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# RAW WOOL PRODUCTION AND MARKETING IN CHINA

ACIAR Project 8811

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## 1. Introduction

This evaluation and economic assessment is of a project funded by the Australian Centre for International Agricultural Research (ACIAR) aimed at improving economic knowledge of the Chinese wool industry. The project was carried out jointly by Australian agricultural economists at the Universities of Queensland and Sydney and their Chinese colleagues attached to the Institute of Agricultural Economics within the Chinese Academy of the Agricultural Sciences and the Institute of Rural Development within the Chinese Academy of the Social Sciences.

The research has concentrated on understanding the supply side of the Chinese wool industry and links between wool production and the marketing system within China. However, the research has consequences for Chinese and Australian understanding of the demand for local and imported wool within China and for Australian wool on the world market. The research also has implications for farm management within China and economic policy decisions within both countries. In particular, the research is relevant to the future course of the trade in raw wool and wool semi-manufactures between Australia and China. In some recent years, China has been the most important buyer of Australian wool. In broad terms, exports of greasy wool and semi-manufactures (scoured wool and wool tops) from Australia to China now account for around one-fifth of Australian production (detailed information on Australian wool exports and world production and trade in wool is presented in section F of the Australian Wool Compendium published by Wool International).

Within China, the wool industry is especially important because of its economic and political significance to ethnic minorities living in the pastoral region. This region is vulnerable to overgrazing and land degradation. Wool is the major source of cash income in some districts. Sheepmeat is an important part of the food supply for ethnic minorities. The balance between wool and sheepmeat in the sheep industry affects the total quantity of wool produced and, even more so, the type of wool produced. The quality composition of the wool clip determines the types of products into which wool can be processed and thus the extent of competition between domestic wool and imported wool.

Developments in Chinese wool production are important to Australia because China is both a major wool consumer and a processor of domestic and imported wool for the Chinese market and export. The clothing and textile industries are already an important component of the Chinese

economy and significant in its overall development strategy. China is now the world's largest exporter of clothing and second largest exporter of textiles, despite severe handicaps incurred from widespread restrictions on trade in clothing and textiles reflected in the Multi-fibre Arrangement that regulates world trade in clothing and textiles (Drysdale 1997). Zhong Chuanshi and Yang Yongsheng (1997) have recently reviewed economic issues surrounding Chinese exports of clothing and textiles. These products have been a driving force behind the surge in China's exports that have accompanied the opening of the Chinese economy over the last two decades. From 1980 to 1994, textile and clothing exports rose from US\$4.4 billion to US\$35.5 billion, an increase more than eight-fold (Zhong and Yang 1997). Furthermore, these industries have created the basis upon which imports of technology, machinery and equipment essential for the development of other sectors of the economy can be financed.

While it is obvious that wool in aggregate competes with synthetic fibres, artificial fibres and cotton in markets for clothing and textiles, it is less clear how wool of different origins competes in determining the shares of Australian wool and other wool in Chinese output of clothing and textiles. This is because wool processing uses specialised assets. Firms in the wool processing business in China and elsewhere are interested in maintaining the throughput of their operations. Blending wool from different countries may also have positive effects on processing performance. In economic terms, the issue is whether Chinese wool and imported wool are substitutes or complements.

Formulation of other Australian policies for the wool industry depends upon knowledge of the economic interaction of domestic Chinese wool production and wool imported from other countries, principally Australia. Australia has an ongoing interest in maintaining access to the Chinese market, the emerging role of China in the world textile industry, and Chinese participation in world trade generally. Chinese demand for Australian wool has been most unstable over recent years—both cause and effect of the profound difficulties for the Australian wool industry associated with the demise of the reserve price scheme and the protracted recovery following that Australian-induced debacle. Knowledge of the supply side of the Chinese wool industry is obviously critical to Australian understanding of the short-term and long-term outlook for wool upon which many private investments and government decisions are based.

Moreover, understanding (if not resolution) of perennial Australian disputes in the wool industry concerning exports of Australian Merino sheep largely depends on economic information on wool supply in major

wool producing countries. On closer inspection, the long-running conflict over the export of Merino sheep to China and elsewhere is a variant of a far wider debate concerning the effects on Australian farmers of assistance by Australia to agricultural development in Third World countries. In the case of wool, the argument hinges on the economics of wool supply versus sheepmeat in the wool industry in the Chinese pastoral region as well as the competitiveness (or complementary position{ Query word with author}) of Australian wool and Chinese wool in processing and final demand.

Of far greater financial significance to Australian woolgrowers than the controversial controls over exports of Merino sheep is their compulsory participation in generic promotion of wool that does not (and could not) distinguish wool by country of origin. The component of domestic Chinese wool in Chinese exports of semi-processed wool and wool end-products is one ingredient in the complex economics of wool promotion. The emerging Chinese wool processing industry is a major beneficiary of the current Australian approach to promotion because Chinese wool end-products, whatever the origin of wool, attract Woolmark certification and promotion, increasing their competitiveness with wool end-products produced by established processing firms in other countries. Wool promotion is an important public policy and commercial issue for the Australian wool industry (Haszler 1997). Over 1995–96 and 1996–97 Australian woolgrowers contributed a total of over \$230m towards the world-wide promotion effort managed by the International Wool Secretariat, largely through their current 3.5 per cent promotion tax. Arguably, the Woolmark ‘brand’ that is the basis of generic promotion of wool has substituted for firm-specific brands and made it easier for new firms and emerging countries in the wool trade such as China to become established in the markets of developed countries (Watson 1997).

