

Australia – Pakistan

# Agriculture Sector Linkages Program

Annual Report 2007-2008  
&  
Annual Operational Plan 2008-2009

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ACIAR  
Australian Centre for International Agricultural Research

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## List of abbreviations

ACIAR	Australian Centre for International Agricultural Research
ASLP	Agriculture Sector Linkages Program
AUD	Australian dollar
AusAID	Australian Agency for International Development
CGIAR	Consultative Group on International Agricultural Research
CEO	Chief executive officer
CFO	Chief financial officer
DAFF	Department of Agriculture, Fisheries and Forestry
EAD	Economic Affairs Division
FSCR	Federal Seed Certification & Registration Department
FVDP	Punjab Fruit and Vegetable Development Program
FY	Financial year
IPM	Integrated Pest Management
HEIS	High efficiency irrigation systems
HC	High Commissioner
LDDB	Livestock and Dairy Development Board
L&DD	Livestock and Dairy Department (Punjab)
MSDS	Mango Sudden Decline Syndrome
MINFAL	Federal Ministry of Food, Agriculture and Livestock
NARC	National Agriculture Research Centre
NGO	Non-government organisation
NRSP	National Rural Support Program
NSW DPI	New South Wales Department of Primary Industries
NWFP	North West Frontier Province
ORI	Orange Research Institute
PARC	Pakistan Agriculture Research Council
PHDEB	Pakistan Horticulture Development and Export Board
PSO	Program support officer
QDPI&F	Queensland Department of Primary Industries and Fisheries
R&D	Research and development
RoU	Record of Understanding
SC	Steering committee
TORs	Terms of reference
UAF	University of Agriculture Faisalabad
UK	United Kingdom
USAID	United States Agency for International Development

## 1. Summary of Progress in FY 07/08

The program is now well under way, with all four R&D projects implemented and fully operational. In some cases the projects are exceeding their planned activities. Although significant impact of R&D activities is normally observed toward the completion of R&D projects and afterwards, there have been a number of early outcomes to date.

### *Generally enhanced linkages*

There is evidence of enhanced linkages in Pakistan across the research-extension-farmer continuum. Collaborative linkages between Australian and Pakistan research organisations have also been significantly enhanced in the horticulture and dairy sectors. As result of the ASLP, a routine engagement between ACIAR and the Planning Commission, the Federal Ministry of Food, Agriculture and Livestock (MINFAL), the Pakistan Agriculture Research Council (PARC) and the Punjab and Sindh Depts. of Agriculture is enabling a broad exchange of expertise between Pakistan and Australia. This extends beyond the ASLP's immediate emphasis on horticulture and dairy to issues of water management and diseases threats (avian influenza, wheat stem rust Ug99), as well as to broader capacity building support, by helping Australian universities link with partner universities in Pakistan and by helping place Pakistan funded postgraduates in Australia.

### *Key outcomes – mango production project*

- Collaboration among researchers has been significantly strengthened, research methodologies have been standardized and there is consensus on the main causal agents of the Mango Sudden Decline Syndrome and researchers are using similar protocols at addressing the disease. It is likely that within the life of the project, farmers will have access to effective MSDS control measures, significantly reducing loss of mango trees.
- Strong linkages have been established with the Fruit and Vegetable Development Program (FVDP) in Punjab through which integrated crop management strategies have been developed and are being evaluated in the project with participation from the National IPM Program and the more than 3600 farmers have been addressed through the Farmer Field School (FFS) approach and 252 researchers and extensionists involved 19 training seminars. Tree pruning, for example, is gradually being adopted and is already giving good results in 8 commercial farms, while it is anticipated that 20 – 40% of the small and medium growers participating in the FFS will start adopting better management practices. It has demonstrated that pruning can be undertaken without yield declines, a widespread belief that has inhibited farmer uptake to date.
- The first commercial nursery operator from Multan willing to invest in a model nursery farm has been trained in Australia and has set up and is developing a Model Commercial mango nursery to make available disease-free planting materials to mango growers in Pakistan and the regional countries that his nursery services.

### *Key outcomes – mango supply chain project*

- Established a core group of 27 supply chain participants representing all stages of the chain plus supporting agencies, ie growers, contractors, wholesalers, retailers, exporters, extension agencies, Pakistan Horticulture Development and Export Board (PHDEB), researchers, which will provide the basis to demonstrate the commercial integration of project findings in a whole of chain context. Following a season of familiarisation and training in 2007, five demonstration supply chain groups were initiated in early 2008, two for domestic markets and three for international markets. A Memorandum of Understanding has been signed by each group's members to formally record the

commitment of firms to their supply chain groups. Each supply chain will target a specific market opportunity in 2008.

- Launched the newly established postharvest laboratory at the University of Agriculture Faisalabad. This will provide critical ongoing capacity in performing research into postharvest technology, underpinning the work of the Pakistan Horticulture Development and Export Board (PHDEB) beyond the scope of the ASLP.
- Walking the Chain training workshop in Singapore and Australia with 18 supply chain participants from Pakistan was a tremendous success in training participants in supply chain management – it gave a frame of reference for subsequent activities in Pakistan.
- Simple techniques aimed at increasing the shelf life and the quality of mangoes through the practice of limewashing has positioned the PHDEB to target the high end European market. Initial batches of high quality, limewashed mangoes have achieved significantly higher prices (2-3 Euros per mango vs. 0.5 Euros untreated) and have positioned the PDHEB to enter new export markets in Germany. This will help increase volume and value of mango exports from Pakistan.

#### ***Key outcomes – citrus production project***

- Heat unit work has been completed, leading into recommendations and export of improved germplasm (varieties and rootstocks) to Pakistan, which has now been propagated to provide the basic germplasm collection for dissemination to nurseries in Pakistan.
- 4 Pakistan staff trained in Australia in plant nutrition, irrigation practices, pruning and tree training, plant propagation and nursery techniques. As result of initial dissemination of these techniques, some early adopters in Pakistan establishing under tree furrow irrigation and pruning in Punjab.
- Links have been established with Roshan enterprises with an agreement to conduct gibberellic acid (a growth regulator) trials at their orchard. This will improve the rind quality of citrus and will enhance the shelf life of the fruit and is seen as a model for other citrus enterprises and exporters in Punjab.

#### ***Key outcomes – dairy extension project***

- The ASLP dairy project is directly working with dairy farmers, two local NGOs, extension and research workers of Livestock Dept. in Okara and Bhakkar districts of Punjab, testing and demonstrating a range of alternative options and strategies for technology transfer.
- 225 dairy households have been surveyed and are participating in training to increase dairy productivity. In the first 6 months, 30% of the participating households have adopted a significant range of recommendations, while 40% are moderate adopters. As an example, farmer training has encouraged dairy farmers to give their animals easy access to water, increasing milk production by around two litres per day and farmers' income by around 1dollar per day. To date primarily male farmers have been reached, but it is planned to conduct women only trainings in the current year.
- A series of workshops has been implemented in which the leading personnel in each subject matter are drawn from institutes across Pakistan and have been brought to together to work co-operatively to collate available information to meet the common goal of improving farmer productivity. Apart from generating a consensus on the content of key technical recommendations to go out to farmers, this is providing an important vehicle to foster inter-institutional linkages in Pakistan and breaking down communication barriers.
- Linkages have been established between the project and the Pakistan Dairy Development Corporation to share and mutually extend improved dairy management recommendations. This will help extend the impact of the project to the corporate dairy sector.

