

Responding to the wool crisis with a focus on technology adoption

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Abstract

The wool crisis of the 1990s has had a severe impact on the profitability and resource base of the Australian wool industry. The capacity of woolgrowers to adopt improved technology has inevitably been impaired, in the short term at least. Conversely, however, collective longer term innovativeness of the wool growing sector may well have been enhanced as a consequence of increased economic imperative, new experiences off-farm and in alternative enterprises, new opportunities to access new technology and the significant adjustment of ownership and management of wool growing resources. This paper outlines fundamental changes in the philosophy and strategy of wool industry R&D from broadly targeted research to strongly outcome-focused R&D programs which include considerable emphasis on on-farm development and evaluation activities as a key component of improved technology adoption. The paper also presents a case study of highly targeted low investment adoption in a specialist wool growing business under near-crisis financial conditions. A second case study outlines the evolution of a woolgrower group typical of the many which now offer greatly improved opportunities for faster technology adoption.

Key words

Wool industry, improved technology, on-farm development, profitability.

The Australian wool crisis resulted largely from the fixing of unrealistically high and inflexible minimum prices in the wool industry's reserve price scheme, coupled with the collapse of several major international markets for wool. Failure to act quickly and decisively saw the industry saddled with a massive debt, excessive supply capacity and a stockpile equal to a full year's production tenuously overhanging the international wool market and threatening total industry collapse.

The immediate consequences as the reserve price was finally abolished included a 50% drop in wool prices, high debt-servicing levies on wool proceeds (up to 25% of gross proceeds) and negligible returns from sale of surplus sheep. Millions of sheep were slaughtered and buried. Add widespread severe drought conditions, high interest rates, diminished asset values and increasing concern by bank managers about their portfolios of woolgrower loans and it is little surprise that investment in the adoption of new technology has fallen far short of researchers' expectations.

Morale has remained depressed in many wool growing communities for eight years now, despite several glimmers of hope during temporary periods of higher wool prices (at or near the cost of production). Woolgrowers caught in a poverty trap, with desperate cutting of cash inputs such as phosphatic fertilisers to avoid plunging to impossible debt levels, have had extremely limited capacity or propensity to invest in new technology. Many woolgrowers, like their land, buildings and flocks, became fixed assets, with low salvage value and a strong propensity to batten down and hold on, hoping to retrieve an increased portion of their capital investment at a later date.

Others have partially or totally escaped the poverty trap by diversification into prime lambs, cropping and beef cattle, though switching to beef was severely hampered for a time by the very low salvage value of Merino sheep. Pleased with the new enterprises which have enabled this escape, many of these diversified woolgrowers have no doubt been reluctant to invest in adopting new wool growing technology, though others with improved means and more confidence in their ability to implement change have no doubt done so.

Technology adoption in response to crisis

years. Increased off-farm work paid a few of the bills and provided substitute stimulation and interest to replace that normally provided by evaluation and adoption of new technology.

Focus on profit drivers

Review of the key profit drivers of our wool business, namely:

- feed base
- feed conversion into saleable product
- wool price, reflecting in part wool quality (which in turn reflects genetic merit of the flock) and
- overhead costs per unit of production focused attention onto four key low-cost opportunities;
- Paradana balansa clover
- Balansa clover hay to enable later lambing
- genetic improvement by selective harvesting of genes from outlier sires identified through central progeny testing
- strategic laneways

Balansa clover

Pilot sowing of 60 ha in 1992 - total cost = \$400

Broadacre sowing of 1000 ha in 1993 and 1994 - total cost = \$1,500

Paradana Balansa clover has contributed greatly to both total feed base and autumn feed quality, despite low seeding rates, no seed bed preparation and nil-cost seed application by strip seeding by contract superspreaders, achieved simply by adding the seed to each load of super. Early "sowing" (before the opening rains) and light enough spring stocking rate to ensure good seed set in the first year, were critical components of this extremely low input adoption strategy. Spread of seed by grazing sheep has given rapid spread from the widely separated strips of Paradana seen in the year of spreading, with good overall establishment after two years, especially in wet areas of high pH where Trikkala sub clover had failed.

