Potential agricultural cooperation between Mongolia and Australia

A scoping study under the Department of Agriculture's International Agricultural Cooperation Program

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Research by the Australian Bureau of Agricultural and Resource Economics and Sciences

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Potential agricultural cooperation between Mongolia and Australia  

ABARES

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# List of acronyms and Mongolian terms

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<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>CMEA</td>
<td>Council for Mutual Economic Assistance (disbanded 1991). This was an economic organisation under the leadership of the Soviet Union, comprising member socialist states in eastern Europe and a number of socialist states elsewhere in the world. Mongolia joined in 1962.</td>
</tr>
<tr>
<td>CSIRO</td>
<td>(Australian) Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>DAFF</td>
<td>Australian Government Department of Agriculture, Fisheries and Forestry (former name). Renamed the Department of Agriculture in September 2013</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>FAO</td>
<td>(United Nations) Food and Agriculture Organisation</td>
</tr>
<tr>
<td>HACCP</td>
<td>Hazard Analysis and Critical Control Point (HACCP) standards are a risk management methodology used by food and related industries for the control of food safety hazards to acceptable risk levels.</td>
</tr>
<tr>
<td>JICA</td>
<td>Japan International Cooperation Agency</td>
</tr>
<tr>
<td>KOICA</td>
<td>Korea International Cooperation Agency</td>
</tr>
<tr>
<td>MCC</td>
<td>Millennium Challenge Corporation USA</td>
</tr>
<tr>
<td>MoFALI</td>
<td>Mongolian Government Ministry of Food, Agriculture and Light Industry (MoFALI). Replaced by the Ministry of Industry and Agriculture</td>
</tr>
<tr>
<td>MSRM</td>
<td>Mongolian Society for Range Management</td>
</tr>
<tr>
<td>NGO</td>
<td>Non Government Organisation</td>
</tr>
<tr>
<td>NRM</td>
<td>Natural resource management</td>
</tr>
<tr>
<td>SDC</td>
<td>Swiss Agency for Development and Cooperation</td>
</tr>
<tr>
<td>SFU</td>
<td>Sheep forage units (SFU) are a unit of measurement for comparing grazing density.</td>
</tr>
<tr>
<td>TAFE</td>
<td>Technical and Further Education</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Program.</td>
</tr>
<tr>
<td>dzud</td>
<td>Mongolian word for extreme weather phenomenon that combines a summer drought and a severe winter that hardens snow and ice into an</td>
</tr>
</tbody>
</table>
impenetrable layer, causing high livestock mortality from starvation (FAO 2011, UNIDO 2011). Also describes a snow storm.

**gur**

Traditional dwelling used by herders in Mongolia, made of animal felt and timber.

**sum**

Mongolian word for administrative district. There are 329 *sums* in Mongolia. Above this is *aimag*, equivalent to region (22 total). *Sums* are the basis for government veterinary and livestock breeding services, and education etc. Nomadic herders move stock around different parts of a *sum*. The smallest administrative unit is a *bag*, equivalent to a subdistrict.
Summary

This study reports on areas of potential agricultural cooperation between Australia and Mongolia. The study was initiated as an activity under a Memorandum of Understanding (MOU) between the Mongolian Government Ministry of Food, Agriculture and Light Industry (now Ministry of Industry and Agriculture) and the Australian Government Department of Agriculture, Fisheries and Forestry (now Department of Agriculture), signed in February 2011. Areas of interest identified under the MOU include agricultural technology transfer and extension activities; training agricultural specialists in Australia and Mongolia; and the exchange of information relating to food, livestock and crop production, fisheries and forestry.

The study included four main components: a desktop review of agriculture in Mongolia; key informant interviews with potential stakeholders in Australia; a visit to Mongolia to interview key stakeholders; and an analysis of opportunities and possible constraints on mutually beneficial cooperation based on the desktop review and interviews.

Key outcomes of this study include: the identification of potential areas of cooperation; a database listing useful agricultural stakeholder contacts for Australia and Mongolia; and further development of the relationships between the Australian and Mongolian governments.

This report does not cover how future cooperation activities could be funded, as this was beyond the scope of the study.

Mongolian agricultural context

Agriculture and herding activities in Mongolia constitute 32 per cent of employment, and around 15 per cent of annual gross domestic product. The agriculture sector is heavily focused on nomadic animal husbandry with around 73 per cent of land area allocated to pasture. Livestock raised commercially include sheep, goats, cattle, horses, and camels, which are used for meat, dairy and fibre production. The main crops are wheat, potatoes and fodder. Development in the sector is faced with inherent challenges of production seasonality and extreme weather, and other issues including physical infrastructure, human resource capacity and technology capacity needs.

Key areas of opportunity

Key areas of opportunity for cooperation are identified under categories of: markets; productivity; and resources—including rangeland management and human resources. These are explained further below.

Markets: Mongolia has under-developed supply chains and is placing importance on re-organisation of processing and marketing structures. In particular it has needs around developing product differentiation strategies and quality improvement in meat, dairy and wool. There are opportunities for cooperation on developing Mongolia’s agricultural commodity exchange; building processing technology for meat, fibres and dairy products; food safety expertise and systems (including storage and transport infrastructure); food and fibre quality expertise and management systems (including traceability and certification schemes); biosecurity and animal health expertise and systems; and understanding the economics of supply chains.

Supply chain structures, silvicultural management and processing technology in forestry are other areas for potential exchange of expertise.
**Productivity:** There is opportunity for cooperation around livestock breed improvement through the exchange of genetic material (already in development), particularly in fine wool and dairy; expertise and systems for managing introduced breeds; and exchange of expertise and systems for nutritional feed management and fodder processing for intensive dairy systems. Opportunities for the cropping sector focus around exchange of expertise for developing dryland crop varieties, conservation tillage technology, agronomy expertise transfer, and irrigation technology.

**Resources**

**Rangeland management:** Australia and Mongolia both have rangeland areas that require management for sustainable livestock production. Areas identified for cooperation include mutual learning around land management; exchange of information on rangeland management mechanisms and safeguards under leasehold tenure; and sharing experiences on management of resource degradation. The Landcare model of community-based natural resource management (NRM) is a specific program that could be beneficial in Mongolia. Other areas of opportunity include support for developing ‘ecosystem services’ market-based approaches to grassland management, and support in developing carbon sequestration opportunities.

**Human resources:** A core area identified for cooperation is developing the human resources of the agricultural sector, with Mongolia seeking information and expertise exchange in education and skills training. Australia has a highly developed vocational education system that can provide opportunities and a model for skills training in the agricultural industry. Priority areas for education and training include wool classing; meat, dairy and fibre processing; food safety and food handling; cropping skills; and marketing for product differentiation. There are also opportunities for exchange and learning within the University sector, with Australian universities offering a range of undergraduate and post-graduate agricultural degrees that cover a wide range of relevant disciplines from veterinary science, genetics (animal and plant) through to agronomy management. There may be potential to build human resources through professional volunteer programs and in-country mentoring. While visits to Australia can aid in valuable exchange of information particularly for government and industry, benefit is seen in supporting longer training timeframes in Mongolia or Australia.

The stakeholder lists for Australia and Mongolia offer interested parties key contact points for developing relationships in these key areas of opportunity. Some Australian organisations and individuals have been involved previously, as expert consultants and through international organisations, and there is an interest in Mongolia in fostering further partnerships. To further the opportunities identified, the Department of Agriculture’s key role can be to provide connections to government, academia and industry to progress cooperation activities in collaboration with industry and other stakeholders.

In summary, this study identifies a broad range of potential cooperation opportunities particularly around skills transfer, systems for increasing productivity and common experiences with natural resource pressures. Existing MOUs support cooperation in these areas and there are opportunities for companies and organisations to make connections between Mongolia and Australia. There may also be challenges to developing these opportunities. Such challenges include the different stages in development of agricultural industries and production systems in Mongolia and Australia, priorities within Australia’s international aid programs, language challenges in expertise transfer, and funding availability for programs or investment.

This study has not prioritised which areas of cooperation opportunities might be most feasible and what might be most beneficial, or examined how some of the areas of cooperation might
interact. These aspects, as well as potential funding options for activities, would be important to consider going forward.

**Notes on machinery of government changes during 2012 and 2013**

Following the general election in Mongolia in June 2012, the Ministry of Food, Agriculture and Light Industry was replaced by the Ministry of Industry and Agriculture.

In September 2013, there was a change of government in Australia and subsequent changes to Australian government departments. The Department of Agriculture, Fisheries and Forestry was renamed the Department of Agriculture. On 1 November 2013, AusAID was integrated with the Department of Foreign Affairs and Trade and responsibility for Australia’s aid program transferred to the Department of Foreign Affairs and Trade.

This document has references to both previous government portfolios in both countries, and updated current responsibility areas depending on the context. Some information may have been superseded since the original research was undertaken in 2012.
1 Introduction

Mongolia continues to emerge from a major economic, political and social transition (the transition) that occurred in the early 1990s. Its economy is strongly underpinned by livestock herding and other agricultural production in a context of the increasing importance of its mining resources sector. In its transformation into a market economy, and through intensification of primary production, Mongolia faces resource pressures and challenges around maintaining and improving rural livelihoods, and competing in global markets. A key goal for the Mongolian government is developing intensified agriculture to help meet food security and self-sufficiency targets (in certain sectors). Some of the systems in place prior to the 1990s were lost (e.g. stock registration, intensive dairy production, public service capacity). The country is in a re-building phase, finding a balance between government support and private sector investment.

Australia has similarities to Mongolia in terms of its dry landscapes, and a strong primary production base. There has been some cooperation between the countries in agriculture previously. As part of its transition to a market economy and development of its agricultural and mining resources sector, Mongolia is interested in cooperating with other countries to advance its industries.

The Australian and Mongolian Governments are building closer bilateral ties including in science, education and human resources, and mining expertise (DFAT 2012a). Mongolia opened an Embassy in Australia in 2008. In 2007, Australia appointed an Honorary Consul in Ulaanbaatar and opened an Australian Trade Commission (Austrade) office in 2011 which was upgraded to an Australian Consulate-General in March 2012. There are opportunities for Australia to play a role in the development of Mongolian agriculture. Likewise, there are likely to be opportunities for Australia to benefit from Mongolian expertise, knowledge and experience.

This project was funded by the Australian Government in the first half of 2012, the year marking 40 years of Australia-Mongolia diplomatic relations. The anniversary was acknowledged by the Mongolian and Australian governments.

Reason for this study

A Memorandum of Understanding between the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) and the Mongolian Government Ministry of Food, Agriculture and Light Industry (MoFALI) was signed in Canberra on 23 February 2011 during a visit to Australia by the then Prime Minister of Mongolia, HE Mr Sukhbaatar Batbold. The purpose of the MOU is to 'strengthen cooperation in the field of agriculture between Mongolia and Australia on the basis of mutual benefit', and to 'encourage and facilitate the exchange of information including on technology with a view to fostering long-term cooperation in agriculture. Six areas of cooperation are identified in the MOU.
1) Encourage cooperation on livestock and crop production.

2) Encourage cooperation on technology transfer and extension activities in the agricultural sector.

3) Encourage training of agricultural specialists in Australia and Mongolia.

4) Exchange of information relating to food, livestock and crop production, fisheries and forestry, and other subjects of relevance.

5) Encourage joint ventures and development projects between public and private sectors of both countries in the fields of food, agriculture, fisheries and forestry.

6) Other related areas of interest that are mutually decided by the Participants.

The project 'Potential agricultural cooperation between Mongolia and Australia' was undertaken as an activity under the MOU. The project was conducted by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), for the Trade and Market Access Division (TMAD) in the Department of Agriculture (the department). ABARES provides professionally independent economic and science research and analysis to inform decision-making and policy development, primarily for the department as well as other government and non-government clients.

The project was funded under the department’s International Agricultural Cooperation (IAC) Program. The IAC program aims to 'promote rural exports by building bilateral government-to-government relationships, facilitating improved market access and trade growth for portfolio industries and providing technical and capacity-building assistance to targeted trading partners'.

There is modest agricultural trade between Mongolia and Australia. In 2011–12, Australia’s agricultural exports to Mongolia were valued at $1.2 million and consisted of mostly wine, sugar and beef and lamb cuts (ABS 2012a). Agricultural imports from Mongolia into Australia consisted largely of tomatoes and were valued at $0.5 million. Agriculture represents a small amount of the total Australian exports to Mongolia which were $46 million in 2011–12 comprising mostly civil engineering equipment, instruments and tools used in Mongolia’s mining industry (ABS 2012a).

The Mongolia country profile released alongside the Australia in the Asian Century White Paper notes that there are opportunities for Australian expertise and equipment to be employed to develop Mongolia’s agriculture sector, especially the wool and meat industries (DFAT 2012b). This project has built the department’s knowledge and understanding about the Mongolian agriculture, fisheries and forestry sectors and enabled an analysis of the potential for future cooperation, identified potential stakeholders in Australia and Mongolia, and provided greater understanding of opportunities and some potential constraints to agricultural cooperation.

**Scope and approach**

This is a scoping study conducted over a relatively short period, with data collection occurring in May–June 2012. Key objectives were to understand the current situation in Mongolia’s agricultural industry, and to identify potential for agricultural cooperation by focusing more closely on areas of interest identified under the MOU, principally: technology transfer and extension activities; training of agricultural specialists in Australia and Mongolia; and exchange of information.
The expected outcomes of the project were:

- improved understanding of the development needs of the Mongolian agricultural sector
- improved understanding of existing agricultural links between Australia and Mongolia
- identifying potential for Australian expertise and services to be harnessed under the MOU
- increased range and database of contacts with relevant stakeholders in the Mongolian agricultural industry
- a database of potential areas for collaboration
- potential to lead to increased trade in agricultural services between Australia and Mongolia in the future
- recommendations about further activities or efforts to maintain a positive relationship with Mongolia and further develop the opportunities identified.

This project is not focussed on developing opportunities for or facilitating trade in agricultural products e.g. meat or other livestock products.

The approach used in this study was:

- a background desktop review (international projects and country analysis) including initial stakeholder identification
- meetings with key stakeholder contacts in Australia
- DAFF delegation visit of one week in Mongolia for stakeholder interviews
- synthesis of material from the desktop review, meetings, interviews, and stakeholder analysis.

**Report structure and study outcomes**

This report is the primary output of the scoping study under the DAFF IAC project. Section 2 describes methods in more detail; section 3 gives an economic overview of Mongolia’s agriculture sector, trade, and context for international activities; section 4 explores possible cooperation needs and opportunities according to themes, including notes on Australian context and linkages; section 5 provides overview information on Australian agriculture and issues; and section 6 provides synthesis and conclusions for possible further activities or directions.

While this study identifies potential stakeholders, it does not seek to actively develop relationships between them. That is for respective stakeholders including industry and education bodies and the private sector to undertake.
2 Methods

The overall purpose of this study is to identify and report on the potential for agricultural cooperation between Australia and Mongolia. The study focuses on the areas of interest identified in the MOU between MoFALI and DAFF.

The project was divided into four key phases.

1) Literature review and desktop stakeholder analysis.
2) Design and preparation of field work in Mongolia.
3) Field work in Mongolia including key informant interviews.
4) Analysis of issues and opportunities identified through desktop study and field work.

These phases are described in more detail below.

Literature review and country analysis

Phase one of the project involved establishing baseline information about the Mongolian agricultural sector. This involved identifying key characteristics of the sector, such as the main agricultural activities, production systems, farm structures, production challenges and relevant policy settings. Information was gathered through a mix of methods including personal contacts at relevant government departments and a literature review. A key strategy was to undertake a review of relevant past and current projects already in place within the country. This involved collecting existing research reports and papers to develop a background paper as a tool for guiding enquiries, forming contacts with key people and identifying an initial list of potential collaborative opportunities. The ability to build on existing relationships and avoid repetition of effort was a key aspect of this approach.

Sources of data included:

• websites
• published and unpublished studies
• official records and documents
• statistics on trade, production and socio-economic data
• representatives of government, non-government, education, research, and commercial organisations (see below).

Interviews in Australia

Based on the country and stakeholder analysis undertaken above, key contacts in Australia were interviewed about relevant interests and/or projects in Mongolia. This primarily included government departments and research organisations such as the Australian Agency for International Development (AusAID), Australian Centre for International Agricultural Research (ACIAR) and researchers from the Mongolian Studies Centre at the Australian National University (ANU). These interviews provided an overview of context, opportunities in Mongolia and the potential issues for which Mongolia may seek exchange of information and additional expertise under the MOU. Interviews also provided feedback on the design of a questionnaire for the field work in Mongolia, and suggested contacts.
**Visit to Mongolia**

A field visit to Mongolia by a DAFF delegation was proposed. DAFF received a formal invitation from the Director General of the Coordination Department of Food Production, Trade and Service Policy Implementation, MoFALI, to visit Mongolia. This visit was undertaken from 2 – 9 June, 2012. The visit was organised with the assistance of the External Cooperation Division of MoFALI, the Mongolian Embassy, the Mongolia State University of Agriculture (MSUA) and the Australian embassy in the Republic of Korea which is responsible for relations with Mongolia. Interviews were organised with a range of stakeholders in the agricultural industry. This visit was designed to gather information for the study and provide the opportunity to develop new contacts and deepen existing relationships between Australia and Mongolia.

The delegation met and interviewed representatives of MoFALI divisions and other government agencies, non-government organisations, research organisations, consultants, a commodity processor, several international organisations, and primary producers. The objective, as part of a Rapid Rural Appraisal (RRA) (outlined below), was to obtain a variety of perspectives in a short timeframe.

Speaking with stakeholders in a number of different contexts was an important step to gain a strong understanding of the Mongolian agricultural sector. As well as meetings in the capital Ulaanbaatar, the department’s delegation visited two rural locations to gain direct experience of Mongolia’s agricultural practices and lifestyles, including speaking directly with farmers and herders (see Figure 1). A list of the meetings is provided in Appendix C.

**Rapid Rural Appraisal**

The method used to undertake the stakeholder analysis is based on the RRA approach (Chambers 1981). This approach is based on undertaking informal interviews with a diverse range of stakeholders, along with direct observation and reference to secondary sources. The benefit of RRA lies in the speed with which it can be undertaken and the ability to develop an understanding of local agricultural conditions, problems and characteristics (FAO 1997). Based on the RRA method, four broad questions were identified for the study visit in Mongolia.

- What are Mongolia's expectations and desires for cooperation with Australia under the MOU?
- What are the opportunities and constraints for co-operation?
- Who are the key stakeholders relevant to cooperation under the MOU?
- How can opportunities be progressed and constraints overcome most effectively?

To identify relevant stakeholders, the following considerations were applied.

- Who or what affects or is affected by cooperation between Australia and Mongolia?
- What are stakeholders' interests, needs, priorities and influence?
- Who interacts with whom about what?
- How do stakeholders operate and interact in relation to opportunities for cooperation?
- What are the areas of shared understanding or conflict?
- Are there any marginalised stakeholders?
Not all of these were addressed fully due to unavailability of information - particularly dynamics between stakeholders.

**Interviews in Mongolia**

Semi-structured interviews were conducted with key informants. After an introduction to their role, goals and priority issues, follow up questions were asked to openly explore their views. Interviews were guided by a questionnaire, which had been provided to most interviewees before the meeting. The questionnaire emphasised the following topics.

- For agricultural technology transfer – what do you see as the most important needs / opportunities?
- For training of agricultural specialists – what do you see as the most important needs / opportunities?
- For exchange of information between Mongolia and Australia on agriculture – what do you see as the most important needs / opportunities?
- How do you think Mongolia and Australia can cooperate on agriculture and herding in Mongolia?

Further questions explored areas such as marketing, education and volunteer programs, and other suggested stakeholders. The questionnaire was provided in English and Mongolian languages, and an interpreter was present at interviews undertaken where English was limited. The meeting record and full questionnaire sheet including Mongolian translation are provided in Appendixes C and D. A number of meetings were recorded with the permission of participants.

Ten interviewees also provided written responses to the questionnaire. Three of these were answered in Mongolian and a translation was provided by the External Cooperation Division of MoFALI.

**Synthesis and write up**

Synthesis and interpretation of the information obtained from interviews and the literature review drew on background review and country analysis, and integrating these with findings from the Mongolian field visit. An overview of the Australian agricultural context was also incorporated; with a specific focus on identifying potential stakeholders that link with the needs and opportunities identified though the interviews and literature review.

Australian organisations were contacted to indicate interest, provide information if applicable, and to seek permission to be listed as stakeholders in the report. Organisations included those mentioned in key informant interviews or identified as potential or likely stakeholders by the research team. This action contributes to encouragement of collaboration under the MOU between the Australian and Mongolian governments.
Figure 1 Mixed goat and sheep herding, Erdene district, east of Ulaanbaatar

Source: DAFF delegation visit, June 2012.
Agriculture in the Mongolian economy and international activities

Agriculture and herding activities in Mongolia in 2010 constituted around 15 per cent of annual gross domestic product and 32 per cent of employment. While overtaken by mining in terms of total economic contribution, agriculture remains a major influence on wellbeing and livelihoods for much of the population. The agriculture sector is heavily focused on extensive livestock production, as herding activities on grasslands that make up around 73 per cent of the land area (MoFALI 2009a). The main livestock raised commercially are sheep, goats, cattle, horses, and camels, used for meat, dairy, hides and fibre production. The main crops include cereals (wheat, barley), potatoes and other vegetables. Development in the sector is influenced by challenging natural resource conditions: an extreme climate, long winters, a short growing season and low precipitation, and other issues including relatively limited physical infrastructure, low rural population density, and low levels of technology uptake.

This section gives an overview of general economy and agricultural trade contributions, followed by a scan of internationally-supported cooperation activities.

Economic overview

Prior to 1990, Mongolia was a centrally planned economy. The break-up of the former Soviet Union and the socialist trading system led to Mongolia’s transition toward a market oriented economy. The transition was characterised by the liberalisation of prices and tariffs, a shift toward a free exchange rate system and a new social welfare system (European Commission 2001). The withdrawal of Soviet financial and institutional support in the immediate period after the break-up resulted in a contraction of the economy in the early 1990s, shown by a decline in gross domestic product (Figure 2).

The economic situation in the early 1990s saw tight monetary and fiscal policies put in place to achieve macro-economic stabilisation by reducing hyperinflation, and both the budget and current account deficits. Intensification of structural reforms led to large scale privatisation—the transfer from public to private ownership—in sectors including construction, trade and agriculture. These reforms provided the necessary framework for the economy to recover from the downturn in the early 1990s (European Commission 2001).

Mongolia has experienced strong economic growth over the last decade. Real gross domestic product (GDP) grew at an average annual rate of 6.2 per cent between 2001 and 2010. The economic growth of the mid 2000s was largely underpinned by higher commodity prices, large increases in revenue from the mining sector and favourable weather which boosted agricultural output (European Commission 2006).
Mongolia experienced a downturn in economic growth in 2008 and 2009 following the global financial crisis, with growth dropping to -1.3 per cent in 2009. The economy has since recovered and grew by 17.3 per cent in 2011 in real terms (Asian Development Bank 2012), driven mainly by infrastructure spending related to mining activity. Other important contributors included domestic consumption (which increased by 14.5 per cent in real terms), mining (8.7 per cent), manufacturing (16.0 per cent) and construction (14.3 per cent). Growth in agriculture has been slower, increasing by 0.3 per cent in 2011. The overall economy was forecast to grow in real terms at rates of 15 per cent in 2012 and 17.5 per cent in 2013 (Asian Development Bank 2012).

**Personal income and rural poverty**

Mongolia remains a relatively poor country despite recent levels of economic growth. In 2010, Mongolia had a gross national income of $US1870 per person (Figure 3). Although this increased from $US460 in 2000, this level of income per person is relatively low by world standards (UNDP 2010). A large proportion of the population live below the poverty line. In 2008, 46.6 per cent of the rural population and 26.9 per cent of the urban population lived below the poverty line according to World Bank analysis (World Bank 2012).

Rural poverty has been particularly influenced by disruption from the privatisation of livestock from the early 1990s, and migration to urban centres, leaving high numbers of subsistence herding households. In 2009 the Mongolian government estimated that 82 per cent of rural livestock households have less than the 200 head of stock needed for subsistence (MoFALI 2009a).

