Processors' perspectives on product quality and the need for closer linkage to the raw material supplier in the apparel wool textile industry.

S.C. Champion

Tasmanian Institute of Agricultural Research
University of Tasmania
GPO Box 252-54
Hobart, TAS, 7001
Australia
(S.Champion@utas.edu.au)

A.P. Fearne

Agricultural Economics and Business Management Research Group
T.H. Huxley School
Imperial College at Wye
Wye, Ashford, Kent, TN25 5AH
United Kingdom
(a.fearne@ic.ac.uk)

Abstract

Data gathered from downstream wool supply chain members, indicated problems with the sourcing of raw wool. These problems suggest poor communication in the chain, even though most organisations surveyed had communicated with woolgrowers. Possible barriers to more effective communication included the perpetuation of 'functional silos' in the chain, and the dominance of auction as the primary marketing system. This paper argues that a move to a more collaborative marketing arrangement such as supply chain management, would enhance communication, enabling quality issues to be more quickly addressed, and adding value by identifying the needs of the various customers.

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Introduction

During the 1990's the various sectors of the world's wool production and processing supply chain have faced a period of static demand and correspondingly poor prices, a declining share of the world textile market and changing consumer tastes. The impact of these changes has been acutely felt by the world's largest wool exporters, Australia and New Zealand, which together account for 92% of world wool exports (IWS, 1998). In response, major wool industry reviews were commissioned in Australia (Wool Industry Future Directions Taskforce, 1999) and New Zealand (McKinsey and Company, 2000). Both reviews included recommendations relating to the need for woolgrowers to communicate more closely with their downstream customers, in order to better understand their requirements for raw wool. In this sense, at least in outlook, the wool industry is beginning to move from a production to a market orientation and mirrors changes in other agri-food industries (Meulenberg and Viaene, 1998). However, there are few concrete ideas on how to achieve this transition quickly, efficiently and effectively and recent history is scattered with failed attempts on behalf of various growers and grower groups, to add value to their wool in various ways (Seaman, 1998).

The question of the role of communication as a tool for adding value is important in the context of the wool industry as auction markets currently dominate as the preferred method of sale in Australia (>80%) (Ward, 1998). This may present an immediate barrier to achieving better communication as commodity markets such as auctions perpetuate communication problems through the separation of buyer and seller, producer and processor, by creating difficulties for both parties in understanding the actions of the other (O'Keeffe, 1998).

However, auction systems do not represent communication vacuums. Sellers use grading systems in an effort to improve price and to communicate this variability to buyers, the various grades often being viewed as equivalent to quality (Carman, 1997). These grades act to lower buyer and seller search and transaction costs and foster a more efficient price discovery mechanism (Kohls and Uhl, 1990). In the wool industry, the impact of grades is seen in the diversity of description of wool lots offered at auction. This diversity translates into various premiums and discounts based on types and level of defect (defects include vegetable matter and colour contamination and poor fibre strength) and on the most important quality attribute, fibre diameter) (see Table 1).

Table 1. Discounts (%) in the first quarter of the 2000/01 season for various wool faults in different fibre diameter categories.

Fibre Diameter Descriptor	Fibre Diameter (μm)	Vegetable matter (3% vs. 1%)[1]	Fibre strength (25N/ktex vs. 38N/ktex)[2]	Point at which discounts are applied for strength (N/ktex)	Colour (medium)
Superfine	16.6 to 18.5	11	19	40	-
Fine	18.6 to 20.5	8	7	35	10
Medium	20.6 to 22.5	5	4	29	6
Strong	22.5 to 24.5	5	2	28	4

Source: (Woolmark, 2000a; Woolmark, 2000b)
[1] Australian mean vegetable matter level for first half of 2000/2001 season = 2.0% (AWTA, 2001)
[2] Australian mean staple strength for first half of 2000/2001 season = 35.4 N/ktex (AWTA, 2001)

The question is whether the communication in this commodity type market is sufficient to capture and add value for both the intermediate and end-user customers. This importance of communication is identified by Boehlje *et al.* (1998) as a driver of the change from commodity markets with minimal interaction between stakeholders, to a more interactive, co-ordinated market form;

> *"…in traditional commodity markets where specific attributes are not demanded, supplies are fully adequate and can be obtained from various sources, and information flow between the stages are minimal, traditional spot commodity markets can function quite effectively and efficiently. As one deviates from these conditions - which is increasingly the case with more specificity in raw materials and information flows, and with fewer potential sources of acceptable*

supplies – various forms of negotiated coordination systems become more effective and necessary for efficient functioning of the production and distribution system."