Balansa clover hay

200 tonnes per annum at \$30/tonne = \$6000 per annum.

Adoption of big-roll fodder conservation has vastly improved summer weaner nutrition, enabling August/September lambing to better match the flock's overall nutritional requirements with the feed base. Balansa hay has tested at 18% crude protein and 70% digestibility, with high palatability resulting in almost 100% utilisation by weaners. At around 20c per kg crude protein, fed out, surplus spring feed conserved as Balansa hay is an attractive alternative to purchased lupins @ \$230/tonne (70 to 80c/kg crude protein) as a supplement for weaners on dry standing paddock feed which often averages crude protein levels of 3 to 5% in autumn.

Laparoscopic AI to selectively harvest superior genetics

Cost - \$3000 per annum (\$30-50 per lamb reared).

Rigorous on-farm progeny testing and utilisation of genetic benchmarking software has enabled accurate identification and capture of superior genetics identified in linked central test sire evaluation.

The 2.0 micron reduction in clip fibre diameter of the Blackford clip over the past 8 years is judged to arise substantially from genetic improvement, though portion may be attributable to modified management practices.

The resultant \$60,000 increase in average value of the Blackford clip (at standard prices) is a permanent ongoing increment achieved at a total AI outlay over the past eight years of \$24,000 (plus measurement costs and on-farm progeny testing).

Strategic laneways

Cost - \$12,000.

Installation of 8 km of laneways, utilising spare farm labour, has revolutionised stock movements with major labour savings.

Collectively, the total expenditure on these four items of newly adopted technology has amounted to \$70,000. The net annual benefit at 1997/98 prices is well over \$100,000, comprising

- 1.5 to 2 micron reduction in fibre diameter on a 60,000 kg clip, at \$1 per kg = \$60,000
- Additional 1000 breeding ewes carried
- <@\$25net per breeding ewe unit=>\$25,000
- 100 tonne reduction in lupin purchases = \$23,000
- 200 hours of labour saved = \$3,000

Implications of input reductions

Improved efficiency of labour utilisation has significantly reduced cash costs with minimal impact on total production. It should be noted, however, that the labour savings are in part associated with virtual cessation of capital improvements in the form of fencing, watering facilities and regrowth control. Cutting out phosphatic fertiliser, however, was quickly judged to have serious production implications, despite a generally good super history. Resumption of base level applications of 10kg of Phosphorus per hectare annually after only two years missed has been verified by soil tests and assessed production. Small scale assessment of a doubled rate (20kg/ha/annum) is at present under way, as part of the IWS paired paddock program.

Apart from a \$4,000 Suzuki van, the laneways and a little replacement boundary fencing, capital improvement has remained near zero over the eight years since 1990.

Cadiz Serradella - another production-increasing technology

Low stocking rates and poor economic performance of the deep acid sand portion of Blackford has remained an unsolved frustration since clearing and pasture establishment in 1976. Dryland Hunter River lucerne initially gave reasonable performance on areas with better soil, but generally showed poor production and limited persistence on the areas of deeper acid sand. Furthermore, re-establishment of lucerne had been deferred as being quite unaffordable in a time of wool crisis given the heavy lime and fertiliser application required plus the loss of production during the establishment year.

New technology in the form of a soft-seeded pink serradella, cultivar Cadiz, appears to have solved that problem. A pilot planting of 40 hectares in 1997 has given excellent production, even on the worst sandhills. The all-up establishment cost of \$5,000 has been more than recouped through seed sales, with over 6 tonnes of clean seed harvested from 25 arable hectares. The stand has re-established with phenomenal density in 1998, reflecting total seed yields of at least 500 kg/ha.

A critical component of this technology was the packaging of the new cultivar with a new high performing inoculant, Serradella Special. Failure to nodulate in similar deep acid sands has severely impaired the performance of an alternative new legume cultivar, Casbah biserrula, which was also trialed in 1997. The cost of trialing this alternative technology on a 1 hectare pilot planting was less than \$100.