There are practical and theoretical differences between economic assessment of scientific versus economic research into agricultural production. Economic research is generally less costly than scientific research because it has expensive requirements such as capital equipment and land for research stations. Like other agricultural research, the adoption of economic analysis leading to improvements in farm management depends upon decisions by farmers. The benefits of research can then be observed directly in higher (net) farm incomes. The rate of adoption is an important determinant of the research profitability. According to the nature of the research, on-farm research may require capital investment by farmers.

The connection between economic research and economic benefit is less where that research leads to decisions by Governments on agricultural policy. Often, policy decisions are re-inforced by economic research but also based on other evidence or a priori economic reasoning. Therefore, while changes in economic policy bring about a range of actions by economic agents, not all of the associated costs and benefits can be directly linked to the underlying research. Moreover, adoption of policies by Government is generally discrete rather than continuous. Judging the specific contribution of this project to the changes in economic policy that have taken place in the Chinese wool industry is perhaps the most difficult and problematic component of this assessment.

In the present case, the gains from research on Chinese wool production mainly relate to increased gains from trade that are occurring because the research has reduced impediments to the import of Australian wool. In addition, liberalisation of the wool trade is part of the process by which Chinese aspirations to join the World Trade Organisation are responded to by Australia.

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## 2. Background

### 2.1 Origins of This Project

This project was conceived in mid-1986, but did not formally commence until March 1989 (Longworth and Williamson 1993). The objectives of the project as set out in the Record of Understanding of the Project Agreement between ACIAR and the University of Queensland were as follows:

- to identify and, where possible, to quantify the technical, economic and institutional constraints on the production and marketing of raw wool in China; and
- to establish a strong basis for longer term collaborative research with Chinese scholars on wool economics in China.

The genesis of the project coincided with a series of events in the mid- to late-1980s that, although obviously not anticipated by Australian and Chinese researchers at the time, culminated in serious dislocation of the wool industry in both countries. Nevertheless, there was a degree of prescience in initiating a project that illuminated developments within the Chinese wool industry.



China had emerged as a significant purchaser of Australian wool in the mid-1980s with the liberalisation of its economy. The addition of Chinese demand to a wool industry already buoyed by the interaction of favourable world demand for wool, a significant fall in the Australian exchange rate and ill-judged transactions in buffer stocks held by the Australian Wool Corporation led to a 'shortage' of wool and a boom in prices. The complex causes of this boom were grievously misinterpreted in Australia. The Australian reserve price for wool was pushed to levels that were unsustainable once the demand for wool inevitably slackened and the exchange rate recovered. This already difficult situation was exacerbated by the rapid increase that occurred in Australian wool production, brought about by the high reserve price and the unusually favourable weather conditions that occurred in the early 1990s.

Likewise, the slump that followed and persists to this day is often misinterpreted by giving too much emphasis to the volatility of demand for wool from China and some other countries, with insufficient recognition of the serious long-term damage caused to investment decisions in the world wool processing industry by the collapse of the reserve price scheme per se. By definition, a buffer stock or reserve price scheme that sets out to stabilise prices also destabilises the quantity available for processing. Under most circumstances, this increases the average costs of processors and others further down the marketing chain. Furthermore, the collapse of the reserve price scheme has been followed by frequent, and capricious, changes in Australian policy in management of the stockpile.

The influence of Australian policy on the global wool industry is the result of Australia's major contribution to world production of apparel wool and world trade in wool. Australian wool production accounts for almost 30 per cent of wool production, and just under 60 per cent of exports of all wool. However, Australia accounts for around 70 per cent of world exports of the wool that is used in apparel (Garnaut et al. 1993).

Successful research is of interest for its own sake in terms of both subject matter and research methods. The question of greatest professional interest in understanding Chinese wool supply is the economics of transition from plan to market in the Chinese pastoral region as the local agricultural economy adjusts to abandonment of rigid central planning and its replacement with economic incentives. Paradoxically to some, centrally planned economies have had great problems in controlling land degradation and achieving sustainable agricultural development.

In the present case, the ACIAR model of collaborative research on topics of interest to scholars in different countries has contributed to the resolution of other pressing problems for policymakers in Australia and China. The principal Australian interest in this project was in the effects of Chinese production on demand for imported wool. China was concerned with long-run prospects for woolgrowing in the Chinese pastoral region, an area of strategic significance that is extremely vulnerable to environmental damage from overgrazing. Australia was also concerned with questions of market access for wool to the Chinese market. As events have unfolded, the question of market access for wool has become linked with more general questions of Chinese participation in world trade and its admission to the World Trade Organisation.

## 2.2 Wool in China

Wool production in China operates under several constraints resulting in serious economic, social and political problems (Longworth and Williamson 1993). The most obvious symptom of these constraints is severe land degradation in the pastoral region. Perhaps the most important conclusion of the project being assessed is that the present system of wool production in China is unsustainable. Many constraints could be relieved by changes in economic policy. A superior economic outcome would be possible for China if endemic economic problems in the pastoral region were diagnosed and acted upon, hence the potential value of economic research. To the extent that other countries like Australia suffer from a misdiagnosis of the economic problems of the Chinese wool industry and inappropriate policy responses by China—for example, restricting wool imports further—the benefits of economic research would extend beyond China.

