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Evaluation of the impact of Lifetimewool on sheep producers

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Abstract. Lifetimewool was a national project that began in 2001 to develop profitable ewe feeding and management guidelines for wool producers across southern Australia. By 2005, the project included communication and adoption activities. Rigorous communication, adoption and evaluation plans were used to maintain focus on its objectives and to measure impacts. Evaluation was an integral part of the project's development and allowed the project to gain a clear idea of its impact. The project aimed to influence at least 3000 producers nationally to change the management of their ewe flock by the adoption (or part thereof) of Lifetimewool messages and guidelines. More specifically, the project aimed to 'cross the chasm' and target producers that were deemed to be in the 'early adopter' and the 'early majority' segments. The project surveyed sheep producers, sheep industry consultants and sheep industry extension practitioners at the beginning and end of the project to gauge the change in knowledge, attitudes, skills and aspirations of wool producers over the life of the project. Results from the survey of sheep producers in 2008 indicate that the project achieved its aim. About 12% (~3000) of sheep producers nationally have changed practice due to information received from Lifetimewool since 2005. Many other producers have been affected through their increase in knowledge, belief and skills, and market segmentation of the audience shows that the project was successful in 'crossing the chasm'. The strategies employed by the project to initiate change (i.e. using private consultants and extension professionals as a pathway to adoption, and involving producers, consultants and extension professionals in the development of the Lifetimewool key messages and tools) were validated. The survey results and analysis provided baseline data for future livestock management projects to build on producers' progress towards practice change. The present paper looks at how the Lifetimewool's evaluation plan provided a focus for and demonstrated meeting its objectives. In doing so, this paper also seeks to better understand the adoption process.

Introduction

Evaluation is primarily used to assess the impact of a program but can also be used to define the audience, target information and to inform program improvement (Patton 1997), but few programs use evaluation to its full potential and therefore fail to achieve widespread adoption (Barnett 2007). Audience members can be categorised, based on their willingness to adopt new technologies, as an 'innovator', 'early adopter', 'early majority', 'late majority' or 'laggard' (listed in order of their willingness to adopt; Rogers 1983). These terms are also referred to as 'market segments'. The behaviour of 'innovators' and 'early adopters' is relatively easy to change as they actively seek out new technologies, whereas 'laggards' are the hardest to change as they are most comfortable doing what they already do. Rogers' model suggests that diffusion (market penetration) occurs *continuously and successively* from 'innovator' to 'laggard'. By contrast, Moore (2006) argued that diffusion is not continuous and that influencing the behaviour of the 'early majority' requires 'crossing the chasm' (see Fig. 1). 'The chasm', as introduced by Moore, refers to the significant gap that occurs in market penetration (discontinuity) between the early adopters and the early majority. Moore (2006) believes that each market segment must have their individual needs (expectations) met by the development of the innovation and that the rate of adoption by any segment is fundamentally independent of the adoption rate of other segments (although related in terms of availability and form of the product in the market). This is due to the fact that the two groups are independent in their expectations of a new product.

'Early adopters' perceive the new technology as a means to give them a competitive edge (and are prepared to put up with glitches in the system). The 'early majority', on the other hand, expects the new technology to make life easier and for the transition to it to be smooth (no debugging required; Moore 2006). The main stumbling block with diffusion to the early majority is that they need to see *other early majority members* (not

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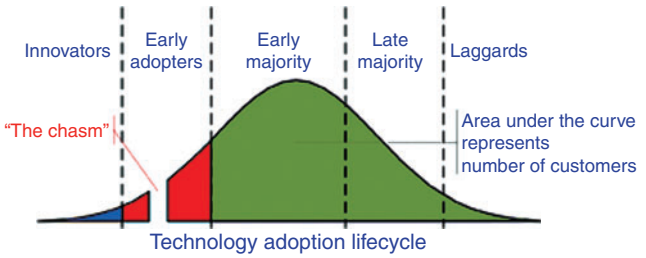

Fig. 1. Moore's (2006) adaptation of Rogers' (1983) diffusion of innovations model, showing the distinct breaks between categories. This figure highlights the distinctness of each segment and the particular difficulty in disruptive technologies 'filtering down' to the 'early majority', 'late majority' and 'laggard' segments of the audience.

innovators or early adopters) using the product to have confidence in it. The dilemma is that there are few to observe.