This paper presents preliminary data gathered during interviews with mostly downstream or 'late-stage' wool processors (spinners and weavers) in relation to wool quality, wool quality improvement over the last decade and the level of communication between processors and woolgrowers. These interviews sought to address the hypothesis that wool quality needs to be further improved to better meet end-user needs and that improved communication between wool processors and woolgrowers, possibly as part of a more co-ordinated marketing approach, could facilitate this.

Methods

The interviews with wool processors

Italian and German spinners, weavers and a topmaker (see Table 2) were approached to provide comment and insights on aspects of raw wool quality, raw wool contamination and communication with woolgrowers during January 1999. With the assistance of staff of The Woolmark Company's Dusseldorf, Germany and Biella, Italy offices, middle-senior management representatives of appropriate spinners and weavers were identified as being key informants and interviewed. These informants were single individuals in some organisations and small groups (up to four persons) in others.

The informants and areas of questioning were chosen for a number of reasons. Downstream chain members were chosen as interview subjects as anecdotal information (TQW Board, *pers. comm.*) suggested poor raw wool quality impacted most heavily on these chain elements and it was in communicating with these chain elements that Tasmanian grower interest was focussed at the time of the study. Contamination was included as an area of questioning, as there had been significant historical problems with both dark fibre and wool pack (i.e. foreign matter) contamination. This was being dealt with at the grower end through high profile 'keep the clip clean' campaigns and the phasing in, although slow, of nylon wool packs which were believed to contaminate to a lesser extent than the previous polypropylene packs. With respect to communication, questions relating to along-chain communication were included to assess whether there was currently communication between up- and downstream members of the wool supply chain, and to what extent this was occurring.

Table 2. Description of informant organisations by country and chain element/position and the status of the countries as destinations for Australian raw wool exports.

Chain Position	Chain element (sector)	Germany	Estimated sectoral market share in Germany[1]	Italy	Estimated sectoral market share in Italy[1]	Total informants
Upstream	Topmaker	1[#]	35.7%	N/A	-	1
⇓	Spinner	1	26.9%	1	15.6%	3
Downstream	Weaver	2	26.1%[2]	3	7.5%	4
	Total	**4**		**4**		**8**
	% of Australian wool production processed[#]	4		19		
	Destination rank[*,+]	9		2		

[1]Estimated market shares of interviewed firms based on production figures provided in the interviews and national statistical data for 1996 (IWS, 1998). Data assumes majority of raw wool production and an average fabric weight of 250g/lm. Value is a total for all firms interviewed within a sector.
[2]Data available for one firm only.
[*]Source: Woolmark (2000c)
[+]Where 1 is the largest export destination for Australian wool
[#]Informant operates topmaking capacity in both Germany and Italy

Semi-structured interviews, were conducted with a representative from each organisation (questions are indicated in Tables 3a and 3b). Informants were asked to grant permission for the interviews to be tape recorded. Permission to record was provided by all informants and the tape recordings were used to later transcribe the interviews. It should be noted that staff of The Woolmark Company acted as interpreters in meetings where interviewees did not speak English or on occasions where interpretations/translations of technical information were needed. Quotes in this paper are taken direct from the transcripts and represent direct processor comments or the translation of these. Data

from the interviews is summarised in Table 3. It should be noted that not all informants were able to answer all questions.

Results and Discussion

Size and sourcing arrangements of the interviewed wool processing organisations

Wool processed by interviewed organisations had fibre diameters in the range 15.0 to 26.5 μm, and the volume of wool processed ranged from 300,000 to 11,500,000 kg per annum (see Table 3a). As indicated in Table 2, both Italy and Germany rank amongst the 10 most significant export destinations for Australian raw wool. The higher concentration of processing capacity in Germany is evident from the larger market shares and processing volumes of the German firms. In comparison, the Italian wool processing sector is fragmented, with firms specialising in particular product niches. Most of the organisations interviewed purchased their inputs from the previous chain member, although one of the weavers had recently commenced sourcing greasy wool.

General wool quality and contamination

When asked whether wool quality had improved over the last decade (Table 3a), five organisations felt it had, although two of these questioned whether this improvement had been 'significant'. One commented that improvement, in their case, had come about more through changes in buying strategy and another that a change in supplier of semi-processed product had significantly changed the quality of the inputs into their business. One weaver emphasised that contamination continued to be a significant problem and that they were prepared to pay increased prices should they be able to source uncontaminated wool. This latter comment seems to verify the cost of contamination to the processing sector.