Alleviating vulnerability and rural poverty is a key driver in Mongolia's agriculture and development goals. Box 1 provides more information on herders and the effects of economic transition.
The harsh continental climate in Mongolia and variable grassland availability has meant that Mongolian people have historically tended to lead a nomadic lifestyle based on pastoral animal husbandry (ERINA 2003). Traditionally, groups of around 7-12 herder households formed small nomadic settlements, with households raising a variety of livestock to supply different needs of the settlement, such as food, clothing and transportation (ERINA 2003). During summer, households would settle in one place and would move to their winter shelters when the weather became harsher.

Although the government attempted to collectivise livestock herds in the 1930s, it wasn’t until 1960 that the process of collectivisation was completed. As part of this, private ownership of livestock was restricted and the majority of livestock were transferred to the collective ownership of State operated cooperatives. All herders became paid employees and responsible for specialised single-species herds. As a result, the nomadic herder-settlement systems were abandoned. Large scale investment, state control and regulation of pasture management in the herding sector changed a nation of nomads into an agricultural industrial state (MSRM 2009). These cooperatives operated up until decollectivisation, which commenced in 1991.

Privatisation of cooperatives saw livestock ownership transferred back to private herder households, and consequently saw the re-emergence of the nomadic herder settlements. Pasture land remained state owned. Herders became responsible for their own herd management decisions, as well as production, managing risks and sourcing inputs.

The privatisation of state-owned collective livestock provided an incentive for many Mongolians to turn to herding as a safety net due to unemployment in other areas of the economy. Herding has continued as an open access system since privatisation in 1990.
Agriculture and trade

The agricultural sector plays a critical role in the Mongolian economy, particularly in terms of employment. However, its relative contribution to Mongolian GDP has been declining since 1996 (Figure 4). In 1993, agriculture’s contribution to GDP was 30 per cent and increased to 43 per cent by 1996. It has since decreased to 15 per cent (in 2010), as the mining sector has grown.

Figure 4 Contribution to GDP by industry

![Graph showing contribution to GDP by industry from 1990 to 2010.](image)

Data source: National Statistical Office of Mongolia 2012

Since 1991, agriculture has grown at a slower average rate than overall GDP. As stated earlier, from 2001 to 2010 Mongolian GDP increased at an average annual rate of 6.2 per cent; agriculture grew at an average annual rate of 1.2 per cent (in real terms) over the same period. In 2010, overall real GDP increased by 6.5 per cent compared to the decrease in agriculture of 16.5 per cent (Figure 5).

Considerable growth experienced in the mining and manufacturing industries, combined with relatively low productivity growth in agricultural sectors, have contributed to this decline in agriculture’s contribution to GDP. In addition, severe winters or dzud in 1999-00 and 2009-10 contributed to a significant downturn in agriculture relative to the rest of the economy (the term dzud is described in Box 2).
Box 2 Climate, soils and grasslands

Mongolia’s climate is characterised by sharply defined seasons, high annual and diurnal temperature fluctuations and low rainfall. Because of the high altitude, the climate is generally colder than other countries of the same latitude. Annual rainfall averages 200-220mm, ranging from 38.4mm in the extreme south to 389mm in parts of the north (Ministry of Nature and the Environment 2007). Heavy rain, snowfall, strong winds, sandstorms, snowstorms, flooding and drought can result in loss of livestock and substantial property damage in rural areas. During extreme dzud events, which are the combination of summer drought and severe winter conditions, seasonal feed shortages are exacerbated because a larger proportion of the land is snow covered and cannot be grazed, causing stock starvation.

The principle soil type in Mongolia is dry-steppe chestnut soil which covers 40 per cent of the national area. Chestnut soils are typically light and silty, around 30cm deep with high organic matter content of 3 to 4 per cent. The relatively light nature of the soils results in low moisture retention and makes them more vulnerable to erosion (FAO 1996).

Grasslands in Mongolia have a very short growing season, limited by the cold temperatures and variable precipitation. Pasture growth begins in mid-May and mostly ends after mid-August (MSRM 2009).

Agriculture provides a major contribution to employment in the Mongolian economy. However, the sector's contribution to the labour force has steadily decreased since reaching a high in 1999 (Figure 6). In 1993, agriculture accounted for 36 per cent of the total labour force. This increased to around 47 per cent in 1999, and in 2010, agriculture accounted for 32 per cent of the total labour force.
Agricultural contribution to total labour force

Data source: Asian Development Bank 2011

Agricultural trade

Prior to 1993, Mongolia was a net exporter of agricultural products—mainly meat, wool and cashmere and occasionally cereals and milk. The trade balance of exports to imports has declined and since 2002, Mongolia has been a net importer of agricultural products, with the exception of 2006 (Figure 7).

Agricultural trade balance

Data source: FAO 2012

Between 1989 and 1995, agriculture experienced a downturn which led to a decline in the value of agricultural exports, and therefore a decline in the total value of agricultural trade by 60 per cent to $US83 million (Figure 8). Since 1995, the total value of agricultural trade has been increasing partly because of a recovery in agricultural exports (at least until 2007) but also because of increasing agricultural imports. In 2008 and 2009, the value of agricultural imports
increased substantially compared to previous years, while the value of agricultural exports was particularly low.

Although the value of agricultural trade has been increasing, the contribution of agricultural trade to total merchandise trade in Mongolia has been decreasing. For example, in 1999 agriculture accounted for 26 per cent of total trade value, while in 2009, it accounted for 9.5 per cent. The significant growth in mineral exports over this period has been largely responsible for the decline in agriculture’s share of the total value of trade in Mongolia.

**Figure 8 Value of agricultural trade**

![Graph showing value of agricultural trade from 1970 to 2009.](image)

**Data source: FAO 2012**

Textile fibres, including sheep wool and cashmere, and meat have accounted for a significant component of Mongolian exports in recent years. The contribution of the meat sector to exports declined from 32 per cent of exports in 1993 to 17 per cent in 2009, while the share of textile fibres increased from 42 per cent in 1990 to 56 per cent in 2009. The relative growth in textile fibre exports reflected the shift in Mongolian agriculture toward goats and fibre production in the 1990s.

In 2009, Mongolia’s agricultural imports on a value basis were comprised predominantly of cereals (22 per cent), tobacco (12 per cent), cocoa (9.5 per cent) and fruit and vegetables (8.7 per cent) (FAO 2012). Mongolia is dependent on imports for rice, sugar, vegetable oil, eggs and vegetables such as onion and garlic (MoFALI 2012).

**Contributions to agricultural output**

The agricultural sector is dominated by livestock production (Figure 9), with the main stock being sheep, goats, cattle, horses, and camels. The relative contribution of the livestock sector has varied over time. In the late 1980s, the livestock sector accounted for 82 per cent of total agricultural production value. However, as a result of the shift in employment to the livestock sector during the early 1990s, livestock production accounted for 95 per cent of production value by 2000. The re-emergence of the cropping sector, combined with the *dzud* of 2010, has seen the relative contribution of the livestock sector to agricultural output decrease in recent years. In 2010, 85 per cent of the gross value of agricultural production was animal based while
the remaining 15 per cent was mostly from field crops, principally potatoes and wheat. Other crops are turnips, carrots, cabbages, onions and other vegetables including greenhouse-grown cucumbers and tomatoes (MoFALI 2012).

Figure 9 Livestock and cropping sector contributions to gross agricultural production value

Between 1970 and 1990, the total value of agricultural production increased at an average annual rate of 2.3 per cent. During this period, the value of livestock production increased at an annual rate of 1.3 per cent (Figure 9).

Further detail and trends information for Mongolia’s livestock and cropping sectors is provided in Appendix A.
Context for international activities

The list below summarises key geographic and socio-economic conditions in Mongolia, which explain key agricultural development needs and the context for the range of government-supported international programs.

- Extreme weather conditions. 43 per cent of area is semi-desert prone to dzud and drought, creating instability in agriculture production, stock and crop losses.

- Seasonality of production. Most animals are sold in autumn after they have regained full weight in summer. Vegetable harvest is restricted to late summer/autumn (except greenhouse production).

- Vulnerability of population to poverty. Influenced by low livelihood diversification and weather extremes (dzud).

- Small, heavily urbanised population. Sparse population elsewhere. Urban population growing quickly due to migration from rural areas.

- Strong influence of major economic neighbours, Russia and China, on trade conditions.

- Restricted capacity to supply of higher quality and value-added agricultural products, due to marketing structures and food processing standards.

- Poor infrastructure including storage, transport and irrigation systems.

- Degradation of natural resources, particularly rangeland pastures.

- Low capacity of human resource skills, including vocational and higher education.

- Water resource utilisation for food production, with needs for re-building water infrastructure and sustainable management.

Sources: Collated from MoFALI presentation (2009c), and National Food Security Programme Brief for donors committee meeting (MoFALI 2009a).

A number of these are discussed in further detail in the next section.

There are a significant number of international agencies and supported projects active in the Mongolian agricultural sector. The conditions noted above provide some context and reasoning behind the areas of activity initiated under a variety of international projects, in most cases in partnership with the Mongolian government. Some of these projects are listed below to provide an overview of the topic coverage of capacity building being undertaken in Mongolia, with a focus on agriculture (Table 1). The projects outlined here also may assist with identifying areas for further research or capacity building opportunities.

Australia’s Agency for International Development (AusAID) commissioned a 2011 scoping study on Mongolia to inform its assistance program planning. The study found the infrastructure sector attracted the highest level of donor commitment and number of projects, followed by agriculture, and then rural development (Chamberlin and Mijiddorj 2011). The three sectors were described as “heavily subscribed as a proportion of total commitments”, with some 28 projects in the agriculture sector costed at over $600m. Donor agencies located or represented in Ulaanbaatar (not just agriculture) include the United Nations Food and Agriculture
Organisation (FAO) and United Nations Development Program (UNDP), World Bank, Asian Development Bank (ADB), Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), KfW Entwicklungsbank (KFW), Korea International Cooperation Agency (KOICA), Japan International Cooperation Agency (JICA), Millennium Challenge Corporation USA (MCC), Swiss Agency for Development and Cooperation (SDC), and United States Agency for International Development (USAID) (Chamberlin and Mijiddorj 2011).

### Table 1 Examples of recent projects supported or implemented by international agencies

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<thead>
<tr>
<th>Project / topic area</th>
<th>Agency / partners</th>
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</thead>
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<tr>
<td>Rural Poverty Reduction Programme</td>
<td>IFAD</td>
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<tr>
<td>Integration of Crop and Livestock Production</td>
<td>EU-TACIS</td>
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<td>Sustainable Grasslands Management</td>
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<td>Sustainable Livelihoods</td>
<td>World Bank</td>
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<tr>
<td>Conservation and Sustainable Management of Nat. Res</td>
<td>GTZ</td>
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<tr>
<td>Green Gold Pasture Ecosystem Management</td>
<td>SDC</td>
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<tr>
<td>Rural Agribusiness Support Programme</td>
<td>USDA</td>
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<tr>
<td>Gobi Regional Economic Growth Initiative</td>
<td>USAID/MercyCorps</td>
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<tr>
<td>Rural Self Help Group Development</td>
<td>GTZ</td>
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<td>Support to Veterinary privatisation</td>
<td>GTZ</td>
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<td>Capacity Building in Agriculture</td>
<td>ADB</td>
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<td>Development of Agricultural Services</td>
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<td>Agriculture Sector Strategy Study</td>
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<td>France</td>
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<tr>
<td>Cooperative Management</td>
<td>GTZ</td>
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<td>Rural poverty reduction</td>
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<td>Pastureland management component of Sustainable Livelihoods</td>
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<td>Animal Health and Livestock Marketing</td>
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<td>Index-Based Livestock Insurance Program</td>
<td>World Bank/SDC/Japan</td>
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<td>Peri-urban rangeland management</td>
<td>Millennium Challenge Program/MSRM</td>
</tr>
<tr>
<td>Sustainable Land management for combating desertification</td>
<td>SDC/Netherlands/FAO/UN</td>
</tr>
<tr>
<td>Training for Rural Development</td>
<td>Canada (International Development Agency)</td>
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<td>Mongolian Potato Program</td>
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<tr>
<td>Rural infrastructure and service - Agriculture and rural development</td>
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<tr>
<td>Safety Control System Mongolian Animal Products</td>
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</tr>
<tr>
<td>Improved Meat Hygiene and Commercial Meat Processing</td>
<td>FAO/UN</td>
</tr>
<tr>
<td>Rural water supply</td>
<td>UNDP</td>
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<tr>
<td>Establishment of Climate-Resilient Rural Livelihoods (2012)</td>
<td>ADB</td>
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<td>Poverty Reduction through Community-Based Natural Resource Management (2008)</td>
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<td>Water Point and Extension Station Establishment for Poor Herding Families (2008)</td>
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<td>Eco-electricity project</td>
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<td>Project for the Establishment of a Greenhouse for Vegetable Cultivation in Mongolia</td>
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<td>Enhancing the Extension System for Comprehensive Crop-Livestock Management</td>
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<td>Property Rights Project</td>
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<tr>
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<td>MCC</td>
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<td>Enabling Market Integration through Rural Group Empowerment</td>
<td>USAID implemented by CHF International</td>
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<tr>
<td>Farmer to Farmer (FtF) Project</td>
<td>USAID implemented by Mercy Corps</td>
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<tr>
<td>Rural Agribusiness Support Project (RASP)</td>
<td>USDA implemented by Mercy Corps</td>
</tr>
<tr>
<td>Mongolian Agriculture Support Project</td>
<td>USDA implemented by CHF International</td>
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<tr>
<td>Coping with Desertification Project</td>
<td>SDC</td>
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Potential agricultural cooperation between Mongolia and Australia

<table>
<thead>
<tr>
<th>Project / topic area</th>
<th>Agency / partners</th>
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<tbody>
<tr>
<td>Sustainable Land Management Project</td>
<td>SDC</td>
</tr>
<tr>
<td>Linking herders to carbon market Project</td>
<td>SDC</td>
</tr>
<tr>
<td>Promotion of camel milk as a potential source of additional income for Gobi herders</td>
<td>SDC</td>
</tr>
<tr>
<td>Ger to Ger - Nomad Centred Tourism</td>
<td>SDC</td>
</tr>
<tr>
<td>Partnership and cooperation of Jura and Gobi-Altai in regional and rural development</td>
<td>SDC</td>
</tr>
<tr>
<td>Project for Market and Pasture Management Development</td>
<td>IFAD</td>
</tr>
</tbody>
</table>

Notes: List covers period since 2000 and is illustrative only, it may not cover all projects or project partners; Some projects and initiatives may have been completed; Refer to acronyms list at front of report for agency names.

Source: MoFALI 2009a and MoFALI Ministry Book 2008

Australian government aid to Mongolia

The Australian Government’s aid assistance to Mongolia focuses on three priority themes: human resource development, mining for development and supporting vulnerable communities. These themes are specified in the Australia-Mongolia Program Strategy 2012–16, agreed to by the Australian and Mongolian governments, and which guides the Australian Government’s approach to aid investments to meet Mongolia’s development goals (AusAID 2013).

Programs for human resource development operate primarily through awards and scholarships addressing professional education and capacity gaps in fields including health, mining, education and natural resource management. A key activity is Australia Awards in Mongolia Program, previously known as the Mongolia-Australian Scholarships Program (MASP), which offers Masters level study scholarships to Mongolians from the public, private, and non-government sectors, to develop economic sectors of priority in line with Mongolia’s National Development Strategy and to enhance institutional linkages between the two countries. AusAID also funds the Australian Volunteers for International Development program (which includes Australian Youth Ambassadors for Development), through which Australians assist local hosts in capacity building. Under the supporting vulnerable communities priority theme, AusAID is supporting an activity to improve access to water, sanitation and hygiene facilities for children in northwest Mongolia. Other work focuses on strengthening governance in the mining sector and addressing environmental and social impacts around mining.

Agriculture is not a priority area under the Australia-Mongolia Program Strategy 2012–16 and the Australian government is not in a position to fund activities in Mongolia’s agricultural sector. Australia contributes to the International Global Agriculture and Food Security Program (GAFSP), which in Mongolia is implemented by FAO and the Mongolian government. Broad GAFSP objectives include to: reduce rural poverty; increase access to markets for livestock commodities; strengthen capacity of producer groups; and raise productivity and quality of livestock through services, technical assistance and capacity building.

The large number of projects active in the agriculture sector was acknowledged in interviews during the field visit to Mongolia. One view expressed was that there was not necessarily duplication and that the number was warranted because of the needs in the agriculture sector.

The fact that projects have been or are active does not preclude (this study) identifying areas of potential cooperation. Knowledge of these projects can be a useful means to identify or reinforce key areas for cooperation activities and understand where linkages could be developed relating to the Australian context.
4 Australian agriculture

Australian agriculture, fisheries and forestry industries have a combined gross value of production of $52.8 billion (2011–12), and account for around 2 per cent of gross domestic product (ABARES 2012a). Total employment across these sectors was approximately 335 000 in 2012, or 2.9 per cent of the total Australian workforce. Whilst this share of national output and employment is lower than in Mongolia, the sectors make an important contribution to Australia’s economic prosperity (DAFF 2012a).

Around 60 per cent of Australian agricultural production is exported, with farm exports generating $36.4 billion in 2011–12 (ABARES 2012a). Major agricultural exports are wheat ($6.4 billion), beef and veal ($4.5 billion), wool ($3.1 billion), cotton ($2.7 billion), dairy products ($2.3 billion), and wine ($1.9 billion). Forest products and fisheries products contributed an additional $2.2 billion and $1.2 billion in export value respectively in 2011–12.

Australian agricultural land use

Around 63 per cent of Australia’s land area supports some form of agriculture or forestry, with climate, soil type and water availability tending to dictate where activities occur (DAFF 2012a). On an area basis, much of the agricultural activity is in semi-arid rangelands regions (ABARES 2012b). The two major sub-sectors within Australian agriculture are those based either on plant crops and their products (including grains and oil seeds, cotton, sugar, horticultural crops, grapes and wine), or on livestock and livestock products (including cattle, sheep, pigs and poultry – for meat, wool, dairy products, leather and other products). Map 1 shows the distribution of land use in Australia. Livestock grazing, mostly on native vegetation for beef, wool and mutton production, is the dominant land use, making up 56 per cent of the land area (Lesslie and Mewett 2013). Other agricultural uses are dryland and irrigated cropping (around 3.5 per cent) and horticulture (under 0.1 per cent). Prime lamb, beef and wool production are undertaken in the high rainfall zone around the eastern and southern coastal and ranges areas. In 2010–11 irrigated agriculture used less than one per cent of agricultural land in Australia, but made up nearly 30 per cent of the gross value of agricultural production (ABS 2012b).

Around 13 per cent of land is protected areas and 7 per cent is set aside for nature conservation. Forestry covers about 2 per cent of Australia in regions with higher rainfall (Lesslie and Mewett 2013).

Land used for grazing on native vegetation may be privately owned (freehold land) or public land leased by private landholders, normally as long term leasehold tenure. Agricultural cropping and livestock grazing on improved pastures are mainly located on freehold land (Lesslie and Mewett 2013). Most land allocated to forestry (native forests) is publicly owned and managed. Most Australian farms tend to be small to medium size family-operated businesses, although there is a trend of increasing larger-scale and corporate managed farms, partly influenced by efficiency drivers (Australian Farm Institute 2012).
Key agricultural commodity trends and exports

An average of 13 million hectares of wheat is planted annually in Australia (13.9 million in 2011–12), often in conjunction with other grain and oilseed crops on mixed enterprise farms (DAFF 2012a). Of the 29.9 million tonnes produced in 2011–12, around 77 per cent was exported (ABARES 2012a). Principal markets for exported wheat are Indonesia, Vietnam, Korea and China.

Figure 10 shows the trend in area of wheat and other crops since the 1970s. The total area has fluctuated at around 24 million hectares since 2004. Other than wheat, on a value basis Australia’s most important crops are fruit and vegetables, cotton, barley, canola (oilseed), and sugar.
Beef production is widespread across Australia, principally from grazing native vegetation in northern areas and modified pastures in southern areas on smaller properties (DAFF 2012a). Annually around 2.1 million tonnes of beef and veal are produced in Australia (ABARES 2012a). Around two-thirds of Australian beef production is exported, with Japan, the United States and the Republic of Korea the principal markets (DAFF 2012a). Beef cattle numbers have fluctuated between 20 and 25 million since the 1970s.

Most Australian wool is merino wool, with around 80 per cent produced in New South Wales, Victoria and Western Australia. Australia exported 405 000 tonnes of wool (greasy equivalent) in 2011–12, valued at around $3.1 billion (ABARES 2012a). China was the major export destination with 75 per cent of the market; India and Italy are other principal export markets for Australian wool.

Wool production has declined from levels of around 700 000 tonnes annually in the mid 1990s (DAFF 2012a), reflecting reduced global demand. In recent years, the increased use of meat breeds has led to a higher proportion of medium to strong types of wool (DAFF 2012a). In 2010-11 about 34 per cent of wool produced was super fine wool (DAFF 2012a). Reflecting improving Chinese domestic demand for wool apparel, exports of super fine wool to China rose by 19 per cent in the September quarter 2012 (ABARES 2012a).

Dairying is established in most temperate areas of Australia, particularly in the south and east near the coast (DAFF 2012a). Most dairy production is on rain-fed pasture, but inland dairying regions generally rely on irrigation water for growing feed and fodder (DAFF 2012a). Around 20 per cent of milk is produced in the irrigation areas of the Murray–Darling Basin in northern Victoria and southern New South Wales.
The number of dairy farms has fallen by two-thirds over the last three decades to around 7000 in mid-2011, while the average herd size has increased to around 230 cows per farm (DAFF 2012a). This reflects a period of market deregulation in the dairy industry and pressures on productivity.

Australian milk production in 2011-12 had a total gross value of around $3.9 billion (ABARES 2012a). Around 45 per cent of milk is exported as dairy products, valued at $2.3 billion. The key export products are milk powders (37 per cent of total value), cheese (33 per cent), and butter (9 per cent). The principal markets for Australian dairy product exports are Japan, Singapore, China and Indonesia (ABARES 2012a).

Figure 11 shows trends in livestock numbers in Australia to 2012. While dairy and beef cattle numbers have been relatively stable since the 1970s, at about 3 and 24 million head respectively, sheep numbers have decreased markedly from 1990, from over 170 million head to around 74 million in 2012. This has been due in part to a shift by wool producers from wool production to dual-purpose or meat sheep, or other enterprises including cropping, as a result of a period of poor returns from wool production (Australian Wool Innovation 2011).

Figure 11 Australian farm livestock numbers

Data source: ABARES 2012c Agricultural commodity statistics

In the last 20 years there has been a shift in emphasis from European to Asian markets for Australian agricultural exports (DAFF 2012a). Since 2001, there has been particular growth in exports to China and south east Asian markets with a relative reduction in proportion of exports to Japan (ABARES 2012a), including in forest and fisheries products.

Current issues in Australian agriculture

Australia’s agricultural landscapes are diverse, defined by the interrelationships between landscape resources (especially hydrology, soil quality and topography), climatic constraints and the availability of irrigation water. These interrelationships can be classified by agro-ecological region—which are regions with a characteristic interrelationship between agronomy, farming systems and various environmental features, not just climate. Williams et al. (2002)
classified the Australian continent into 11 agro-ecological regions. In some areas, Australia’s natural resources, including soils, water, fisheries and biodiversity, are fragile and some have degraded over time from inappropriate use. The impacts of climate change could increase the frequency of pest and weed outbreaks and extreme weather events, which in turn could constrain productivity (DAFF 2012b, p. 38).

Agriculture is a vital part of the Australian economy, but like many other nations, Australia faces challenges such as climate change, population growth, changing economic conditions, and competition for resources.