Longworth and Williamson (1993) classify the factors influencing unfavourable development outcomes in the pastoral areas of China as being (i) population pressures, (ii) market distortions, and (iii) institutional uncertainties. The theoretical link between growing human population, increased grazing pressure and irreversible land degradation in pastoral areas occasioned by the myopic behaviour of nomadic herdsman suffering from declining incomes and widespread poverty is strongly confirmed in the case studies conducted in this research. Less obvious is the way that official Chinese Government policy has contributed to increasing population pressure by (i) encouraging expansion of cultivation by resettlement in the pastoral region, (ii) the introduction of the household registration system, and (iii) the granting of family planning concessions to ethnic minorities.

There are complex causes and effects flowing from all these policies that are certainly applied much more from political necessity than from preference or considered choice. Consequently, not all of these policies could be completely reversed, although partial amelioration of their adverse effects is possible once the linkages and chains of causation are more fully understood. Economic research yielding environmental benefits raises serious problems of valuation of the gains from research—even in market economies—because environmental benefits and costs are unpriced. The problems are even more acute in centrally planned economies.

There are other serious distortions of product and factor markets affecting wool production in China apart from the household registration system which has such pervasive effects on internal migration and the Chinese labour market. The tension between the dual roles of the price mechanism in guiding production and consumption and determining the distribution of income finds full expression in the transition from plan to market in the Chinese wool industry.

The traditional system of grading wool in China did not, and still does not, reflect adequately the three major dimensions of wool quality: (i) fibre diameter or fineness, (ii) yield—effectively, what is available for processing after grease, vegetable matter and contamination in wool is removed and is a function of genetic, husbandry and marketing factors, and (iii) fibre strength. Obviously, premiums and discounts in the wool market influence on-farm decisions and the economics of processing.

Furthermore, the researchers have conducted detailed research on the reform of wool marketing arrangements in China, particularly the system of price discovery (Longworth and Brown 1995). Wool is a difficult product to market because of its heterogeneity. This is why the auction system has persisted for so long even in countries like Australia where substantial investment has been made in the science and economics of product description. The clue to understanding the economics of agricultural marketing is to recognise the key role of marketing systems in providing information upon which the economic decisions of producers, processors and consumers can be based. Marketing information is a crucial aspect of economic coordination within and beyond the agricultural sector. Improvement in marketing information is essential for reducing the costs of the physical marketing functions—infrastructure, transport, handling and so on—that are required for wool to flow from producer to consumer and for money to flow in the opposite direction.

Longworth and Brown (1995) emphasise the institutional uncertainties that make an efficient production and marketing system difficult to achieve in the Chinese pastoral region. Property rights in livestock, land and pasture are ill-defined. The frequent changes in Chinese economic policy are harmful to a sustainable system of wool production in the pastoral region. Technical advances like pasture improvement, supplementary feeding and changes in grazing regimes to relieve the imbalance between summer and winter feed supplies are difficult to implement under current circumstances even though all these practices have the potential to raise incomes. The research being assessed has clearly established that alternative production systems which yield higher incomes from fewer sheep are feasible—a propitious outcome for both producers and the environment.

Longworth and Brown (1995) have elaborated the complex reasons for failure of policies regarding livestock improvement. The profound consequences of the interaction between genotype and environment in the harsh climate of the Chinese pastoral region have frustrated Chinese attempts to improve wool quality by introducing Australian merinos. Age old Australian fears of adverse effects of exporting merinos have been exposed for their intrinsic hollowness, at least under Chinese conditions.

Valuing the contribution of this research on wool production in China is difficult in principle and practice. The scale of potential changes flowing from the analysis is too large and the relationships too intricate to use simple measurement techniques. There should be no argument, however, about the quality and usefulness of the research. In this context the economic surplus from continuation of existing policies leading to overgrazing would be zero following collapse of the grazing economy of the pastoral region. However, such an outcome would automatically bring about major changes in policy forced by the drastic consequences of the existing policies. The approach in this assessment has been to concentrate on the demand side of the Chinese wool industry. The assessed benefits do not include the benefits to China from improved management of its pastoral region.

## 2.3 Wool in Australia

The pre-eminence of the wool industry in the agricultural and economic development of Australia has given way to an extended period of economic depression. Although management of the reserve price scheme has to count as a significant breakdown in implementation of policy and agricultural administration, not all the difficulties of the Australian wool

industry can be attributed to the collapse of the scheme. Many of the current problems relate to declining competitiveness of the wool industry within the Australian economy, brought about by continued growth of the service sector with economic development and exchange rate effects of the growth of the mining industry.