Lifetimewool was a national project that integrated new and existing knowledge about the effect of the nutrition of the ewe on the production and profitability of the whole farm and developed management guidelines specific to regions and different times of lambing (Young and Thompson 2008). To help achieve high levels of adoption, Lifetimewool developed an evaluation plan (Accessory Publication) using the people-centred evaluation technique, as outlined by Dart *et al.* (2011). People-centred evaluation enabled the project to develop an evaluation plan that focussed on getting beyond the 'early adopters' to the 'early majority' audience (Rogers 1983). This was essential to achieve the adoption target of 3000 producers who would change practice as a direct result of the project within 3 years. Curnow *et al.* (2011) outlined how the Lifetimewool activities and tools were developed to meet the specific needs of the 'early adopters' and 'early majority' market segments. This paper looks at how effective the Lifetimewool project was at meeting its adoption objective using this approach, discusses the adoption process in terms of the diffusion of innovation models as outlined by Rogers (1983) and Moore (2006) and the factors affecting it and how this may be relevant to other projects pursuing change in livestock management practices.

Evaluation methodology

Surveys were used to quantify change in the knowledge, attitudes, skills and aspirations of 'next users' (consultants and extension practitioners) and 'end users' (wool producers) between 2005 and 2008.

Survey of private consultants and government extension practitioners (next users)

Consultants were defined as those outside of government departments who gave advice and made recommendations to the sheep industry either on a one-to-one basis or at larger gatherings. This group included private consultants, veterinarians, agribusiness operatives and university academics. Extension practitioners were defined as people employed by state government departments of primary industries or equivalent whose role was to communicate or extend information to the sheep industry, particularly Merino producers. The survey in 2006 aimed to benchmark awareness, beliefs and willingness to promote change, while the survey in 2008 (see Accessory Publication) aimed to measure change that had occurred through the life of the project and to gauge the value of using consultants and extension practitioners as a conduit for communication and adoption. Consultants and extension practitioners that gave advice on pasture and sheep management were invited to participate in an on-line survey, conducted by an independent market analysis company. Respondents were asked about where they work, how many and what kind of producers they talk to, whether they were prepared to recommend Lifetimewool practices and tools, and whether or not they agreed with Lifetimewools' key messages.

Surveys of sheep producers (end users)

In 2005, 2032 sheep producers across southern Australia, who sold wool from more than 500 sheep, were surveyed to establish a benchmark for ewe and pasture management practices, knowledge and willingness to change practice. The number of producers surveyed in each statistical division was determined by the relative proportion of wool producers in each area according to the Australian Wool Innovation (AWI) shareholder database, using a methodology developed and validated by Curtis (2005, 2007*a*, 2007*b*, 2009*a*, 2009*b*, 2009*c*). The statistical divisions represented 85% of the Australian sheep population, as recorded in the 2001 Australian Bureau of Statistics agriculture census. In the 2005 survey producers were asked if they were willing to be resurveyed in 2008 (see Accessory Publication); 93% agreed to this request. Overall, a total of 1295 sheep businesses were successfully surveyed in both 2005 and 2008; more than three-quarters of the respondents to the 2008 survey were the same people that responded to the 2005 survey. The 1295 respondents represent 5% of the national population of sheep producers. Not only does this provide a strong sample size, but it has allowed Lifetimewool to compare individual producers' changes in practices, knowledge and willingness to change practice over the 3 years of communication and adoption activities.

The national farmers' survey was a telephone questionnaire that lasted ~10 min. The 24 questions covered enterprise information, current pasture and ewe management practices, willingness to adopt management systems and belief in the Lifetimewool messages and guidelines. The 2008 survey also included questions on whether the farmers had changed practices within the preceding 5 years, and whether those changes were due to information provided by Lifetimewool. The response to this last question provided a direct link, attribution for the practice changes to the project, an aspect of evaluation that is often difficult to measure (Dart and McGarry 2006).

Producers' recognition and use of tools

A further survey was conducted to ascertain producer's awareness and use of Lifetimewool tools. Responses to these questions were received from 1353 randomly selected producers nationally. This independent survey was needed to avoid response bias inherent in returning to producers who had already been asked questions relating to the Lifetimewool Project in the initial 2005 survey.

Market segmentation of sheep producers

A series of five questions about the producers' willingness to adopt specific innovations was included in the national producers' survey. Each of the five willingness questions covered a particular

aspect of ewe management, including pasture assessment, monitoring of ewes, nutritional management of ewes, feed budgeting and scanning for pregnancy. The responses to these questions were weighted to reflect the anticipated level of impact on their livestock enterprise and the aggregate score was used to allocate each producer to a market segment according to the percentages of the general model proposed by Rogers (1983) (Fig. 2). More details of the methodology can be found in Rose and van Burgel (2006).

In 2008, the same set of 'willingness to change' questions was asked to explore whether producers had changed their attitude to willingness and therefore their market segment.