Investment in technology to improve long term sustainability

Investment in shelter belts, a relatively high capital cost project with long term benefits, has been completely suspended during the wool crisis. Strategic investment to combat drench resistant internal parasites, an emerging threat of major proportions in the longer term, has, however, been judged to be of sufficiently high priority to warrant resourcing, even in a time of severe wool crisis.

As part of the Nemesis program, 500 ram weaners have been individually sampled and tested for resistance to internal parasites in each of the past three years. This has enabled significant emphasis on improving this trait as part of the breeding program, initially at low cost due to free faecal egg counting for participating flocks. This breeding strategy will be continued at an annual cost of approximately \$3,000.

Broader industry crisis response

With respect to willingness to adopt, woolgrowers tend to fall into two major categories, those who treat woolgrowing as a business and those who see woolgrowing more as an occupation or way of life.

Those woolgrowers in the occupation group have essentially tightened their belts in response to the wool crisis, and are attempting to hold on until prices recover to above their costs of production. By and large, woolgrowers in this large group have made few if any significant management changes, and generally they do not see opportunities to increase their profitability through adopting new practices. Very often they rationalise that what they are doing is "about right" for their type of country.

Conversely, those farmers who see woolgrowing as a small business are fundamentally concerned with the challenge of increasing profit, and recognise technology adoption to improve productivity as part of this challenge.

The overall impact of the wool crisis on these would-be adopters has undoubtedly been constraint in the short term due to:

- efforts diverted (other enterprises off-farm *etc.*);
- opportunities severely constrained;
- increased risk of business failure;

but greatly increased incentive and desire by many to "do something" to improve long term prospects and to "take charge" again (cf wool prices, bank manager, *etc.*).

The net result, I perceive, within the more innovative or business focused sector of the woolgrower population, is some significant attitudinal changes:

- More woolgrowers are prepared to have a go, although very selectively, on a small pilot scale and with greater attention to detail, seeking of support, *etc.*
- More woolgrowers are actively interested in the adoption efforts of others.
- There is reduced peer pressure on those who dare to be different, reduced condemnation on those who fail and some quiet applause of those who succeed.
- There is also greatly increased willingness to participate, with real commitment, in technology adoption groups, to collectively develop ownership of new technology and of the evaluation process.

One further problem remains, however, especially for those woolgrowers attempting to adopt new technology alone, without "expert" support. Many farmers do not totally understand the system they are managing, or what factors their profitability is most sensitive to. This lack of understanding hampers their ability to evaluate new technology and to maximise its potential contribution in their woolgrowing system.

Case study 2 - the Keilira Farm Management Group

The group comprises 12 moderately innovative livestock producers, all with heavy emphasis on Merino wool production and very limited cropping potential. Age spans from three members in mid twenties to

three in early fifties, with nine located close to Keilira and three relative geographic outliers. Several sub-sets of the group had strong prior connection through social activities and sport.

The key common factor was recognition by members of skill limitations in respect to pasture and livestock assessment, and of scope for improvement in performance of their livestock enterprises. The key initiating activity was a Prograze course, centred on Keilira Station. Ultimately it was the minimum group size for this course which expanded participation beyond the initiators, drawing in several outliers to make up the numbers.

Commitment was cemented by the diabolical season over which pastures and livestock were monitored.? 1996 was a year of extremely late break and wet winter.? This saw course participants constantly applying their new skills at home and collectively challenging concepts such as the minimum "food-on-offer" for varying categories of livestock.

The inevitable question of "What do we do next?" was answered by a successful application to IWS for PIRD funding. The project topic was "fixing the autumn feed gap", the ultimate targets being a 10% increase in lambing percentages and a tensile strength improvement of 10 Newtons per kilotex. The \$10,000 funding was to be applied in roughly equal proportions to testing of feed and wool, study tours and consultancy fees and facilitation expenses.