## 2. Review of Progress FY 07-08

### 2.1 Overview

The program is now well under way, with all four R&D projects implemented and fully operational. In some cases the projects are exceeding their planned activities. Although significant impact of R&D activities is normally observed toward the completion of R&D projects and afterwards, there have been a number of early outcomes to date. Given that most of the short term activities and exposure visits have been completed and reported upon in previous years, this report will restrict itself to providing progress updates on the four R&D projects.

### 2.2 Program Activities

#### 2.2.1 Horticulture – mangos

*HORT/2005/153: Development of integrated crop management practices to increase sustainable yield and quality of mangoes in Pakistan and Australia (Combining ASLP activities A.1.3, A.1.4 and A.1.5)*

Good progress was made with activities associated with each of the four focus areas, during the first year of the project operations.

##### *Obj. 1. Establishment of clean nurseries*

For the establishment of clean nurseries, the target was to initiate capacity for a mango research nursery at the Mango Research Station at Shujabad in Punjab and another at the Sindh Horticulture Research Institute at Mirpurkhas in Sindh. Structures for these nurseries have been re-furbished at both stations and there is good progress with the establishment of functional research nurseries. The other target was to encourage and technically support private commercial nursery operators to establish model commercial nurseries in each of the two main mango production regions of Punjab and Sindh, from which other operators could learn and duplicate in their establishments. One private commercial nursery operator from Multan visited Australia and undertook training through a Crawford-funded training fellowship. He has commenced the construction and establishment of the model commercial nursery in the Multan area. There have been expressions of interest from a number of commercial nursery operators from the Sindh and one will soon be selected and assisted through the Crawford fund to undergo similar training in Australia, so that he can establish a model commercial nursery for Sindh. Primary selection criteria for the current collaborating and possible future nursery operators include ability and commitment to invest in a new nursery facility, their track record as local industry champions and their willingness to collaborate with the team on an ongoing basis and to implement project recommendations. This implies that primarily larger operators will end up being selected, but with a higher likelihood of impact and sustainability of the intervention post project. Flow-on benefits to small growers would be access to disease free germplasm, which currently they do not have.

The last activity associated with clean nurseries establishment was the publication of a nursery manual which could facilitate clean nursery establishment by others. This is a collaborative activity with the Pakistan Federal Seed Certification Board and the Punjab Fruit and Vegetable Development Project, all of who also have this as an output of their on-going projects. An outline for the publication of this manual has been produced and the activity is on schedule to

produce the first draft by the end of year two and have the final document published as scheduled by the end of year 3.

*Obj. 2. Improvements in orchard husbandry*

In the focus of improving tree husbandry to increase yields of quality fruits, one of the activities was the identification and introduction of rootstocks with tolerance to adverse abiotic conditions such as high pH and salinity. A good number of mono-embryonic rootstock sources from 3 locally cultivated varieties (Chaunsa, Sindhri & Langra) have been identified from the screening of over 1500 trees with apparent good salt tolerance. Seedlings of a known salt tolerant variety (13-1) have been imported from Australia and are being conditioned at the National Agriculture Research Center (NARC) in Islamabad, for later distribution to the different research centres for evaluation and use in establishing salt tolerance rootstock sources. Nutrient and canopy management trials were also established as activities to improve tree husbandry. Unfortunately, these trials were affected by the heavy frost that went through most of the production districts of Multan. In the few farms in the area where the effects were less and in other farms in Sindh where these trials were also conducted, the initial results are very encouraging, indicating that current orchards could be improved through appropriate nutrient applications and a carefully planned pruning schedule to reduce tree height, without severely affecting the yields of quality fruits.

*Obj. 3. Detection and management of mango sudden death*

Studies on the mango sudden death syndrome (MSDS) were closely linked with on-going activities in the national project focusing on the aetiology and management of this disease. Progress was made with the completion of surveys initiated through the national project. Disease detection studies were completed with the standardization of sampling and isolating methods among researchers and the identification and testing of the main pathogens (*Ceratocystis fimbriata* and *Lasiodiplodia theobromae*) involved in this disease syndrome. The role of other minor pathogens in the syndrome was also investigated and demonstrated. Initiated studies which are on-going are also demonstrating that the bark beetle has a major role in the transmission and spread of this disease within orchards. The two main associated pathogens have been isolated from infected beetles. A grower guide showing various stages of symptoms development of the disease has been developed. It will be linked with action points during initial phases of the disease and made available to growers for use. There was limited progress on research on the epidemiology of dendritic spots due to the absence of a graduate student fellowship.

*Obj. 4. Improvements in training and extension*

In capacity building, individuals have undertaken training in Australia and there have been a number of group training seminars and workshops delivered by visiting Australian project scientists as well as national project counterparts on different areas of the project focus. Individual trainings have been on commercial nursery establishment and the implementation of extension strategies, both undertaken in Australia through Crawford funds. Another individual training was in project management through the John Dillon fellowship. More individual graduate training fellowships are expected to commence through the John Allwright Fellowship Scheme during the next academic year. Group training workshops and seminars have focused on integrated disease management strategies, tree pruning in good orchard management and procedures in the establishment of clean and disease-free nurseries. During the first year of project operation, a total of 252 researchers have been trained through 14 training workshops. It is also estimated that more than 3600 growers have been addressed and directed through 19 seminars/workshops conducted in different production districts.

In the communication and dissemination of the project outcomes, two project Newsletters were produced and the third is in the press while the fourth is also in progress. Project brochures highlighting some of the project outcomes have also been produced and distributed to growers and other stakeholders.

*Gender mainstreaming*

Recently 5 female researchers from the National Agriculture Research Centre (NARC) have been trained in various aspects of mango disease management. However, at a provincial level no female researchers are currently employed in mango research work. Similarly, due to predominance of male extensionists, it has not been possible to induce participation of female mango growers in the training workshops.

*HORT/2005/157: Optimising mango supply chains for more profitable horticultural agri-enterprises in Pakistan and Australia (Combining ASLP activities A.2.3 and A.2.4)*

In general this project has proceeded according to plan, arguably even exceeding its expected impacts at this early stage. The project has three objectives and progress against each is summarised below.