There are inherent problems on both the supply and demand sides. Compounded by serious drought in eastern Australia, wool production has fallen by around 40 per cent since its peak of 1.1 million tonnes greasy in 1989–90 (further information on Australian wool production is presented in section B of the Australian Wool Compendium published by Wool International). Wool production which was around 10 per cent of world fibre production 50 years ago is now around three per cent, while world fibre production has quadrupled. In a period of significant expansion of agricultural output, world wool production is only 40 per cent greater than 50 years ago! The productivity performance of the wool industry is disappointing in Australia, and elsewhere. Wool now finds it difficult to compete for land with other forms of agricultural production, including no use, in the pastoral regions of the world. By contrast, cotton's share of world fibre production has fallen from just under 75 per cent to around 45 per cent. Cotton output is now two-and-a-half times greater than it was previously. Cotton has thus held up better in the cotton textile industry than has wool in its segment of the textile industry. Wool has lost ground to man-made fibres in apparel and other end-uses that were previously important for wool.

The Australian wool industry is in severe difficulties from what is usually, and loosely, referred to as a cost-price squeeze, manifested in declining incomes of woolgrowers relative to the rest of the population. Wool price effects have been reinforced by increased input costs, notably labour. Apart from contract services like shearing, not much labour is employed on Australian sheep farms. However, the cost of self-employed labour is increasing as other parts of the economy grow. It is proving difficult to offset falling prices and rising costs through increased productivity. Like China, this is especially the case in the pastoral zone of the Australian sheep industry, these days often referred to as 'rangelands'. Many of the technical improvements recommended by Longworth and Williamson (1993) for China have already been exploited in Australia. The limits of productivity of labour in the sheep industry may have been reached in some parts of Australia.

As alluded to above, wool is also suffering from declining demand because of long-term damage to wool processing around the world when the reserve price scheme was abandoned. Stabilising prices through

transactions in stocks led to wide fluctuations in the quantity of wool available from Australia and thus higher average costs for processors whose specialised wool processing assets were intermittently operating well above, or below, their planned capacity.

These macroeconomic and industry-specific problems sharpen the interest of the Australian wool industry in its trade relationship with its leading customer.

## 2.4 Trade in Wool Between Australia and China

There are many subtle aspects of the trade in wool between Australia and China that go to the core of the role of the agricultural sector in the economic development of both countries. Wool is also an important part of the political relationship between the two countries.

The relationship between China and Australia in the wool trade is unusual in at least three respects:

- China is a recent participant in international trade in wool, at least in its modern manifestation;
- China is a large wool producer as well as consumer and processor; and
- China protects its domestic wool and wool processing industry from competition through tariffs, quotas and other regulatory devices.

Moreover, the economics of wool is different to that of other agricultural commodities—especially on the demand side. Unlike other important commodities in Australia’s agricultural commerce, there are few barriers to world trade in wool—a crucial reason for wool’s earlier place in Australia’s economic development. The relative freedom of the world wool trade is still a major asset for Australia that is worth defending vigorously. Wool should always be thought of as an industrial raw material as well as an agricultural product. Raw materials, mineral and energy commodities that are inputs to manufacturing industries are far less commonly protected than agricultural products (with the exception of coal).

The status of wool as an industrial raw material that is converted into durable consumer goods also explains its vulnerability to fluctuations in the business cycle. By contrast, the demand for other agricultural products is stable in aggregate. Fluctuations in world agricultural prices essentially

arise because supply is sensitive to climatic conditions. In addition, policies of self sufficiency by many importing countries and the associated problems of market access mean that weather-induced, short-term variations in output and prices have to be absorbed by trade-exposed exporters and importers.

The traditional wool importing countries in Europe, Japan and the United States rely on wool from Australia and other southern hemisphere countries to maintain their wool textile industries. There is no local wool production industry of any size requiring protection. Trade issues are therefore unimportant in the political economy of raw wool. Unlike other agricultural products, the actions of foreign governments are more or less irrelevant. The wool trade is like other world trade in industrial raw materials, with trade essentially conducted by private firms. However, the trade is much more complex than trade in other commodities because wool is such a heterogeneous material and the industry is so traditional. The wool trade is characterised by long chains of private marketing intermediaries ('middlemen') providing specialised services to producers and processors. With its tradition of central planning, China has been slow to develop the commercial acumen and specialised skills that are so typical of the European wool trade.

China is therefore very much a special case in that bilateral relationships between the governments of China and Australia loom large in the conduct of the wool trade. Brown (1997) has described the complex relationships and conflicts between protectionist and non-protectionist forces within the Chinese wool and wool textile industries. The interplay of these forces continues to threaten the development of the wool trade between Australia and China, and helps explain its extraordinary volatility over the last decade.

Generally speaking, there are fewer restraints in world trade in manufactures than with trade in agricultural products. Trade in clothing and textiles is a notable exception. What agricultural production in wealthy countries and clothing and textile industries have in common is that they are labour intensive and regionally concentrated. Production of clothing and textiles is also distinguished by its geographical mobility. The technology and capital equipment required is relatively simple and the clothing and textile industries are important in the early stages of industrialisation. The adjustment problems of these industries in wealthy countries generate significant political pressure for increases in protection. In the absence of intervention in trade through tariffs, quotas and other devices, economic pressures would cause the domestic clothing and textile industries of wealthy countries to contract as incomes rise.