Six organisations identified that they still experienced problems with contamination (Table 3a) although two of these commented that these were rare but unpredictable. One of these stated;

> "Contamination has never been resolved…you may go 3, 4 months without anything and then…it's a real problem. It costs a lot."

The data highlights the problems associated with managing for contamination where occurrence is rare but impact, due to tight tolerances, is significant. Within the organisations surveyed, the success of the anti-contamination campaigns appears questionable and continued adoption of in-shed quality assurance programmes seems warranted. However, as one spinner noted, the limits on the number of dark fibres acceptable in their product has got tighter over time, often with little reference to how easily achievable these were. This comment seems to suggest poor communication between adjacent sectors as to reasonable limitations with respect to product quality. The comments below also underline the seasonal variability inherent in wool and the problems this may present.

> "But from time to time we have problems with the weavers because if these people don't accept 4 [number of contaminated fibres/100g product], they want to have between 0 and 2 and that's very difficult to get for the whole season. It is possible to get 2 coloured fibres per 100g but from time to time it's difficult to get the right wool."

Raw wool quality attributes

Four organisations felt it was not important to further decrease fibre diameter (Table 3b) and a fifth stressed further reductions in fibre diameter were acceptable as long as price did not increase. As one spinner commented;

> "It is better to improve the other characteristics; tenacity, crimps…There are so many ways without changing the diameter"

These reflections are interesting given the dominance of fibre diameter as a raw wool price determinant and the strong messages from industry service providers as to the need to decrease fibre diameter in order to remain profitable. The comments' significance is difficult to determine. While reductions in fibre diameter will undoubtedly increase return in the short to medium-term, an industry-wide shift may not see sustainable price increases in the longer term due to the altered supply of finer wools. Clearly, growers should not neglect productivity factors such as

fleece weight in their breeding programmes, and possibly other quality measures, given the comments above. Improved communication with the processing sector as to long-term trends would seem warranted, guiding the on-farm management and breeding processes that determine the nature of the raw materials entering the supply chain. More thought as to the implications of these trends, especially as they relate to customer requirements, is needed.

Only four organisations commented on staple strength (Table 3b), three commenting that improved strength was important, the fourth that the characteristics varied with season and therefore so too did the need for improvement. All five organisations commenting on staple length (Table 3b) felt further increases were not important. With respect to the variability of fibre diameter (Table 3b), five organisations responded, four seeing improvement as important, one not. One organisation commented that wools of low fibre diameter variability can often be hard to source as the characteristic (at the time of this data being collected) was not always objectively measured.

The diversity of these responses is interesting in that it appears to show that the processing sector is not united with respect to their reflections on wool quality and those areas that require improvement. This lack of unity may have implications for feedback arising from price signals at auction and also for grower groups undertaking general data gathering/feedback exercises amongst a range or processors. Clear direction would appear to arise through a strong relationship developed along a chain, rather than with a horizontal sectoral cluster. The diversity of response may also indicate that more work is required to inform the processing sector of the implications of raw wool quality for processing efficiency.

Communication with woolgrowers

The extent of communication between the processing organisations interviewed and woolgrowers was considerable. When asked if they communicated with woolgrowers or grower groups, six of the eight processors responded positively (Table 3b), the contact occurring either directly with their business unit or through a parent company. While most of these links were informal, two of the organisations held membership of a woolgrower representative body. Given the significant level of past communication, the question then becomes not whether communication is occurring, but whether this communication is effective.

Some processors viewed their communication with growers positively. One spinner commented on the usefulness of shared understanding with respect to wool quality, and on the critical role of the spinner as a communication agent, due to their interaction with both up- and downstream chain elements. They said;

> "...we show these people our production and explain our problems...I think it is necessary to keep in contact with growers because I think the spinners and weavers can explain there problems much better than the combing mills. Because we have the contact with the weaver and the weaver with the retailer..."

Clearly this communication can deliver benefits. One spinner commented on a specific case where a quality problem was identified as being under the control of the grower and was rectified simply, following communication with the spinner. However, not all comments about communication with woolgrowers were positive. Some saw problems associated with the size mismatch between farm production and mill batch or with the geographic separation between growers and processors. Some processors clearly exhibited a strong desire to limit interaction with respect to sectoral activity. As one spinner commented;

> "...I think the growers are making a good job but they should concentrate on their business and that means I think it's a problem if growers want to produce tops and all these things...and he hasn't so much time for the farming which is very important."