*Obj. 1: Improving and maintaining mango quality from harvest to consumption*

The fruit postharvest laboratory at the University of Agriculture Faisalabad was substantially upgraded through this project to enable the necessary fruit quality research to be undertaken. Technical staff have received training. In 2007, experiments focused on mango harvest maturity assessment, storage temperature treatments and postharvest diseases were initiated successfully, as planned. A lime-based, safe, cheap and environmentally friendly treatment for mango sapburn, a major blemish detracting from quality and value, has been developed, tested and extended to the industry. It is predicted to be adopted across the whole industry in the 2008 season. A sample of domestic and export supply chains were studied to document existing product handling practices and their effects on fruit quality. Findings were used to inform fruit quality improvement R&D activities and priorities.

Training of Pakistani collaborators in fruit quality assessment and management took place in the UAF postharvest laboratory and at field days. In addition, two Pakistan PhD scholars spent 17 days in Australia with the Department of Primary Industries and Fisheries for training in mango handling practices and research techniques.

In Australia, studies on the impact of heat disinfestation treatments on skin browning were conducted on Queensland mangoes. The impact of temperature was examined to find a suitable handling regime to minimise the expression of skin browning post heat treatment.

All fruit quality research results were used in developing strategies for the project's demonstration supply chains (see objective 3).

*Obj. 2: Identifying present market needs and likely future opportunities for Pakistan mangoes, and using this information to inform the analysis of existing supply chains and the development of improved supply chain management systems and practices*

Detailed market research was carried out in the three largest cities of Pakistan (Faisalabad, Lahore and Karachi) under the supervision of Professors Dunne and Khalid. Mango freighters, exporters, importers, wholesalers, retailers and consumers were interviewed to examine

market responses and consumer requirements. Results were very encouraging, in particular the finding that consumers were willing to pay more for better quality mangoes. A report was disseminated through end of season workshops.

Market research on existing international markets in Dubai, UK and Singapore was carried out to examine the current performance of Pakistan mangoes as well as monitoring a trial shipment of mangoes from Pakistan to each market. The second trip collected data on the market response to Pakistan mangoes throughout the season, including recommendations from importers, wholesalers and retailers regarding improvements to the system. Reports from these activities were produced in two forms: one for general consumption by the industry, and one in confidence for the commercial partners whose fruit was monitored and evaluated.

China was identified as a potential market for Pakistan mango. In- market research was conducted by one Australian and three Pakistani project team members. It investigated market access, consumer perceptions, importer and wholesaler requirements, competitors in the market, optimum supply season, marketing channels and financial feasibility. A market research report was produced and disseminated to project participants.

All market research results were used in developing strategies for the project's demonstration supply chains (see objective 3).

*Obj. 3: Working with selected mango supply chains so that they can demonstrate to the rest of the industry the impact of improved supply chain management on competitiveness*

A study of factors that may impact on applying supply chain management principles in the Pakistan mango industry is being conducted by a John Allwright PhD Fellow. Results will be fed back to demonstration supply chain team members and used in planning chain development strategies.

Following a season of familiarisation and training in 2007, five demonstration supply chain groups were initiated in early 2008, two for domestic markets and three for international markets. A Memorandum of Understanding has been signed by each group's members to formally record the commitment of firms to their supply chain groups. Each supply chain will target a specific market opportunity in 2008, fully informed by all the other project activities and results. These chains will demonstrate best practice technically, in marketing, and in the application of chain-based strategies and management. Results will be documented and quantified for dissemination to industry wherever possible.

#### *Gender mainstreaming*

The project team includes a female scientist from QDPI&F. The project provides equal opportunity to males and females to participate in the project activities. Ms Nafeesa, grower and mango exporter, participated in a Mango Quality Improvement Workshop held in July 2007. Subsequently on her suggestion a similar workshop was conducted at her farm in July 2008, in which 10 females participated in addition to males. Two female staff working with the commercial partners (IAC and Roshan enterprises) also participated in project activities conducted at their respective facilities. The female participants are using best practices recommended by the project. In addition, a number of female faculty members and students at University of Agriculture Faisalabad have participated in and benefited from project activities. On average, the ratio of male to female participation in project activities is 10:1.

### 2.2.2 Horticulture - citrus

*HORT/2005/160: Increasing citrus production in Pakistan and Australia through improved orchard management techniques (Combining ASLP activities B.1.3. and B.1.5)*

This project started in May 2007 with an inception and planning workshop in Islamabad. Since then progress has been made against all objectives.

*Obj. 1. Improved nursery production and introduction of better germplasm*

Using climatic data from Pakistan in conjunction with heat unit mapping techniques and expert advice from Australian citrus breeders, a broad range of citrus cultivars was selected for introduction to Pakistan. The primary purpose is to select and introduce varieties that would widen the window for marketing as well as introducing clean (virus-free) germplasm. As a result, budwood for 23 cultivars and 8 rootstocks were sent to the University of Agriculture Faisalabad (UAF), Pakistan in September 2007. The budwood was budded by the collaborators at UAF and the germplasm and rootstock are growing successfully at UAF as inspected during the May 2008 visit by the Australian team to Pakistan. Production of variety fact sheets characterising the cultivars and rootstocks is underway and is being done in close liaison with the Federal Seed Certification & Registration Department.

Progress in relation to establishing a model citrus nursery producing clean planting material is behind schedule. The main problem encountered is the lack of screen houses in nurseries in both NFWP and Punjab, without which is not possible to establish disease free planting material. Work is underway with one nurseryman to establish a screen house. In the interim, training has been provided to four technical staff of the collaborating partners' institutions in NFWP and Punjab and a production of a nursery manual in Pakistan is also underway.

*Obj. 2. Demonstration of 'best practice' orchard management*

Improved irrigation designs have been established in a number of farmer managed orchards near Sargodha (Punjab) and Tarnab (NFWP). The primary approach is to modify the prevailing, inefficient flood irrigation systems to under-tree furrow irrigation systems. Under-tree furrow irrigation trials have been started and work is also underway to measure the amount of water used by furrow vs. flood irrigation system in order to develop refined citrus irrigation recommendations. Sites have also been selected and are being instrumented to trial pressurised irrigation (drip/sprinkler) systems at the Orange Research Institute (ORI, in Sargodha, Punjab) and the Agriculture Research Institute, Tarnab (NFWP).

Training in other orchard management practices (especially pruning, thinning, plant propagation and disease and pest management) has been carried out both in Australia and in Pakistan, but needs to be followed up with practical demonstrations in farmer fields in Pakistan. The latter has been somewhat hampered by travel restrictions due to security issues in NFWP and the current restructure of the ORI.

*Obj. 3. Capacity building in extension and research*

The project has a very strong extension component. For extension purposes, a DVD has been prepared by NSW DPI for the plant propagation and nursery component. This DVD was launched and distributed in Pakistan in May 2008 and has been received with keen interest by growers and nurserymen. Linkages with the Fruit and Vegetable Development Project (Punjab) have also been established for extension training and as an additional channel of information dissemination in future.