China has a major political and economic interest in liberalisation of world trade in clothing and textiles. Correspondingly, Australia is interested in the conflict within China concerning wool imports being resolved in the direction of openness. Both countries have sufficient share of the world markets for raw wool and wool end-products that the effects of their actions will not be independent of one another. Australia needs the Chinese market for Australian wool. China needs Australian wool because their domestic wool is not of sufficient quality to supply its rapidly growing production of wool end-products for the export market. Australia also provides China with support in its aspirations to gain greater access to the world market for clothing and textiles.

What is essentially in dispute is the *form*, as well as the *extent*, of any protection afforded the Chinese wool production industry. The more so for Australia because of the extraordinary difficulties in the wool industry since the demise of the reserve price scheme. A proposed protectionist device from the Chinese side has been a 'tariff quota' whereby higher rates of tariff apply once imports pass a specified quantity. Tariff quotas would have far greater effect if the world wool market were to recover and Australian wool production increased. A higher proportion of Australian imports would then attract the higher rate of duty.

China now accounts for around 20 per cent of the value of Australia's wool exports, and slightly more on a volume basis. Chinese imports are biased towards the stronger end of the distribution of Australian wool types because the woollen sector, knitwear and blankets are becoming more important relative to the worsted sector. Exports to China were around one quarter of Australian exports in 1993–94, not long after exports had fallen to a minuscule four per cent in 1989–90.

The volatility of Chinese imports has obviously created serious difficulties for the Australian wool industry, although it is clear that the chain of economic causation is not only in one direction. Along with other wool processing firms around the world, Chinese processors suffered from Australian attempts to defend an unrealistic reserve price and the consequent disruption of wool exports. The situation was possibly even more difficult in China because the wool processing sector was undergoing a period of economic liberalisation, with transition from a system dominated by large State-owned mills on the coast to a situation where around 30 per cent of wool is processed by smaller enterprises in rural townships (Brown and Longworth 1995). Further expansion of early-stage processing capacity has occurred in wool producing regions.



Economic and political power within the Chinese wool industry is now widely dispersed between groups that reflect commercial, political and regional factors. These groups have a variety of interests and attitudes towards expansion of wool imports. Arguments about the political economy of trade are well-rehearsed for agriculture and manufacturing in market economies with a tradition of involvement in world trade. The situation is much more problematic in countries where planning is still important and there has been a recent tradition of favouring self-sufficiency over trade and specialisation.

Brown (1997) has classified the (overlapping) forces for and against imports of wool to China as follows (with fibre inspection bureaus and east coast mills shifting between the two categories):

*Tighter Import Arrangements:*

Ministry of Agriculture (State farms), traditional import agencies, the chemical fibre industry, and supply and marketing cooperatives;

*More Liberal Import Arrangements:*

up-country mills, township enterprise mills and non-traditional import agencies.

These differences in interests and attitudes towards protection of the wool industry in China are systematic rather than random in their origins and effects. There are inevitably short-term losers from the expansion of trade who are difficult to convince that the tide will ever turn in their direction. A significant barrier to the expansion of Australian wool imports is the entrenched position of state agencies—the Ministry of Agriculture and Supply and Marketing Cooperatives—based on previous arrangements for wool production and marketing. The Ministry of Agriculture controls the woolgrowing state farms that produce finer wool than the national average and thus compete more closely with imported Australian wool. The Supply and Marketing Cooperatives have lost much of their influence as internal trade in wool has been deregulated. It is both a matter of ideology and self-interest that these Cooperatives also oppose imports over which they have no control. The opposition of the chemical fibre industry to wool imports is easy to understand. The major support for import liberalisation comes from the wool textile industry. Even then, support is greater from new mills than existing mills which have an established access to imports and would not be as adversely affected by a tariff quota.

## 3. Economic Assessment of The Project

### 3.1 Consequences of The Research

The almost forensic investigation in this project of all aspects of Chinese wool production and its relationship to the textile industry has generated detailed results and information that, subject to both acceptance and implementation by government, could yield major benefits to Australia and China. It is clear from official documents that government officials are aware of the research and have used it in analysis that underpins policy-making. Indeed, in its 1994 review of the ongoing debate over Australia's merino export policy, the Department of Primary Industries and Energy (1994) made extensive use of material from the project published at that stage as part of ACIAR Technical Reports 25 (1993). In particular, section 6.1.3 of the report on merino export policy, Institutional Restraints to the Development of the Chinese Flock, probably could not have been written without the assistance of this research.

The benefits of the research can be summarised as follows:

- interpretation of economic and other factors leading to serious land degradation in the pastoral region of China and identification of policies with the potential to assist alleviation;
- understanding of agribusiness developments within the Chinese wool industry that should encourage introduction of improvements in grading, price discovery and transport and handling with lower costs of agricultural marketing and associated benefits for processors and producers;
- recognition that the Chinese and Australian wool industries are complementary rather than competitive because the output and quality of Chinese wool is constrained and Australian imports are required by mills located in the Chinese producing areas to maintain the domestic wool processing industry;
- providing a rationale for continued Australian technical assistance to meat and wool production in the pastoral region of China and to wool processing in China; and
- re-inforcing the case for trade liberalisation in the wool industry and, in the event of restrictions on trade, the case for a transparent regime of controls rather than the ambiguity and uncertainty of previous arrangements.