Also , communication was not always seen as a core business skill or capability, but rather it seemed to be viewed as an 'add-on'. As one interviewee commented;

> "It depends on the communication. If it isn't every week it is no problem but if you have to discuss these things all the time you will have a problem because one part of our business this is. Our main part is to buy the wool, to produce the product and to sell the yarn."

In relation to grower-processor communication in the future, there were few comments, although one organisation felt there was a need to get all parts of the wool supply chain together, including the marketers, while another felt

that existing structures such as the International Wool Textile Organisation (IWTO) were sufficient for between-element communication.

Other issues

Given the presence of a sectoral view amongst some processors, it was interesting to note comments that highlighted the interdependency of the chain members and the need to think from the market back to the production base. It demonstrates that amongst some organisations there is a recognised need to identify customer needs and the communicate these back to the production base. With respect to interdependency, one weaver commented;

> *"Most of the questions are more or less…interesting…but our part as weavers…we can only give you indirectly because we react on our part from what we get."*

In relation to communication and the drivers of product specification;

> *"When you, as I say, see the sheep and you think from the sheep to the market then you make already the mistake. You have to go from the market to the sheep."*

Another interesting comment, given the interest amongst grower groups in direct communication with processors, related to the potential fragmentation of the grower base along the lines of region, genetic type or other point of coalescence. This was highlighted as a potential problem by one spinner with respect to the problems and confusion it may create for the intermediate chain customers. The centrality of price as a point of negotiation is also underlined.

> *"Now we have a group from New Zealand, now it's from Tasmania. And everybody wants to make their own product. Our difficulty is to explain it to the weaver…Perhaps it's an advantage in the production, but not for the retailer and in the end-product. There's no advantage for these people and if they see no advantage I think nothing will happen. Perhaps you can sell a lot of fabric from Tasmanian wool but you don't get more money. And at the end we always talk about money."*

Conclusion

The data has provided a number of interesting insights. Interviewees appeared divided as to whether contamination and general 'wool quality' had improved over the last decade. This would suggest that there is further room for improvement and given the difficulties the sporadic contamination outbreaks cause, a preventative approach through on-farm quality assurance appears warranted. However, responsibility for contamination prevention rests with all chain elements, not just the on-farm sector, illustrating the interconnectedness of the value chain. The impact of quality variability was also mentioned in relation to other quality attributes, this lack of programmability a potential problem for woolgrowers within a supply chain arrangement where meeting contract specification is central. Clearly further work in quality management through improved farm management, or in quality prediction is needed.

The inability of some informants to comment on aspects of raw wool quality illustrates a disconnection from the supply base, despite other indicators of some level of communication. The nature and quality of communication would appear to be the issue, rather than whether it is occurring or not. Comments indicating a desire to retain activity within defined sectors would seem to be a causative factor. Despite these problems however, the various sectors are not foreign to one another and there are some interesting reflections on the need for change in raw wool quality that should be investigated further with respect to their implications for on-farm breeding and management. Interdependency and the role of the retailer as a chain driver were also identified. Structural change in the chain, in response to the realisations, appears to be limited however.

As a result and given the quality problems still present, a more co-ordinated approach to marketing, based on a definition of the customer's needs appears warranted. In this sense, a supply chain management approach may have a role to play, although the concerns of potential fragmentation of the supply base, and the resulting downstream confusion need to be considered. It could be argued that in a supply chain management approach, this fragmentation is essential and inherent and that rather than causing confusion, it is central to the building of relationships within the chain. The aspects of improved communication and the defining of the drivers of customer value inherent in

supply chain management, could be used effectively in the wool supply chain, although the sectoral barriers and focus on price as the sole point of negotiation, must be overcome.

Acknowledgements

Table 3a. Structure of the interviewed organisations and responses to questions relating to wool quality and contamination.