Technical training in a range of research methodologies has also been carried out. As part of research and extension capacity building, a field seminar was also held for measuring soil water use and training in tensiometer use. Primary recipients of the training were extension officers of Sargodha and Toba Tek Singh districts, which are the two main growing regions of “Kinnow” mandarins.

Four staff members from all four collaborating Pakistan research institutions visited Australia in November 2007 to obtain training in various components of the project, including plant propagation and nursery techniques, irrigation systems, tree pruning and thinning, basic nutrition and other research techniques.

### **2.2.3 Livestock - dairy**

*LPS/2005/132: Improving dairy production in Pakistan through improved extension services (Combining ASLP activities C.1.2 and C.1.3)*

In spite of the importance of the Pakistani dairy industry to the Pakistan's economy and food supply, the productivity of buffalo/ cows owned by small farmers dependent on an income from 3-10 head is poor by world standards. Much of the technology required to boost efficiency is available but not readily disseminated nor adopted by the farming community. Thus the project objectives are to:

*Obj. 1. Demonstrate the economic and social benefits of improved extension services to small holder dairy farmers;*

*Obj. 2. Capture, enhance and disseminate knowledge relevant to smallholder dairy systems.*

To achieve the first objective a survey was designed to identify the key rate-limiting elements for production on small farms in 2 disparate regions of Punjab. Approximately 100 farmers from Bhakkar in the arid Barani region to the west and a similar number from the more advanced Okara region to the east are being studied with the assistance of staff from the National Rural Support Program, the Punjab Livestock and Dairy Development Department (LDDDB) and the Halla co-operative respectively. The data being collected will cover all aspects of the farm operation including production, feeding, reproduction, animal health, and where possible, farm budgets over a 2 year period during which the impact of the project's extension advice will also be assessed. These studies will provide direction for the development of effective extension support for a sustainable model system for smallholder dairy production in the Punjab.

The approach involved the development of a herd recording booklet that can be readily used by dairy extensionists and farmers. The booklet was designed to carefully ensure that comparable data could be obtained from each farm in each of the two regions. Farmer training days then were held to ensure that each producer was capable of recording the appropriate data accurately and that participants understood clearly the aims and the potential outcomes of the study that would be of benefit to them. The emphasis in training workshops has been to promote active participation of attendees. The benefits on offer were the provision of effective vaccines for Foot and Mouth Disease and reproductive services.

The initial survey of farmer needs also highlighted the importance of the provision of information on animal nutrition and health and reproductive management. This relates to the second objective of the project in which the project has been working towards the collation of the latest information available on these topics into a format readily understood by relatively untrained extension officers for implementation on farm. A series of workshops has been

implemented in which the leading personnel in each subject matter are drawn from institutes across Pakistan and have been brought to together to work co-operatively to collate available information to meet the common goal of improving farmer productivity. The initial workshop was designed to take a systems approach to small holder dairy operations by establishing the relative importance of nutrition, health, reproduction and breeding and production and marketing and how best to integrate the information in these areas to advance whole farm productivity. Traditionally research in these areas has been conducted in isolation and the approach adopted here was designed to assimilate this information into a package that could be readily used by extension workers with a limited educational background.

The key determinants of nutritional status identified were production and distribution of improved forage seeds, factors that influenced fodder yield including irrigation and fertiliser needs, the measurement of feed values, and ration formulation together with water availability. The requirement for effective vaccines and vaccination schedules, adequate hygiene standards, anthelmintics, the availability of colostrum and appropriate concentrates for calves, dietary minerals and vitamins were seen as important for animal health. The quality of animal housing also influenced health and feed requirements while the provision of sufficient trained labour to implement contemporary management strategies to optimise farm profits were recognised. Ideal management of the above factors then was recognised as being important for improving the efficiency of reproduction in herds to decrease inter-calving intervals to a profitable level. Following the success of this initial workshop a series of workshops is being designed and rolled out to cover the major topics in greater detail, using the expertise available in the major research and extension institutes across Pakistan. Topics include basic nutrition concepts, health, reproduction and breeding, cow comfort – housing and milk quality, fodders and forages and calf and heifer management. This approach has already led to the engagement and linkage of 17 different research organisations. Co-ordination of these efforts has provided the focus for Ms Saadia Hanif for the past 8 months.

In a separate task, vaccine production of the major pathogens compromising dairy production was reviewed through a consultant. The interactions between institutes promoted by his visit have been very encouraging.

The project team has worked continuously to develop linkages between the key stakeholders in the project. It is likely that the linkages formed at the initial workshops will result in long term co-operation between staff in research and extension institutes, non-government organisations and importantly the major government agencies (LDDDB, Livestock and Dairy Development Board and Pakistan Dairy Development Corporation). The forage demonstration trials are now also being linked with an ACIAR funded project on the implementation of raised bed irrigation technology in Pakistan. The project will continue to forge similar co-operation with other organisations in order to promote the Pakistani dairy industry. This will include the presentation of initial survey results in an international forum at the conference of the Asian-Australasian Association of Animal Production entitled "Animal Agriculture and the role of small holder farmers in a global economy" to be held in Hanoi in September 2008.

#### *Gender mainstreaming*

Currently the project team has one dedicated female dairy specialist (Ms Saadia Haneef), who is concerned with extension material development and is heavily involved with workshops. These workshops have also involved other women both from Australia and Pakistan as experts in their own fields contributing to the development of key messages for farmers. Regarding training and working with extension workers in the field, the project has found it difficult to

incorporate women into the project, as it only encountered 2 women working as extension workers in the 3 collaborating groups working with the project in the field. Despite this, the aim is to have farmer discussion groups/training days made up entirely of women run by Ms Haneef. However, at this stage all of the field training has involved only male extension workers and male farmers. This does not mean that the women have not been reached, as it is highly likely that they were involved in the household decision making and labour required.

*Activity C.1.4 Dairy sector exposure visit by Pakistan technical experts and agribusiness entrepreneurs to Australia*

This activity was deferred to June 2008 in order to link it with training and travel activities to Australia to be carried out within the auspices of the dairy R & D project. Given that agribusiness entrepreneurs have already visited Australia through the auspices of the Austrade led market linkages component of the ASLP, this activity will now focus on technical exchange aspects.

### **2.3 Communication**

The ASLP website (hosted on the ACIAR website - <http://www.aciar.gov.au/node/729>) has been regularly updated. In addition, several of the ASLP R&D projects have produced newsletters (see <http://www.aciar.gov.au/node/741> and <http://www.aciar.gov.au/node/740> for mango and dairy newsletters, respectively).

### **2.4 Steering Committee**

The second Steering Committee (SC) took place in Islamabad on the 18<sup>th</sup> April 2008. The minutes of the meeting are provided in appendix 5.1.