This assessment concentrates on the benefits arising from expansion of the gains from trade through trade liberalisation and an improved climate for the conduct of trade. This decision is based on practical considerations and does not diminish the economic usefulness of the other considerable achievements from the project. It would be extremely difficult to value the benefits of research leading to the development of improved farming systems in the pastoral regions of China. As mentioned above, many of the benefits and costs are unpriced.

Even more importantly, it would not be sufficient to compare the profitability of farming systems with different degrees of natural resource degradation because that approach would not pick up the economic costs of the time taken to move from one system to another. A multi-commodity and dynamic framework would be required to account for substitution between wool and sheepmeat and measure the costs and benefits incurred in the transition from one system to another. In essence, that degree of complexity is unjustified given that the requirement to replace an unsustainable system with a sustainable system in the Chinese pastoral region is more or less self-evident.

Similarly, there would be complex conceptual and measurement problems in assessing the detailed research on agribusiness reforms in the Chinese wool industry that has been undertaken as part of the project. A full economic analysis of grading and related reforms would also need to include examination of distributional effects that are beyond the reasonable scope of this assessment. This is because changes in agricultural marketing arrangements have radical effects on the direction of economic development as labour moves from agriculture to the provision of a marketing services and value adding activities in the countryside, called 'township village enterprises' in the Chinese experience. Another conclusion from this research is that a major effort should be made in the provision of market information to guide decisions by producers, market intermediaries and processors. (The analysis of the economics of grading wool in China is the obvious example.) While improvements in market information can be achieved at relatively low cost, such as through simple systems of price reporting in local newspapers and on radio, the benefits are dispersed and difficult to measure.

### 3.2 Influence on Government Decision-making

Until this research was conducted, Chinese and Australian policy-makers approached trade issues in the wool industry from first principles. Usually the presumption at the official level is that countries benefit from trade.

This is different from the general attitudes reflected by commentary in the community at large, where interests opposed to expansion of trade are able to capture popular imagination and political attention. The situation in trade diplomacy could be described as seeking ‘good by stealth’ such is the resistance to accepting economists’ nostrums of the theoretical gains from trade in the face of vocal opposition.

Australia has been engaged in bilateral negotiations with China concerning the wool trade since the mid-1980s. The objective of the negotiations was to remove trade impediments, in particular to improve the transparency of the wool trade and make commercial dealings clearer. Australia has been at pains to advance the view that the wool industries of Australia and China are complementary rather than competitive. The research being assessed has been most valuable in that context because it has clearly established the physical and economic constraints to the ability of the domestic Chinese wool industry to supply the needs of the expanding Chinese wool processing and wool textile industries, with respect to both the quantity and quality of raw wool. It is now recognised by the Chinese that the potential for development in the pastoral areas is restricted, although there could be some expansion of wool production in the agricultural areas.

The effect of the research has been to help tip the balance in the Chinese controversy over protection of the domestic wool industry in favour of those groups within China whose interests would be advanced by increased imports of wool. As is often the case in many bilateral trade negotiations, Australian data on its exports of wool to China have helped improve the information base on which Chinese decisions can be based.

Progress in bilateral wool negotiations between Australia and China has taken place against the background of multilateral negotiations over the entry of China to the World Trade Organisation. Successful conclusion of these negotiations is also in the specific interest of the Australian wool industry because wool semi-manufactures, wool clothing and textiles could be expected to grow with greater access of Chinese products to major world markets. However, it should be conceded that the research under examination is a small part of the overall picture with respect to these negotiations. Nevertheless, in discussions with Australian officials involved in wool trade negotiations with the Chinese conducted as part of this assessment it transpired that the officials were familiar with the ACIAR project results and had incorporated the major conclusions of the research in briefs and other background material prepared for the negotiations.

Australia is now in the process of concluding a bilateral wool arrangement with China that will formalise a tariff quota arrangement. These trade arrangements will be similar to those already made with New Zealand. China has agreed with New Zealand to take up to 220 000 tonnes of greasy wool exports from around the world at a one per cent tariff rate, rising to 287 000 tonnes over seven years. Previous tariffs on wool fibre were up to 10 per cent. A higher tariff will apply beyond these quantities. The deal with New Zealand also sets a global quota of 60 000 tonnes for wool tops, rising to 80 000 tonnes over seven years. The tariff is three per cent compared to tariffs of up to 15 per cent previously. The arrangements apply immediately with full ratification of the deal to take place when China joins the World Trade Organisation.

### 3.3 Economic Evaluation

The effect of lower tariffs is to increase the attractiveness of imported wool to Chinese processors compared with synthetic fibres, and domestically produced wool. The Chinese will therefore be more active in wool auctions than otherwise. In economic terms, the Chinese import demand curve for Australian wool has been shifted upwards.

The economics of the situation can be summarised as follows:

#### *Before research*

- there are tariffs on wool trade between Australia and China;
- the price of Australian wool is higher in China and the quantity purchased is lower than in a market without tariffs; and
- the price of Australian wool is lower at Australian auctions for greasy wool.

#### *After research*

- the ACIAR project has contributed to the removal or reduction in tariffs on Australian wool in China; and
- the result of the tariff removal/reduction is to increase the Australian price of wool at wool auctions and to reduce the price for wool purchased by Chinese processors, benefiting both parties to the trade in wool between Australia and China.