To ensure the agriculture sector remains a significant contributor to the national economy, export and trade, innovation and productivity, the Australian Government has commissioned a White Paper on agriculture that will consider:

- food security in Australia and the world;
- the competitiveness of the Australian agriculture sector, including consideration of the competitiveness of supply and value chains in the sector
- the contribution of agriculture to regional centres and communities, including consideration of ways to boost investment and jobs growth in the sector and associated regional areas
- the efficiency and competitiveness of inputs to the agriculture value chain – including consideration of adequate skills training and education – and of infrastructure and supply chains necessary for the export of agricultural products
- the effectiveness of regulations affecting the agriculture sector, including consideration of the extent to which regulations promote effective competition, investment and private sector-led growth in the sector
- opportunities for enhancing agricultural exports and new market access

**Food security**

Australia is in a strong position as a food producing nation, both locally and globally, exporting over half the food produced. Our farmers and fishers produce enough food to help feed about 40 million people living beyond our borders, as well as our own population. Australia has relatively low levels of imported fresh food—over 90 per cent of the fresh food consumed in Australia is produced here. The government will maintain Australia’s food security by creating stronger and more competitive agricultural industries. The White Paper on agriculture will provide the basis for boosting agriculture’s contribution to economic growth, export and trade, innovation and productivity by building capacity and enhancing profitability.

In 2010 an expert working group on food security reported a number of strengths that contribute to Australia’s preparedness for managing food security issues (PMSEIC 2010).

- Australian agriculture has maintained its leading position by producing food on the driest inhabited continent, on low quality soils and in the face of continual climate variability.
- Strong links and capabilities in delivering technological development to developing countries in our region.
- A strong research and development (R&D) base and our agricultural R&D capability ranks among the best in the world.
- A strong capability in climate change research including studies on impacts, adaptation and mitigation.

- Expertise in human health and nutrition research.

**Australia’s agricultural strengths**

Australia’s key strengths include its geographic location, with relative proximity to key emerging markets in Asia; resource endowments favourable to producing a broad range of agricultural products; a largely pest-and-disease-free biosecurity status; a stable political and business environment; strong R&D and innovation; and a skilled workforce (DAFF 2012b).

Australian strengths in agriculture include:

- dryland agriculture
- well resourced and technologically advanced cropping, dairy, meat and fibres industries
- irrigation and water management
- forestry management
- strong and well regulated biosecurity systems
- strong agricultural R&D sector
- community-based natural resource management (integrated governance)
- economic and social analysis that underpins government agriculture policy development.

Appendix B provides further information relating to influencing drivers on Australian agriculture and food sectors.
5 Key issues and opportunities for cooperation with Australia

This section integrates analysis from the desktop review and Australian interviews with findings from the field visit to Mongolia by officers from the department in June 2012. Each sub section first gives general context and analysis of key issues, followed by discussion of opportunities identified through stakeholder consultation.

The structure is based on categories of markets, productivity and resources. This aligns with the department's strategic goals and provides a framework for discussing key emergent themes of the study.

The analysis shows areas of potential opportunity and some of the challenges there may be in furthering opportunities. Several potential stakeholder linkages are discussed under the heading of 'Links with Australia'. Further discussion of Australian agriculture and issues, information sources and stakeholder details, is provided in Appendixes B and C.

Readers should note that a range of projects involving international development agencies are active in Mongolia, as described in Section 3. Themes discussed below may be the subject of some of these development projects; but this does not preclude Australian interests or the potential for cooperation opportunities with Australia in both the public and private sector in areas covered by these projects. Relevant stakeholders may want to investigate the extent of current activities before developing projects or programs, to avoid duplication. A full assessment of current activities was beyond the scope of this study. Information about current agriculture projects could be sought from the international cooperation division of the Ministry of Industry and Agriculture or international agency representation in Mongolia.

Agriculture is not a priority area under the Australia-Mongolia Program Strategy 2012–16 which outlines Australia’s aid investments to Mongolia. Identifying how to fund cooperation activities in Mongolia’s agricultural sector is beyond scope of this study.

Markets

Mongolia faces a number of key marketing and infrastructure issues, in the livestock sector in particular, to increase market access and provide opportunities for producer income growth. Transport and storage infrastructure, and long distances are challenges faced by both herders and raw material suppliers. Compounding this, processing systems, lack of domestic price differentials and quality drivers, and marketing structures further inhibit opportunities for value adding.

Processing capability and infrastructure

Meat

With livestock herding a cornerstone of Mongolian agriculture, meat products—principally sheep, cattle and goat—contribute around 50 per cent of total value of agricultural production (FAO 2012). Meat production remains critical for rural livelihoods, in terms of both income and consumption requirements. Mongolia is self-sufficient in its meat supply and is a net exporter of meat products (MoFALI 2012). There are opportunities to strengthen the industry, particularly in processing to expand markets.
Since the early 1990s, when the value of meat exports fell, Mongolia's export growth has been constrained by transportation, processing and storage infrastructure (UNIDO 2011). Assurance of safe and hygienic delivery of meat products is limited by sub-optimal supply chain infrastructure (World Bank 2007a). For example, 95 per cent of meat is slaughtered in households and/or at slaughterhouses in more remote sum centres, which makes it harder for the government to regulate and monitor food safety standards (World Bank 2007a). Such standards include the international benchmark Hazard Analysis and Critical Control Point risk management system (HACCP—see glossary). Lack of refrigerated containers, and training of staff on handling refrigerated cargo, compound difficulties Mongolian exporters face due to the import conditions imposed by major trading partners such as Russia and China, in terms of transportation and storage standards (World Bank 2007a). In order to become internationally competitive, the United Nations Industrial Development Organisation suggests Mongolia emulate the meat processing systems of competing countries, and follow international safety standards (UNIDO 2011). Whilst many countries have developed strong systems in hygiene, processing and packaging, the Australian meat industry has been identified in particular as 'the best model for Mongolia to study', because of similarities between the countries (UNIDO 2011). Similarities include a dry climate and important ruminant animal industry, the large distances in processing supply chains, and potential competition for similar exports markets in Asia. Activities of donor organisations such as ADB focus on infrastructure and communications, recognising that these systems will help facilitate agriculture.

Although there will be benefits from improving meat processing, storage and transportation systems for the domestic market, domestic demand appears to be sufficiently met through informal processing. Most of the meat consumed domestically comes from animals slaughtered outside the formal abattoir system and is prepared using traditional cooking methods that do not require differentiation of meat based on tenderness, fat marbling, etc. All meat cuts are sold for the same price, or with very slight differences, and there is no consumer demand or pressure for price differentials (UNIDO 2011). As a result, there are greater potential returns in international markets where there is a value adding opportunity through product differentiation.

There is some potential for marketing Mongolian meat as 'organic', based on traditional production values, low inputs and additives. There are some projects and government activities investigating this potential and other value adding opportunities. However, there is a challenge in aligning production and processing systems to certification standards to meet minimum export requirements. Mongolia does not have a broadly accepted organic certification system, and producers meeting costs of certification to international recognised standards is another potential challenge.

Growth in the Mongolian meat sector is contingent upon the ability of government and industry to develop improved processing chains to meet international standards. By doing so, there is the potential to increase the quantity and variety of exportable meat products, and develop opportunities for marketing of organic livestock products.

**Dairy**

The dairy sector is a major component of Mongolian agricultural production, with fresh milk constituting around 20 per cent of total agricultural production value (FAO 2012). Currently Mongolia supplies around 94 per cent of its milk needs from domestic production (MoFALI 2012). Despite the large available supply, a relatively small proportion of milk products are processed industrially (MoFALI 2009b). This presents opportunities and a need to expand
potential agricultural cooperation between Mongolia and Australia

unprocessed milk dominates the market in Mongolia, particularly in summer. milk and other products such as yogurt and curds are largely traded short distances or used on a subsistence basis by herders. imports of processed milk powder are important in urban markets, particularly during the winter and spring periods when raw milk is in short supply (World Bank 2003a). taxation of processed milk and higher prices of packaged dairy products for consumers create an opportunity for local farmers to meet consumer preferences for “fresh” milk. however, constraining factors of climate, transport conditions, storage and processing facilities put a limitation on this demand being met.

most processors of Mongolian milk are relatively small with daily throughputs ranging from around one hundred kilograms to several tonnes, and most operate in rented premises, which makes it difficult to meet hygiene standards and upgrade processing lines (World Bank 2003a). there is a lack of equipment in Mongolia for testing the protein content of the milk and dairy products, and small processors often do not have international standard testing equipment (World Bank 2003a).

the seasonal nature of milk production, and the subsequent high prices of dairy products in winter and spring, has created potential for processing fresh milk during the production season into ultra heat treated milk which can be stored for consumption in the off season. however, this opportunity remains mostly unrealised due to limited testing and processing facilities. investment in upgrading or replacing current infrastructure in dairy processing is required for producers to be able to access these markets during off-season periods (World Bank 2003a). support for the development of dairy processing infrastructure and capacities for value adding of excess milk in regional centres was identified as an opportunity (N Fijn, ANU, personal communication, May 2012).

Cashmere and wool

As in the meat sector, fibres production, principally goat cashmere and sheep wool are a crucial component of rural livelihoods—and contribute over 50 per cent of total agricultural exports (FAO 2012).

There are significant price and income implications from a trend in Mongolian cashmere toward thicker fibres. In 2009, 85 per cent of Mongolia’s cashmere exports were either scoured or de-haired, and only 15 per cent was finished product (UNIDO 2011). By contrast, China exported no unprocessed raw cashmere, and 68 per cent of raw cashmere was turned into finished products. With value added processing at relatively low levels and a decline in cashmere quality (thickness), the industry is vulnerable to changes in market demand. It has been suggested the long-term success of the Mongolian cashmere and wool sectors depends on herders’ capacity to produce higher quality raw fibres, and suppliers to manufacture and market higher quality finished products (USDA 2009).

According to the World Bank (2003b), Mongolia needs to regulate and align quality standards for its cashmere with international standards. To regulate quality standards there needs to be investment in testing and processing infrastructure including primary testing facilities that are recognised by relevant international agencies (UNIDO 2011). Investment in more advanced processing and manufacturing facilities, combined with the certification and trademark of Mongolian cashmere, will help the industry add value to their exports. A large proportion of wool and cashmere is exported, mostly to China, after only basic processing such as de-hairing; and the government is seeking more value adding in-country to increase returns to processors.
and suppliers. Value-adding manufacturing capacity for machine-made carpets, through spinning, knitting and weaving has been identified in Mongolia, with potential to target the large Chinese market (UNIDO 2011). There is also large demand for hand-woven wool carpets presently supplied by Nepal, Pakistan and other countries.

Beyond changes in processing, improvements to storage and transportation facilities would also support better access for herders producing fibres and traders to local and external markets. Availability of storage facilities during the trading season for instance, can help match production flows with consumption patterns over time and provide sellers and buyers with opportunities to trade at strategic times (also see Agricultural Commodity Exchange section).

Other improvements in market access could come through herder integration into private cooperatives which may allow for a reduction in transportation costs. Alternatively, vertical integration between herders and processors, could lead to a sharing of transportation costs between agents, an improvement of income for herders and reduction in supply uncertainties for processors (World Bank 2003b). Many of these infrastructure and marketing concerns complement the productivity concerns in the cashmere sector. By providing the mechanisms for herders to access markets where there are price differentials for higher quality wool and cashmere, they are provided with price incentives to improve their productivity and produce a higher quality product.

Identifying opportunities for cooperation

The following discussion on opportunities is drawn largely from consultation during the visit to Mongolia by DAFF officers. Mongolia’s development needs were raised reflecting the need for processing infrastructure and stronger systems for post-farm-gate food processing. This was especially relevant for meat products, rather than dairy, and was linked to Mongolian aims for access to export markets. Topics highlighted were supply chain quality systems, enforcement of safety standards and regulations, traceability (identification) and differentiation of products.

Some informants suggested problems with the hygiene standards of meat production lines were not fully acknowledged. Other comments reflected that ‘good meat’ is produced, but there’s lack of quality control and problems meeting sanitary requirements for export. Remote and traditional production is self-sufficient and not set up for ‘modern’ market processing and quality differentiation of meat cuts.

Several international projects were mentioned relating to meat processing and accessing market chains, including the EU-Mongolia Animal Health and Livestock Marketing project. Loans were provided to ‘kick start’ improvements, with mixed effectiveness. The FAO Technical Cooperation Programme (TCP) project Improved Meat Hygiene and Commercial Meat Processing (2005 to 2010) focussed on improving access to affordable and safe meat products domestically and also building capacity in meat product processing and packaging for export. This included vocational training for operators and inspectors and in the use of packaging equipment (FAO 2011).

Mongolian Government policy encourages intensification of dairy production closer to urban centres, and direct support is given to industry with a preference for small scale enterprises. This support includes incentives to establish processing facilities and implement international health standards. Smaller enterprises are regarded as needing more support than large processors. Whilst limitations with dairy processing infrastructure were raised during discussion, this was not emphasised as an area for Australian cooperation. Discussion focussed more on dairy on-farm feed systems and breeding (see Productivity section).
The development by government of a stock registration system, including an electronic database, is aimed at providing meat traceability needed for export, and improving food safety assurance at the domestic level. Government is also providing incentives and financial assistance (including loans from China) for improved meat slaughtering and the introduction of international standards at wholesale centres.

Some interest was raised in recognising and exporting food branded as "Mongolian Organic", utilising the traditional values and minimal additives inherent in production. Limitations include lack of meat traceability and a scheme for certification. MoFALI is doing research and has sought assistance from the FAO on developing a program for organic standards.

One interviewee saw a challenge in Mongolia being the different views on improving meat production, the best markets to pursue, and how much meat should be exported; and that an agreed strategy is needed.

Some suggestions on cooperation to support improved processing:

- exchange of information on food safety laws and regulatory frameworks
- exchange of expertise in meat inspection, for example practical training and implementing technical standards. This could involve government officials as well as representatives of industry and universities
- information and examples on how industry and the private sector meet standards for meat market access including livestock traceability; demonstrate quality differentiation and approaches to targeting most suitable markets
- human resource and skills development in food safety (building on previous MoFALI staff who have studied food safety in Australia under masters scholarship program)
- contribution of advice on introduction and administration of organic certification standards
- technology advice for establishment and maintenance of dairy processing and value adding.

Several of these relate to an overarching theme of developing human resource capacity, through knowledge and skills building (see later section).

**Links with Australia on processing and marketing**

**Food standards**

Australia is regarded as having a strong regulatory system and standards in meat and food processing, and its export markets, particularly in meat, are reliant on quality assurance and reliability. Food Standards Australia New Zealand (FSANZ) is the key Australian Government regulatory authority that develops and reviews overall food standards. FSANZ manages the Food Standards Code to regulate the use of food ingredients, processing aids and additives. The code covers the composition of some foods (for example dairy, meat and beverages) and standards developed by new technologies such as genetically modified foods. State government agencies and the private sector are responsible for compliance and enforcement of the code. Enforcement of food regulations at the border is undertaken by the Department of Agriculture (the department).

**Meat**

In Australia, the livestock industry implements a National Livestock Identification System (NLIS) scheme that helps ensure quality and safety standards of beef, lamb, and other meats.
Traceability assists with access to international markets, particularly where concerns about the spread of infectious animal diseases, such as foot and mouth disease (FMD), are a potential barrier in achieving market access. The system is used by producers, agents, saleyards and processor bodies. The system is a partnership between the Australian Government and industry, supported by a regulatory framework of State and Territory legislation.

Australia’s meat and livestock industries are supported by a range of industry organisations that provide services and advice, including political representation and research and development. As part of the recommendation for Mongolia to emulate other countries, UNIDO (2011, p. 73) reported that Australia’s large population and segmented market, niche markets and cultural mix (differentiation not present in Mongolia), makes it ‘an excellent base for researching what international meat markets require’. Further detailed comparison of Australian and Mongolian meat markets is available in van Gelder (2010).

Training in food processing and standards is supported by industry, and the vocational sector such as TAFE. Universities also provide undergraduate and higher degrees in agricultural science and related topics.

Organic products for domestic sale are commonly certified by one of Australia’s seven private certifiers who base their certification standards on the National Standard for Organic and Biodynamic Produce (Australian Standard 6000–2009 Organic and biodynamic products). The national standard sets out minimum criteria businesses must meet before they can label products as ‘organic’ or ‘biodynamic’ (DAFF 2012b). For export, organic and biodynamic produce must be certified in accordance with the national standard. The department’s Export Organic Program helps ensure organic and bio-dynamic producers meet requirements of importing countries, to maintain market access. Knowledge of these standards and how they have been implemented may be useful in the Mongolian context.

**Mongolia’s Agricultural Commodity Exchange**

The Mongolian government is establishing a national Agricultural Commodity Exchange, supported by a new law introduced in mid 2012. The Exchange will be a company with 49 per cent public and 51 per cent private ownership that will operate warehouses and a trading system. The Exchange will support a more formally organised trading and marketing structure for raw materials, and is aimed at improving quality and market opportunities for producers including access to export markets (Figure 12). The localised trading system where most herders sell fibres directly to agents at farm gate has made it difficult to access competing offers and results in discounts of 10 to 45 per cent from capital city prices; leaving traders with large margins over herders (World Bank 2003b). As well as enabling buying and selling at strategic times, greater transparency is expected, for instance through online auctions. The initial focus will be on wool and cashmere with plans to extend to non-livestock commodities such as wheat. Various government departments, non-government and producer bodies, such as the Association of Suppliers of Raw Materials will be members of a coordination council providing research and overseeing development of the Exchange.

The commodity exchange is expected to improve producer and processor incomes, through a supply chain that supports quality improvement, value adding and better transportation, and provides market access beyond localised level. As part of its support, government is providing financial incentives including low interest rate ‘soft’ loans, for re-establishing local trading cooperatives, food processing facilities and wholesale centres. Member cooperatives are seen as a key part of the system for improving transport, through cost sharing along with other benefits like training.
Identifying opportunities for cooperation on establishing Mongolia’s Agricultural Commodity Exchange

Improving raw materials supply chains and marketing structures was reflected as a key need in discussions during the Mongolia visit. It is also a focus of some international activities including GAFSP. A range of people referred to the difficulties since the transition to a market economy in 1990 and the loss of cooperative marketing systems at local level. The planned Agricultural Commodity Exchange was highlighted by government and other proponents as an important development and it was linked to several policies and programs, including the Integrated Policy of National Development, Industrialisation program and Food Security program.

Whilst various informants agreed with potential benefits from re-establishing localised cooperative marketing structures (for example reducing transport costs across large territory), several also emphasised the importance of building in price incentives for quality, as part of the Exchange. Some suggested that further detailed economic analysis before establishing this structure (one buyer, many suppliers), including fully assessing the costs, would be beneficial.

Marketing organisation and improved processing systems were key areas articulated for potential assistance from Australia, particularly linked to the establishment of the Mongolian Agricultural Commodity Exchange. A large part of this assistance relates to building human capacity. Support needs in re-establishing marketing infrastructure, such as regional processing centres for fibres and dairy, were also raised by researchers consulted in Australia.

Areas of potential cooperation identified mainly related to wool, and are outlined below.

- Study tours to gain information and see operation and trading systems of the Australian Wool Exchange and Grain Trade Australia. Tailored study tours for example in wool classification, management and logistics and quality control. Targeted personnel would be MoFALI staff, members of the coordination council, and its working group.
- Expertise transfer in shearing, fibres classing and industrial processing techniques and services – proposed focus at district (sum) level.
- Expertise and technology transfer in packing, warehousing, transport logistics.
- Evaluation of options in fibres value adding and brand development.
- Support services for herders to increase and recognise quality, to aid in selecting fleeces by quality.
- Research and advice on how to establish and optimally structure a commodity exchange, including economic research.

The difference between Australian fine wool and Mongolian cashmere and coarser wool was acknowledged and may have implications for sharing expertise. Whilst there are technical
differences, there is a strong interest in learning from Australian experiences. A constraint to this type of cooperation may be the length of time official delegations often visit; activities on short visits can be restricted. Exposure tours were seen as beneficial with informants remarking 'it is much better to see it than hear about it'.

**Forestry and forestry products**

A desire for exchange of information on marketing and supply chains for forest products was also raised. Forestry responsibilities in Mongolia sit with two Ministries reflecting objectives of both utilisation and preservation of natural forest resources. There has been action against illegal logging and the amounts of timber for commercial utilisation have decreased. There is interest in learning about transparent commercial supply chains and use of regulations to improve commercial outcomes for forest user groups and support small and medium enterprises. An Exchange is reportedly being considered for forestry products. Forestry is also covered later in section 5.

**Links with Australia on commodity exchanges**

Australian marketing structures are focused on private enterprise and industry marketing bodies, such as Meat and Livestock Australia and Dairy Australia and Grain Trade Australia, which develop supply chain opportunities on behalf of producers. The Australian Wool Exchange is a privately owned company developed following the deregulation of the wool industry in 1993 when the Australian Parliament passed legislation requiring the then statutory wool marketing authority - the Australian Wool Corporation, to divest itself of the responsibility of administering wool marketing arrangements in Australia (AWEX 2012).

The government supports these industry bodies but does not actively participate in marketing. Deregulation and reduction in government involvement has occurred in wool, wheat, dairy and other sectors over the last 20 years. Deregulation of commodity markets as part of developing efficiencies in Australian agriculture is discussed further in Appendix B.

Several other Australian trading structures may be of interest to Mongolia. The Australian Securities Exchange (ASX) is Australia's primary securities and commodities exchange. The ASX trades futures over grain, electricity and wool. Options over grain futures are also traded. AuctionPlus is a real-time internet auction website for the sale of cattle, sheep and wool allowing commodity transaction, reserve price setting and legal change of ownership without the seller, buyer or product having to come together physically at the time of the sale. Links to information and website details for these markets and others that may be of interest, including the Sydney Fish Market, are listed in Table 5 in Appendix C.

The department has a close working relationship with Australian peak industry bodies and can facilitate interaction with Mongolian and Australian industry stakeholders (such as those listed in Appendix C) through its contacts. There may be potential for Mongolia to learn from Australian experiences in brand marketing, such as through Australian Wool Innovation, an industry owned company which has expertise in branding programs, and fibres research. State government departments of agriculture, the Sheep Cooperative Research Centre and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) also have expert knowledge about the production and preparation of wool for sale.

The Australian Centre for International Agricultural Research (ACIAR) has scoped improving cashmere marketing chains in China; and has identified this as an area of research interest that could potentially be extended in Mongolia.
Suggested areas of cooperation included outlining economic modelling approaches, market regulation, and experiences in centralised, regulated commodity markets. As a key national economic and science research agency, ABARES has undertaken research on supply chain dynamics and may be able to provide further information.

**Biosecurity and animal health**

A feature of Mongolia is its large land border, shared with Russia and China, and relatively low population density. Coupled with large livestock numbers, this creates exposure to and risk of disease incursions. Development needs in Mongolia’s pest and disease handling system were less apparent in the desktop review, but were raised during field work in Mongolia. A report under the EU-Mongolia Animal Health and Livestock Marketing project (Brown 2011) has reported on areas for improvement in border control and import and export inspections for livestock products and food. The report identified clarification of responsibilities, risk analysis capacity, and knowledge resources as critical areas.

Infectious animal diseases impact on livestock production and can limit the supply to market of raw materials and livestock products, for example foot and mouth disease (no outbreaks reported since 2010).

**Identifying opportunities for cooperation**

Issues with border surveillance, inspection capacity and diagnosis of disease were raised in interviews conducted in Mongolia. This was described as an institutional challenge as veterinary service and health monitoring is a MoFALI role, while surveillance and quarantine inspections are largely the responsibility of the General Agency for Specialised Inspections. There appeared to be differences in how quarantine controls are managed.

Whilst Mongolia has benefited from relative isolation from disease, the risk of disease outbreaks is a concern. The government is establishing a zoning system to manage disease outbreaks and gain assurances for international trade. MoFALI’s veterinary and animal breeding department has responsibility for monitoring these zones, complemented through private veterinary services. The World Organization for Animal Health (OIE) has undertaken work in Mongolia in cooperation programs on disease surveillance and to evaluate its veterinary service to assist in meeting international standards.

Australia has a fully developed biosecurity regulation and monitoring system that underpins its position as a trading nation in agricultural and food commodities—and has experience in managing demands from international trading partners for greater levels of assurance about exports. There could be potential for transfer of Australian expertise in biosecurity risk analysis and emergency disease management.

