) at Newdegate in the Lakes region of Western Australia (WA). They run a mixed farming operation with around 4000ha cropped each year, 3500 merino ewes in a commercial flock and two stud sheep flocks, Suffolk and white Suffolk, with 200 ewes in each. The stud flocks capture Australian Sheep Breeding Values (ASBV’s) to improve their performance.

Within the studs the Walkers had been visually identifying lambs to their dams, weighing them within one month of birth and another three to four times as they grew to 60 kilogram weight and muscle scanning as well. With both Suffolk and white Suffolk being terminal, these are the most important characteristics to improve the quality of their rams.

Over the past few years, the farm has been progressively expanding and it was starting to get difficult to manage both the data collection and record keeping within the studs. Lambing was moved to August to get away from seeding, but it was still a difficult time on the farm with the work within the stud conflicting with the cropping program. All up it was taking over 380 hours a year for record keeping alone within the stud and a breakdown of the time taken is given in table 1 below. Something had to change.

To solve the labour problem, the Walkers combined pedigree matchmaker, a Gallagher stick reader and weigh head and Sapien Koolcollect and Koolperform computer programs.

Pedigree matchmaker links the lamb to the ewe. Pedigree matchmaker uses electronic identification (EID) to link the ewe and the lamb as they pass by a panel reader, with the ewe and lamb walking close to each other the panel identifies them by proximity over multiple days. By moving to pedigree matchmaker, inspecting the lambs was easier, reducing the job to 15 minutes a day and freeing up time for spraying. All the ewes had to be tagged at the start for the EID to work.

For weighing and muscle scanning the lambs, a Gallagher HR5 stick reader and Gallagher 610V2 weigh head was bought. The Walkers already had a weigh crate. Lambs were weighed within the month of birth and then three to four times until they reached 60 kilograms in weight. Weighing was done when the lambs were bought in for other activities and didn’t add any extra time, but muscle scanning takes an extra 10 to 15 seconds per lamb.

To analyse the data they bought a specific laptop. Initially it was supposed to be used in the field but they found the stick reader was more robust and captured all the information they needed, so it hasn’t been used in the field. Sapien Koolcollect and Koolperform were purchased to enter and analyse the data. Peter does all the analysis himself.

## System cost

Before starting the Walkers spent $500 on EID ear tags for all the ewes within the stud. They already had a weigh crate so didn’t need to buy that. It cost $10 500 for all the other equipment; $4000 for the stick reader and weigh head, $3500 for pedigree matchmaker, $2000 for Koolcollect and Koolperform and $1000 for the new computer.

The Sapien annual subscription cost $330 per year and the cost of putting the lambs into Lambplan costs $1550 a year, but this has to spent regardless. Peter and Rochell expect the system will last ten years before they need to upgrade it.

## Time saving

The Walkers needed to free up time within the stud. Table 1 shows the time savings of moving from manual to EID. The time taken has fallen from over 380 hours a year to around 42 hours and it’s taken a lot of pressure off from July to September.

Table 1 Time spent on tasks before and after adoption of electronic identification (EID). Note acronym: pedigree matchmaker (PMM)

| Task | Time spent before EID | Time spent after EID |
| --- | --- | --- |
| Marking ewes before lambing | 1 day for two people (16 hours) | N/A |
| Identifying a lamb to its dam | 4 hours/day for one person for 65 days (260 hours)1 minute per lamb to enter the data into Pedigree wizard(9 hours) | 15 minutes/day checking sheep1 hour to set up PMM1 hour to pack away PMM1 hour to analyse data (14 hours) |
| Lamb weighing (four times) | 65 lambs an hour for two people (64 hours) | 250 lambs an hour for two people (8 hours) |
| Muscle scanning | 70 lambs per hour for two people (15 hours) | 105 lambs per hour for two people (10 hours) |
| Data entry | 2 hours per weigh session4 hours to analyse data at end of the year (14 hours) | 1 hour to download HR5 EID reader and weigh indicator and to analyse data (4 hours) |
| Providing data for cull ewe lamb sales | 5 hours to put the data together before a sale | 1 hour to identify, select and process the data |
| Using ASBVs for rams | N/A | N/A |
| Error productivity efficiency |  | 1% productivity increase due to error reduction |
| Total time taken | 383 hours | 36 hours |

The activities the new EID system is helping with are discussed below both before and after EID were adopted.