These elements are expressed diagrammatically in Figures 1 and 2.

Figure 1. The Australian market for wool before and after the research.

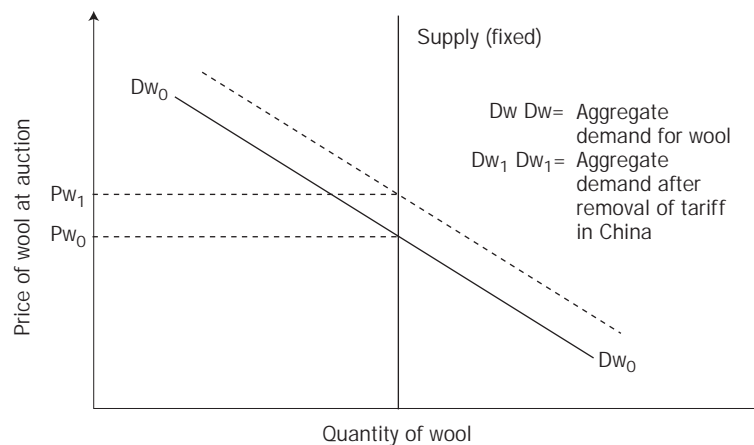
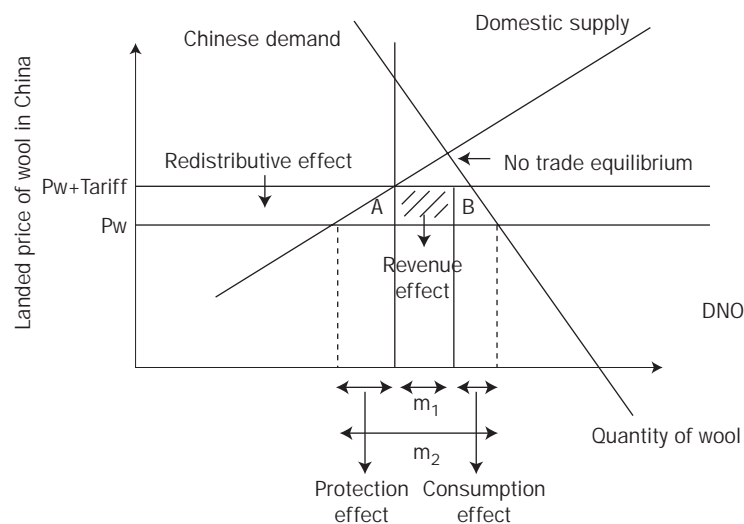


Figure 2. The effects of a tariff on wool imports to China (standard representation, adapted from Tisdell 1974).



The supply of Australian wool is assumed fixed in the short-run. The price axis is Australian auction prices in Australian currency. However, with auction markets for wool in Australia and other exporting countries, arbitrage between markets and qualities of wool means that there is a notional 'world' price for wool in all countries. This world price is the Australian price adjusted for freight, exchange rates and quality. Australian auctions are the basis of price discovery in the world wool market.

The supply of wool to China from the world market is perfectly elastic provided the Chinese are prepared to pay the world price. Figure 2 demonstrates the various effects of a tariff. There is a ‘protection effect’ because domestic production expands. There is a ‘consumption effect’ because local consumers are forced to pay higher prices and there is a ‘revenue effect’ because the government collects customs revenue on the (reduced) amount that is imported. Less obviously, there is a ‘redistribution effect’ from the imposition of the tariffs because local producers make additional profits on domestic production following the tariff, over and above the profits that would be made without a tariff. The revenue and redistribution effects are transfers within the Chinese economy.

With removal of the tariff, these effects are eliminated and imports expand from  $m1$  to  $m2$ . However, there are additional benefits to Chinese consumers, indicated as triangles  $A$  and  $B$ , because Chinese consumers are paying less for the additional wool purchased on the world market. Triangle  $A$  is a net gain to the Chinese economy because the excess costs of expensive domestic production have been eliminated with increased imports replacing part of domestic production. Triangle  $B$  is the increase in consumers’ surplus enjoyed by the Chinese because absolute consumption of wool has increased.

In the analysis that follows, there is no attempt to assess the quantitative significance of these benefits to China. Nor is there an attempt to combine in a formal way the economic effects illustrated in Figures 1 and 2 by translating the increased demand in China into a shift in aggregate demand for Australian wool. This is because an important economic issue is the way the auction system operates to reflect increased demand from China. Moreover, while it is clear that the Chinese gain with the reduction/removal of tariffs, these gains are partly at the expense of other consumers who now have to pay more for wool.