In summary, the SC meeting noted the good progress being made by the program. Planning of the ASLP review was one of the key agenda items. The SC signed off on the proposed TORs for the ASLP review as well as its timing (16-26<sup>th</sup> October 2008, see appendix 5.2). On the request of several SC members, an exploratory discussion was held to consider options for future follow-up and an extension of the ASLP program into a second phase. In general there was consensus that a second phase ASLP would continue to retain its focus on horticulture and dairy, possibly expanding the scope in horticulture to include grapes and temperate fruits in Baluchistan, as well as broadening the dairy focus to include rangeland management (and rehabilitation). However, the AusAID representative reiterated that any decisions on the provision of additional funds to bridge the ASLP into a new phase and the continuation of the ASLP into a second phase were contingent on the outcomes and recommendations of the ASLP review in October.

### 3. Annual Operational Plan FY 08-09

#### 3.1 Schedules

Work in projects will continue as per project schedules below. Activities accomplished since the last annual operational plan have been taken out of the below schedules.

#### *Horticulture – mangos*

*HORT/2005/153: Development of integrated crop management practices to increase sustainable yield and quality of mangoes in Pakistan and Australia (A.1.3 + A.1.4 + A.1.5)*

Objective	Activities/tasks (P = Pakistan; A = Australia)	Time line (year & month)	Milestones
1. To facilitate the establishment of clean mango nurseries in Pakistan	1.1. Establish a clean and high quality model nursery in the major mango production districts of Punjab and Sindh. In doing so, study how different nutrient and irrigation practices influence disease development in nurseries, young and established orchards (P&A).	Yr1, m3 to yr3, m10	- High quality, clean containerised seedlings adopted by the Pakistani mango growers association as preferred planting stock. Yr3, m3
	1.2. Develop a mango nursery production manual, outlining in detail procedures and practices for the establishment of a clean nursery (P)	Yr2, m1 to yr3, m10	- A nursery production manual made available to growers Yr3, m12
2. To develop improved tree husbandry and management options to produce sustainable and quality fruit.	2.1. Acquire and introduce disease, salt and high pH resistant rootstocks into the Pakistan mango industry program (P). - Acquire and introduce other poly-embryonic rootstocks with resistance to sudden death pathogens (P) - Evaluate the introduced potential rootstocks in saline and high pH soils at multi-locations to identify superior ones that could be multiplied and used in nursery establishments.	Yr1, m3 to yr3, m10	- Suitable new rootstocks with desired characteristics identified and multiplied for use in establishing nurseries for all new plantings  Yr 3, m7
	2.2. Develop a rapid nitrogen test - Evaluate improved nitrogen, potassium and canopy management strategies for different mango production districts (P&A)	Yr1, m6 to yr3, m10	A rapid nitrogen test for mango, developed and tested across a range of environments. - Establish the effects of fruit potassium concentrations on the severity of postharvest disease and fruit quality - Improved guidelines for nutrient monitoring and management available to growers Yr3, m12
3. To develop improved detection and management strategies for MSDS and other major diseases of mangoes	3.1: Establish methods of detecting initial infection of MSDS (P)	Yr1, m3 to yr3, m10	- Methods of initial MSDS disease detection made available to growers Yr2, m6

	3.2. Study the epidemiology of the sudden death syndrome (P) and of dendritic spots (A).	Yr1, m3 to yr3, m10	- Published documentation detailing the epidemiology of sudden death and dendritic spots.
	3.3. Screen and identify suitable potential postharvest treatment replacements for mango dips (A).	Yr1, m6 to yr2, m12	- New alternatives to current postharvest dips identified Yr2, m10
	3.4. Develop and evaluate integrated field management practices with grower involvement (P&A)	Yr 2, m1 to yr3, m12	- Guidelines for sustainable management of MSDS available to growers Yr3, m12
4. To build capacity in the industry to undertake integrated crop management research.	4.1. Carry out some workshops targeting RD&E staff in the supply chain in a "Train the Trainer" way. Direct others at growers, contractors and field workers (P)	Yr1, m3 to yr2, m6	- Selected Growers and contractors trained to a level to train others Yr2, m8
	4.2. Develop workshop modules covering various aspects of orchard management including disease and pest management, nutrition, irrigation, phenology (P&A).	Yr2, m1 to yr2, m10	- Training modules covering different production aspects completed Yr2, m12
	4.3 Develop internet learning programs for growers based on training modules (A).	Yr1, m6 to yr3, m3	- Internet learning programs in place Yr3, m6
	4.4. Be involved in the selection and facilitation of graduate student training for researchers and Extension officers in appropriate institutions to undertake graduate RD&E training (P&A).	Yr1, m3 to yr3, m10	- End-of-project workshop bringing together those directly involved and trained through the project Yr3, m12

*HORT/2005/157: Optimising mango supply chains for more profitable horticultural agri-enterprises in Pakistan and Australia (A.2.3 + A.2.4)*

Objective/ Activities	Tasks	Time line (Yr and m)	Milestones
<b>Objective 1: To improve and maintain mango quality from harvest to consumption</b>			
1.2: Improve postharvest quality	<ul style="list-style-type: none"> <li>Set up 3 demonstration supply chains using recommendations from previous season and monitor</li> <li>Conduct laboratory simulations to determine the optimum storage procedures</li> <li>Incorporate recommendations into the 3 commercial demonstration supply chains. Monitor and refine protocols for next season</li> <li>Determine best ripening procedures for Chaunsa and Sindhri</li> <li>(a) Laboratory simulations</li> <li>(b) Commercial application in demonstration supply chains</li> </ul>	<p>Yr 2 &amp; 3, m5-9</p> <p>Yr2, m5-8</p> <p>Yr2, m6-9 &amp; yr3, m5-8</p> <p>Yr1, m5-9 Yr 2 &amp; 3,</p>	<ul style="list-style-type: none"> <li>Documented monitoring of demonstration supply chains and recommended improvements. Recommendations for training</li> <li>Develop optimum storage protocols for Chaunsa and Sindhri and make recommendations for market suitability.</li> <li>Documented product performance using recommended protocols.</li> <li>Recommendations for ripening Chaunsa and Sindhri</li> <li>Successful</li> </ul>