Evaluation of adoption strategies

The combined responses from the surveys of consultants and extension practitioners and the surveys of producers were also used by the project to make an assessment of the strategies used to achieve change. Producers' level of social participation (in either a networking group, or through paying for advice) and their agreement with and use of Lifetimewool messages and tools were compared with the level of agreement of messages and the use of tools by consultants and extension practitioners. This comparison indicated what influence the consultants and extension practitioners had on producers and hence the success or otherwise of using this strategy. The project also placed significant emphasis on the production of tools that met the needs of market segments. Easy to use, regionally specific tools were provided for use with and by producers while more complicated tools were available for those looking for greater depth of knowledge. The success of the strategy to tailor tools to the audience is assessed based on the relative uptake of tools by consultants, extension practitioners and producers.

Results of surveys

Consultants and extension practitioners (next users)

Response rate

Forty-one of 111 consultants (37%) and 43 of 151 extension practitioners (28%) responded to the 2008 survey. From the information supplied by the 84 respondents it was estimated that they worked with ~2800 farm businesses running Merinos. This represents 11% of AWI levy payers. These responses, combined with those from the survey of producers, provided a rich dataset from a considerable proportion of Australian wool growers.

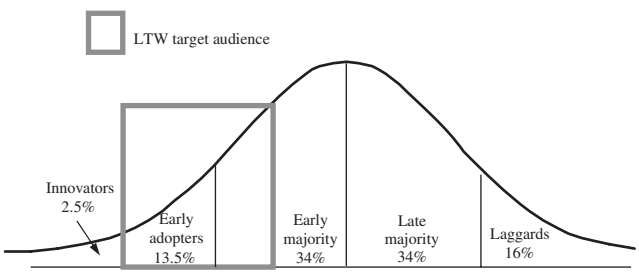

Fig. 2. Rogers (1983) market segmentation curve highlighting Lifetimewool's target audience: the early adopters and early majority. The percentages show what is considered to be the standard breakdown of the population within each segment.

Knowledge and attitude to key messages and tools

Greater than 85% of respondents agreed with 13 of the 16 key messages of Lifetimewool (e.g. 93% agreed with the need to condition score or weigh ewes to accurately assess body condition). Consultants and extension practitioners had also heard of and/or used the majority of the tools (Table 1). The feed budget tables, condition scoring sheet and models, feed on offer photo gallery, the ewe management handbooks and the website were all well utilised, more so by extension practitioners (at least 54% use these tools) than consultants (used by at least 37%). The condition score profile and the electronic decision support tool were less popular with 24% of consultant and 41% of extension practitioners using the condition score profiles and 5% of consultants and 10% of extension practitioners using the electronic decision support tool. However, 70% or more had heard of these tools.

Adoption of recommendations

In 2008, 60% of consultants and extension practitioners reported that they had changed their recommendations based on the new information provided from Lifetimewool. A further 36% responded that Lifetimewool's key messages had confirmed their current recommendations. Of those that said they had changed their recommendations, 44% said they had changed 'somewhat' and 16% said they had changed 'considerably'.

Impact on end users

About 95% of consultants and extension practitioners said that Lifetimewool had changed or validated their recommendations, and 71% of those said they had clients who attributed changed practices to Lifetimewool. This equates to some 1900 farm businesses.

Involvement in groups

Respondents working with groups were more likely to have accessed a greater range of information from Lifetimewool, including attending events and presentations, and using tools. In addition, those involved in producer groups were more likely to have changed their recommendations and reported the change in client's practices (73% with clients who had changed practices compared with 48% for those not involved in groups). Those consultants facilitating groups were also more likely to give credit

Table 1. Percentage of extension practitioners and private consultants that have heard of and used the Lifetimewool tools (2008 survey)

Product	Extension practitioners		Consultants	
	Heard of (%)	Used (%)	Heard of (%)	Used (%)
Feed budget tables	98	76	92	46
Feed on offer photo gallery	93	54	91	49
Condition score models	97	56	98	54
Lifetimewool website	97	56	87	37
Condition score sheet	90	66	92	46
Condition score profile	75	41	80	24
Ewe management handbook	83	63	90	41
Decision support tool (electronic)	71	10	72	5

to Lifetimewool for changing their recommendations (23% changed 'considerably') compared with those consultants not involved in groups (4%).

National farmers' survey (end users) results

This section summarises the findings from the surveys of producers conducted in 2005 and 2008.