### 3.4 Quantitative Significance

To assess the quantitative significance of these changes on Australia requires data (from the Wool International Wool Compendium) and several assumptions as follows:

- the supply of Australian wool is fixed at the level of 1966–97 at 700 million kg greasy—this is not strictly accurate because Australia still has to dispose of the remainder of the stockpile and increased demand from China could also be expressed as an increase in the rate of disposal of stocks as well as an increase in prices;
- the reference nominal price is 400 cents (Australian) per kg greasy, based on the nominal price of 620 cents per kg clean in 1996–97 and an average yield of around 65 per cent—this is equivalent to an annual gross value of Australian wool production of \$2800m;
- Chinese purchases are 20 per cent of the total—as suggested above and explained further below, the significance of China’s market share is somewhat ambiguous because increased Chinese bids at auction are reflected in higher prices paid by all buyers;
- on a conservative assumption of behaviour in the auction room and the pass through of the change in tariffs, the previous tariff reduced Chinese bids by 40 cents for 20 per cent of sales or 8 cents per kg greasy—equivalent to an improvement of \$56 million a year in the gross value of Australian wool production following the change in Chinese policy; and
- the research contributed only 5 per cent to the change in policy—this is an extremely conservative assumption so far as the effects of the research are concerned or, put the other way, represents the rather optimistic view that the bilateral negotiations would have reached the same outcome eventually due to the persistence of the officials coupled with long-term effects of economic fundamentals affecting wool production in China.

Putting these data and assumptions together, the annual flow of benefits from the research is estimated at \$2.8 million a year—that is, five per cent of \$56 million. The figure of \$56 million is calculated as 8 cents (20 per cent, the Chinese market share, of the 40 cent change in tariff per kg of raw wool) times 700 million kg (Australian wool production).



Apart from making some judgement as to the extent to which the research has affected the change in policy, the other difficult issue is the way that Chinese bids at auction are translated into higher prices. The successful bidder at an auction is the bidder who pays one unit more than the next keenest purchaser. The successful bidder does not have to bid up to his or her maximum valuation. These remarks are in the context of progressive English auctions with ascending bids—the situation would be different for Dutch auctions where bids are made in descending order from a high starting point.

The demand for wool at auction is a ‘derived’ demand—derived from the final demand for wool processed into clothing and textiles consumed in numerous end-products and different markets. A useful concept from the practice of the wool auction system is the idea of the ‘bareme’ of wool prices. The bareme is the ready reckoning system that wool buyers use to translate the limits of their clients with respect to the delivered price of wool of various types into maximum bids at auction in Australian currency. Thus, the bareme includes elements reflecting freight, handling and exchange rates. A tariff on wool in one consuming country reduces potential bids of buyers representing that country by the full extent of the tariff. If the tariff is removed, then buyers will bid more at auction.

The question is by how much? The answer is somewhere between near-zero—one bidding unit above the existing price or the full extent of the removal of the tariff. The former situation would correspond to a single Chinese buyer of Australian wool at auctions. The latter situation would apply where there was vigorous competition between many Chinese buyers, all advantaged by the removal of the tariff and acting independently of one another. There is some competition between Chinese mills for access to Australian wool.

In addition, the tariff was not rigidly applied. Apart from duty drawback provisions normal in international commerce for re-exports of wool semi-manufactures and wool end-products, the tariff was not applied because of local pressures and other defects in customs administration. An intermediate assumption has therefore been made by assuming that the increased price paid by the Chinese for Australian wool is 20 per cent, their market share, of the 40 cent decrease in the price of wool to Chinese mills following removal of the tariff.

The approved budget for this project was \$766 167. While the economics of agricultural research sensibly emphasises the nature of research as an investment, there is plenty of room for disagreement on how the investment analysis should be conducted. This is especially the case when

the analysis is conducted retrospectively because the costs of the research have been already incurred and the question naturally occurs as to which costs are relevant.

The public and private costs of creating the human capital necessary to undertake research of good quality are usually ignored in evaluations of research that usually focus on the marginal costs and benefits of an individual research project. The focus of this assessment is on the costs incurred by ACIAR and the benefits achieved in the Australian wool market.

In addition, decisions have to be made concerning the starting period for the research investment and the timing of the flow of benefits. In the present case, the benefits are assumed to occur as an annual flow starting from the time the tariff is removed. There is no real point in assuming an adoption path for benefits given the arbitrary assumptions already being made concerning the contribution of the research to the change in policy and the extent of the shift in the aggregate demand for Australian wool with increased demand from China with removal of the tariff. It was also decided to compound the expenditure incurred between 1989 and 1993 of around \$0.75 million to a current cost of \$1 million. At an interest rate of say 25 per cent for a risky project, this converts to an annual current cost of \$250 000. This is less than 10 per cent of the conservatively estimated benefits.

By way of a simple sensitivity analysis, the following comments are offered:

- on the basis of this simple figuring the research would need to have increased the price of wool at auction by less than one cent per kg greasy to break even;
- wool prices are now very low—at higher prices the calculations would be more favourable to the research;
- while the Chinese need not bid up to the full extent of the reduction in tariffs, other bidders would be obliged to bid closer to their full valuation;
- other benefits of the research have been ignored notably with respect to the contribution to the understanding of the serious problems of land degradation in the pastoral region and reform of the wool marketing system;

- the research has clarified important issues concerning Australian aid to the Chinese wool industry including the related and vexed issue of export of merino genetic material; and
- other costs have been incurred by Australia in bilateral negotiations with the Chinese and no doubt by the research institutions who provided the researchers.

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## 4. Concluding Comment

This has been an excellent piece of research. The quality of the research is unquestioned. On balance, there should also be no argument concerning the overall economic benefits to the Australian wool industry. The nature of the project does not fit easily with standard methods of analysing the economic consequences of agricultural research. A particular problem for the analysis is interpretation of the way that the increased demand for wool from China is translated into improved auction prices.

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