Areas for cooperation could include:
- use of biosecurity risk analysis to determine animal and plant health status in trading partners
- advice on how to structure a border surveillance and inspection system
- expertise and training in veterinary services
- exposure visits to study biosecurity systems and animal health programs.
Links with Australia on biosecurity and animal health

Like Mongolia, Australia has a sparse population, large border and an historic reliance on its agricultural production systems. The Australian Government places a significant emphasis on maintaining Australia's favourable animal and plant health status. The risks of exotic pests and diseases entering and establishing in Australia that might impact production and access to markets are carefully managed by the department. In order to maintain Australia's range of disease free statuses, the department devotes substantial time and resources to biosecurity measures; including quarantine.

The department, in partnership with related state government agencies and industry stakeholders, has developed biosecurity programs, initiatives and expertise including risk assessments and protocols to facilitate trade; database systems and information networks; and community engagement strategies, including involving volunteers in biosecurity monitoring activities (Clarke et al. 2012).

Cooperative Research Centres (CRCs) for invasive animals and plant biosecurity have been established to develop knowledge and strategies for managing invasive plants and animals.

Productivity

Livestock management and improvement

Mongolian herders are recognised internationally for their animal husbandry abilities and for developing stock suited to extreme grazing and climate conditions (UNIDO 2011 and N Fijn, ANU, personal communication, May 2012). The general shift in employment in the early 1990s across to the livestock sector had wide reaching benefits in terms of short term production growth and income generation. However, many of the herders shifting to nomadic herding had limited knowledge of livestock management. The result was a general trend across the livestock sector of a focus on output rather than quality, and subsistence systems characterised by low productivity growth and low incomes, particularly in the dairy and cashmere sectors (USDA 2009 and World Bank 2003b).

Dairy Productivity

Dairy production in Mongolia has benefited from generations of herders' experience, the work of livestock specialists, and previous introductions of outside dairy breeds — developing a large number of breeds well-adapted to conditions. Opportunities remain to further utilise the available genetic resources and increase productivity.

Dairy farmers in Mongolia are faced with a number of management issues affecting productivity and investment growth in the dairy sector. Herd development and breeding are at the core of these management concerns, including the control of calving seasons and the use of artificial insemination (FAO 2011). For example, increased late summer to winter calving could be beneficial to take advantage of the higher seasonal prices during winter and spring (World Bank 2003a). However, this would require more feed during this period and there may be associated risks in terms of calf mortality.

The use of artificial insemination and cross breeding could result in a more productive national herd of cows with a higher genetic potential which are still relatively hardy and able to survive the harsh climatic conditions (World Bank 2003a). Use of breeding technologies may be limited
by the level of public investment in education and institutional support for dairy farmers (World Bank 2003a).

From a survey conducted by the World Bank, there was evidence of a critical shortage of access to credit among dairy farmers in Mongolia. High cow mortality risks, and small herd size limit herder access to loans (World Bank 2003a). Given that dairy farming has a 3 to 4 year lag in returns from investment, there are high upfront costs which can't be funded due to a lack of credit. Uptake of breeding programs would require a significant amount of working capital in order to balance the seasonality of production and the investment required in supplementary feed and fodder.

Achieving productivity improvements in dairy therefore lies in the ability of stakeholders to finance and implement these breeding programs. If feed requirements and the veterinary capacity can be financed, the dairy sector has potential to improve productivity. Combined with improved public education and support services, productivity improvements could generate income growth for producers as they are more favourably positioned to take advantage of high seasonal prices for dairy products in Mongolia.

**Cashmere and wool quality**

Improvement in cashmere and wool quality has been identified as an essential strategic direction in Mongolian agriculture (UNIDO 2011). Mongolia has a stronger position in international cashmere markets than in wool. Cashmere quality is determined by micron diameter and freedom from contamination. Mongolian cashmere has in recent years drifted toward thicker fibres, and as such a large proportion of its cashmere cannot be used for high priced garment manufacture. Mongolia could benefit from transition from exporting low quality raw material to selling finished goods and marketing a high quality, high value product (UNIDO 2011).

A combination of limited animal management practices, and changes in government policy, have led to a fall in cashmere quality and productivity in recent years. Limited management practices have included crossbreeding, poor herd composition and discontinuance of systematic culling (World Bank 2003b). These practices have been exacerbated by new entrants into the market who often lack the skills and training to raise quality herds and produce high quality cashmere. Government policies that have affected cashmere quality in the past include an export ban, followed by an export tax, and withdrawal of state supported veterinary and extension services. In addition, Government encouragement of herders due to external demand pressures and income pressures in the early 1990s saw an increase in animal numbers without regard to quality and productivity (World Bank 2003b).

As with the dairy sector, productivity growth, in terms of improvements in cashmere quality, is contingent upon the ability of herders to uptake breeding programs. Similarly, factors preventing the uptake of these breeding programs are the availability of finance, veterinary services, as well as education and training. Public and private investment into providing these support services will potentially allow for productivity improvements in the cashmere sector. Ultimately though, the herders require the necessary price incentives to invest in managing their herds and improving their quality. At present, the price differentials for cashmere at a localised level are insufficient to encourage herders to invest. Therefore, in addition to investment in infrastructure and support services, structural changes to the supply chain and the marketing channels available to herders would be required (see section on Agricultural Commodity Exchange).
In the face of declining international markets and prices for wool, developing alternative markets, such as natural insulation material, has been identified as an option (UNIDO 2011).

**Identifying opportunities for cooperation**

Improvement of livestock animal breeds was a strong theme raised in the context of improving productivity reflecting the importance of quality, as outlined above. Discussion in Mongolia largely related to priorities in dairy cattle and sheep breed genetic improvement, with the strongest emphasis placed on this by government. Breeding is also a focus area for researchers at MSUA.

The demise of state animal breeding systems was linked to the transition in the early 1990s. The government is re-building its system, including the national animal genebank, established by MoFALI in 2006. Roles of the genebank include to: preserve indigenous livestock genetics, provide artificial insemination (AI) services and maintain a productivity database, and manage import and export of genetic material for improvement. AI services are mainly limited to dairy cattle.

Cattle of larger size and dairy cattle yielding higher milk volumes are key aims. Production figures reported for dairy cattle were 900L/year for indigenous breeds, compared to optimal aims of around 6000L/year. Some progress has been made in access to foreign breeds for crossbreeding. There has been import of live cattle from China, with mixed success. A key issue for one dairy farmer was to build his herd to be more productive by importing live animals or embryos from Australia. Potential issues with replacement, over a short period, of indigenous milk breeds with high yield milkers not adapted to local conditions needs consideration in this context.

The proportion of sheep for fine wool production is low (2 per cent reported) with current use of coarse wool mostly for carpets and outer garments. One interviewee noted there has been past cooperation with Australia on fine wool sheep with Mongolian experts studying in Australia. Importance is placed on import of fine wool genetics, specifically Merino from Australia. Attempts have been made by the national genebank to import fine wool sheep semen, though there have been difficulties with the bidding system resulting in high prices, and legal controls.

MoFALI animal husbandry policy implementation, and the genebank, expressed a strong interest in cooperating with Australia (and other countries) on importation of genetic material, to improve product quality. Whilst quality of wool was reported as improving, they are seeking information, advice or facilitation on approaches to further improvement.

Potential areas for cooperation:

- support for an importing program under a bilateral arrangement with specific objectives to facilitate genetic exchange, particularly for improved wool and dairy genetics
- training in breeding and improvement techniques. Exchange of experts and experience on breeding of fine wool sheep, and technology for integrating breeds in Mongolia. This might go through veterinary and livestock breeding services, which operate in each *sum* district and supply new technology and involves training
- use of a 'model farm' to demonstrate whole of supply chain approach to product supply (suggested for fine wool sheep). That is, shearing, classing, quality improvement. This step is recognised as better than addressing specific parts in the chain
• assistance in contacting appropriate organisations and companies for imports to build market linkages

• educational support for uptake of breeding programs

Mongolia has established MOUs on quarantine with other countries (for example within an FAO dairy project) covering genetic exchange. Such MOUs facilitate the national gene bank progressing imports.

Constraints raised in development of livestock genetics from external sources include: procurement processes and quarantine laws that can be time consuming and complex; limited budget of the Mongolian government; the competitive open bidding system, making top quality expensive. These constraints were noted with attempts to get Merino semen from Australia in 2011. Herders’ limited availability of individual finance and subsequent low uptake of breeding programs was not raised as an impediment, but this may be an issue.

Traditional herders use crossbred cattle with no distinction between use for dairy production or meat. This may be an impediment to improving quality. Some international projects are working on breed improvement, under Mongolia’s national livestock program and food security program, as part of GAFSP (managed by FAO).

Several interviewees thought the government puts relatively too much priority on breed improvement. They emphasised other aspects of animal husbandry as relatively more important—such as managing feed resources; and veterinary health management skills—which have value in lowering production risk.

**Links with Australia on livestock improvement**

In 2011 Mongolia and Australia agreed on protocols for the export of Australian bovine (cattle) and ovine (sheep) embryos and semen to Mongolia. In April 2012, Australia proposed health conditions for the export of equine (horse) reproductive material, and for the export of breeder cattle to Mongolia, in response to requests from Mongolia. Further agreements may be required to help facilitate further genetic exchanges.

Australian Wool Innovation (AWI) is a key wool services body. As well as developing wool marketing and branding programs, AWI is responsible for research, development and extension strategies addressing challenges faced by the Australian wool industry. Strategic directions include building genetic resources for quality enhancement, innovating products and processing, enhancing animal welfare and improving supply chain logistics (AWI 2011). In the last 20 years, Australia’s sheep population has fallen from around 170 million to 68 million, but numbers are expected to increase in the next five years due to improved market conditions (AWI 2011). Other key wool industry bodies are listed in Appendix C.

Import of genetic material can be facilitated by commercial suppliers and industry bodies subject to animal health and quarantine protocols. As an example, the Australian Association of Stud Merino Breeders, although not currently active in international technology transfer, are interested in building links with Mongolia.

Dairy Australia is a peak industry organisation relevant to interest areas in both breed and quality improvement and fodder management. Like AWI, Dairy Australia is an industry services body that helps to coordinate and establish strategic priorities, and invests in research and development including genetic improvement. Dairy Australia is a suitable contact point for exposure visits. The biannual Australasian Dairy Science Symposium could be an opportunity for
information and expertise transfer; the 2012 program included sessions on biotechnology and feed base and nutrition systems (refer to http://www.adssymposium.com.au).

There may be potential collaboration on breeding techniques and veterinary services, as part of exchange programs between Australian and Mongolian universities.

**Feed and risk management**

Whilst traditional animal husbandry knowledge in Mongolia is very strong, there is vulnerability to extreme climatic conditions. Pressures associated with the market economy contribute to challenges with productivity and risk management for herders.

Beyond herd management and breeding, productivity in the livestock sector is contingent upon the ability of herders to better manage their production risk over time. Livestock herders are exposed to significant levels of risk. In particular, *dzud* is a major risk to livestock mortality, and the severity of each *dzud* varies over time and by location. The 2010 *dzud* was the worst in Mongolia’s history. Around 97,500 households were directly affected and the total livestock loss reached 9.7 million head, approximately 22 per cent of the total herd (World Bank 2011).

Given the significant risk presented to herders in the form of *dzud* events, a range of risk management strategies are essential to alleviate their potential impacts and provide income smoothing opportunities over time (World Bank 2011). Such risk management strategies would involve enhancing both the systems of preparation and resilience to future *dzuds*, and responsiveness during and after these events. Balancing out the seasonality of feed supply is a priority to manage the production risk prior to a *dzud*. At present, major obstacles are the availability and cost of feed during these winter periods (World Bank 2007b). Enhancing existing feed production systems, exploring alternative feed supplies, providing the infrastructure to allow for stockpiling of feed before *dzuds* has been suggested to government (IAEA 2009). In addition, improved herd management would help herders to manage climate risks. This would involve providing herders with the education and support services to better understand the carrying capacity of the land, and breed a herd of animals better equipped to deal with the climatic extremities of a *dzud* (World Bank 2011).

In response to *dzuds*, where losses are infrequent but significantly high, the World Bank used a risk layering framework to better understand the nature of risk and appropriate responses for the Mongolian livestock sector. The World Bank proposed a livestock insurance program as a mechanism for livestock farmers to manage this risk. This uses a mortality rate index by species in a local region, where herders would receive an insurance payout based on the local mortality, irrespective of their individual losses, when the mortality rate in the local region exceeds a specific threshold (World Bank 2007b).

Having been constructed and piloted with three provinces in 2005 for the initial phase (World Bank 2007b), in 2011 the Livestock Insurance Program had completed five full seasons, with a full scale roll-out to 21 provinces expected in 2012 (World Bank 2011). Participation rates of herders in 2011 reached over 10,000 herder households, 8 per cent of herder households nationally. In 2010, 4706 herders received a total of US$1.42 million in indemnity payments.
The World Bank identified a number of challenges to establishing a sustainable agricultural insurance system in Mongolia. These include:

- developing a robust data system to determine the indexes
- securing ex-ante financing
- establishing efficient delivery and indemnity payment systems
- creating capacity in both government and insurance firms
- establishing an appropriate legal and regulatory framework.

In 2010 the World Bank initiated the Trust Fund for Environmentally and Socially Sustainable Development (TFESSD) Study following the major dzud that year. As part of this study, the World Bank will review these issues and investigate options to enhance disaster management systems in the Mongolian livestock sector. This study is looking at the before- and after- event components of risk management, including structured government financing for dzud, and systems of preparation, support and recovery.

**Identifying opportunities for cooperation**

Issues around management of feed and fodder and seasonality were raised in interviews in Mongolia. It is a challenge linked to productivity aims and the introduction/development of higher yielding animal breeds. Feed is generally fresh grass when available; some herders will store some for winter conditions, but these supplies can be limited. Policy on livestock feed and protection from shock and disaster is a key role of government. This was linked to aims of promoting intensified production systems.

Government, researchers and international organisations emphasised the need for fodder and forage management to improve stock nutrition. Much of this was particularly related to dairy and cattle production. A livestock researcher explained how optimum feed is needed for high reproductive rates and development of young cattle. Fodder given to dairy cattle is mixed, variable and not precisely controlled. These needs were frequently related to genetic improvement, such as the comment ‘you can’t just bring in genetics; you need the whole management system up and going’. A difficulty in managing or processing fodder crops, with climate change and seasonal variation was also raised, citing delayed establishment of crops in 2012 because of cool and dry conditions.

An intensive (small scale) dairy farmer has introduced Australian technology in Mongolia to produce feed from sprouts in a controlled environment. Some informants suggested this may not be the most efficient system for Mongolia, that it is better to grow and store quality hay for winter. The cost of technology such as this could be an impediment too.

Risk management knowledge and capacity to prepare for and protect against climate shocks, particularly dzuds, was stressed as a key need and linked to fodder issues. A driver for this is seen in the transformation of herders from a subsistence lifestyle towards a business model. Encouraging market thinking and objectively valuing livestock is part of an FAO TCP project demonstrating forage crops and management for productivity. The project focussed on training and preparation for dzuds including planting hay and using wells to supply water to stock.

The herder family visited during the field visit to Mongolia try to prepare for future dzuds by building up fodder stores. They would only use these when conditions are at emergency levels.
and are not using stored fodder as a supplement to optimise production in less severe circumstances.

Fencing establishment is part of the Livestock Insurance Program, and is seen as step in improved risk management by providing shelter for stock and helping protect pastures. The Mongolian Society for Range Management (MSRM) provide advice to pasture user groups on moving stock for winter protection, and sharing fenced places between user groups. Some of these self-managed groups have built finances up to invest in fencing off areas of long grass, for stock protection.

The National Statistics Office has conducted yearly livestock censuses to measure stock losses and determine herders' payments under the Livestock Insurance Program. This is an activity government aims to continue after the World Bank project is completed in 2013.

Potential areas suggested for cooperation:

- projects or farms demonstrating nutrition and fodder management. Demonstration and training through sub-contracting local agents has been used in the FAO Productive Partnerships program
- introduction and testing of feed crop varieties with potential for higher production of winter feed. This was attempted with New Zealand varieties
- feed and fodder management knowledge integrated with introduction of any higher productivity breeds
- exposure tours to other areas/Australia to build knowledge of livestock management (raised in relation to intensive dairy production)
- increasing awareness of the need to prepare for climate shocks; emergency fodder and hay resources need to be of higher nutrition; education at sum level
- gain from Australian experiences in managing risk posed by natural disasters such as drought; information on the role of public versus private players.

Challenges might include the level of support for industry-farmer associations in Mongolia. This was mentioned in relation to the organisation of groups for study tours abroad. The level of herders' financial capacity could be a challenge in terms of purchase of risk insurance, as well as high input fodder management.

Links with Australia on feed and risk management

Like Mongolian farmers, Australian livestock managers are generally well regarded in terms of managing stock for climate risk and drought. Forage management is an area that industry bodies such as Dairy Australia could potentially contribute expertise, especially in high productivity intensive systems and may be able to assist with content for a study tour.

It may be useful to consider a regional approach on cooperation in some areas. For example, ACIAR has research interests in the management of risk involving weather index and market-based mechanisms to improve herder livelihoods. In north west China, ACIAR has experience in developing approaches to incentive payments for improved grassland management, and has considered the potential for possible application in Mongolia that could reduce state financial burden of insurance relief (see also Rangeland Management).
The Australian Government is undertaking reforms to its drought policy directed at encouraging farmers and land managers to prepare for drought conditions by focusing on risk management rather than crisis management. This is a shift away from past provision of financial assistance in specific areas where exceptional conditions were declared. A 2008 review of drought programs found that financial assistance had 'not helped farmers improve their self-reliance, preparedness and climate change management' (ABARES 2012b). Informed by the review and new approaches piloted in Western Australia from 2010 to 2012, a new drought program package includes support for farm business training, social support services and provision of technologies to inform farmer decision making. The department may be in a position to provide advice on strategies to handle shocks including drought and other disasters such as floods and bushfires that have impacted on farmers in recent years.

Natural Resource Management (NRM) bodies and Landcare groups focus on resource protection and knowledge in the use of shelter belts on farms for stock protection. Landcare is a successful model of community-based groups that look after local areas and can compete for government program funding and often self-manage projects and finances. Establishment of Landcare groups and principles is promoted internationally, and Landcare has been used as a model to develop community-based groups in a number of countries.

**Cropping**

A short growing period of around three months between the end of May and early September, low and erratic rainfall of 200 to 300mm, and extremely low winter temperatures restrict cultivation to early maturing spring crops such as spring wheat, potatoes, other vegetables and fodder crops. High winds, particularly during April and May, promote drying of the upper rooting zone and serious wind erosion from unsuitably prepared fallow and arable land. The lack of soil moisture, especially at seeding and during crop establishment in May and June, are other impediments on productivity in the cropping sector (USAID 2009).

The low levels of productivity have been further exacerbated by limitations to farming practices, including the use of little or no fertiliser or agricultural chemicals, frequent cultivation leading to soil erosion and reduction in levels of soil moisture, and a lack of spare parts for equipment (USAID 2009). Fertiliser and chemical usage was restricted by the relatively high price of these inputs following the decline of the former Soviet Union (Asian Development Bank 2004).

Production levels in the cropping sector declined significantly following transition to the market economy with a 70 per cent fall in total cereal production across Mongolia in the early 1990s, largely due to shortages of fuel, fertilizers, seed and equipment parts (also see Appendix A).

Following a request by the Government of Mongolia, the FAO implemented a TCP project "Improved Cereal Production Technology" from 2000 to 2002 (Bachmann & Friedrich 2002). The objective of the project was to introduce conservation agriculture technologies in the wheat-fallow production system of Mongolia. The FAO project successfully tested conservation technologies under marginal agricultural conditions and demonstrated that these crop management practices are able to address some limitations to cropping productivity in the country. The introduction of a no-tillage system with direct seeding, reduced wind and water erosion and increased soil moisture retention, improved soil structure and fertility and increased yield and farm profitability significantly (Bachmann & Friedrich 2002). International agencies and MoFALI have been active in promoting use of low tillage technologies and equipment.
Although such management strategies have been proven effective in improving crop productivity, there are resource constraints that have prevented the widespread uptake of such technologies in Mongolia. Recent investment by the government under the Third Crop Rehabilitation program has gone some way to overcoming this issue, through financial incentives paid to producers including subsidised tractors, harvesters and pesticide costs (MoFALI 2011). This program was initiated to restore the country’s productive capacity, following a severe market shortage in 2007 that isolated Mongolia from wheat trade to Russia and China (MOFALI personal communication, June 2012).

Investment in cropping equipment, fertiliser production use, and vegetable production are key priorities in Mongolia’s food security program (MoFALI 2009b). Irrigated crop production is also identified as a key priority area in the food security program; with aims to achieve 30 per cent of wheat production from irrigation, compared to 2 per cent currently.

**Identifying opportunities for cooperation**

Cropping productivity was also a key area of focus expressed by government and researchers in Mongolia. It was frequently linked to Mongolian government aims for self-sufficiency in food production and food security programs (e.g. the national Third Crop Rehabilitation program implemented by the Mongolian government). The government invests directly in loans and subsidies for cropping machinery, seed and processing mills, aimed at increasing crop production for export markets and the area of potentially arable land that is utilised.

Two areas were emphasised in discussions as further goals: introduction and diversification of new crops and varieties; and uptake of dryland conservation cropping techniques (i.e. no or minimal soil tillage, leaving a high proportion of crop residue for soil and water conservation). The majority of crops are rainfed and drought is a key issue that affects Mongolian crops. MSUA researchers are aiming to diversify the range of crops grown (including vegetables) and are looking at wheat breeding, cultivation technology and seed productivity. Companies are introducing conservation tillage technology, and there were many references to this, relating to soil erosion and the yield benefits in soil moisture retention. The need to develop maintenance services alongside the uptake of machinery and technology was raised.

Intensive fodder cropping located close to urban areas where development of intensive dairy production is needed, and is seen as important in enabling better market access. Fodder crops include barley, oats, rapeseed and alfalfa (lucerne). Increasing irrigated crop production generally was reflected as a priority for productivity growth, and was related to climate change as a risk to future production. Interviews revealed that a challenge continuing to affect the uptake of irrigation is relatively low irrigated crop yields, influenced by lack of fertiliser use (due to expense) and limited hybrid varieties (farmers are using original breeds). Introducing better varieties, including fodder crops, irrigation techniques, and improving water use efficiency were raised as needs. The government is investing in and coordinating irrigation infrastructure rehabilitation and construction, to boost production and incomes from irrigation.

Sustainable resource use, with an emphasis on supply of river water, is also an issue. Groundwater is being rapidly depleted around urban centres and is not encouraged for agricultural use. There has been a FAO Sustainable Irrigation Management Project (TCP/MON/3203) involving training irrigators, trialling of monitoring equipment and use of water meters. However, further development of skills and knowledge is sought, including in development of systems for water allocation. A government official cited previous collaboration in 2010 with an Australian expert in the FAO project.
Potential areas for cooperation:

- exchange of expertise and techniques in wheat breeding for drought and disease resistance - to maximise access to dryland varieties
- increased access to and uptake of advanced conservation tillage cultivation technologies, and experience in managing machinery and techniques
- assistance in establishment of machinery maintenance and spare parts services
- transfer of expertise in management of irrigated crops in dry climates; irrigation scheduling/soil moisture measuring technologies
- supporting government efforts to establish fairer access to water, regulate water use (e.g. creating regional water associations); advice on water allocation experiences/systems.

A challenge raised relating to transfer of cultivation technologies was that only large producers can access expensive crop cultivation machinery, and there is a need for small scale machinery options. Whilst benefits of low tillage have been observed, reported challenges included decreasing yields in initial years, and skills limitations including machinery and agronomy related skills (see human resources section).

**Links with Australia on cropping**

There are a number of Australian universities and other research organisations with strong capacity and experience in cereal breeding for dry climates. The University of Western Australia was mentioned by one interviewee in reference to wheat breeds and advanced low-tillage cultivation technology.