	Questions	Organisation number							
		1	2	3	4	5	6	7	8
Structure of the organisation	Chain element	Weaver	Weaver	Spinner	Knitwear spinner	Worsted and woollen weaver	Spinner	Weaver	Topmaker and trader
	Fibre diameters processed	18.5 – 19.0 µm	18.0 - 21.5 µm.	15.0 – 20 µm	19.5 µm - 20.5 µm	19.0 µm – 21.0 µm	18.5 µm - 26.5 µm	19.0 µm – 23 µm	<18.0 – 21.5 µm
	Volume processed	300,000 kg	1,000,000 kg	1,500,000 kg	10,000,000 kg	15,000,000 lm	~ 11,000,000 kg	N/A	11,500,000 kg
	Australian wool as a proportion (%) of total wool consumption	90%	100%	100%	90%	~100%	85%	~90%	70%
	Buying arrangements	70-80% purchased as yarn, the remainder as top spun on commission.	Mainly top, but recently started purchasing greasy wool in an effort to improve wool quality.	Source both greasy wool and top.	Purchase at auction and by forward contract through in-house buying office.	Purchase of raw and dyed yarn	Purchase top only	Purchase yarn only.	All buying systems used.
Wool quality and contamination	Has wool quality improved over the last 10 years?	Yes, but buying patterns have changed and as a result, higher quality wools have been purchased.	There has been improvement but not sure whether this is significant.	Yes, in general.	No, but differences have been noted between suppliers.	Not sure	Yes	Not sure, probably not.	Has improved, but not significantly.
	Do you have problems with contamination?	No	Yes	Yes	Yes, with polypropylene and dark fibre. Sometimes in-house test results differ from that certified by the supplier.	Yes, but they are sporadic.	Very rare, one case in last 3-4 years. Some problems with dark fibres and meeting weavers requirements in this area. Difficult to source wools with low dark fibre levels for the whole season.	Not really. Occurs only when piece dyed.	Yes, mainly polypropylene. Dark fibre levels depend on type of wool purchased
	Has the level of contamination decreased over the last ten years?	N/A	Mostly the same through the last decade, however some improvement over the last year.	It has never been resolved and is a significant problem, mainly due to polypropylene. They would be prepared to pay more for uncontaminated wool. Contamination is sporadic but is costly when it happens.	No improvement in polypropylene. Impact of dark fibre depends on the product.	Not sure.	Yes. Dark fibre limits have got tighter also.	Not sure.	N/A

N/A = no answer.

Table 3b. Responses to woolgrower focus and along-chain communication.

	Questions	1	2	3	4	5	6	7	8
					Organisation number				
Where should the focus be for woolgrowers?	On deceased diameter?	N/A	Shouldn't be the only focus.	Not necessary. Better to improve the other characteristics.	Yes, as long as price doesn't increase.	N/A	Yes	Not a relevant question. These are problems for spinners.	No. Decrease in diameter is driven by desire for increased income.
	On higher staple strength?	N/A	N/A	Yes, needs to be increased.	Yes, but more important for woven wear than for knitwear.	N/A	Not normally a problem, but depends on the season.	N/A	Important
	On longer staples?	N/A	No	No	No	N/A	No, fibre lengths are adequate now.	N/A	No. Some mills have problems at longer lengths.
	On decreased fibre diameter variability?	Yes, but variability (CV%) not always measured and therefore low CV% wools can be hard to source.	No	N/A	Yes, especially in coarser product and due to felting in knitwear following washing.	N/A	Yes	N/A	Yes, but not yet actively seeking lots measured for low variability.
Communication with woolgrowers	Do you currently have any level of communication with growers or grower groups?	Parent company does. This is very important.	No experience so far but see two-way communication as important.	Informal links only through visits to Australia and mill visits in Italy by woolgrowers. Company is a member of grower organisation.	No formal program but chairman frequently visits Australia.	No, but do have discussions with spinners and makers-up. Some contact with the topmaker but always through the spinner.	Have visited growers in Australia on-farm. Feel there is a growing separation between 'good' and 'bad' growers. Would like to see them concentrate on their business.	Parent company has been approached.	Member of grower organisation and have input from growers through topmaking activities.
	If not, do you see any benefit in doing this in the future?	N/A	Important in the future to have more transparency. Would like to start now in order to support a move to greasy wool purchases. Would like to have precise information as to wool quality.	Difficult to get quality fibre, so there is a role for going direct to growers but difficult to communicate and there is variability from year to year so growers supplying may not be the same. There is a role for the provision of early warning information due to seasonal conditions.	N/A	N/A	Yes, but it will remain a small part of the business.	N/A	Not really. Difficult due to mismatch between farm lot and processing batch.
	What other means can growers and processors use to move closer together to improve their level of understanding?	N/A	N/A	N/A	N/A	N/A	N/A	Need to get all sections of the chain together; growers and processors with the marketers.	Use existing channels such as IWTO and grower associations.

N/A = no answer.

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