	<ul style="list-style-type: none"> <li>• Develop a harvesting guide for Chaunsa and Sindhri.</li> <li>• Develop control strategies and test in commercial demonstration supply chains</li> </ul>	<p>m5-9</p> <p>Yr2, m5-9</p> <p>Yr 2 &amp; 3, m5-9</p>	<p>commercialisation of ripening procedures</p> <ul style="list-style-type: none"> <li>• Time of harvesting recommendations based on optimum maturity</li> <li>• Control strategies implemented and tested commercially</li> </ul>
1.3: Identify the causes of skin browning in Australian mangoes	<ul style="list-style-type: none"> <li>• Determine possible causes of skin discolouration</li> </ul>	Yr2, m1-3, 11-12	<ul style="list-style-type: none"> <li>• Recommendation for its minimisation</li> </ul>
1.4: Training of Pakistan R&D collaborators in Australia	<ul style="list-style-type: none"> <li>• Train 2 Pakistan colleagues in mango handling practices and mango research techniques</li> </ul>	Yr2 & 3, m12, 1-2	<ul style="list-style-type: none"> <li>• Collaborators trained in mango handling and research techniques</li> </ul>
<b>Objective 2: To identify present market needs and likely future opportunities for Pakistan mangoes, using this information to inform the analysis of existing supply chains and the development of improved supply chain management systems and practices</b>			
2.3: Desktop and in-market research to identify prime target(s) for future market development	<ul style="list-style-type: none"> <li>• Carry out desktop research, followed by in-market research. Analyse and interpret results for feedback to sub-project 3</li> <li>• Train collaborators to ensure they have the skills necessary</li> </ul>	Yr1, m9-11	<ul style="list-style-type: none"> <li>• Results are used in demonstration supply chain plans and activities and are disseminated</li> </ul>
<b>Objective 3: To work with selected mango supply chains so that they can demonstrate to the rest of the industry the impact of improved supply chain management on competitiveness</b>			
3.2: Initiate and develop three demonstration supply chains, one domestic, two export	<ul style="list-style-type: none"> <li>• Carry out continuous through-season support and training</li> <li>• Conduct end of season review and planning workshops</li> <li>• Action learning by extension, PHDEB, UAF, project staff and participants co-developing the supply chain</li> </ul>	<p>Yr1, 2, 3 m5-9</p> <p>Yr1, 2, 3 m9-10</p> <p>Yr1, 2, 3 continuous</p>	<ul style="list-style-type: none"> <li>• Satisfactory commercial performance of demonstration supply chains</li> <li>• Collaborators able to use results and experiences as part of dissemination activities</li> </ul>
3.3: Undertake a study of the three demonstration chains, possibly also an international comparative case	<ul style="list-style-type: none"> <li>• Conduct continuous study of the development of demonstration supply chains</li> <li>• Action learning by PhD scholar and other participants to identify success factors</li> </ul>	<p>Yr1, 2, 3 continuous</p> <p>Yr1, 2, 3 continuous</p>	<ul style="list-style-type: none"> <li>• Satisfactory collection, analysis and interpretation of data</li> <li>• Collaborators able to use results and experiences as part of dissemination activities</li> </ul>

### **Horticulture - citrus**

*HORT/2005/160: Increasing citrus production in Pakistan and Australia through improved orchard management techniques (ASLP B.1.3 + B.1.5)*

<b>Objectives/Activities</b>	<b>Tasks</b> P = Pakistan A = Australia	<b>Time line</b> (Yr and m)	<b>Milestones</b>
<b>Objective 1: To improve nursery production practices and production of a package incorporating QA procedures for maintaining disease free material and to introduce germplasm to extend the marketing season based on the climatic suitability to specific growing areas</b>			
1.1: Develop and implement	<ul style="list-style-type: none"> <li>• Establish a clean citrus nursery in Punjab and NWFP. Study the</li> </ul>	Yr 1, m4 to Yr 3, m10	<ul style="list-style-type: none"> <li>• A High quality, clean containerised seedlings</li> </ul>

disease-free, high quality nursery production (A & P)	<p>current practices and procedures and address the gaps (P)</p> <ul style="list-style-type: none"> <li>• Develop a citrus production manual, outlining detail procedures and practices for the establishment of a clean nursery (P &amp; A)</li> <li>• Training modules and courses available</li> <li>• Visits EAMI Labs</li> <li>• Inspection of commercial nurseries</li> </ul>	<p>Yr 2, m2 to Yr3, m10</p> <p>Yr 1, m11</p>	<p>adapted by the citrus growers as preferred planting stock</p> <ul style="list-style-type: none"> <li>• Nursery production manual available to growers</li> <li>• Staff trained in operational procedures</li> </ul>
1.2: Select potentially superior germplasm and establish assessment trials (A & P)	<ul style="list-style-type: none"> <li>• Source rootstock seeds and scion material from Australia (P)</li> <li>• Budding new cultivars</li> <li>• Establish new trees (P)</li> <li>• Compiling available research information (fact sheets) about the new rootstock and varieties based on Australian information (A)</li> <li>• Rootstock evaluation Stage 3 &amp; 4</li> <li>• Roots structure and health Stage 1</li> <li>• Roots structure and health Stage 2</li> </ul>	<p>Yr 1, m12 Y2</p> <p>Yr 1, m4 to Yr 2, m4</p> <p>Yr2, m1 to Yr 3, m10</p> <p>Yr1, m5-m8 to Yr 3 Yr 2 m9</p> <p>Yr3, m9</p>	<ul style="list-style-type: none"> <li>• Seed and bud wood sourced and sent to Pakistan</li> <li>• New trees developed and mother tree established</li> <li>• New varieties established and multiplied for use in establishing nurseries for all new plantings</li> <li>• Trees from Valencia rootstock uprooted and assessed</li> </ul>
1.3: Establishment of phenology data collection for navel cultivars (A & P)	<ul style="list-style-type: none"> <li>• Detailed phenology data collection</li> <li>• Fruit growth data for fruit size prediction</li> </ul>	<p>Yr1, m7 to Yr3, m12</p> <p>Yr3, m12</p>	Phenology information collected and collated and fruit size prediction model completed
1.4: Explore regions for growing blood oranges (A & P)	<ul style="list-style-type: none"> <li>• Sourcing climatic data from NWFP</li> </ul>	<p>Yr1, m4 to Yr2, m10</p>	<ul style="list-style-type: none"> <li>• Blood orange regions identified using Chill Unit Modelling</li> </ul>
1.5: Assessment of the internal quality using new NIR sweetness head (A&P)	<ul style="list-style-type: none"> <li>• Obtain and assess fruit samples from rootstock trial</li> <li>• Establish methodology</li> <li>• Develop quality parameters</li> </ul>	<p>Yr2, m7-m12</p>	<ul style="list-style-type: none"> <li>• Quality parameters and methodology documented</li> </ul>
<b>Objective 2: To demonstrate 'Best Practice' orchard management focussing crop management, nutrition and irrigation management.</b>			
2.1: Planning and establishment of 'best practice' tree/crop management demonstration trials (P)	<ul style="list-style-type: none"> <li>• Meeting held to identify the growers sites (P)</li> <li>• Level of pruning and thinning decided (P)</li> <li>• Pruning/fruit thinning applied (P)</li> </ul>	<p>Yr1, m4-8</p> <p>Yr2, m4-6</p>	<ul style="list-style-type: none"> <li>• Data collated and structured in a fashion relating to the intent of the regulations.</li> </ul>
2.2: Modification of flood irrigation system and establishment of modern drip irrigation trials (P & A)	<ul style="list-style-type: none"> <li>• Plan pressurised systems</li> <li>• Installation of drip systems (P)</li> <li>• Irrigation training courses (P)</li> <li>• Irrigation training held (A)</li> <li>• Irrigation information package prepared (A)</li> </ul>	<p>Yr 1, m10</p> <p>Yr2, m2</p> <p>Yr2, m8</p> <p>Yr2, m2</p>	<ul style="list-style-type: none"> <li>• Recommendation made on pressurised systems</li> <li>• Irrigation courses package available</li> </ul>
2.3: Outline	<ul style="list-style-type: none"> <li>• Incorporation of adaptive research</li> </ul>	<p>Yr2, m2 to</p>	<ul style="list-style-type: none"> <li>• Key nutrition practices</li> </ul>