CSIRO has had breeding success for dryland wheat in Australia by targeting specific traits for effective use of available water. Some of these traits have also been shown to improve adaptation of wheat to conservation farming practices. A CSIRO and ACIAR led project aims to extend this success to China, working with breeding programs for dryland wheats in north-western China in collaboration with universities. This five-year project runs until 2013 (ACIAR project CIM/2005/111 ’More effective water use by rainfed wheat in China and Australia’).

CSIRO identified there may be investment opportunities for grain seed production and agronomy services expertise, in the commercialisation of new varieties in north west China. Similar conditions exist in Mongolia and there could be opportunities in research on dryland wheat breeding, and commercialisation of varieties.

Agronomy, machinery and technology services for cropping are well established in Australia with a large number of commercial providers active including in international markets. AgLinks and Austrade provides linkages to Australian agricultural services, suppliers and grower groups (see stakeholder table, Appendix C).

In Australia there is considerable depth of knowledge amongst irrigation specialists, irrigator farmer groups and associations and state governments, including managing lucerne fodder, wheat and other irrigated crops in dry landscapes. This knowledge could be accessed through exposure tours, volunteer or mentoring programs, or visits to Mongolia. Australia also has experience in developing systems of water trading, and allocation systems, including private-managed and owned irrigation companies and service providers (e.g. Murrumbidgee Irrigation
Resources

Resource issues that emerged in Mongolia relate to natural resource management, particularly in the context of rangeland grazing systems, and human resource capacities. There is a connection with themes discussed earlier on productivity and market challenges, because developing these is contingent on availability of natural, financial and institutional resource bases and peoples' skills and knowledge. For example, in livestock productivity, physical and financial capital and educational support services are required to improve breeding programs. Themes of rangeland management and human resource development are discussed below.

Rangeland management

Grasslands in Mongolia have a very short growing season, are limited by cold temperatures and variable precipitation. Pasture growth begins in mid-May and mostly ends after mid-August. Over 80 per cent of Mongolia's land area is managed as common grazing land; largely grassland pastures (Upton 2010). The privatisation of collectives in the early 1990s left an institutional gap in the absence of a formal regulatory framework to govern pasture use. As a result, the current dependence of livestock production in Mongolia on the open access nature of pasture resources has led to unsustainable grazing practices and increasing conflicts over pasture use. This has increased rural poverty through limitations on productivity and income growth due to localised overgrazing and environmental damage (USDA 2009).

Increases in herd sizes over time, combined with a gravitation of these herds toward land closer to markets, appears to have stretched the environmental carrying capacity of the land (World Bank 2003b). Neupert (1996) estimated carrying capacity, finding that Mongolia on average can potentially support the equivalent of 62.5 million sheep forage units (SFU, see glossary) per year. In 2009, prior to the dzud, Mongolia had a livestock equivalent to 69 million SFU. This suggests, at these numbers, that the livestock sector is operating beyond the carrying capacity of the land when compared to the estimates by Neupert (1996). This is not withstanding further environmental degradation that may have reduced pasture land carrying capacity between 1996 and 2009.

Structural changes such as intensification of parts of the livestock sector away from nomadic herding to feed lots has been proposed as a prospective resolution to the problem of over-grazing. However, a drawback of intensification is that it precludes mobility as a response to risk (World Bank 2003b). In addition, climatic pressures, feed supply issues and high upfront capital requirements are limits to intensification. Intensification requires investment in supplementary feed, veterinary services and in capital assets such as livestock shelters and water supply infrastructure. These do appear as priority areas under government policy (e.g. National Mongolian Livestock Program 2009).

The World Bank (2003b) concluded that the government's efforts should be directed toward improvement of the regulatory framework for sustainable pastureland management. Given the predominantly nomadic environment in Mongolia, land privatisation is a particularly challenging proposition. Guaranteeing secure land rights for herders, as opposed to strict privatisation (individual ownership), could be a means to rationalise land use and rights to different pastoral resources. The World Bank has suggested that such a framework could be
complemented with market-driven land user fees and a value-based tax based on sheep forage units. These initiatives may provide incentives to herders to rationalise stocks, pool resources and employ more efficient grazing techniques (World Bank 2003b).

The MSRM (2009) suggests addressing this resource problem by establishing residence-based groups with exclusive user rights over pasture within their area. The direct involvement of resource users, through incentives for usage, would assist in altering the current open access framework. Herders as well as the local authorities are aware that the large number of animals and management practices are leading to pasture degradation; and the MSRM has identified a bottom-up approach with external facilitation has strong potential for improving the resource use regime. Strengthening community institutions to be self-sustaining will be a long term process that requires both technical and financial resources (MSRM 2009).

Identifying opportunities for cooperation

During the visit by DAFF officers to Mongolia, rangeland pasture management and overgrazing were raised as areas where external cooperation and knowledge is sought. Soil erosion and land degradation were noted as problems caused by grazing pressure in rangelands; it was reported that over 70 per cent of pastures are overgrazed. Soil erosion in gullies was seen on field trips outside Ulaanbaatar. Other than grazing management and choice of suitable pastures to graze, challenges with managing dry and harsh conditions including strong wind were noted for areas such as the arid Gobi region. MoFALI as well as the Ministry for Nature, Environment and Tourism have responsibilities in pasture land management.

Several factors were discussed as contributing to grazing pressures, which reflect the desktop review:

- levels of awareness of the ‘carrying capacity’ concept; managing a maximum number of livestock matched to feed production rate from particular pastures, without causing soil/water damage. Not all pastures are suitable for grazing

- government policies focusing on combining traditional herding with more intensity to increase productivity. These policies, and programs are identifying specific areas for intensive production

- the land tenure challenge, with public ownership of land and private ownership of stock. One interviewee noted that with herders not paying tax, there is lack of incentive not to degrade land.

A 'Millennium Challenge Account' project on peri-urban rangeland management is looking at the issue of overgrazing in dairy production. This is an integrated project with government and non-government partnership, covering identification and management of suitable land and leasing arrangements including setting grazing regulations. The MSRM reported success with a grass roots approach in supporting ‘pasture user groups’ to look at soil management, pasture health and rotational grazing. MoFALI is involved with other pasture projects including management planning and training, such as the International Fund for Agricultural Development/World Bank - Sustainable Livelihoods Project.

Whilst natural resource management is a topic of international activities, this was seen as a key area for learning and potential cooperation with Australia. There was recognition that like Mongolia, Australia is dry and has challenges with fragile soil resources, and also pastoral leasing systems. One interviewee commented in relation to training priorities, 'There is a real existing need for training of Mongolian agricultural specialists in Australia, especially on pasture
management, sustainable management of natural resources—to learn effective modern methods and gain knowledge and experience’.

Topics of interest raised during the Mongolia visit but not in the desktop review were ‘ecosystem services’—essentially putting a market value on the benefit of land resource protection, and land management based carbon sequestration in rangelands.

Potential areas for cooperation:

- learn from each other’s experiences in managing rangelands and lease tenures on public land
- learn from Australian experiences in monitoring pasture condition and safeguarding mechanisms against degradation from over-stocking, including several Australian rangeland monitoring tools
- training for herders in pasture management. Exposure tours can assist in seeing practical examples. Also need longer timeframes for education, such as through specialists visiting Mongolia (see Human Resources)
- development of ‘ecosystem services’ approach of payments to herders for improved pasture management
- learning from Australian experiences on weed control. Weeds are being observed in Mongolia as indicators of pasture degradation
- development of carbon sequestration opportunities (pasture systems). Not currently an area of government activity, but is an interest area for research and trials. Participation in carbon markets may have potential to contribute to herders’ income and favourable natural resource outcomes
- tree planting for erosion control and stock shelter.

An acknowledged challenge with promoting herders to change land management practices was the public-private land ownership issue—and this explains why some projects are looking at land leasing arrangements.

Links with Australia on rangeland management

A large area of Australia is taken up by extensive grazing land use, much of it in semi-arid and arid rangelands. Rangelands including dry grasslands and woodlands, and sub-tropical savanna cover 80 per cent of Australia (Rangelands Australia 2012). Australian graziers are in general based at fixed locations and many have well-developed management systems to balance carrying capacity, market demands, water and biodiversity protection, and climatic pressures (drought, floods, wind).

Community level governance through Natural Resource Management (NRM) bodies, and state-administered Lands Protection and Pastoral Lands Boards provides a strong system of governance active in Australia, including in sparsely populated areas under long-term pastoral leases. For example, a Pastoral Board in South Australia is responsible for setting conditions for types of stock and numbers in arid northern areas with fragile soils and little groundcover (DEWNR 2012). The higher levels of government set policy objectives and then devolve (some) responsibilities to community level. The long standing community-based Landcare movement in Australia has successfully contributed to protecting local areas through landholder projects including grazing management and tree planting. There is some similarity with pasture user
groups who can finance cooperative work in Mongolia. Some of these models and rangeland management structure applied in arid parts of Australia may have potential in Mongolia, including in the particularly dry Gobi region.

The ACIAR funded project 'Sustainable development of grasslands in western China' found that reducing stocking rates and grazing pressure could increase growth rates and maintain incomes; degraded pastures also being an issue in China (ACIAR 2012). In this area ACIAR also sees potential benefits in working regionally, recognising the linkages between Chinese and Mongolian rangeland resources, although pathways for ACIAR collaboration in Mongolia have not yet been determined.

Researchers from the CSIRO Sustainable Agriculture Flagship have worked in Inner Mongolia and western parts of China using time series remote sensing technologies for tracking land use and land use changes. This was through the 5-year AusAID initiative Australian China Environment Development Program, which began in 2007. From that, CSIRO have collaborated with ACIAR in a scoping study 'Potential for market mechanisms to enable improved grassland management in northern China'. This examined remote sensing technology for tracking changes in land condition, and the effectiveness of allocation of grassland usage rights to herders. Incentive systems give individual herders potential to benefit from improving management of land they have been granted long term usage rights for by the government.

ACIAR has met Mongolian university researchers visiting Australia and identified potential for looking at an index-based market incentives system for improved grassland management. This could have benefits in both resource condition and preparedness for feed shortages. The experiences of ACIAR and CSIRO may also tie in with interests of MSUA and MSRM researchers in ecosystem services.

The Carbon Farming Initiative (CFI) is a voluntary carbon offsets scheme. This Australian Government initiative allows farmers and land managers to earn carbon credits by reducing greenhouse gas emissions and storing carbon in vegetation and soils through changes to agricultural and land management practices (also known as carbon farming).

This voluntary scheme was introduced in 2011, becoming the world's first nationally legislated scheme regulating creation and trade of carbon credits from farming and forestry. The Department of Agriculture is responsible for delivering research, on-farm trial and extension programs to support farmers to engage in the CFI. The Department of the Environment is responsible for the CFI design and implementation. While there are likely to be changes to the CFI as part of the government's repeal of the carbon tax and development of the Direct Action Plan, the government intends to expand the CFI to include a wider range of activities under its Emissions Reduction Fund to make it easier for farmers to participate (more information at: www.environment.gov.au/emissions-reduction-fund/index).

CSIRO researchers are strongly engaged in international capacity building through 'Research for Development' priorities. A key interest area for CSIRO is in landscape based carbon abatement, and the organisation is active in advising on potential of agricultural carbon capture, and methodologies for participation in carbon markets (e.g. Sanderman et al. 2010).

Current challenges in Australia with natural resource management, drought and climate pressures and carbon farming programs are further discussed in Appendix B.
Human resources (education and skills)

Capacity building and vocational training is identified as a key priority as part of the Enabling Environment strategic pillar in the Mongolian government’s food security program (MoFALI 2009b). A focus is on training for best practice in food processing and food standards. Government ministries (MoFALI and the Ministry of Education, Culture and Science) have responsibilities under this program and also support the key agricultural university, the MSUA, through its research institutes, and extension centre.

Human resource (HR) development and education is a core thread in many international partnered programs, such as the EU Livestock and Marketing project, and GAFSP. Human resource capacity was discussed in interviews in Mongolia and Australia, and is a key aspect of the MOU between MoFALI and DAFF.

Identifying opportunities for cooperation

One of the key themes to emerge during the visit to Mongolia was the need for education and training, including vocational training in the agriculture sector. ‘Capacity building’ in human resources was raised frequently as a challenge by government, university and non-government informants. Training and skills development spans many areas raised as issues in this section (hence some overlap). They can be divided broadly into sub areas of higher level management capacity, professional skills, and technical and vocational skills. These are discussed below.

Higher level management capacity- covering higher education qualifications and administrative sectors. The Asian Development Bank (which leads donor coordination in education) and other informants, identify a gap in management and leadership capacity. This related to various aspects including loss of highly experienced people following economic transition, and officials leaving the public service for careers in mining in recent years. Resources appear stretched in government agencies. People with strategic perspectives are needed to recognise and implement critical priorities such as food quality assurance systems.

There was strong awareness of the Mongolia-Australian Scholarship Program (MASP), which funds Masters level study in Australia, as part of AusAID’s investment in broad HR development in Mongolia. There was a positive impression of this program for the opportunities it provides, for high level professional training.

Professional skills. With livestock production such a critical part of the agricultural economy, capacity in veterinary science and services is important and was an area identified as a key need. Informants commented that there are too few veterinary practitioners. Other important areas of professional needs were: marketing and economic analysis, advanced agronomy skills, wool classing (to select by quality not weight), nutrition management for animals, biosecurity surveillance, risk analysis in meat industry, and plant and animal breeding. A university representative noted human resources capacity was a key part of improving a ‘weak’ border inspection system for animal disease surveillance.

Suggestions on approaches to developing higher level and professional education, with references to Australia include:

- university twinning programs. Explore potential for partnerships between Australian universities and Mongolian counterparts
- assist at tertiary institutions and regional research institutes, through practical demonstrations, specific events, or professional training; exchange of experts on individual basis
potential agricultural cooperation between Mongolia and Australia

- placements for experienced people for longer timeframes (e.g. six months). The Veterinarians Without Borders volunteer program was cited as a good approach in building veterinary capacity

- developing placement opportunities under existing Australian volunteer programs: Australian Volunteers for International Development (AVID) and Australian Youth Ambassadors for Development (AYAD). Mongolian State University Agriculture cited an example of an Australian horticulture specialist previously placed in Mongolia for 12 months under the AYAD program

- train the trainer programs. The Mongolian government provides training or intends to provide training through district service centres and cooperatives and through national extension service to herders’ groups. Skills are needed in being able to train others

- training opportunities in agricultural science in Australian institutions, such as provided by Crawford Fund Fellowships.

In developing links, organisations and stakeholders should work through Mongolia research institutes, university and government departments which are active.

**Technical and vocational skills.** Technical and vocational skills were raised as areas where Australia could provide training assistance. Areas of most interest were: shearing and wool sorting, operating and servicing crop cultivation machinery, use of technology in processing raw materials, mechanics, feed management, butchery and meat processing. Basic hand clipping is currently used in Mongolia and there would be benefits from the use of electric shearing.

Training needs to be practical, to include herders and farmers themselves, that is, not just be directed at higher levels of qualification, with the comment, 'Training is crucial for herders...many visits are just talking about policies; herders need to see practical examples'.

Irrigation management skills were raised as a training need; it was included in the FAO Sustainable Irrigation Management Project which ran to 2011—and is a continuing need, given the government focus on water use infrastructure and irrigation productivity.

Some suggestions for cooperation applying to vocational training:

- work experience in Australia. Rotary is an example of a community organisation with international links, active in Australia including regional areas

- mentoring both in Australia and Mongolia, through on-ground farming bodies in Australia (e.g. Birchip Cropping Group). The potential for exchange of both technical and professional farming skills was suggested, drawing on successful examples of demonstration projects championed by external knowledge

- sending specialists to Mongolia to assist in training programs (e.g. shearing, butchery, cropping machinery, irrigation management).

The National Agricultural Extension Centre under MoFALI, has 31 staff across 329 sums. They work mainly in supply of new technology, veterinary and breeding services, and training in partnership with national and international programs.

Several challenges relate to cooperation on training and human resource development. The English language barrier was frequently raised relating to assistance from English-speaking countries. Limited English language skills of people in the agriculture sector were noted as a factor that had limited engagement in the (highly competitive) Mongolia Australian Scholarship.
Program. The language barrier was also noted as a potential challenge for mentoring and volunteer placements, whether in Australia or in Mongolia.

Some people noted that short timeframes for training visits or tours are not adequate for building the knowledge required; technical people and farmers need longer training, and usually exposure visits are for the benefit of 'higher level' (government) policy people. Visa eligibility for Mongolian herders/farmers/students visiting Australia was raised as a potential challenge in cooperative efforts. One international agency said they prefer technical experts to come to Mongolia for knowledge building, rather than exchange in the opposite direction, because of the 'high transaction costs' which would include visa negotiations.

Mongolia is involved with the Asian Education Group for developing university twinning programs. A constraint to establishing university exchanges may be that Australia is not part of that group.

**Human resources links with Australia**

The Australian Government and other stakeholders have MOUs with Mongolia that may assist in building cooperative opportunities relating to needs discussed above. The MOU between DAFF and MoFALI encourages cooperation in extension and training of agricultural specialists in the two countries; the areas above guide possible directions for this. Mongolia's Ministry of Education, Culture and Science has an MOU with TAFE Directors Australia on technical and further education to assist in revitalizing Mongolia's Technical and Vocational Education and Training programs. TAFE Directors Australia has an International Engagement & Business Development section and is interested in partnerships on training in the agricultural sector in Mongolia.

TAFE colleges are a key institution in Australia providing technical and industry focused training. TAFEs have training expertise in many areas raised in Mongolia such as: butchery, wool handling and classing, mechanical and machinery, food processing, and training (train the trainer). TAFE has expertise in how to structure and provide skills development.

Mongolia is a significant international education partner with 500 enrolments of Mongolian nationals on a student visa in Australia as at year-to-date December 2012. In 2012, Mongolian student enrolments were predominantly in English Language Intensive Courses for Overseas Students (220 enrolments), Higher Education (157 enrolments) and Vocational Education and Training (103 enrolments) respectively.

Mongolia signed a Memorandum of Vocational Education Cooperation (MoVEC) with the then Australian Government Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education in February 2011. The MoVEC agreement encourages exchange in common areas of interest, and specifies mining and engineering and English and Mongolian language study, but not specifically agriculture. There may be potential however, for cooperation on common education training needs in agriculture under these MOUs.

In mid-2011, the then Department of Education, Employment and Workplace Relations (now Department of Education) International Education and Science Division funded TAFE Directors Australia to conduct the *Australia-Mongolia Skills Development and Training Colloquium Series* for a delegation of senior vocational education officials from Mongolia. The Department of Industry has a current focus on increasing exposure of the Endeavour Scholarships and Fellowships in Mongolia and facilitating visits as appropriate between Australian and Mongolian institutions. Information on scholarships and fellowships supported by the Australian Government is available on the Australia Awards site [http://www.australiaawards.gov.au/](http://www.australiaawards.gov.au/).
Australian universities and agricultural colleges are open to and benefit from overseas enrolments and are able to transfer skills in areas such as marketing, crop breeding, agronomy, agricultural science, soil science etc. The Crawford Fund Fellowship supports further training for young agricultural scientists from developing countries. Whilst this was raised as a potential area relating to cropping industries, currently Mongolia is not listed in the nominated group of developing countries (further information: http://www.crawfordfund.org/).

The University of Western Australia was mentioned specifically in Mongolia as being known for wheat breeding and dryland cropping expertise.

The Mongolia-Australia Scholarships Program (MASP) was reported as highly effective in forging strong links with Mongolia’s leadership, through masters level education (DFAT 2012) and has provided opportunities in the area of food safety. The program, now known as Australia Awards in Mongolia will align with the Australia-Mongolia Country Strategy 2012-16, targeting candidates in the Mining for Development and Supporting Vulnerable Communities priority areas.

Australian Volunteers for International Development program, which includes the Australian Youth Ambassadors for Development (AYAD) program, is part of Australian Government support for international capacity building and skills exchange. The program works with a host organisation to identify needs and develop assignments. The program is also transitioning to alignment with the Australia-Mongolia Program Strategy 2012–16 priority areas.

Other areas

Several areas of potential cooperation and needs were raised that do not fit into the categories of Productivity, Markets and Resources. Whilst not identified as key areas from desktop review, findings focussed on field visit outcomes are outlined below.

Forestry

Around eight per cent of Mongolian land area is covered in forests. The forestry sector in Mongolia is largely based on utilisation of native forest resources. The economic contribution of the sector has declined since the 1990s, to a level of 0.26 per cent of Mongolian gross national product in 2010 (FAO 2010). The main issues are achieving a balance between utilisation and preservation; impacts of illegal logging (at both commercial and local subsistence level); threats from pest and fires, and a problematic management structure (FAO 2010).

All Mongolian forests are state owned and primary government responsibility lies with the Ministry of Nature, Environment and Tourism. Community-based natural resource management procedures approved by government in 2006 allow for allocation of forest resources to communities (FAO 2010).

Identifying opportunities for cooperation

The issues mentioned briefly above were reflected in discussions in Mongolia with staff from the Ministry of Environment, Nature and Tourism (Forestry authority). Following economic transition there has been a trend towards less commercial utilisation of forests. Most utilisation of forest is from ‘cleaning’ of dead wood after fire and insect pest damage. Community level ‘forest user groups’ (FUG) are being supported as a key management mechanism, including monitoring illegal activities. This builds on a traditional role herders have in looking after forests. Ninety per cent of the members of a FUG have to be local, with members including

56
herders, management advisors and other residents. FUGs can raise funds from sale of dead wood (for firewood), and develop furniture making enterprises.

The challenges of regulatory control balanced between MoFALI (utilisation by commercial enterprises) and Ministry of Environment, Nature and Tourism was noted. The government has a role in organising the schedule of re-planting cleared forests for preservation, and providing incentives and equipment for plantations. Goals include a well regulated transparent supply chain, with a balance between community-based use and sustainable commercial activities.

Resource management in forest areas is also a subject of internationally supported activities, such as an FAO implemented project funded by the Mongolian and Netherlands governments, *Capacity building and institutional development for participatory natural resources management and conservation in forest areas of Mongolia* (FAO 2011).

Several areas of potential cooperation with Australia were raised:

- exchange of information on options for supply chain models and marketing (Mongolia has previously sought to establish a timber products exchange and is considering this again)
- silviculture: planting and establishment technology, for dry landscape tree production and regeneration
- technology in small scale processing equipment (mobile mills), for use in remote areas.

Around 70 per cent of Australia's forested area is privately managed, and remaining areas are roughly half conservation area and half government managed (DAFF 2012a). The commercial forestry sector directly employed around 73 000 people in 2011, with most employment in wood and pulp and paper product manufacturing (ABARES 2013). Investment in new processing technologies to add value to Australia's native forest resources has been a major priority for the forestry sector in recent years. 'Farm forestry' provides some landholders with an alternative source of income through the incorporation of commercial tree growing into farming systems.

Australia does not have a forestry product exchange. While significant forest areas are government owned, forest product processing and marketing is carried out by the commercial private sector. Government plays a role in setting regulation and policy in consultation with industry bodies (see stakeholders section). Topics of community-based management structures, pest and fire management were not specifically raised as areas for cooperation. However, Australia may potentially have relevant expertise in these areas, based on a strong forestry industry, and forest evolution in relatively fire prone and in some areas arid environments (Forests NSW 2000). Pest management is covered by commercial companies. Community bodies, such as the Country Fire Authority (Victoria) and Landcare groups, are involved in protecting forest assets, which include native and plantation forests.

**Agricultural statistics**

Several informants in Mongolia within government and non-government organisations raised weaknesses in official statistics—that they may not accurately reflect the trading system, and better official statistics are needed as there is a discrepancy with industry statistics. Proponents of the Agricultural Commodity Exchange noted a lack of accurate statistics as a problem with the present marketing system.

In 2012 MoFALI and Mongolia's National Statistics Office produced a first edition compilation of five years of agriculture, food and light industry statistical data; this provides a detailed assessment of the current situation in these industry sectors. The National Statistics Office has
had recent cooperation with Australia through the Australian Bureau of Statistics (ABS) agricultural statistics section, based in Tasmania. Based on this exchange, including visiting Australia, the Office has reviewed and adjusted the frequencies of its Census and survey collections, such that agricultural crops can be covered in more detail. Recently, a greater number of questions about socio-economic details have been included in the Office’s survey instruments.