Response rate

In 2005, 2032 randomly selected wool producers completed the national survey. This represents a response rate of ~36% of producers approached. Of the 2032 producers, 1295 producers were successfully resurveyed in 2008, providing responses from ~5% of the total number of wool producers in southern Australia. The comparison of those same producers that answered both the 2005 and 2008 surveys provided much stronger evidence of impact than the comparison of two randomly selected groups of participants. Further, the results of the 2005 survey, as presented in this paper, refer only to that subset of respondents in 2005 who also responded in 2008.

Knowledge and attitude to key messages

Lifetimewool began publishing its preliminary findings in 2003. In 2005, ~80% of producers surveyed either agreed or strongly agreed with the key messages (Table 2). By 2008, there was an increase in the proportion of producers that agreed or strongly agreed with all key messages contained in both questionnaires. Agreement with the key messages contained only in the 2008 survey were also high for all except the statement on need to condition score or weigh to accurately assess body condition (47%).

Skills (management of ewes)

About 96% of sheep producers said they monitored the condition of their ewes throughout the year, an increase of 4% since 2005 (Table 3). There has been no significant change in the numbers of producers who weighed ewes. Fifty-seven percent of producers monitored their ewes using their hands to either condition score or fat score, and 39% of producers only monitored their ewes visually. The most popular time that producers monitored their ewes was when they were conducting a pre-lambing worm drench or vaccination (58%). Of the other times provided in the questionnaire, the least popular time was at pregnancy scanning (30%). The other options were when rams were taken out, at marking and at weaning.

There was no significant change in the number of producers that scanned for pregnancy (36%) since 2005. Of those producers that scanned for pregnancy, 43% identified single- and twin-bearing ewes. Of those respondents who scanned for twins, 82% managed single- and twin-bearing ewes separately.

Skills (pasture management)

In all, 84% of sheep producers said they assess the quantity of their pasture (Table 3). However, ~90% of these producers stated that the method by which they assess their pastures could be best described as visual, using broad terms such as 'not enough', 'good' and 'plenty'. Sixty-six percent of respondents said they assess pasture growth rate and of those, 91% use a visual method. Similarly, for the question asking producers how they feed budget, 9% of those who feed budget opt to create a new category captured by the interviewers as 'visually assess/personal experience'. The largest proportion of

Table 2. Producers agreeing with the key messages developed by Lifetimewool (results of 2008 survey, with comparison to the responses of the same producers in 2005)

Key message developed by Lifetimewool	Producers agreeing in 2005 (%, of 2008 respondents)	Producers agreeing in 2008 (%, whole survey)	Producers who changed practices due to Lifetimewool (%, 2008 responses)
1. The effect that the condition of a ewe during pregnancy and lactation has on the clean fleece weight and fibre diameter of their progeny can affect farm profits	80	87	93
2. Lamb survival is strongly influenced by how much you feed your ewes through pregnancy	78	84	88
3. Lamb birthweights will increase if the body condition of a ewe increases during late pregnancy	81	84	89
4. Ewes that are fed more will have an increase in ewe clean fleece weight and ewe fibre diameter compared with ewes that are fed less	82	85	85
5. The effect that the body condition of a ewe has on the fleece weight and fibre diameter of her progeny are permanent over the progeny's lifetime	62	65	84
6. Improving the condition of a ewe during pregnancy and early lactation can increase the fleece weight of progeny	79	80	86
7. Improving the body condition of a ewe during pregnancy and early lactation can decrease the wool fibre diameter of progeny	27	28	43
8. Poor ewe condition at lambing has more affect on twin lamb survival than single lamb survival		87	87
9. Lamb birthweight is a key factor affecting lamb survival		84	87
10. Farm profit is responsive to the condition of the ewe throughout the year		83	92
11. Ewes higher in condition score at joining conceive more lambs		83	90
12. Ewes with higher condition score at lambing will have less mortality than ewes with lower condition score		79	85
13. You need to condition score ewes or weigh them to accurately assess their body condition		47	71

Table 3. Survey results from 2008, showing the proportion of producers using various practices to manage pasture and ewes

Management practice	Total of survey (%)	Proportion using the management practice (%)
Ewe-management practice		
Usually weigh ewes	17	
Monitor the condition of ewes	96	
Use visual assessment only	39	41 (of the 96%)
Use hands on assessment only	7	7 (of the 96%)
Use visual and hands on assessment	50	52 (of the 96%)
At pre-lambing, drench and vaccination	58	
At pregnancy, scanning	30	
Pregnancy scanning	36	
Scan for twins and singles	15	43 (of the 36%)
Manage single- and twin-bearing ewes separately	13	82 (of the 15%)
Feed-budget practice		
Use feed budgeting	32	
Simple 'back of the envelope' calculation	22	68 (of the 32%)
Using feed-budget tables	5	14 (of the 32%)
Visual assessment based on personal experience	3	9 (of the 32%)
Pasture-management practice		
Assess quantity of green pasture	84	
Assess pasture quantity visually	75	90 (of the 84%)
Assess pasture growth rate	66	
Assess pasture growth rate visually	61	93 (of the 66%)

those who feed budget (68%) used a 'back of the envelope' calculation, with 14% using feed budget tables.