basic nutrition require-ments for mandarin & blood orange (A)	and drafting key nutrition practices (A)	Yr3, m4	included in Citrus manual
2.4: Development of a production manual for Citrus (P & A)	<ul style="list-style-type: none"> <li>• Key management practices identified and drafted (A)</li> </ul>	Yr2, m2 to Yr3,m10	<ul style="list-style-type: none"> <li>• Management methods and procedures included in citrus manual</li> </ul>
<b>Objective 3: To enhance the research, extension and production capacity of Pakistan citrus institutions and industry</b>			
3.1: Training of researchers and relevant extension personnel in varietal evaluation (P)	<ul style="list-style-type: none"> <li>• Training in varietal evaluation (Australia)</li> </ul>	Yr 2 m4-10 Yr 3 m4-10	<ul style="list-style-type: none"> <li>• Researchers trained in varietal evaluation methodology</li> </ul>
3.2: Train Extension Workers, Industry Practitioners in 'best practice' crop production techniques (P)	<ul style="list-style-type: none"> <li>• Training implemented</li> </ul>	Yr2, m4	<ul style="list-style-type: none"> <li>• Research and extension personnel trained and implementing new techniques</li> </ul>
3.3: Extension staff and key growers trained in grower group dynamics and processes and other extension techniques (P)	<ul style="list-style-type: none"> <li>• Training implemented</li> <li>• Hands on work with groups</li> </ul>	Yr 2, m4 to Y3, m11	<ul style="list-style-type: none"> <li>• Extension personnel trained</li> <li>• At least six grower groups established and operational</li> </ul>
3.4: Project staff training in research methodology (P)	<ul style="list-style-type: none"> <li>• Staff training in orchard management</li> </ul>	Yr1, m11 to Y3, m4	<ul style="list-style-type: none"> <li>• Training program developed and staff trained</li> </ul>
3.5: Short term visits for Research and extension staff to Australia (A)	<ul style="list-style-type: none"> <li>• Provide training and courses</li> </ul>	Yr2, m8 Yr3, m1	<ul style="list-style-type: none"> <li>• Selected staff trained in research and development/variety evaluation/citriculture</li> </ul>

### **Livestock - dairy**

*LPS/2005/132: Improving dairy production in Pakistan through improved extension services (C.1.2 + C.1.3)*

<b>Objectives / Activities</b>	<b>Tasks</b>	<b>Timeline</b>	<b>Milestones</b>
<b>Objective 1: To demonstrate the economic and social benefits of improved extension services to smallholder dairy farmers.</b>			
1.2: Training extension staff in milk production technologies and extension techniques arising from Objective 2.	<ul style="list-style-type: none"> <li>• Identify the extension workers from Halla (40) &amp; NRSP (40) who will participate in the 1<sup>st</sup> round of training. The training programs will occur at locations suited to participants (using government and community facilities where possible).</li> <li>• Provide training for 40 extension</li> </ul>	m15-18  m19-20	Training provides extension personnel with the knowledge and tools necessary to advise smallholder dairy farmers on how to improve productivity and profitability.

Objectives / Activities	Tasks	Timeline	Milestones
	officers from the Punjab L&DD associated with one of the national development programmes.		
1.3: Implement farmer training for at least 100 farmers at each site, and monitor adoption and benefits.	<ul style="list-style-type: none"> <li>• Deliver farmer training programs to NGO farmer groups using primary + follow-up delivery approach</li> <li>• Maintain monitoring program of farm operations</li> <li>• Collect and collate problems encountered by farmers that require additional information.</li> <li>• Conduct on-farm field visits to encourage interaction between farmers, extension workers and researchers.</li> </ul>	m18-30	Training provides smallholder dairy farmers with the knowledge and tools to improve productivity and profitability.
1.4: Provide feedback to researchers on knowledge and information gaps identified by farmers.	<ul style="list-style-type: none"> <li>• Report problems encountered by farmers to researchers.</li> <li>• Researchers to adjust extension worker training programs accordingly.</li> </ul>	m18-30	Regular communication between farmers and extension personnel provides insights into possible areas for intervention from researchers to address know-ledge and information gaps.
<b>Objective 2: To enhance the scope and quality of information used for training extension personnel.</b>			
2.1: Collate existing information in Pakistan and Australia into about 12 modules, in an appropriate language for extension personnel and farmers.	<ul style="list-style-type: none"> <li>• Drafts of modules reviewed by the trainers for appropriateness of language and style, and by independent scientists for content. Modules modified accordingly.</li> <li>• Modules put into a range of media formats (print, DVD, posters, etc).</li> </ul>	m9  m10-12	Collation of information into 12 training modules provides the Pakistan dairy industry with the knowledge and tools to improve productivity and profitability.
<b>Objective 3: To enhance the research capacity of Pakistani scientists in priority fields relevant to the ongoing development of the dairy sector.</b>			
3.1: Undertake reviews and applied research activities in areas identified in Objective 2.	<ul style="list-style-type: none"> <li>• Undertake reviews, with Terms of Reference to include follow-on recommendations for consideration by the Board.</li> <li>• Agree on initial areas for applied research activities &amp; implement.</li> <li>• Implement applied research activities identified as knowledge gaps in the development of training modules and/or as recommendations from the reviews.</li> </ul>	m3-6  m2-20  m10-24	Reviews and applied research activities enhance present knowledge and assist to develop new tools to further improve productivity and profitability for the Pakistan dairy industry.
3.2: Provide a range of skills-enhancement activities for leading scientists.	<ul style="list-style-type: none"> <li>• Agree on skill areas that warrant training, the modality and people who will participate in that training.</li> <li>• Design and implement the training activities in conjunction with Australian and Pakistani agencies</li> </ul>	m12-30	Opportunities for leading and young promising Pakistani scientists to enhance their skills will assist in ensuring improvement in productivity and profitability for the Pakistan dairy industry is