In the ten months since commencement of the two year PIRD project in July 1997, all participating farm businesses in the Keilira Farm Management Group have:

- Established base-line levels of pasture productivity, wool quality and reproductive performance;
- Assessed the nutritive value of their autumn feed base;
- Travelled extensively through similar environments in WA from Albany through Kojonup and Darkan to Badgingarra, assessing feed base and sheep management strategies through a series of farm visits, consultancy presentations and meeting with AgWA deliverers;
- Critically assessed the array of twenty strategies identified in WA; and
- Established on-farm trials to evaluate those strategies judged to offer best prospects in the Keilira environment.

Strong team work, group ownership and sharing of outcomes and excellent communication have been highlights of the group's activities. The co-ordination, data analysis and reporting services provided by the facilitator (the regional Sheep and Wool officer of Primary Industries SA) have clearly been a critical element in maintaining the group's momentum, as has the strong sense of enjoyment and social interaction at the group's frequent meetings, all of which include a meal and a guest speaker.

Field inspections and discussion of members' on-farm trials, which is a further important component of most meetings, has no doubt contributed to members' willingness to adopt new technology. For example, a successful trial planting of Cadiz Serradella on one participating property in 1997 has spread to broad-acre sowings on two additional members' farms in 1998, plus trial plantings on another four.

Bonding of the group which was greatly strengthened during the eight day study tour to WA, has seen the group well-positioned to take on other technology adoption initiatives. Already five members have signed up for the IWS Triple P program, and another sub-set is participating in a South Australian initiative to establish marketing alliances between woolgrowers and major early-stage processors.

Response by IWS to increase technology adoption in the wool crisis

The response of the IWS Technical Division to the wool industry crisis has been based substantially on the recommendations of the Technical Strategy Report.? Positive outcomes from early funding allocations to technology transfer activities, particularly the grower driven Victorian Grasslands Society Pasture Productivity Program, have also given important confidence regarding further investment in technology transfer.

The Technical Strategy Report focused attention onto three critical issues relating to technology adoption, firstly the generally poor rate of uptake of new "on-farm" or production related technology, secondly, the severity of the poverty trap as a barrier to technology adoption, and thirdly, the imperative of technology adoption to achieve long term economic viability. The report highlighted the impact of effective technology adoption on the profitability and viability of wool growing businesses and identified a huge gap between average current practice and established best practice.

Increased woolgrower involvement in the identification of R&D priorities and delivery opportunities has been achieved by IWS through establishing an R&D advisory process based on three Zone Advisory Committees. For each production zone, a team comprising six widely spread woolgrowers plus a sheep enterprise consultant provides strong grass roots focus on R&D needs and opportunities, plus a much stronger understanding of opportunities for and barriers to technology adoption.

The final key ingredient in the IWS response was the appointment of a person with strong commercial focus as Director of the Technical division. John Grant quickly established a culture in which R&D funding was dictated by assessed realisable benefit. Judgment on ability to deliver the prospective commercial benefits from investment in R&D rapidly became a focal point in research funding decisions by IWS.

Through resourcing a series of "ZAC Initiatives" to increase technology adoption and through establishment of strong grower involvement as demanding customers in all research decision making, John Grant's leadership drove this focus on realised outcomes of commercial significance to woolgrowers. These initiatives have been enhanced by the creation of a special technology adoption team within IWS.

The four ZAC initiatives were initiated by the woolgrower and sheep consultant members of the IWS zone committees at a joint meeting in February 1996;

- Wool PIRDs
- Benchmarking
- Cultural Profile
- Meeting the Market.

Driven by grower champions, all have flourished as significant forces in technology transfer.

Under the PIRD initiative, more than fifty woolgrower groups have now been funded to progress on-farm R&D of importance to them. The wide array of topics being researched stretches from feed base to pesticide residues, daggy sheep, cricket control and lucitrap evaluation. Many of the groups are already delivering outcomes of value beyond the immediate participants in the group.

The benchmarking group is now developing standard procedures for benchmarking and is examining the potential cost of production of wool as a trigger to get woolgrowers to focus more strongly on profit drivers and on unrealised potential productivity of their wool growing systems.