There may be scope for further cooperation. Australia might be able to continue to provide advice on methods of data collection in a market economy (e.g. ABS business register). The ABS uses a range of techniques for agriculture, natural resource management and business data collection.

ABARES has a strong record in socio-economic data analysis, including indicators such as adaptive capacity, which can provide important information on potential vulnerability in rural communities. These analyses tend to be based on population Census data, including income levels and education attainment. ABARES also conducts a farm survey annually focussing on economic performance in broadacre and grazing industries and this may be of interest to Mongolian agencies (see [http://www.daff.gov.au/abares/surveys](http://www.daff.gov.au/abares/surveys)).
6 Synthesis and conclusions

Economic transition in the early 1990s continues to drive changes in Mongolia’s agricultural sector, as the country adjusts to the growth of an open market economy. Some agricultural systems in place before the transition were lost and the country is in a re-building phase, finding a balance between government support and private sector investment. The Mongolian government plays a major role in supporting industries directly in re-structuring and gaining access to export markets. International partners are engaged in supporting work in food security, resources, infrastructure, and agriculture. This project has identified scope for potential cooperation between the Australian and Mongolian agriculture sectors, under the MOU between DAFF and MoFALI signed in 2011.

Funding sources or specific linkages on how to develop opportunities further are not identified as this was beyond the scope of this project.

Key messages: opportunities for cooperation

There are similarities between Australia and Mongolia: geographically in terms of a dry, harsh climate subject to extremes; and agriculturally in terms of significant meat, wool, dairy and cropping industries. There are also significant differences in production systems, financial capacities, access to markets and level of trade. Despite differences, there are opportunities to cultivate exchange of knowledge, expertise and information, as articulated by stakeholders consulted in Australia and Mongolia during this study.

The key areas of opportunity are identified as markets, productivity and resources (rangeland management and human resources). Most of the topics identified cut across areas covered in the MOU: technology transfer, training and exchange of information.

Markets

Mongolia has under-developed supply chains and is placing importance on re-organisation of processing and marketing structures. In particular, it has needs around developing product differentiation strategies and quality improvement in meat, dairy and wool. To this end there are opportunities for cooperation on:

- Mongolia’s agricultural commodity exchange (already in development)
- processing technology for meat, fibres and dairy products
- food safety expertise and systems (including storage and transport infrastructure)
- food and fibre quality expertise and management systems (including traceability and certification schemes)
- biosecurity and animal health expertise and systems
- economic research on supply chain models.
Productivity

Achieving a balance of increasing intensified agriculture to boost production, whilst supporting a traditional herding culture, is a focus of government. With this comes challenges relating to feed supplies and risk management capacity. There is opportunity for cooperation on:

- livestock breed improvement through the exchange of genetic material (already in development)
- expertise and systems for managing introduced breeds
- exchange of expertise and systems for nutritional feed management and fodder processing for intensive dairy systems.

Cropping opportunities include exchange of expertise for developing dryland crop varieties, conservation tillage technology and agronomy expertise transfer, and irrigation technology transfer. Water management is an area that could benefit from collaboration with both Australia and Mongolia facing production risks in a variable climate, and having scarce water resources.

Resources

Rangeland management: Australia and Mongolia both have vast rangelands that require management for sustainable livestock production. Areas of cooperation include mutual learning and exchange of experience in rangeland management mechanisms, safeguards under leasehold tenure and resource degradation. The Landcare model of community-based NRM is a specific program that could be a useful model for Mongolia. Other areas of opportunity include support for developing 'ecosystem services' market-based approaches to grassland management, and support in developing carbon sequestration opportunities.

Human resources: A core area of potential for exchange of information and expertise is education and skills training. Australia has a highly developed education system encompassing schools (including specialist agricultural high schools), university and technical and vocational education—that can provide opportunities for skills training in the agricultural industry. Priority areas for education and training in Mongolia include wool classing; meat, dairy and fibre processing; food safety and food handling; cropping skills and marketing for product differentiation. There are opportunities for exchange and learning within the university sector, with Australian universities offering agricultural degrees that cover a range of disciplines from genetics and biotechnology through to agronomy management. Australian scholarship programs are well regarded in Mongolia and there may be potential to build human resources through professional volunteer programs and in-country mentoring.

Frameworks for Training Sector Capacity Development

This study details areas where training and education support could be directed and notes the following bilateral agreements relating to training sector capabilities.

- MOU between Mongolia's Ministry of Education, Culture and Science and TAFE Directors Australia on technical and further education.
- Memorandum of Vocational Education Cooperation with the then Australian Government Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (now Department of Education).
There are a range of agriculture-related projects active in Mongolia supported by international partners and the government. The study provides guidance to encourage collaboration and linkages in areas of mutual interest. Interest in cooperation might come from the private sector, research and education organisations, as well as government.

**Role for Australian Government and industry**

The Australian Government role in cooperating with Mongolia on agriculture is largely in policy leadership and supporting portfolio research and development. To further the opportunities identified, the department anticipates a role in providing connections to relevant industry, government and research interests. This would include assisting with facilitating agricultural delegations, in cooperation with other stakeholders.

A number of industry and research organisations identified as having relevant expertise may have an interest in building cooperation. They may want to see mutual benefit in order to take cooperation further, or to fund activities. Potential stakeholder organisations of interest and links towards contact points are listed in Appendix C.

This study found a number of Australian consultants have been active in international projects (e.g. with FAO and ADB) in Mongolia. Mongolian stakeholders recognise previous cooperative work with Australia, such as in livestock genetic development and researcher exchange, and there is a desire to further this cooperation.

Table 2 collates key messages under the identified themes for potential cooperation.
Table 2 Summary of opportunities for potential agricultural cooperation

<table>
<thead>
<tr>
<th>Themes for potential cooperation</th>
<th>Key messages and opportunities</th>
<th>Potential linkages (refer Appendix C)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Markets</strong></td>
<td>- Australian meat processing, safety systems and diverse markets have been previously identified as a useful example for Mongolia</td>
<td>Industry bodies</td>
</tr>
<tr>
<td></td>
<td>- Sharing knowledge and advice including different traceability and certification systems particularly for meat and organic food; and value adding and processing advice, particularly in dairy</td>
<td>Department of Agriculture/Government agencies</td>
</tr>
<tr>
<td></td>
<td>- Australian meat processing, safety systems and diverse markets have been previously identified as a useful example for Mongolia</td>
<td>Companies</td>
</tr>
<tr>
<td><strong>Commodity marketing</strong></td>
<td>- Expertise and technical assistance in trading structures and technology, processing and storage technology, particularly wool</td>
<td>Industry and services bodies</td>
</tr>
<tr>
<td></td>
<td>- Advice needs to be considered in context of Mongolia's Agricultural Commodity Exchange supply chain model</td>
<td>Department of Agriculture</td>
</tr>
<tr>
<td></td>
<td>- Extension of research and expertise in fibres marketing and value chain development (wool, cashmere)</td>
<td>Research providers</td>
</tr>
<tr>
<td></td>
<td>- Study tours and longer training are seen as beneficial</td>
<td>Consultants</td>
</tr>
<tr>
<td></td>
<td>- Support services and training for producers, recognising quality as a key focus</td>
<td></td>
</tr>
<tr>
<td><strong>Biosecurity and animal health</strong></td>
<td>- Exchange of expertise and skills in risk analysis and inspection systems (animal products)</td>
<td>Industry bodies</td>
</tr>
<tr>
<td></td>
<td>- Animal disease diagnosis and surveillance expertise</td>
<td>Department of Agriculture</td>
</tr>
<tr>
<td><strong>Productivity</strong></td>
<td>- Exchange of genetic material; fine wool sheep, dairy cattle, import of dairy cattle</td>
<td>Research providers</td>
</tr>
<tr>
<td>Livestock management and</td>
<td>- Higher productivity breeds need adequate feed conditions, careful management; demonstration and training needs</td>
<td>Universities</td>
</tr>
<tr>
<td>improvement</td>
<td>- Support for whole of supply chain approach to product supply, quality improvement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Study tours seen as beneficial</td>
<td>Industry bodies</td>
</tr>
<tr>
<td><strong>Feed and risk management</strong></td>
<td>- Exchange of expertise in nutritional feed management / fodder processing for intensive dairy systems</td>
<td>Companies</td>
</tr>
<tr>
<td></td>
<td>- Risk management and feed strategies for climate shocks</td>
<td>Research providers</td>
</tr>
<tr>
<td></td>
<td>- Risk management and feed strategies for climate shocks</td>
<td>Universities</td>
</tr>
<tr>
<td><strong>Cropping (and irrigation)</strong></td>
<td>- Extension of dryland crop breeding expertise to Mongolia</td>
<td>Industry bodies</td>
</tr>
<tr>
<td></td>
<td>- Expertise, equipment and machinery services for minimum and conservation tillage cultivation</td>
<td>Companies</td>
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<tr>
<td></td>
<td>- Access to drought and disease resistance varieties</td>
<td>Research providers</td>
</tr>
<tr>
<td></td>
<td>- Irrigation technology and management expertise</td>
<td>Universities</td>
</tr>
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<td></td>
<td>- Extension of dryland crop breeding expertise to Mongolia</td>
<td>Volunteer programs</td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td>- Expertise in monitoring grassland condition, safeguards against over-grazing</td>
<td>Industry bodies</td>
</tr>
<tr>
<td>Rangeland management (and natural</td>
<td>- Experiences in managing lease tenures</td>
<td>Research providers</td>
</tr>
<tr>
<td>resource management)</td>
<td>- Models of community level land management</td>
<td>Universities</td>
</tr>
<tr>
<td></td>
<td>- Development of market based, ecosystem services approaches to improved management</td>
<td>Volunteer programs</td>
</tr>
<tr>
<td></td>
<td>- Expertise in weed control</td>
<td></td>
</tr>
</tbody>
</table>
Potential agricultural cooperation between Mongolia and Australia

### Themes for potential cooperation

#### Key messages and opportunities

- Models and information on carbon sequestration for pasture
- Vegetation management for wind and water erosion, and stock shelter management

#### Potential linkages (refer Appendix C)

- Professional: veterinary science, animal production, marketing, agronomy, risk analysis, nutrition management, plant and animal breeding, vocational training
- Technical/vocational: shearing, wool handling and classing, crop machinery operation and maintenance, mechanics, butchery and meat processing, irrigated cropping
- Explore partnership opportunities with Australian research and education organisations
- Longer timeframe training support in Mongolia has advantages over shorter visits to Australia
- Mongolia-Australian Scholarship Program well regarded, though challenging to access in agriculture
- Volunteer/mentoring programs for capacity building (e.g. industry groups/NGO hosts in Australia)
- Potential linkages under other MOUs on education and vocational training systems

### Human Resources (education and skills)

- Industry bodies
- Companies
- Universities / TAFE
- Volunteer programs
- Department of Education
- TAFE
- AusAID (MASP)

### Water resources

- Water resource allocation experience; involvement of water users

### Forestry

- Exchange of information on supply chain models
- Silviculture in dry landscapes
- Small scale timber utilisation technology

### Industry bodies

- Companies
- Universities / TAFE
- Volunteer programs
- Department of Education
- TAFE
- AusAID (MASP)

### Project outcomes

The outcomes of this project include:

- the department investigated and reported on specific needs and opportunities for cooperation under the MOU between MoFALI and DAFF
- a visit to Mongolia by a delegation from the department built understanding of Mongolian agriculture and relationships with key stakeholders
- a database of key stakeholders and contacts to support further collaboration and linkages under the MOU
- exchange of information in the form of publications including statistics and research reports directly with stakeholders in Mongolia. Whilst this was only a sample of relevant information available, it is a positive step and is complemented by the information in this report.

These outcomes meet the aims of the department's International Agricultural Cooperation Program, by helping facilitate relationships across government agencies, researchers and consultants to assist developing future cooperation with Mongolia on food security and agriculture.
Possible further cooperation activities

The themes and ideas identified in this study may help inform strategies for further activities between Mongolia and Australia, with a view to fostering long-term cooperation in agriculture.

Exchange of information between Australian and Mongolian stakeholders in government, agricultural research and development, industry organisations, education and training institutions and private consultants is encouraged. This could lead to a similar study to deepen Mongolia’s understanding of Australian agriculture, government policy structures, industry organisations and market structure. Such a study could be combined with educational objectives (for example on livestock risk management or commodity marketing), or be purely investigative.

Further information on the department’s role and examples of ABARES research could be provided.

This scoping study has identified themes and a range of areas for potential cooperation and linkages. However, it has not undertaken to:

- prioritise which areas of cooperation might be most feasible in the shorter versus longer term, and what might be most beneficial, for each country
- examine how some of the areas of cooperation might interact. There could for example be benefits in targeting technical areas in concert with institutional arrangements, to add to effectiveness
- examine funding options for developing opportunities or activities.

Some of these aspects were raised in consultations and they would be important to consider going forward. Government agencies and key stakeholders in Australia and Mongolia may want to explore these considerations together.
Appendix A Mongolian agriculture sectors

This appendix provides further detail and analysis of trends in key Mongolian agriculture sectors: livestock, including meat, fibres and dairy sub-sectors and cropping, including vegetables. It expands on the 'Contributions to agricultural output' part of section 3. Smaller sectors such as poultry, eggs, and greenhouse crop production are excluded from this analysis.

Mongolian agriculture sector overviews

Livestock

Agriculture and the livestock sector in particular, have experienced inconsistent levels of growth in production since the economic transition in 1990.

There have been a number of factors that have contributed to the inconsistent growth in livestock output since 1990. The withdrawal of fiscal and institutional support from the former Soviet Union resulted in a significant decline in output for the livestock sector in the early 1990s. The sector experienced positive growth from 1994 to 1999 due to an increase in livestock numbers from the general shift in employment toward the livestock sector following decollectivisation. Consecutive dzuds however, in 2000 and 2001, resulted in a significant decline in the value of livestock production. Favourable weather conditions between 2003 and 2009 saw strong growth in livestock numbers and output over this period. However, the dzud in 2010 had devastating consequences for the Mongolian livestock sector, with the value of livestock production falling by 24 per cent.

Characteristics of Mongolian livestock

The composition and size of the livestock population in Mongolia has changed considerably since the early 1990s. Total livestock numbers have been increasing over the last two decades, despite the severe declines in 2001 and 2010 (Figure 13). In 2009, total livestock reached 46.6 million head, up from 27.5 million head in 1990. However, livestock numbers fell to 35 million head in 2010 due to high mortality rates during the dzud (see Box 1).

Sheep have always accounted for a large proportion of total livestock numbers. However, a significant increase in goat numbers in the mid 1990s saw a decline in the proportion of sheep to total livestock numbers. Goat numbers more than doubled from 5.2 million head in 1992 to 11.1 million in 1999 (Figure 13). As a result, goats have increased from 17 per cent of total livestock numbers in 1990 to 40 per cent in 2010. Over the same period, the share of sheep has decreased from 52 per cent in 1990 to 42 per cent in 2010.
Potential agricultural cooperation between Mongolia and Australia

Nomadic herding is the primary production system in the Mongolian livestock sector. Herd size is the major distinguishing factor between Mongolia's groups of households with livestock. Figures for the cashmere sector indicate the group of households with less than 100 livestock, who are considered poor, constituted the bulk of households and contribute a relatively small share of total production. In 2002 these households made up 69 per cent of herder households and accounted for 30 per cent of total cashmere production. The wealthiest group, households with more than 500 livestock (around half of these being goats), accounted for 2 per cent of herder households (World Bank 2003b).

**Meat**

In 2010, meat production was the most important livestock sector by value of production, and made up 48 per cent of total value of agricultural production (FAO 2012). Livestock numbers, and therefore the value of meat production, have fluctuated since the early 1990s (Figure 14). Livestock numbers have varied due to the high death rate caused by adverse climatic conditions, as evident through the 9.7 million animals that died during the 2009-10 dzud (World Bank 2011).
Meat production remains critical to rural livelihoods both in terms of rural incomes and consumption requirements. In 2010 for example, 8.1 million head of livestock were slaughtered for consumption, accounting for about 23 per cent of the total livestock herd counted at the beginning of that year. This is equivalent to 206 000 tonnes of meat. Mutton and beef are the main meats produced, accounting for around 61 and 23 per cent of the total quantity of meat respectively. Horse and camel meat are only usually consumed during the winter.

Mongolia exports around 11 per cent of total meat production (MoFALI 2012), with main markets in Russia and China. The meat industry has suffered from a historical dependence on Russia as the primary export market, with meat products currently lacking diversification required to compete in dynamic international markets (UNIDO 2011). The value of meat exports decreased from around $US40 million in the early 1990s to around $US14 million by 2009 (Figure 15).
Cashmere and wool

The cashmere and wool sectors remain a pivotal component of Mongolian agriculture. As with the other livestock sectors, many people were left unemployed by privatisation in the early 1990s, and as such a large proportion of the population resorted to livestock production to support their families. This shift consequently saw goat numbers increase from 17.7 million head in 1991 to 30 million by 1999. This also saw the production of raw cashmere more than double from 1500 tonnes in 1990 to 3288 tonnes in 2000. Growth in cashmere production has continued particularly since 2004. Sheep numbers on the other hand decreased from 52 million head in 1991 to 40 million head in 2000, with minimal growth in total sheep wool production between 1990 and 2000. Annual wool production increased from around 15 000 tonnes in 2004 to around 23 000 tonnes in 2010 (Figure 16).
Figure 16 Sheep wool and cashmere production

![Bar chart showing sheep wool and cashmere production from 1990 to 2010](chart.png)

Note: kt = kilo tonnes production output.


There were a number of external factors which promoted growth in the cashmere sector over this period. For example, the collapse of the Council for Mutual Economic Assistance (CMEA) (see glossary), combined with the liberalisation of the exchange rate, saw the expansion of trade and created new markets for Mongolian cashmere (World Bank 2003b).

Despite the growth experienced in the early 1990s, the cashmere and wool sectors have experienced a series of fluctuations in output that have affected GDP and herder incomes (World Bank 2003b). The main downturn in cashmere and wool output came following the dzud in 2000, and was exacerbated by fluctuating world prices for these textile fibres. The harsh winter conditions cut animal offspring survival rates (Figure 17), goat and sheep herd numbers, and thus production over this period. Survival rates also fell sharply in 2010.
Between 1993 and 1996 the value of cashmere exports doubled from US$33.5 million to US$71.2 million as cashmere’s share in exports rose from 9.2 to 16.8 per cent. However, the reduction in output in the early 2000s translated into reduced export revenue. For example, cashmere exports fell to US$45.2 million in 2002 (World Bank 2003b). The increase in production after 2003 however led to an increase in cashmere exports in the second half of the 2000s. The value of Mongolian cashmere exports reached a peak of US$202 million in 2008, before declining to US$180 million in 2009 (UNIDO 2011).

**Dairy**

Mongolia was self-sufficient in processed milk production in the socialist period, and a small exporter at times. The formal dairy processing industry declined and experienced major restructuring during the transition from State to private ownership in the early 1990s, leading to a substantial reduction in the quantity of processed milk products produced in Mongolia (Figure 18) (MSUA 2009).
During the same period, large scale dairy processors were suffering from management and financial challenges. As such, Mongolia moved toward a model of smaller scale, semi-intensive dairy processing (World Bank 2003a). Subsequently only a small proportion of the total milk produced in the country is processed by the formal dairy processing industry. Despite the decline of the milk processing sector, the total value of milk production in Mongolia nearly doubled between 1993 and 1999 from $US51million to $US101million. This highlights the importance of the informal dairy processing sector in milk production following decollectivisation in 1990.

From the middle of the 1990s until 2000, Mongolia was largely self-sufficient in milk production. However, the decline of national livestock numbers from 2000 to 2002 as a result of the dzud in
2000–01, resulted in a sharp decline in domestic milk production (Figure 19) and a significant increase in imports of processed milk products (Figure 20), particularly to supply urban markets.

**Figure 20 Value of dairy products imports**

![Graph showing value of dairy products imports from 1970 to 2006.](data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAAAIAAAAAACAQMAAABQAAAAAASwMMAAAADUlEQVR42mNkA+//w/AABgQAAAABJRU5ErkJggg==)

Data source: FAO 2012

The supply of milk from the traditional grazing season is highly seasonal, and the demand for milk in the winter and spring exceeds supply. The prices for ‘off-season’ milk therefore rise considerably over this period. From this perspective, there is a high potential income in the dairy sector due to the relatively high price of raw milk (World Bank 2003a).

**Cropping**

Cropping has historically accounted for less than 20 per cent of the value of Mongolian agricultural output (Figure 21). Emphasis on livestock rather than crop production is generally due to the generally poor and highly variable climate in Mongolia.

**Figure 21 Cropping contribution to agricultural output**

![Graph showing cropping contribution to agricultural output from 1970 to 2010.](data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAAAAUAAAAFCAYAAAC1HAwQAAAABJRU5ErkJggg==)
The contribution of cropping to agricultural output dropped from 18 per cent in 1989 to 11 per cent in 1992. This decline in the cropping sector was largely due to shortages of fuel, fertilizers, seed and parts for agricultural equipment. Other indirect causes can be attributed to the subsequent increased costs of production due to liberalisation of production inputprices, and limited credit availability (Asian Development Bank 2004).

In 2009, approximately 962,000 hectares of the land in Mongolia (0.61 per cent of land area) was classified as being arable or having permanent crops, compared to the 114.8 million hectares (74 per cent of land area) classified as pasture land (FAO 2012). Figures from MoFALI indicate around 29 per cent of arable land was cropped in 2009 (MoFALI 2009c). The vast majority of this area is harvested for wheat (90 per cent).

The proportion of arable land harvested has declined significantly since decollectivisation in 1990 (Figure 22). For example, in 1989, 62 per cent of the arable land was harvested for crop production. This figure fell to 16 per cent in 2007 prior to the implementation of the Third Crop Rehabilitation program by the Mongolian government. This decline in total arable land harvested is evidence of the shift away from cereal production. Although total value of crop production is nearly at levels reached prior to 1990, area harvested and cereal production is well below levels reached in 1989.

Production

Crop production in Mongolia has historically been dominated by cereals—especially wheat with some barley and oats—and potatoes, although there have been shifts in the balance of crops through time. In 1990, cereals accounted for around 65 per cent of total crop production value, and potatoes accounted for 35 per cent. In 2010 however, potatoes accounted for 43 per cent of total crop production value, followed by cereals and other vegetables—mainly turnips, carrots, cabbages, onions and cucumbers—which accounted for 33 and 17 per cent of the value of production respectively (FAO 2012).

Until the middle of the 1990s, Mongolia was self sufficient in cereal production and an occasional exporter. Along with most other food industries, the sector collapsed following decollectivisation.
in 1990, and there was a 70 per cent fall in total cereal production across Mongolia between 1990 and 1995 (USAID 2009). This significant drop in production meant that Mongolia became increasingly dependent on commercial imports and food aid of cereals and other major crops. Wheat yields were consistently declining between 1989 and 1996 (Figure 23), and fluctuated below 0.8 tonnes per hectare up until 2006 because of poor crop and land management including fertiliser and chemical use. Use of these inputs was restricted by relatively high prices following the decline of the former Soviet Union (Asian Development Bank 2004). Wheat yields rose to around 1.6 tonnes per hectare by 2009.

The cropping sector has seen a recovery in terms of production in recent years. The introduction of the Third Crop Rehabilitation initiative in 2008 was a major policy reform by the Mongolian government that had the direct aim of expanding crop production as part of their National Food Security Program (USAID 2009). It followed from first and second crop production campaigns launched in 1959 and 1976.

The effect of the Third Crop Rehabilitation program can be seen through a 61 per cent increase in the total value of crop production between 2007 and 2010 (Figure 24). Over this period, the value of production of potatoes and cereals increased by 47 and 213 per cent respectively.

Figure 23 Wheat yields

Data source: FAO 2012
Figure 24 Total crop production value

Note: Other crops include carrots, turnips, cabbages and other brassicas, nuts, onions, cucumbers and gherkins.
Data source: FAO 2012
Appendix B Australian agriculture situation and drivers

This Appendix provides further information about agricultural policy and food trends in Australia and key further information sources.