## Lamb identification

To identify the lambs manually, two people took a day prior to lambing to paint large numbers on the side of each ewe. Over the 65 days of lambing, one person spent two hours in the morning and two hours in the afternoon to check the lambs and determine their ewe. Large ear tags were used costing $2 each and it was very time consuming. With 400 ewes lambing at 130% it was costing $14 000 a year or $24 a head, with $22 of that being labour costs. Manual identification is around 95% accurate in identifying the lineage.

EID technology in the form of pedigree matchmaker (PMM) uses the mothering instinct to link the lamb to the ewe. An EID ear tag is put on each ewe and lamb. A panel reader then reads as both lamb and ewe walk past a constriction point. After two weeks the maternal lineage can be calculated with 95% confidence, the same level as physical identification.

Using PMM, all the ewes had to be ear tagged costing $1.30 each and this needs to be done with the lambs every year. PMM takes about an hour to set up and take down and another hour to do the analysis. With the stud lambs being high value, Peter still likes to check the lambs each day but it only takes 15 minutes now.

The total costs for identifying the lambs using PMM are about $1400 per year, a saving of over $12 500 per year due to the high costs of visually identifying the lambs before.

## Weighing and muscle scanning the lambs

The lambs are weighed four times; at marking, second marking, weaning and post weaning. The lambs are muscle scanned once at a weight around 60 kilograms as Peter believes this is the key driver of performance in a terminal sire.

Manually weighing the lambs took two people an hour to weigh 65 lambs and the data entry then took an extra two hours at the end of the day to enter the data while muscle scanning takes around two people an hour to scan 70 lambs. The labour costs of manual weighing and muscle scanning was costing $4600.

By using EID to collect, weight and muscle scan, the Walkers still use two people but they do it faster. Two people can weigh 250-300 lambs an hour against around 90 manually. By increasing the rate at which the lambs are weighed and scanned, the labour costs are reduced significantly, down to around $800 per year, but this figure does not include the ear tag costs.

## Cull ewe lamb sales

For the past few years, the Walkers have had the opportunity to sell cull ewe lambs from the stud at a higher price than sending them to auction, but it took time to prepare for the sale as the purchasers required lineage back three generations as a condition of sale. While Peter had the data, it took around five hours the day before the sale to get it together. By using Koolperform, the data was able to be extracted much easier, taking only an hour to identify, select and process the data for the cull lamb sale. By using the Koolperform program, they saved around $180 per year in time.

## Using Australian Sheep Breeding Values for rams

Peter had been manually collecting performance data on lambs to gather ASBVs via Lambplan. As the farm expanded however it was getting more difficult to put the time aside to capture the data and Peter was considering stopping using the program.

Using EID and the Koolcollect and Koolperform programs, Peter has been steadily increasing the ASBVs of his rams. In terms of ram sales, the ASBVs alone only generate one to two extra sales a year. The real value is the improvement with the breeding program.

## Error productivity efficiency

Using electronic identification significantly reduces operator error and both Peter and Rochell think it adds a lot of value. Calling out numbers in the yards adds stress and time and the errors cause problems with the analysis.

While it’s a real number, Peter and Rochell feel they get at least one per cent value in using EID, equivalent to around $200 per year on their farm.

## Results

The EID system cost $10 500 per year to purchase and is expected to last around 10 years before it will need to be replaced. When they began using EID, they had to purchase ear tags for all of the ewes ($500) and annual operating costs for the Sapien computer programs are $330 each year plus the cost of the lamb ear tags ($700).

The savings are mostly in labour as outlined in table 1 above. Using pedigree matchmaker reduced the time required to determine lineage from 285 hours a year to 18, a massive reduction in time. By using EID for recording weights and muscle scanning, the time taken reduced from 93 to 27 hours a year. By using the Koolperform program, preparing cull ewes for sale took one hour, where before it had taken five hours. The use of ASBVs is generating an extra ram sale a year worth $800 and there is potentially a $200 increase in value from reduced errors. The savings across the stud amount to $12 500 per year in labour for the pedigree matchmaker, $3400 in labour savings using EID for lamb weighing and muscle scanning and $200 in labour for the cull ewe lambs.

The total time saved by moving to the new system is around 350 hours during July to September; a busy time of the year. For the Walkers, saving time during July and August is vital as it allows more time to go to cropping and pasture management.