Aspirations (willingness to adopt)

Formal feed budgeting attracted the greatest increase in willingness to adopt (Table 4). There were significantly more producers (+6%) who were either very willing or already feed budgeting in 2008 (38%). Of those included in this category, the number of producers who were already formally feed budgeting increased from 4.9% in 2005 to 8.6% in 2008. The changes in willingness to adopt the other behaviours listed were not significant.

Producers who changed practice due to Lifetimewool

Sixty-four percent of the respondents stated that they had made a change to how they manage pastures or ewes in the past five years and, of these, 19% indicated that they had made changes due to Lifetimewool (Table 5). Thus, 12% of producers surveyed acknowledged that they have made changes to their management practices based on information that they specifically received from Lifetimewool.

The producers who changed due to Lifetimewool had a larger Merino ewe flock, (2495 *v.* 1734), less pasture area and ran their ewes at a higher stocking rate (2.2 *v.* 1.4 ewes/ha) than the survey population. They were also more aware of the project in 2005 (70% *v.* 40%), more likely to engage a consultant (41% *v.* 20%) and to be a member of a production or research group (61% *v.* 35%). Producers who changed practice due to Lifetimewool were more likely to be in Bestwool and Grain and Graze groups to which Lifetimewool had provided information (Curnow *et al*. 2011). Twenty-eight of the 32 producers surveyed that participated in Lifetime Ewe Management attributed their changes in practice to Lifetimewool.

The percentage of producers that agreed with the key messages was higher among the producers who attributed their change in practice to Lifetimewool than in the whole population of producers surveyed. For example, of those who changed due to Lifetimewool, 71% agreed with the statement on condition scoring and weighing *v.* 47% of the whole population. Similarly 84% agreed with the statement on long-term effects of ewe nutrition on progeny production compared with 65% of the whole population.

Market segmentation

Overall, the proportion of producers in each market segment remained the same in 2008 (Table 6), even though some producers had changed segments reflecting that they were more willing, and others were less willing, to adopt new technologies in 2008. By contrast, the group of producers that had changed due to Lifetimewool showed a distinctly different distribution. There were more 'innovators' and 'early adopters' and fewer members in 'late majority' and 'laggards' groups than others, reflecting a change in willingness to formally assess pastures, monitor ewes, feed budget and to separate and manage ewes based on different nutritional requirements.

Table 4. Survey results of respondents to 2008 survey, with corresponding 2005 results for comparison, showing the net change (%) in willingness of producers to adopt various pasture and ewe management systems

*, change is not significant

Producer response	Willing to or already doing it in 2005 (%)	Willing to or already doing it in 2008 (%)	Change (%)
Willingness to try formal feed budgeting to assist with getting ewes to a target bodyweight or condition score	32	38	+6
Willingness to try formal pasture assessment methods to determine feed on offer, pasture growth rate and pasture quality	35	38	+3*
Willingness to separate ewes into lighter and heavier mobs and manage the mobs according to their different nutritional needs	46	47	+1*
Willingness to try formal systems of condition scoring, fat scoring or weighing of ewes to monitor their condition	34	32	–2*
Willingness to try pregnancy scanning to separate twin-bearing ewes to manage them as a separate mob	46	44	–2*

Table 5. Characteristics of producers who did not change practice, those who changed practice and those who changed practice as a result of Lifetimewool

Parameter	Whole survey population	Producers that did not change practice (36% of survey)	Producers that changed practices (64% of survey)	Producers that changed as a result of Lifetimewool (12% of survey)
Number of respondents	1295	473	822	155
Heard of Lifetimewool (2005) (%)	40	36	43	70
Average Merino ewe flock size	1734	1593	1815	2495
Average area of pasture (ha)	1267 (SR = 1.37 ewes/ha)	1256 (SR = 1.27 ewes/ha)	1273 (SR = 1.43 ewes/ha)	1124 (SR = 2.22 ewes/ha)
Agribusiness Network (combination of three below) (%)	55	47	60	78
Pay for advice (%)	20	15	23	41
Benchmark flock (%)	27	19	33	45
Member of group (%)	35	32	37	61
Member Lifetime Ewe Management (%)	2	1	4	18
Agreed with the statement that you need to condition score or weigh ewes to accurately assess their condition (%)	47	39	52	71
Agreed with the statement that the affects of ewe condition on wool production of her progeny are permanent for the lifetime of her progeny (%)	65	58	69	84