Drivers and trends in agriculture and food

Australia's agricultural policy reforms

The economic and policy environment facing Australian farms has changed considerably over the past three decades. Historically, Australian governments employed a range of measures to maintain and stabilise farmer returns, including marketing and price support schemes and subsidies to reduce farm input costs. Recognising the costs of these policies, Australian governments have largely dismantled interventions affecting product prices and input costs and reduced assistance provided to farmers. Key reforms included:

- reductions in tariff and other border protection measures
- deregulation of marketing and price support schemes, including statutory marketing arrangements
- reform of drought and rural adjustment policies.

As a result of these reforms, Australia no longer provides any market price support to farmers and Australia’s current level of producer support is the second lowest in the OECD (member countries of the Organisation for Economic Co-operation and Development). Currently, some support is provided in the form of grants aimed at helping farmers improve productivity and efficiency, facilitate structural adjustment, adapt and adjust to climatic change, improve environmental management of natural resources, and funding for research and development.

Australia’s agricultural reforms have made resource allocation within the sector more responsive to market signals, and exposure to competition has provided a strong incentive for farmers to improve productivity by adopting new technologies and management practices. In turn, ongoing improvements in productivity growth have helped maintain the competitiveness and profitability of the sector, offsetting a declining trend in the terms of trade (output prices relative to input prices).

While Australia's agriculture sector has gained from these unilateral reforms, further liberalisation of agricultural trade via World Trade Organization negotiations could bring significant gains to Australian farmers (and other countries), through improved access to overseas markets for Australian products.

Climatic extremes and climate change

Climate has a significant impact on the agriculture sector’s performance. Most producers rely on seasonal rainfall to support crop and pasture growth, and Australia has one of the most variable climates in the world. As a result, production, particularly cropping, is highly volatile by international standards. In drought years, agricultural production can decrease sharply.

In recent years, other natural disasters have also significantly affected agricultural productivity (PMSEIC 2010). These include severe bush fires in Victoria in 2009, which affected intensive
livestock grazing, horticulture and forests; flooding events in Queensland and New South Wales in 2010 and 2011, which affected fruit, vegetables and cotton crops; and Severe Tropical Cyclone Yasi in 2011, which affected tropical crops, including sugar cane and bananas in north Queensland. All of these events had immediate losses and flow-on effects through re-building efforts and market adjustments.

Under the predicted effects of climate change, scientists forecast a continuing drying trend across much of southern Australia, accompanied by rising temperatures and higher evaporation rates, and more frequent and intense natural hazard events (IPCC 2007). Predicted longer droughts and higher temperatures associated with climate change are likely to make water supply issues more acute for irrigators. Changes in cropping patterns could also be expected.

**Economic trends and productivity performance**

Within Australia’s agriculture sector there is a diverse range of industries. Because of a relative abundance of land, including vast arid and semi-arid regions mostly suited to livestock grazing on native vegetation, Australia has a comparative advantage in extensive broadacre agriculture (essentially non-irrigated crops, cattle and sheep). Other key industries include intensive livestock, cotton and horticultural production.

Agriculture represents a small but important part of Australia’s economy. The real value of agricultural production was nearly $30 billion in 2011–12, up from around $14 billion at the start of the 1980s (ABARES 2012c). Australian agriculture has a strong export focus, exporting around 60 per cent of the gross value of farm production in recent years (ABARES 2012c). The value of exports can vary significantly between years for some commodities, because of variations in seasonal conditions and world prices.

Over time, productivity growth has been central to the continued viability and profitability of Australian farm businesses. Average productivity growth across all broadacre agriculture (non-irrigated cropping and extensive livestock industries) has been around 1 per cent a year for more than three decades. This has been largely due to reduced input use (-0.9 per cent a year), rather than output growth (0.1 per cent a year).

Productivity growth has been an outcome of many factors, including farmers’ adoption of new technologies and management practices and improvements in how production is organised across farms (industry structural adjustment). For example, increases in farm size and specialisation are recognised avenues of productivity growth through structural change. However, productivity growth has slowed in recent years, largely due to more frequent dry seasons and a long-run decline in public investment in rural research and development relative to the value of agricultural production (Dahl et al. 2013).

**Technology and science**

Major innovations have taken place in the machinery used in most agricultural sub-sectors over the last few decades. For example, in the dairy industry, the main innovation has been the ongoing development of automated milking systems. In 2001, the first commercial ‘single box’ Automatic Milking System began operating on an Australian dairy farm. Each of these units can milk 70 cows.

These kinds of innovations also have possible implications for the agricultural labour force as fewer people may be needed to produce the same amount or value of products. Other significant technological innovations in agriculture include the development of minimum till and no-till cultivation systems and their associated machinery; advanced irrigation and soil moisture...
monitoring systems, including drip irrigation to deliver water directly to plant roots; and precision agriculture that uses Global Positioning Systems, satellite technology and laser levelling of fields to control inputs for increasing productivity.

The rapidly advancing area of nanotechnology may lead to major changes in agriculture and food production via improvements in precision agriculture and hydroponics, in detecting and preventing plant and animal diseases, and by enhancing the ability of plants and animals to absorb nutrients (Joseph and Morrison 2006).

**Consumer attitudes and values**

Consumer preferences and the factors affecting them can have a major influence on sales of agricultural products. Having confidence in food safety, quality and price are key consumer purchasing drivers. All food sold in Australia, whether imported or produced domestically, must meet Australia’s food safety requirements, as set out in the Food Standards Code. There is a trend of growing consumer demand for foods and information on food labels, which align with personal values and ethics. Consumers are increasingly seeking information relating to health benefits and medical needs (such as food allergens), where and how food is produced (including animal welfare, organic production, and country of origin), religious requirements (such as halal or kosher), environmental sustainability (including carbon footprint), as well as nutrition and fair trade information (DAFF 2012b).

These consumers tend to be an influential but minor segment of the retail food market; and the trends in choice present opportunities for food businesses seeking new and high-value opportunities. Businesses are able to respond to consumer preferences and provide information, so long as the representations they make about products are not misleading and comply with national codes and laws. An example is packaged food, and some unpackaged food, must carry a declaration on a label or a sign near the food that states the country of origin. This labelling is to help consumers make an informed choice (DAFF 2012b).

A consumer concern where there has been a regulatory response is for genetically modified (GM) crops and foods. The Gene Technology Act 2000 which is concerned with human health and safety, and the environment, aims to provide industry with a clear path to market, and also provide a regulatory regime to meet consumer concerns. In addition to this Commonwealth Act, most state and territory governments additionally have reacted to consumer concerns by introducing moratoria on commercial release of products that have been approved as safe under Commonwealth regulations. Australia has a mandatory labelling system for approved GM food products (Under the Australian Food Standards Code) Manufacturers and food producers can also voluntarily label their products as ‘GM free’ if they perceive a market opportunity. Overall, public concerns about health, environmental or animal welfare issues associated with products and production systems can affect market share, and have often led to producer and retailer responses designed to alleviate these concerns or allow consumers to exercise choice by providing more information on products.

Sections of the community and farmers are now much more alert to risks associated with new or existing agricultural pests, weeds and diseases. This risk awareness is reflected in formal arrangements to protect biosecurity being established within government, and focused attempts to engage the community in biosecurity monitoring and surveillance (DAFF 2012b).
Australia's Food Industry - current situation

The Australian food industry encompasses many sectors—from production of raw materials used in food (the farm and fishing sectors) through export and import and the processing sectors and ultimately to domestic sales to consumers (Figure 25). Employment in agriculture and fishing industries is around 300,000 (2.6 per cent of the national workforce); while the broader food industry in Australia—including farm and fisheries production through to manufacturing, retailing and food and beverage service—employed around 1.64 million persons in 2011–12, around 15 per cent of total employment in Australia (DAFF 2013).

Figure 25 Australia’s food supply chain

Note: This figure is an indicative food chain only and may not fully represent all of Australia’s many and varied food chains. Non-food Inedible business inputs such as fertiliser, fuel and equipment are not represented. The heavy arrows show the domestic chain, the top line shows the export chain and the bottom lines show the import chain (though in practice these may overlap).
Source: DAFF 2011

Employment in food and fisheries production in Australia has been declining over the past decade (Figure 26). Employment in 2011–12 was only 77 per cent of the level in 2000–01. A contributing factor, particularly in the grains industry, is ongoing productivity improvements that have reduced labour requirements and increased capital intensity. The impact of drought and in horticulture, shortages of irrigation water, have been other contributing factors for declines in employment (DAFF 2013).

The total value of Australian farm and fisheries food production was $42.6 billion in 2011–12, 3.4 per cent higher than in 2010–11 (Figure 27). The value of broadacre food crop production was up by 7.4 per cent in 2011–12, horticulture by 2.6 per cent, fish products by 7.1 per cent and milk by 1.3 per cent. The value of livestock slaughtering was down 0.5 per cent in 2011–12 (DAFF 2013).
Australian agriculture is strongly export-oriented, with around two-thirds of the value of farm production exported (ABARES 2012a). Since the early 1990s, there has been a shift in export markets away from Europe towards Asia; and in 2011–12 more than 50 per cent of Australia’s food exports went to Asia. Export of fresh agricultural produce (particularly fruit) is limited by quarantine restrictions in a number of countries, including Japan, USA, mainland China, South Korea and Taiwan. A wide range of fresh produce is prohibited from entering Australia because of quarantine restrictions.

The value of Australian food exports increased to $30.5 billion in 2011–12, nearly 12.3 per cent higher than in 2010–11 (Figure 28). The main contributors to the rise in food exports between 2010–11 and 2011–12 were unprocessed grains (up $2028 million) and unprocessed oilseeds (up $582 million), reflecting a record Australian harvest in 2011–12. Live animal exports were down $137 million in 2011–12, but meat exports were up $218 million. The broad trend over
the past decade has been for increasing exports of cereal and oilseeds, but lower exports of dairy products and seafood, both unprocessed and processed (DAFF 2013).

Japan remained the largest destination for Australian food exports in 2011–12, with a share of 14.5 per cent of total value. This share has declined from around 20 per cent over the past decade. Korea, China and Indonesia have become increasingly important markets for Australian food exports over this period, each with a share of around 7.5 per cent of value in 2011–12 (DAFF 2013). For agriculture merchandise exports overall, including wool, China has eclipsed Japan as Australia’s major trading partner, with 18 per cent of total value going there in 2011–12 (ABARES 2012a). Outside of Asia, the United States was Australia’s largest food and beverage export market in 2011–12.

While exports increased, the value of Australian food imports also increased, to $11.3 billion in 2011–12, 8.6 per cent higher than in 2010–11. The main contributors to increased Australian food imports to 2011–12 were processed fruit and vegetables and processed seafood. Australia’s food net exports, as measured by the difference between the value of food exports and imports, increased to $19.2 billion in 2011–12 (Figure 28).

Figure 28 Trends in Australian food trade

Role of governments in the Australian food system

Australia has three tiers of government, which manage a range of policies, programs and regulations affecting the food system, to promote broader public benefits and encourage markets to operate efficiently (DAFF 2012b). Regulation touches a broad range of areas—from controlling which chemicals can be applied to a crop, to setting rules for waste management, to managing industrial relations at a factory.

Under section 51 of the Australian Constitution, the Australian Parliament can legislate on matters including external affairs; interstate and international trade; consumer and competition protection; taxation; foreign, trading and financial corporations; quarantine; certain fisheries; and patents of invention (see Figure 29). The Australian Government works with state and territory governments to improve regulations across the economy and reduce gaps and overlaps, including through the Council of Australian Governments (COAG), a collaboration particularly relevant to cross-jurisdictional issues such as water, or when Australia needs to meet the obligations of international agreement.
State parliaments can pass laws on a wider range of subjects than the Australian Parliament, and on matters of relevance to that particular state. Matters regulated by state laws include food safety, transport, education, health, the environment, trade within states and land management. Local governments, the third tier of government, provide a broad range of infrastructure, economic and community services to the community involving the food system.

Through regulation, the Australian Government only intervenes to address an identified problem and where regulation is likely to be cost effective. In doing so it aims for maximum possible benefit to the community—such as safe working conditions, safe food or reduced pollution. Cost-effective regulation and vigorous competition help the economy and society function safely, fairly and efficiently, reduce prices and improving quality and choice for consumers. The Australian Government is working with the food industry to improve regulations, including on agricultural chemicals and veterinary medicines, food labelling and biosecurity.

By and large, investment in production and technology provision is the role of private enterprise, outside the direct role of government.

Figure 29 Structure of the system of Australian government

- **The Australian Government**: Powers granted under Section 51 of the Australian Constitution.
- **State/Territory Governments**: Make their own laws for matters not controlled by the Australian Government under Section 51.
- **Local Governments**: Established by state and territory governments to be responsible for a number of community services.
- **Council of Australian Governments**: Joint decision-making by all tiers of government.
More information on Australian agriculture: key reports

The following are examples of key sources of information on Australian agricultural, food, fisheries and forestry activities, output and trade, and government programs supporting natural resource management in these industries.


- Australia’s Agriculture, Fisheries and Forestry ’At a Glance’ series provides easy-to-read information on the key features of Australian agriculture, fisheries and forestry industries including size, location, contribution to the economy, export standing and major markets for the various industries: [http://www.daff.gov.au/about/publications/glance2012](http://www.daff.gov.au/about/publications/glance2012)


Industry stakeholders such as those listed in Appendix C are also a key source of information and reports on Australia's agricultural industries and supply chains.
Appendix C Mongolia visit and stakeholders database

This appendix has information on the meetings held during the Mongolia visit. It also contains the Australian stakeholder database.

**Mongolia visit: meetings and stakeholders.**

Table 3 Meetings in Mongolia

<table>
<thead>
<tr>
<th>Organisation/representation</th>
<th>Information/contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mongolian Association of Suppliers of Raw Materials</td>
<td>NGO. Industry member of coordination council for Agricultural Commodity Exchange.</td>
</tr>
<tr>
<td>EU-Mongolia “Animal Health and Livestock Marketing” project, Technical Assistance Team</td>
<td>Government (MoFALI)/ international project. <a href="http://www.ahlmproject.mn">www.ahlmproject.mn</a></td>
</tr>
<tr>
<td>Mongolian State University of Agriculture (MSUA)</td>
<td>MSUA is the principal agricultural research and tertiary education institution in Mongolia. Sits under Mongolian Academy of Agricultural Science. Seven academic departments, six research institutes (including regional), and extension centre. <a href="http://www.msua.edu.mn/EN/">http://www.msua.edu.mn/EN/</a></td>
</tr>
<tr>
<td>MSUA, Vice president for scientific affairs</td>
<td></td>
</tr>
<tr>
<td>MSUA, Secretary of Science</td>
<td></td>
</tr>
<tr>
<td>MSUA, School of Ecology and Technology Development</td>
<td></td>
</tr>
<tr>
<td>MSUA, School of Biological Resource Management</td>
<td></td>
</tr>
<tr>
<td>MSUA, Veterinary Research Institute</td>
<td></td>
</tr>
<tr>
<td>MSUA, Centre for Innovation and Technology Transfer</td>
<td></td>
</tr>
<tr>
<td>Bornuur Food Company, Bornuur soum, Tuv aimag</td>
<td>Intensive dairy farm of 50 cows. Small processing facility with value added product making. Approximately 50 km west of Ulaanbaatar. Cattle herders, hand-milking at yards at summer camp and gur</td>
</tr>
<tr>
<td>Small dairy farm, Songino khairkhan district</td>
<td>Cattle housed inside during winter. Trialling artificial insemination. Interest in biochar.</td>
</tr>
<tr>
<td>Ministry of Food, Agriculture and Light Industry (MoFALI), Animal husbandry policy implementation and coordination department</td>
<td>MoFALI is primary Mongolian government agency for food and agriculture sectors, and also responsibilities in forestry. <a href="http://www.mofa.gov.mn">www.mofa.gov.mn</a></td>
</tr>
<tr>
<td>MoFALI, External Cooperation Division (Director)</td>
<td>Main contact point/host for Australian Government delegation. The Division engages international cooperation in various aspects across portfolio sectors.</td>
</tr>
<tr>
<td>MoFALI, Veterinary and Animal breeding department</td>
<td></td>
</tr>
<tr>
<td>MoFALI, Food production, trade and service policy implementation and coordination department</td>
<td></td>
</tr>
<tr>
<td>MoFALI, “Mongolian Agricultural Commodity Exchange” Project</td>
<td></td>
</tr>
<tr>
<td>MoFALI, Crop production policy implementation and coordination department</td>
<td></td>
</tr>
<tr>
<td>MoFALI, National Agricultural Extension Centre, Project and Cooperation Division</td>
<td></td>
</tr>
<tr>
<td>MoFALI, Light industry policy implementation and coordination department</td>
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<tr>
<td>MoFALI, National centre for animal gene bank</td>
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<tr>
<td>Organisation/representation</td>
<td>Information/contact</td>
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<td>-----------------------------------------------------------------</td>
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<tr>
<td>Traditional herding family, Erdene sum</td>
<td>Herders with 1000 mixed stock. Crossbreed of cattle. Erdene sum, Tuv (east of Ulaanbaatar). See Figure 1. Three gurs for family.</td>
</tr>
<tr>
<td>Forestry authority, Ministry of Environment, Nature and Tourism</td>
<td>Responsibilities of Ministry include land management, forest preservation and utilisation.</td>
</tr>
<tr>
<td>Crop farmer and consultant agricultural economist</td>
<td>9500 ha cropping farm; wheat and buck wheat; no-tillage methods.</td>
</tr>
<tr>
<td>Food &amp; Agriculture Organization of the UN (FAO), Mongolian country office</td>
<td>International organisation assisting government develop policies, programs and projects to achieve food security, develop agriculture, fisheries and forestry sectors, use natural resources sustainably and develop economy. Interaction with international partners and stakeholders <a href="http://www.fao.org/countryprofiles/index/en/?iso3=MNG">http://www.fao.org/countryprofiles/index/en/?iso3=MNG</a></td>
</tr>
<tr>
<td>Mongolian Society for Range Management (MSRM)</td>
<td>NGO active in grassland research, community development, training and project management. MSRM provide consultancy and advice to herding community and implement projects with Mongolian government, research institutes and international partners. A key role is to support herder groups’ initiatives in developing rangeland community management. <a href="http://www.msrm.mn">www.msrm.mn</a></td>
</tr>
<tr>
<td>Asian Development Bank Resident Mission in Mongolia</td>
<td>International organisation with focus on education, infrastructure, health, employment, urban development and trade facilitation. Promoting private sector and regional cooperation. Lender for major projects. <a href="http://www.adb.org/mnrm">http://www.adb.org/mnrm</a></td>
</tr>
</tbody>
</table>

Note: All meetings held in Ulaanbaatar unless otherwise shown (June 2012). Names and contact information for individuals not shown; More detailed information is held by ABARES/the Department of Agriculture.
### Table 4 Other stakeholders in Mongolia

<table>
<thead>
<tr>
<th>Organisation/other</th>
<th>Information / contact</th>
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<tbody>
<tr>
<td>Ministry of Education, Culture and Science</td>
<td>Responsibilities include funding science and agricultural science research. MOU with Australia for technical and further education to strengthen Mongolia’s Technical and Vocational Education and Training programs. <a href="http://www.mecs.gov.mn">www.mecs.gov.mn</a></td>
</tr>
<tr>
<td>Research Institute of Animal Husbandry</td>
<td>Under MSUA</td>
</tr>
<tr>
<td>Mongolian Food Industry Association</td>
<td>Dairy/food NGO</td>
</tr>
<tr>
<td>Mongol Bactrian Association</td>
<td>Dairy NGO</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.mongolbactrian.com">www.mongolbactrian.com</a></td>
</tr>
<tr>
<td>Professional Dairy Producers’ Association</td>
<td>Dairy NGO</td>
</tr>
<tr>
<td>Dairy researcher’s Association</td>
<td>Dairy NGO</td>
</tr>
<tr>
<td>General Agency for Specialised Inspection (GASI)</td>
<td>Mongolian government regulatory agency responsible for border surveillance and quarantine inspection, covering agricultural products as well as mining, environment, tourism and other sectors. Separate to MoFALI, sits under Deputy Prime Minister. <a href="http://www.inspection.gov.mn">www.inspection.gov.mn</a></td>
</tr>
<tr>
<td>Mongolian Wool and Cashmere Association</td>
<td><a href="http://www.mongoliertextile.mn">www.mongoliertextile.mn</a></td>
</tr>
</tbody>
</table>

*Note: These stakeholders were not interviewed; organisations identified by interviewees in Mongolia and desktop review. Listings are indicative only and not exhaustive.*
# Australian stakeholder information and contact details

## Table 5 Australian stakeholders

<table>
<thead>
<tr>
<th>Australian stakeholders</th>
<th>Information</th>
<th>Contact</th>
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<tbody>
<tr>
<td><strong>RESEARCH and DEVELOPMENT</strong></td>
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<tr>
<td><strong>CSIRO Plant Industries</strong></td>
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<td></td>
</tr>
<tr>
<td>International Environmetrics Society (TIES)</td>
<td>Engages specialists in quantitative analysis of issues at interfaces with environmental sciences, including agri-environmental. In particular, technologies relevant for smart information use across issues for food, livestock and crop production, fisheries and forestry, including risk assessment.</td>
<td><a href="http://www.environmetrics.org/">http://www.environmetrics.org/</a></td>
</tr>
<tr>
<td><strong>Australian Centre for International Agricultural Research (ACIAR)</strong></td>
<td>The Australian Centre for International Agricultural Research (ACIAR) is a statutory authority that operates as part of the Australian Government’s development cooperation programs. The Centre encourages Australia’s agricultural scientists to use their skills for the benefit of developing countries and Australia. ACIAR funds research projects that are developed within a framework reflecting the priorities of Australia’s aid program and national research strengths, together with the agricultural research and development priorities of partner countries. Sustainable livestock grazing systems on Chinese temperate grasslands project (<a href="http://www.aciar.gov.au/project/LPS/2008/048">http://www.aciar.gov.au/project/LPS/2008/048</a>) Crop Improvement and Management program (<a href="http://aciar.gov.au/programarea/Crop%20Improvement%20and%20Management">http://aciar.gov.au/programarea/Crop%20Improvement%20and%20Management</a>)</td>
<td><a href="http://www.aciar.gov.au">http://www.aciar.gov.au</a></td>
</tr>
<tr>
<td>** Cooperative Research Centres (CRCs)**</td>
<td>The CRC program is an Australian Government initiative that supports end user driven research collaborations to address major challenges facing Australia – involving researchers, industries, communities and governments. CRCs pursue solutions to challenges that are innovative, of high impact and capable of being effectively deployed by end users. CRCs operate across four broad industry sectors, including 9 currently in agriculture, forestry and fishing, as well as other sectors.</td>
<td><a href="http://www.crc.gov.au/About-Us/CRCs/Pages/CRC-Directory.aspx">http://www.crc.gov.au/About-Us/CRCs/Pages/CRC-Directory.aspx</a></td>
</tr>
<tr>
<td>Australian stakeholders</td>
<td>Information</td>
<td>Contact</td>
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</tr>
<tr>
<td>Dairy Futures CRC</td>
<td>Dairy Futures Cooperative Research Centre (CRC) invests in large-scale research projects to deliver improved pasture and animal options.</td>
<td><a href="http://www.dairyfuturescrc.com.au">www.dairyfuturescrc.com.au</a></td>
</tr>
<tr>
<td>CRC for Sheep Industry Innovation</td>
<td>The Cooperative Research Centre for Sheep Industry Innovation (Sheep CRC) was established for a term of seven years with effect from July 2007 until June 2014 to undertake a program of research and delivery of innovation to the Australian sheep industry. The role of the CRC is to facilitate transformation of the sheep industry through making sheep easier to manage, developing the production and processing of meat and wool to meet increasing consumer expectations and by increasing the uptake of new technologies by the industry.</td>
<td><a href="http://www.sheepcrc.org.au">www.sheepcrc.org.au</a></td>
</tr>
<tr>
<td>CRC for Beef Genetic Technologies (2005-2012)</td>
<td>Legacy website only available. The Cooperative Research Centre for Beef Genetic Technologies (Beef CRC 3) was established to identify the genetic and non-genetic factors affecting beef quality and other production traits of economic importance. The focus on “genetic technologies” in Beef CRC 3 followed two previous successful research programs undertaken by the Beef CRC in CRC 1 and 2.</td>
<td><a href="http://www.beefcrc.com/about/about-beef-crc-website.html">http://www.beefcrc.com/about/about-beef-crc-website.html</a></td>
</tr>
<tr>
<td>Australian Rangeland Society</td>
<td>Independent association of people interested in sustainable use of resources in natural or semi-natural landscapes (such as grasslands, shrublands and woodlands). A forum for exchange of ideas and information amongst those who live remotely or are concerned about rangeland issues in their work. Members include owners and managers of businesses, members of NGOs, scientists, communicators, government administrators, NRM facilitators and community leaders.</td>
<td><a href="http://www.austrangesoc.com.au/site/">http://www.austrangesoc.com.au/site/</a></td>
</tr>
</tbody>
</table>