A Net Present Value (NPV) analysis of the total system was undertaken. A NPV looks at all benefits of investment in EID across its life after deducting the costs incurred over the same time. A dollar today is worth more than a dollar in the future, so the NPV calculation converts both income and expenses into today’s dollars. One way to think of this is if a friend asked to borrow $100 – if they pay you back tomorrow you might say just pay me back the $100, but what if they couldn’t pay your back for a year, depriving you of its use for that length of time? You might still lend the money but say you need to be paid interest as a form of payment for the deprivation of use. That’s the concept behind a NPV calculation, money saved or spent today is worth more than money spent or earned in the future. Because the NPV factors in a time value of money calculation, if the result is greater than zero, then the investment is worth making. If it’s negative or below $0, then you’d be better off not buying the equipment as you could put your money to better use elsewhere.

From an initial investment of $11 000 the overall system generates an NPV of $118 000 over 10 years. The benefit cost ratio (BCR) or return from each dollar is $11, meaning each dollar invested in the system would return $11 over the next ten years. Payback on the investment is less than one year. Labour costs within the analysis are assumed to be $46/hour for a farm worker earning about $87 000 per year; however with much of the work done by the owner, it could be argued the time savings are even higher.

The largest cost each year under the old system was identifying the lineage of each lamb, costing the Walkers around $24 per sheep. There are a number of alternate technologies that might have saved them money even if they hadn’t gone to EID for lineage, and table 2 below shows the impact of the result on reducing the cost of identification for the lamb. For each dollar that the cost of identification can be reduced, the return falls by around $4 000 in total; but under all scenarios is still profitable.

Table 2 Impact of cost to identify lambs on return

| Cost to identify lambs | $10 | $12 | $15 | $17 | $24 |
| --- | --- | --- | --- | --- | --- |
| Net present value | $62 000 | $70 000 | $82 000 | $89 000 | $118 000 |
| Benefit cost ratio | 6 | 6 | 7 | 8 | 11 |
| Payback (years) | 2 | 2 | 1 | 1 | 1 |

## Removing the pedigree value from the investment

If the lambs’ lineage was already determined, the value of the use of EID to capture weight, muscle scanning and ASBV data can be looked at separately. The system purchase price would fall to $7 000 consisting of $4 000 for the stick reader and weigh head, Koolcollect and Koolperform at $2 000 and the new computer at $1 000. The NPV from these activities is $21 000 over ten years with a benefit cost ratio of 3.0, meaning $3.00 in return for each dollar invested, and the payback occurs after two years.

A smaller stud considering investing in EID would have to run the cost over fewer lambs. Table 3 below shows the return from using EID for recording weighing, muscle scanning, ASBV collection and increases in ram sale along with the productivity benefit.

Table 3 Return from EID lamb weighing, scanning and ASBV collection only

| Lambs | 200 | 250 | 400 | 520 |
| --- | --- | --- | --- | --- |
| Net present value | $11 000 | $13 000 | $18 000 | $21 000 |
| Benefit cost ratio | 1.6 | 1.8 | 2.5 | 3.0 |
| Payback (years) | 3 | 3 | 3 | 2 |

## Conclusions

Running a sheep stud is a labour intensive business. Each animal within the stud is high value and understanding that value drives performance over time. The challenge is how to gather the data efficiently and in a cost effective manner.

Peter and Rochell Walker had been collecting data on the stud but it was taking over 380 hours a year just to collect the data to keep the stud going. As the farm got bigger and time became more important they had to find a solution to reduce the amount of time spent on the sheep during August and September when there were a lot of demands on their time.

By investing in electronic identification (pedigree matchmaker) and using it to determine lineage, record weights and muscle scanning data on the sheep (using a Gallagher EID wand and weigh head) and then use a program to put it all together (Sapien Koolcollect and Koolperform) they managed to dramatically reduce the cost to run the stud, saving over 340 hours of time in the process. Overall the investment of $11 000 is on track to save $118 000 over ten years with every dollar invested returning $11 in savings. It has been an investment worth making and has freed up time during one of the busiest times of the year.

# Appendix: assumptions used in the analysis

The following assumptions have been used in this report:

* wages costs $38/hour or $46/hour including all costs. $87 000 per year for an experienced farm worker is used as the base
* discount rate: 6% per year (the long term rate accepted by broadacre farmers in WA, being 2% capital gain and 4% return, the value is below that accepted in other industries)
* inflation 2% per year.