Table 6. Survey results from respondents to 2008 survey, with corresponding 2005 results for comparison, showing the market segmentation of respondents (producers) contrasting with the market segmentation of those respondents that stated that they had changed practices as a result of Lifetimewool

	Market segmentation				
	Innovator	Early adopter	Early majority	Late majority	Laggard
2005 Survey (%)	3	15	37	32	14
2008 Survey (%)	2	15	37	32	14
Respondents in 2008 who changed practice as a result of Lifetimewool (%)	10	34	39	16	1

Producers' recognition and use of tools

One thousand, three hundred and fifty-three producers responded to the national survey on the awareness and use of Lifetimewool tools. Fifty-five percent of producers had heard of at least one of the Lifetimewool tools (Table 7). All of the tools were recognised by producers, with the condition score sheets and models showing the greatest level of awareness at ~37%. These were also the most used tools, with 7% of producers using them.

Discussion

Evaluation demonstrates the impact of the project

Lifetimewool achieved its adoption target for at least 3000 producers to have changed practice as a direct result of the project within 3 years. AWI, using the results of the evaluation and the economic analysis (of the impact of changing practice) determined that Lifetimewool generated an 11 : 1 return on investment compared with their average level of return in the order of 4 : 1 (AWI, pers. comm.). It is, however, an underestimate of the full impact of the project as it is inherently difficult for projects to attain attribution for their influence. Consequently, most projects are now opting to show their contribution to change (Mayne 1999). Contribution reflects the real world view that each person's process of changing behaviour is affected by a whole range of internal and external influences. Often someone needs to hear new information several times and from various sources before it becomes an intrinsic part of their knowledge, and that the need to change is

Table 7. Percentage of producers who have heard of and use Lifetimewool tools as a proportion of the total survey respondents (from Curtis 2008)

	Feed budget tables	Food on offer photo gallery	Condition score models	Website	Ewe management handbooks	Condition score sheet	None
Heard of Lifetimewool tools (%)	25	18	37	20	25	38	45
Used Lifetimewool tools (%)	6	3	7	3	5	8	

accepted on a range of levels before actual change is initiated. In the present paper, we have shown that 12% of producers attribute their changed practices to the Lifetimewool project. As Lifetimewool's messages have been incorporated into other extension materials and programs without brand recognition it can be assumed that Lifetimewool has contributed to the practice change of many more producers. Wool producer networks such as AWI's '8x5 Wool Profit' (http://www.dpiw.tas.gov.au/inter,nsf/ThemeNodes/CART-6U42TF?open, verified 10 January 2011) and 'Sheep's Back' programs (http://www.wool.com/Grow_AWI-Grower-Networks_WA-The-Sheeps-Back.htm, verified 10 January 2011), and the joint AWI–MLA (Meat & Livestock Australia) program *Making More from Sheep* (www.makingmorefromsheep.com.au, verified 10 January 2011), or the client networks of consultants and extension practitioners have all used information developed by Lifetimewool. The 64% of respondents who said they changed practices between 2005 and 2008 were more likely to be a member of one of these groups and to have an adviser. Through these media they are, thus, likely to have been influenced by Lifetimewool in some way.

Using market segmentation as a part of evaluation contributes to demonstrating impact

In 2005, allocating survey respondents to market segments (Rogers 1983) provided the project with the means of mapping the reach of its impact in 2008. The mark of a successful project is that it is able to 'cross the chasm' (Moore 2006) between 'early adopters' and the 'early majority'. Fifty-five percent of those who changed practice due to Lifetimewool fell within the 'early majority' and 'late majority'. This suggests that the project has successfully 'crossed the chasm', if in fact it existed. Nonetheless, it strongly suggests that the project will achieve longevity in its influence on the wool industry, as a defining characteristic of the 'early' and 'late majorities' is that they look to each other to evaluate the potential of a change in practice (Rogers 1983). Having influenced producers beyond the 'early adopters', it is now probable that other producers from within those categories will follow in their footsteps and also adopt Lifetimewool recommendations, given time.

Evaluation demonstrates progress towards practice change – a starting point for future sheep management projects

While evaluation can show whether or not a project has reached its desired outcome, it can also provide the project with a rich tapestry of information that supports the complex process of adoption. The adoption process involves awareness of the need for change, belief that an alternative practice addresses the need to change, and the knowledge and skills required to make the change. If the evaluation can show positive responses from the target audience on these points then the project can show that the audience is progressing towards practice change. The evaluation of the Lifetimewool project demonstrates considerable progress towards further practice change through knowledge of and attitude to Lifetimewool messages, and the desire to develop skills through the use of Lifetimewool tools. However, different key messages and tools are at different stages of this process.