**EDUCATION and TRAINING**

Crawford Fund Awards and Fellowship

The annually awarded Crawford Fund Fellowship provides further training of an outstanding young scientist in agriculture, fisheries or forestry from a selected group of developing countries. Training takes place at Australian agricultural institutions, and focuses on the application of knowledge to increase agricultural production in the Fellow’s home country. Currently nominated countries focus on the Pacific and south east Asia, although nominated countries may change with time.

http://www.crawfordfund.org/


For international engagement Australia signed a Memorandum of Vocational Education Cooperation (MoVEC) with Mongolia (Ministry of Education, Culture and Science) on 23 February 2011. This covers encouragement of mining and engineering and language teaching, not mentioning agriculture.

http://www.education.gov.au
http://www.aei.gov.au (Australian Education International)
### Australian stakeholders

<table>
<thead>
<tr>
<th>Information</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAFES – specific links such as wool classing, shearing, butchery, mechanical courses</td>
<td>TAFE Directors peak body - See below</td>
</tr>
<tr>
<td>TAFE Directors Australia (TDA)</td>
<td>TAFE Directors Australia (TDA) is the peak national body representing Australia’s 58 public TAFE (technical and further education) Institutes and university TAFE divisions. TDA has an MOU with Mongolian Technical and Vocational Education and Training (TVET) under Mongolian Ministry of Education, Culture and Science. Millennium Challenge funded Australian consultant from TAFE Directors Australia to work for a year on revitalising TVET.</td>
</tr>
<tr>
<td>Skills Australia</td>
<td></td>
</tr>
<tr>
<td>Australian College of Agriculture and Horticulture</td>
<td></td>
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<tr>
<td>AgriFood Skills Australia</td>
<td></td>
</tr>
<tr>
<td>Australian Pacific Extension Network Austraining International</td>
<td>Network for Australasian agricultural extension specialists. Austraining International manages the Australian Government’s AYAD and AVID volunteer programs in Mongolia, which are transitioning to alignment with the Australia-Mongolia Program Strategy 2012–2016 priority areas of Mining for Development and Supporting Vulnerable Communities.</td>
</tr>
<tr>
<td>INDUSTRY and NON-GOVERNMENT</td>
<td></td>
</tr>
<tr>
<td>Australian Fodder Industry Association</td>
<td>Australian Fodder Industry Association (AFIA) is the peak body for Australian fodder industry. The fodder industry underpins agricultural production in dairy, livestock, horticulture and other intensive industries. AFIA engages in sharing information, assisting trade, promoting research and development, and works with government regulators to maintain a favourable business environment for industry members.</td>
</tr>
<tr>
<td>Dairy Australia</td>
<td>Dairy Australia is the national services body for dairy farmers and the industry. Dairy Australia invests across the dairy supply chain, identifying the best opportunities for collective action - the activities that farmers and companies cannot do efficiently themselves.</td>
</tr>
<tr>
<td>Grain Growers</td>
<td>Grain Growers Limited (&quot;GrainGrowers&quot;) is Australia’s largest grain industry organisation promoting the development of a sustainable, viable and efficient Australian grain industry.</td>
</tr>
<tr>
<td><strong>Australian stakeholders</strong></td>
<td><strong>Information</strong></td>
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</tr>
<tr>
<td>GrainGrowers</td>
<td>GrainGrowers works on behalf of all Australian grain producers. GrainGrowers' five core operational areas include: Grower Development Industry Development Information Services Technical Services Analytical Services</td>
</tr>
<tr>
<td>Grain Trade Australia</td>
<td>Grain Trade Australia (GTA) was formed in 1991 to standardise grain standards, trade rules and grain contracts across the Australian grain industry to enable the efficient facilitation of trade across the grain supply chain. GTA's role today is to ensure the efficient facilitation of commercial activities across the grain supply chain. To GTA develops and provides the industry with some key tools: Commodity Standards; Contracts; Trade Rules; Dispute Resolution Service; Professional Development; Australian Grains Industry Conference</td>
</tr>
<tr>
<td>Meat and Livestock Australia (MLA)</td>
<td>Meat &amp; Livestock Australia (MLA) is a producer-owned company, with more than 47 500 cattle, sheep and goat members. MLA delivers marketing, research and development services on behalf of its cattle, sheep and goat producers in partnership the entire red meat and livestock industry.</td>
</tr>
<tr>
<td>AuctionPlus website</td>
<td>Service offering real-time internet auctions of cattle, sheep and wool. Site allows commodity transaction, reserve price setting and legal change of ownership without the seller, buyer or product having to come together physically at the time of sale (not a commodity exchange).</td>
</tr>
<tr>
<td>Australian Wool Exchange</td>
<td>The Australian Wool Exchange (AWEX) is a public company limited by guarantee to manage and administer wool marketing arrangements in the Australian wool industry. The Australian Wool Exchange commenced operations in February 1994.</td>
</tr>
<tr>
<td>Australian Wool Innovation Ltd</td>
<td>Australian Wool Innovation is a not-for-profit company owned by over 29,000 Australian woolgrowers. AWI invests in research, development, innovation and marketing along the global supply chain for Australian wool.</td>
</tr>
<tr>
<td>Australian Wool Testing Authority Ltd</td>
<td>Controls and administers a wool testing service in Australia. The company’s mission is to assist or</td>
</tr>
<tr>
<td><strong>Australian stakeholders</strong></td>
<td><strong>Information</strong></td>
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<tr>
<td><strong>promote the development of the pastoral, agricultural, manufacturing and industrial resources of Australia, in particular, by providing independent objective data and information services which will facilitate the efficient production, marketing and processing of wool, other fibres, textile products and related materials.</strong></td>
<td><strong>ACWEP represents the interests of wool buying firms which traditionally have serviced most of their wool supplies from the auction selling system; and Australian early stage wool processing companies.</strong></td>
</tr>
<tr>
<td><strong>Australian Council of Wool Exporters &amp; Processors Inc</strong></td>
<td><strong>The Woolmark Company operates a global licensing program which enables Woolmark licensees to use one of The Woolmark Company’s logos as an independent quality endorsement on the licensee’s products. The Woolmark Company offices are strategically located to develop direct business relationships with global brands/retailers, textile manufacturers and fashion designers in key markets across Asia, Europe and the Americas. The Woolmark Company Pty Ltd is a subsidiary of Australian Wool Innovation Limited.</strong></td>
</tr>
<tr>
<td><strong>The Woolmark Company</strong></td>
<td><strong>The Australian Wool Industries Secretariat Inc (AWIS) comprises the following organisations:</strong> Australian Council of Wool Exporters and Processors Inc. (ACWEP) Private Treaty Wool Merchants of Australia Inc (PTWMA) Federation of Australian Wool Organisations (FAWO) Staff at AWIS provide administrative support and advisory services to members of these wool bodies.</td>
</tr>
<tr>
<td><strong>Australian Wool Industries Secretariat</strong></td>
<td><strong>Wool Producers Australia</strong> is the peak national body for the wool producing industry in Australia, representing farmers whose primary business is growing wool, and is the national voice on behalf of producers. WPA advocates their interests to the Federal Government and internationally and enables woolgrowers to determine policy and drive change in their industry.</td>
</tr>
<tr>
<td><strong>Wool Producers Australia</strong></td>
<td><strong>Australian Superfine Wool Growers’ Association Inc</strong> is an international association of superfine wool growers and processors founded to promote and further the development and marketing of superfine wool.</td>
</tr>
<tr>
<td><strong>Australian Superfine Wool Growers’ Association Inc</strong></td>
<td><strong>Australian Association of Stud Merino Breeders Limited (AASMB) is the federal association that represents six state Merino organizations and, through them, the approximately 1100 registered studs in all parts of</strong></td>
</tr>
<tr>
<td><strong>Australian stakeholders</strong></td>
<td><strong>Information</strong></td>
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<tr>
<td><strong>Australia except the Northern Territory.</strong></td>
<td>The principal aims of the Association are to encourage, promote and foster the breeding and improvement of stud Merino and Poll Merino sheep, and to compile and publish a register of Merino and Poll Merino stud sheep in Australia.</td>
</tr>
<tr>
<td><strong>AgForce Queensland</strong></td>
<td>AgForce Queensland is the peak organisation for Queensland's rural producers. Areas of interest include resource management, land tenure, environmental issues, international competitiveness and withdrawal of rural community services. AgForce also undertakes training for skills development in the rural sector.</td>
</tr>
<tr>
<td><strong>AgLinks</strong></td>
<td>Agricultural services and business directory, providing internet links to a variety of products, marketing and professional services, and forums.</td>
</tr>
<tr>
<td><strong>Grain Producers Australia Ltd</strong></td>
<td>The Grain Producers Australia portfolios include: Research and Development; Quarantine and Biosecurity; Environment and Sustainability; Trade and Market Access; Infrastructure as well as Grains Promotion and Market Support for grain producers and the grains industry in Australia.</td>
</tr>
<tr>
<td><strong>Australian Dairy Farmers Ltd</strong></td>
<td>Australian Dairy Farmers Limited (ADF) is a not-for-profit organisation representing the interests of Australian dairy farmers.</td>
</tr>
<tr>
<td><strong>Australian Dairy Industry Council</strong></td>
<td>The Australian Dairy Industry Council (ADIC) is the dairy industry’s peak policy body. It co-ordinates industry’s policy and represents all sectors of the industry on national and international issues through its two constituent bodies, the Australian Dairy Farmers Ltd (ADF) and the Australian Dairy Products Federation (ADPF).</td>
</tr>
<tr>
<td><strong>Australian Lot Feeders’ Association</strong></td>
<td>The Australian Lot Feeders’ Association is the peak national body for the feedlot industry in Australia. Feedlots are a rapidly expanding and important industry in Australia. ALFAs mission is to lead the industry in a manner that fosters excellence and integrity; improves the feedlot business environment; and ensures its community standing.</td>
</tr>
<tr>
<td><strong>Australian Meat Industry Council</strong></td>
<td>The Australian Meat Industry Council (AMIC) is the Peak Council that represents retailers, processors, exporters and smallgoods manufacturers in the post-farm-gate meat industry.</td>
</tr>
<tr>
<td><strong>Australian Meat Processor Corporation</strong></td>
<td>The Australian Meat Processor Corporation (AMPC) is a national Research &amp; Development Corporation that represents the Red Meat Processing Industry throughout Australia. AMPC’s mandate is to support Research, Development and Extension/Education (RD&amp;E) initiatives that are directed at improving the sustainability and efficiency of the meat processing industry.</td>
</tr>
<tr>
<td><strong>Australian stakeholders</strong></td>
<td><strong>Information</strong></td>
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</tr>
<tr>
<td>Australian Veterinary Association</td>
<td>The Australian Veterinary Association is the professional organisation that represents veterinarians across Australia.</td>
</tr>
<tr>
<td>Cattle Council of Australia</td>
<td>The Cattle Council of Australia is the peak producer organisation representing Australia’s beef cattle producers. The objective of the Council is to represent and progress the interests of Australian beef cattle producers through wide and regular consultation with, and policy advice to, key industry organisations, relevant Federal Government Departments and other bodies regarding issues of national and international importance.</td>
</tr>
<tr>
<td>Federation of Australian Wool Organisations</td>
<td>The Australian Wool Industries Secretariat provides administrative and advisory support to the Federation of Australian Wool Organisations (FAWO). FAWO provides Australia’s membership of the Australian National Committee of the International Wool Textile Organisation. With virtually all industry sectors as members, FAWO can also be regarded as the peak industry body in Australia and is used for addressing major local issues.</td>
</tr>
<tr>
<td>GrainCorp Limited</td>
<td>GrainCorp Ltd is an Australian grain handler. With the full deregulation of the wheat market in Australia in 2008 and the removal of the single wheat desk. GrainCorp now trades grain internationally in its own right, with the Marketing arm of the business operating in Australia, Europe, the UK and North America. GrainCorp’s business areas include production and processing as well as bakery products and milling businesses.</td>
</tr>
<tr>
<td>Pastoralists and Graziers Association (PGA) Western Australia</td>
<td>The PGA is a non-profit industry organisation in Western Australia which represents primary producers of wool, grain and meat &amp; livestock.</td>
</tr>
<tr>
<td>Birchip Cropping Group (BCG)</td>
<td>BCG is a not-for-profit agricultural research organisation led by farmers in the Wimmera Mallee region of Victoria. BCG is a national leader in farmer-driven, agronomic research and extension.</td>
</tr>
<tr>
<td>Organic Federation of Australia</td>
<td>The Organic Federation of Australia is the peak body for the organic industry in Australia. Whilst not certifying growers, as a national representative body it includes certifiers, food producers, wholesalers, exporters, retailers, consumers, processors and inspectors.</td>
</tr>
<tr>
<td>South Australian Arid Lands NRM Board</td>
<td>The Board delivers various regional projects in cooperation with local landholders, industry,</td>
</tr>
<tr>
<td>Australian stakeholders</td>
<td>Information</td>
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</tr>
<tr>
<td>Rangelands NRM (WA)</td>
<td>Rangelands WA is a non-government organisation which represents community needs and encourages the sustainable use of land, flora and fauna, fresh water and coastal marine environments.</td>
</tr>
<tr>
<td>National Rangeland NRM Alliance</td>
<td>A partnership of 13 Australian NRM bodies providing a mechanism for collaboration and efficient approaches on common issues. Has key themes of biodiversity management, total grazing pressure, and pest control.</td>
</tr>
<tr>
<td>Landcare Australia Ltd</td>
<td>Landcare is a national network of thousands of locally-based community groups who care for the natural resources of our country. Australia has more than 4000 community Landcare groups, 2000 Coastcare groups and many thousands of volunteers across the country.</td>
</tr>
<tr>
<td>GOVERNMENT</td>
<td>The Australian Government Department of Agriculture role is to develop and implement policies and programs that ensure Australia’s agricultural, fisheries, food and forestry industries remain competitive, profitable and sustainable. The department also has primary responsibility for managing Australia’s biosecurity system.</td>
</tr>
<tr>
<td>Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)</td>
<td>ABARES is a research bureau within the department that provides professionally independent research, analysis and advice for government and private sector decision-makers on significant issues affecting Australia’s agriculture, fisheries and forestry industries.</td>
</tr>
<tr>
<td>Department of the Environment</td>
<td>The department is responsible for implementing the Australian Government’s policies to protect our environment and heritage, and to promote a sustainable way of life.</td>
</tr>
</tbody>
</table>
Potential agricultural cooperation between Mongolia and Australia

<table>
<thead>
<tr>
<th>Australian stakeholders</th>
<th>Information</th>
<th>Contact</th>
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<tr>
<td></td>
<td>businesses to succeed in international business—including in agriculture products and professional services. Austrade attracts productive foreign direct investment into Australia and promotes Australia’s education sector internationally. There is now Australian Trade Commission and Consult General representation in Ulaanbaatar.</td>
<td><a href="http://www.austrade.gov.au/">http://www.austrade.gov.au/</a></td>
</tr>
<tr>
<td>The Australian Suppliers Directory promotes Australian goods and services to overseas buyers through Austrade’s website. It is a searchable directory of thousands of Australian companies, products and services.</td>
<td><a href="http://www.austrade.gov.au/">http://www.austrade.gov.au/</a></td>
<td></td>
</tr>
<tr>
<td>Food Standards Australia New Zealand (FSANZ)</td>
<td>FSANZ develops food standards to cover the food industry in Australia and New Zealand. The Australia New Zealand Food Standards Code regulates the use of ingredients, processing aids, colourings, additives, vitamins and minerals. The code also covers the composition of some foods e.g. dairy, meat and beverages and standards developed by new technologies such as genetically modified foods. FSANZ is also responsible for packaged and unpackaged food labelling and mandatory warnings or advisory labels.</td>
<td><a href="http://www.foodstandards.gov.au/">http://www.foodstandards.gov.au/</a></td>
</tr>
<tr>
<td>PRIVATE CONSULTANTS</td>
<td>Ag Institute Australia is the peak industry body for agricultural and natural resource management professionals. Ag Institute Australia members are engaged in a wide range of activities including research, education, government, agribusiness and private consulting.</td>
<td><a href="http://www.aginstitute.com.au/">http://www.aginstitute.com.au/</a></td>
</tr>
<tr>
<td>Agricultural Institute Australia: Australian Association of Agricultural Consultants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ralph van Gelder</td>
<td>Private agricultural &amp; agribusiness consultant who has worked with the Mongolian government and on AusAID, UNDP, UNOPS, World Bank, UNIDO and ADB projects.</td>
<td><a href="mailto:ralphvangelder@hotmail.com">ralphvangelder@hotmail.com</a> <a href="mailto:ryan4456@bigpond.net.au">ryan4456@bigpond.net.au</a></td>
</tr>
</tbody>
</table>

Note: Identification in this table does not indicate funding interests or commitments for collaboration. Whilst stakeholders have been contacted where possible, verification of any further interest is beyond scope of this study. Listings are indicative only and not exhaustive.
Appendix D Questionnaire

Introduction

Scoping the potential for agricultural cooperation between Mongolia and Australia
Department of Agriculture, Fisheries and Forestry International Agriculture Project

Mongolia’s Ministry of Food, Agriculture and Light Industry (MoFALI) and the Australian
Government Department of Agriculture, Fisheries and Forestry (DAFF) have signed a
Memorandum of Understanding (MoU) encouraging cooperation in the following areas of
interest:

- agricultural technology transfer and extension activities;
- training agricultural specialists in Australia and Mongolia; and
- the exchange of information relating to food, livestock and crop production, fisheries and
  forestry

DAFF officers are using this questionnaire to gather information on these areas of interest in
meetings with contacts in Mongolia. A translation is available.

Австрали-Монголын хөдөө аж ахуйн салбар дэх хамтын ажиллагааны цар хүрээний урьдчилсан судалгаа

Австрали Улсын Хөдөө аж ахуй, загас агууур, ойн яамны олон улсын хөдөө аж ахуйн төсөл

Монгол Улсын Хүнс, хөдөө аж ахуй, хөнгөн үйлдвэрийн яам (ХААЗАОЯ) ба Австрали
Улсын Хөдөө аж ахуй, загас агууур, ойн яам (ХААЗАОЯ) - дын гаргасан Хамтран Ажиллах
Санамж Бичүүнөө дагуу дөрөх салбаруудад хамтран ажиллахыг хөхүүлэн дээмжинэ:

- Хөдөө аж ахуйн салбарт технологи дамжуулах, хөдөө аж ахуйн үйлдвэрлэлийг
  өргөжүүлэх;

- Австрали болон Монгол улсад мэргэжилтнуудийг хөдөө аж ахуйн чиглэлээр сургах
  сургалт зохион байгуулах; ба

- Хүнс, мал аж ахуй, газар тариалан, ой болон загас агуурын салбарын асуудлаар
  мэдээлэл солилцох

ХААЗАОЯ-ны ажилтнууд нь энэхүү санал асуулгын хуудсын дээр дүрдсэн сэдвээр
мэдээлэл цуглуулах зорилгоороор Монголын тэлээ холбогдох ажилтнуудтай холбогдохдоо
ашиглах болно. Мөн орчуулсан хувилбар байгаа болно.
Questions
Санал асуулгын хуудас

Can you provide a brief overview of the Mongolian agriculture and herding sector you are involved with?

Монголын хөдөө аж ахуй, мал ахуйн салбар дэх таны оролцоо юу вэ? Энэ талаараа та товч мэдээлэл өгнө үү.

What is your role in this sector?

Энэхүү салбар дэх таны гүйцэтгэх үүрэг юу вэ?

What do you see as the key goals for developing the agriculture and herding sector in Mongolia?

Монголын хөдөө аж ахуй, мал ахуйн салбарыг хөгжүүлэхэд тавигдаж буй хамгийн гол зорилгыг та юу гэж бодож байна вэ?

What are the biggest issues that need attention in your opinion?

Таны бодлогоор, анхаарлаа хандуулах ёстой хамгийн том асуудлууд нь юу юу байна вэ?

Are there any current or planned projects to address these goals and issues?

Эдгээр зорилт болон тулгарч буй асуудлуудыг шийдэх зорилгоор хэрэгжүүлж байгаа буюу хэрэгжүүлэхээр төлөвлөсөн төслүүд бий юу?

For agricultural technology transfer – What do you see as the most important needs / opportunities?

Австрали болон Монгол улсын хөдөө аж ахуйн салбарын технологи дамжуулах тал дээр хамтран ажиллах ямар ямар хамгийн чухал эрхцэг шаардлагууд байна вэ? Мөн энэ талаар хамтран ажиллах ямар боломж, бололцооны уд хөж та бодож байна вэ?

For training of agricultural specialists – What do you see as the most important needs / opportunities?
For exchange of information between Mongolia and Australia on agriculture – What do you see as the most important needs / opportunities?

Австрали болон Монгол улс хооронд мэдээлэл солилцох асуудлаар хамтран ажиллах ямар ямар хамгийн чухал хэрэгцээ шаардлагууд байна вэ? Мөн энэ талаар хамтран ажиллах ямар боломж, бололцооны байдлаа гэж та бодож байна вэ?

How do you think Mongolia and Australia can cooperate on agriculture and herding in Mongolia?

Хөдөө аж ахуй болон мал аж ахуйн салбаргын хэмжээний дээд мэргэжилтний салбарт Монгол Австрали улсууд хэрхэн хамтран ажиллах боломжтой гэж та угж байна вэ?

How are agricultural products marketed in Mongolia?

Are there any problems with the marketing systems and if so how could they be improved?

Монголд одоогийг хөдөө аж ахуйн бүтээгдэхүүнүүдийг зах зээлдээ хэрэгцээ гарган борлуулж байна вэ?
Зах зээлийн маркетингийн системд ямар ямар асуудлууд тулгарч байна вэ? Үүнийг яаж сайдруулах хэрэгтэй гэж та бодож байна вэ?

What opportunities in Mongolia are there for scholarships or volunteer programs relating to agriculture?

Хөдөө аж ахуйн салбарын ямар ямар тэтгэлэгт хөтөлбөр болон сайн дурын хөтөлбөрүүдэд хамрагдах боломжгүй Монголд байдаг вэ?

Which other interested stakeholders should we talk to – in government, education or industry?

Та биднийг болох сонгуулийг яам, тухайн аж ахуйн салбарыг хариуцсан яам гэх мэт захиагийн газрын ямар ямар сонирхогч болон оролцогч талуудтай ярна хэрэгцээгийн зүйлээ тэйшүүгээ гэж та бодож байна вэ?

Do you have any other comments or observations?

Өөр ямар нэгэн бусад ажигласан зүйл эсэхүл санаал болгох зүйл танд байна уу?
We would like to send you a project report. Please provide your contact details:

| Name:                          | .......................................................... |
| Agency / Company:              | .......................................................... |
| Address:                       | .......................................................... |
| E-mail:                        | .......................................................... |
| Phone:                         | .......................................................... |

Бид танд төслийнхөө тайлбар тээвэрлэх болно. Та холбогдох утас хаяг ба эмэгэн үү:

| Овог нэр :                        | .......................................................... |
| Компани/Агентлаг:                | .......................................................... |
| Хаяг:                            | .......................................................... |
| И-мэйл:                          | .......................................................... |
| Утас:                            | .......................................................... |
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