The "cultural profile" group has progressed through transformation into a formal program known as Understanding and Innovation. Still grower driven, this group is developing a much needed profile of Australian woolgrowers to enable better design and targeting of technology transfer activities.

The fourth ZAC initiative, "meeting the market", is also now a formal program. This team is pursuing opportunities to increase the market focus of woolgrowers and to establish effective marketing alliances. Their newly established "Wool Market Link" project is PIRD-like opportunity for woolgrower groups to secure funding of up to \$20,000 over two years to facilitate development of market-related initiatives.

Strong participation of ZAC members in program management teams and in regional technology transfer projects has ensured demanding customer assessment of the delivery components of all projects. These programs now include a diverse array of technology transfer initiatives, for example, Triple P and WoolPro

in the Feed Base program and Better Breeding, Nemesis, linked sire analysis and training the trainers in the Sheep Breeding Program.

Grower-owned demonstration sites have sprung up across the nation, from WoolPro sites in WA through to a silvergrass initiative in SA to Cicerone on the IWS-owned research station near Armidale in the New England tablelands. All have been initiated and significantly driven by woolgrower champions, members of the ZAC teams. All have seed funding and some staff backup from IWS.

Professionally facilitated best-prac groups are being established throughout the pastoral zone at the initiative of the Pastoral Zone Advisory Committee, each region driven by the local PZAC member. Already some of these pro-active groups are moving on to the next stage of their action-learning process, seeking PIRD funding to tackle a research or adoption issue of importance.

Woolgrower awareness of new technologies and of opportunities to access resources available for regional and local initiatives is clearly a high priority objective of the technology adoption team. The inclusion of an experienced rural journalist in the team to manage communication activities across all programs, projects and ZAC initiatives has streamlined the flow of information to woolgrowers, culminating in the development and launch of Wool Techstyles as the primary vehicle with wide woolgrower circulation.

Future opportunities for IWS

Increased woolgrower ownership of their R&D program and of resultant new production technologies offers substantial improvement in the rates of adoption of superior wool growing technologies towards improved productivity, market focus and economic viability of the wool industry.

Investment in increasing understanding of the wool industry structure, culture and especially of the motivational forces and constraints impacting on rates of adoption of technologies which enhance profitability and improve sustainability will undoubtedly enable better development and targeting of delivery strategies.

Nurturing the growing network of IWS woolgrower and consultant "champions" recruited through the Zone Advisory Committee system is clearly a priority, to increase the spread and effectiveness of on-the-ground activities, and the interconnection with the respective delivery agencies participating in their initiatives.

Firming up the business plans and communication strategies of each Program Advisory Group with its respective offering of existing, new and "in-pipeline" technologies is also expected to give more bite to the delivery process, and more focus to the new and ongoing R&D.

Most importantly, I see the nurturing of the rapidly expanding network of woolgrower groups (and ungrouped innovative growers) and targeted "feeding" of relevant technologies and opportunities to those early adopters as the most critical strategy towards achieving acceptable rates of adoption of new technology. Only by seeing, touching and believing local evaluation will the majority of our 40,000 woolgrowers gain confidence to adopt the new technologies in which their R&D levies have been invested.

Conclusion

As always, visionaries and early adopters have continued to evaluate and adopt new technology through a protracted period of wool industry crisis, though in a much more selective and frugal way than normally.

A large proportion of woolgrowers, caught in the poverty trap, have gone into survival mode with neither incentive nor means to adopt new technology. Others have diversified their resources and innovativeness into alternative enterprises.

A significant proportion, however, are now facing reality, removed from the illusory safety net of the reserve price scheme. These woolgrowers are increasingly interested in profit drivers and in opportunities to improve their long term prospects. Furthermore, they are less scornful of experts, and less condemning of fellow woolgrowers who are unsuccessful in their efforts to adopt promising technology.

Strategic seed resourcing of emerging groups of innovative woolgrowers, especially with good facilitation, is rapidly creating momentum in a new wave of technology evaluation, ownership and adoption.