Almost all consultants and extension practitioners agree that you need to condition score or weigh ewes to accurately assess their condition, but the majority of producers do not. In this case, the 'next users' believe the message but the 'end users' are yet to be convinced. There is also more work to be done with the key message that 'improving the body condition of the ewe during pregnancy and early lactation can decrease the wool fibre diameter of her offspring' as more producers disagreed (35%) than agreed (28%) with this statement. This statement also had the lowest level of agreement by consultants and extension practitioners (68%). This relatively low level of acceptance may be caused by the apparent conflict with the message that good nutrition increases fibre diameter in adult ewes. More education on the effects of maternal nutrition would be required if an increase in acceptance of this message is seen as important.

Similarly, where Lifetimewool recommends objective monitoring of pastures and ewe condition, most producers still prefer to visually assess these key parameters. Clearly, the need to make these assessments has been accepted, but producers are still choosing the easiest and most inaccurate option. In addition, a high number of respondents also offered 'visual assessment/personal experience' as a response to how they formally feed budget, suggesting that producers believe that they can make adequate assessments without the use of tools and a structured process.

Considering that the tools had only been developed and distributed within a 2-year period before the final survey was conducted (and some less than 12 months before), it is a successful achievement that 18–38% of producers have heard of the Lifetimewool tools. However, in contrast to the key messages, the response to the tools has seen a consistently high level of uptake by the next users (Table 1) but none is being used by a significant proportion of the end users. For example, the feed budget tables, which were only released in 2007, were being used by 76% of extension practitioners and 46% of consultants. Whereas only 25% of producers had heard of them and only 6% were actively using them. Hence, continued awareness and promotion of adoption will be required to achieve significant use of the tools. The electronic decision-support tool had the lowest level of usage by extension practitioners (10%) and consultants (5%), likely reflecting the higher level of complexity of the tool (i.e. it required training and a certain level of computing skills) as argued by Rogers (1983).

Evaluation can validate the strategies used to achieve practice change

Develop and deliver information and tools to meet market segment needs

To take into account the needs of individuals, the project generated a range of tools and services to suit multiple points of entry by producers (Curnow *et al*. 2011). The tools and services also provided different levels of complexity to allow for the variation in users knowledge, attitude, skills and awareness (Bennett 1975). It is a well supported generalisation that one of the indicators of a person's willingness to adopt a new technology is their level of social participation (Rogers 1983). Social participation includes seminar attendance, group

membership and engagement of an adviser (Rogers 1983; Gasson and Errington 1993). However, social participation does not guarantee willingness to change. In an early survey of producers participating in the Lifetimewool research activities, 3 of 12 participating producers were happy to participate in the research, but unwilling to change their everyday practices (Rose *et al*. 2005). This supports the generalisation that 9 of the 12 were willing, but also shows that the opinions of 'early/late majority' and perhaps even 'laggards' can be captured from group participants. About 5000 producers attended Lifetimewool workshops and seminars in 2004 and 2005. Feedback from these events allowed the continuous refinement of the information and tools (Curnow *et al*. 2011). This provides confidence that the needs of the 'early majority' and even those less likely to change behaviour, would be captured and incorporated in the extension material.

The results of the 2008 survey showed that the tools that are the easiest to use were the most successful in terms of adoption. The newer and more complicated tools, such as the electronic decision support tool and the condition score profiles, were not as well adopted. This response is consistent among consultants, extension practitioners and producers. However, having end users 'road test' the prototypes allowed for not only practical feedback but increased their exposure.

Using consultants and extension practitioners as 'next users'

The use of private consultants and government extension practitioners as conduits for Lifetimewool tools and services was an important part of the Lifetimewool adoption process (Curnow *et al*. 2011). These advisers (referred to as 'next users') were engaged throughout the development of the tools and services to make it more likely for them to actively promote the tools to their clients (McKenzie-Mohr 1999). The reach of this strategy was tested by asking whether producers paid for advice, were a member of a production or research group, or benchmarked their activities in some way. Fifty-five percent of producers surveyed were involved in some or all of these networks. Producers who changed practice were more likely to be part of an agribusiness network (60%), and producers who attributed change to Lifetimewool were even more likely to be a part of a network (78%). Lifetime Ewe Management was the network that had the greatest impact on practice change. In all, 28 of 31 producers surveyed (90%) who cited this network had changed practice. This shows that the closer the connection with Lifetimewool, the more likely Lifetimewool was to influence change. However, it was clear from the overlap in participation in the various networks that practice change occurs more frequently where messages come from multiple sources. In addition, it was also important to make information available through broad media as a further 22% of those who changed were not a part of the network mechanisms specifically focussed on by Lifetimewool.

While only 20% of the whole survey population pay for advice, of those producers who changed practice due to Lifetimewool, twice as many (41%) employed consultants. This shows a correlation between the engagement of a consultant and a producer's recognition of Lifetimewool's influence on his choice of practices. The results of the survey of consultants also reflected this relationship, with 95% of consultants and extension practitioners saying that Lifetimewool had changed or validated their recommendations and 71% of those saying that they had clients who had changed practices due to Lifetimewool.

Next, users also expressed a high level of awareness and use of the Lifetimewool tools, although extension practitioners are much more likely than consultants to use the tools. As consultants agree with the underlying messages and say that many of their clients have changed practice due to Lifetimewool there is no observable reason why their level of use is so significantly lower than that of their government counterparts. The question asked of consultants was '...do you use any of these Lifetimewool products'. While this question does not specifically refer to the use of the tools with clients, some consultants may have perceived it this way. Their comparatively lower level of use of the tools may simply reflect their reluctance to use the tools with their clients, either because they wish to appear the sole provider of information or because the tools are generic and they provide the results of using the tools rather than the tools themselves. These potential reasons would need to be explored further with consultants before any conclusions can be made.

In terms of using consultants and extension practitioners as conduits for change, it is imperative that consultants and extension practitioners first accept the credibility and value of the messages and tools. The next crucial element is for the consultants and extension practitioners to extend that to their clients. The results of the surveys of consultants and extension practitioners in 2008 showed that both of these happened and, further, that their clients actually changed their practices based on Lifetimewool's recommendations. This validates the strategy to use consultants and extension practitioners as a conduit for practice change in producers. If consultants and extension practitioners continue to promote Lifetimewool as best practice and education programs such as RIST (Trompf *et al*. 2011) and the Sheep CRC (Curnow and Thompson 2008), it seems reasonable to assume that further adoption will compound in to the future.

Evaluation highlights factors that influence change

A comparison of the characteristics of the respondents who said that they had changed practices due to Lifetimewool *v.* those that had not changed provides some insight into the conditions and support structures that allowed producers to more readily adopt Lifetimewool's key messages. The producers that cited Lifetimewool had larger flocks (57%) and higher stocking rates (69%). This finding was confirmed by Rogers (1983) who stated that 'earlier adopters' have larger units (e.g. farms) and more specialised operations than later adopters. This trend is apparent among other characteristics, such as social participation. Producers who changed due to Lifetimewool were nearly three times as likely to have a consultant as producers who did not change practice, and twice as likely to benchmark their flock or to be a member of a group as those who did not change. Similarly, Rogers (1983) also reported that 'earlier adopters' have a higher level of social participation. Further, the consultants that facilitated groups were more likely to give credit to Lifetimewool for changing their recommendations

(23% changed 'considerably') than were those consultants not involved in groups (4%). It is unfortunate that the surveys of consultants and extension practitioners also showed that there has been a move away from consultants and extension practitioners working with producer groups. Obviously consultants will continue to work with individual producers but, as the surveys of producers showed, there is a distinct correlation between participation in group activity and practice change.

Conclusions

The primary reason for conducting evaluation is to gauge the success or otherwise of the project. The data from the surveys demonstrate that Lifetimewool has achieved the desired aim of having 3000+ sheep producers change their practices. Many other producers have been affected through their increase in knowledge, belief and skills. The impact on the industry could increase substantially in the future as other projects continue using information and tools developed by Lifetimewool.

Market segmentation of the audience shows that the project was successful in 'crossing the chasm'. As later adopters (the 'early majority', 'late majority' and 'laggards') need to see peers successfully transitioning to the new practice, 'crossing the chasm' means that there is the possibility that more producers will continue to adopt the Lifetimewool messages. The continued use of the Lifetimewool information and tools by other projects will encourage continued practice change by producers into the future.

Other benefits of evaluation include validating the strategies employed by the project to initiate change and providing baseline data for future livestock management projects to build on producers' progress towards practice change. The evaluation showed that it was worth the investment in using private consultants and extension professionals as a pathway to adoption. Involving producers, consultants and extension professionals in the development of the Lifetimewool key messages and tools was also a valuable strategy as it resulted in believable messages and useful tools for all market segments.

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