Objectives / Activities	Tasks	Timeline	Milestones
	and individuals.		sustained.
<b>Objective 4: To promote the benefits of agency linkages and enhanced extension services to National and Provincial research and extension agencies and NGO groups.</b>			
4.1: Hold a national forum mid-project to outline the aims and approach adopted and to present initial benchmarking survey information, review and research results and an overview of the new extension material.	<ul style="list-style-type: none"> <li>• Make arrangements for the forum at least 3 months in advance to enable attendance by key stakeholders.</li> <li>• Develop a program that captures an understanding of the diversity of the farming systems and potential intervention opportunities: make the training material available for review and possible use by groups not included in the project, and present the outcomes of program reviews &amp; initial applied research.</li> </ul>	m13  m16	A mid-project national forum to review project progress as well as training module content reinforces agency linkages and promotes involvement in on-going applied research.
4.2. Hold a final national forum that reviews the achievement of project aims and objectives, considers opportunities to improve the approach and for scaling out.	<ul style="list-style-type: none"> <li>• Make arrangements for the forum at least 3 months in advance to enable attendance by key stakeholders.</li> <li>• Develop a program that provides a comprehensive coverage of project activities and outcomes, particularly including the impacts achieved to that time by smallholder farmers; the flow of information between farmers, extension workers and scientists; and linkages formed between Australian and Pakistani scientists. The program will include farm visits.</li> <li>• A workshop will be designed to consider opportunities to improve on the approach used in this project based on experiences, and to consider options for scaling out.</li> </ul>	m27  m30	An end of project national forum to review project achievements, consider improvement opportunities and scaling out options promotes agency linkages and enhances extension services. This will ensure that improvements in productivity and profitability for the Pakistan dairy industry are sustained.

### 3.2 Communication

The ASLP website will continue to be the main communication tool for the ASLP. This will be complemented by ongoing visits by the ASLP Coordinator and relevant ACIAR Research Program Managers to Pakistan. The ASLP PSO will maintain regular liaison with all four project teams, as well as continuing to provide networking and liaison between stakeholders and other similar donor activities.

### 3.3 Steering Committee

The ASLP Coordinator will liaise with AusAID and MINFAL to establish to most convenient venue and date for the next meeting, which is likely to take place early in 2009.

### 3.4 ASLP Review

As per RoU between AusAID and ACIAR a joint review is to be commissioned in year 3 of the initiative. The review will analyse each of three ASLP program components (1. Market linkages, 2. Academic linkages and 3. Agriculture linkages – the latter being the ACIAR administered component of the ASLP) and compile outcomes, provide comment on the impact the initiative is having on strengthening linkages between Australia and Pakistan and provide recommendations on options for future assistance. This review will be conducted in Pakistan during the period 16-25<sup>th</sup> October 2008. The Terms of Reference endorsed by the Steering Committee, AusAID and MINFAL are appended to this document in 5.2.

### 3.5 Risk Management

An updated risk assessment framework and management plan is provided below. Hindered travel of Australian project personnel to Pakistan due to the increased level of security risks continues to pose a significant risk to the programme. To date, with the exception of two deferred trips in late 2007, visits by Australian teams are progressing as planned. The ACIAR executive has approached executive management of QDPI&F and NSW DPI and obtained assurances that travel approvals will continue to be granted for staff of these organisations, on the provision that the security situation does not deteriorate further. Should the situation deteriorate, contingencies are being put in place as per ASLP risk management framework. Measures include increased visits by ACIAR research program managers and the ASLP program support officer, as well as project meetings being held in third countries. Increased travel by Pakistan partners to Australia could also be considered. Several new risks have also emerged over the course of the last year, including the frequent transfer of senior Pakistan government officials (e.g. Joint and Additional Secretary MINFAL) and lack of screen-houses to produce disease free plantings.

The continued import of Australian high performance dairy cattle into Pakistan under the auspices of the Austrade-managed component of the ASLP has some residual elements of risk to the ASLP in terms of stakeholders in Pakistan concerned with underperformance or increased mortality of these animals. However, this risk has decreased significantly as cattle are exclusively being distributed to corporate dairy farmers with the ability to adequately manage high performance animals. Concurrently, ACIAR has worked closely with DAFF in their implementation of a consultancy to scope the feasibility of establishing a herd monitoring system to enable improved tracking and management of Australian cattle in Pakistan.

Updated risk assessment framework and management plan (*changes since July 07 in italics*)

Category	Description of Risk	Probability	Impact on Task	Containment Measures
public perception	ASLP associated with death of imported Australian cattle	<i>low</i>	low	close liaison with Austrade, DAFF and key Pakistan partners (LDDDB, Dairy Pakistan) to manage possible negative publicity; better planning of future exports taking into account capacity of local institutions and partners
institutional	incentive structures within Pakistan NARES inhibit transition of researchers to participatory research and extension modality	low	high	maintain close liaison with PARC leadership to support research management and institutional change

<i>institutional</i>	<i>frequent transfer of project-relevant senior provincial and Govt. of Pakistan staff</i>	<i>medium</i>	<i>low</i>	<i>ALSP coordinator with help of ASLP PSO to continue frequent briefings of senior government staff</i>
scope definition	program duration too short for interventions tested to deliver impacts in R&D projects	medium to high	medium to high	maintain funding to selected topics through ACIAR core program beyond life of ASLP
scope definition	scope too broad for resources available	low	medium to high	renegotiate tasks and/or reduce scope; reassign resources
security	short-term restrictions for Australians to travel to Pakistan	medium	high	bring forward activities in Australia, defer activities in Pakistan; <i>increased visits by ACIAR research program managers and the ASLP program support officer; project meetings being held in third countries.</i>
security	long-term restrictions for Australians to travel to Pakistan	low	very high	enlist support of South Asia based CGIAR centres (ILRI, IWMI); appoint higher level local technical support; shift emphasis of plan and downsize field research dependant on Australian input and increase range of activities possible in Australia (exposure visits, training)
resources	staff of commissioned organisation resign or unavailable	low to medium	high to medium	outsource to other providers; reappoint; renegotiate tasks and/or reduce scope
resources	staff of commissioned organisation lack appropriate knowledge and/or skills	low	high	resource appropriately; close scrutiny of commissioned organisation staff; form consortia with track record to spread risk
contractual	longer project development and design timelines; delays in Pakistan sign-off procedures	project development: medium delays in sign-off: low	high	allow unfunded extension of projects for up to 6 months beyond formal finish of ASLP
contractual	collaborators do not provide in-kind contribution	low to medium	high	renegotiate tasks and resources; defer payments; <i>enlist support of Secretaries of Agriculture in line ministries / departments</i>
organisational	changes to organisational structures	low	medium	renegotiate tasks and/or reduce scope; reassign resources; defer payments
timing/schedule	milestones not delivered on time	low to medium	medium	reassign existing resources; defer payments
technical	poor quality outputs	low	high	resource appropriately; outsource to other providers; defer payments;
<i>technical</i>	<i>Lack of screen-houses in nurseries in Pakistan inhibiting establishment of disease free planting material</i>	<i>high to medium</i>	<i>high to medium</i>	<i>targeted training of nursery entrepreneurs; close liaison with Seed Certification &amp; Registration Department to provide more support to nursery sector</i>
communications	communications plan ineffective	low	high	resource appropriately; revise plan
environmental	detrimental impacts on environment	low	low	revise plan

## 4. Budget

### 4.1 FY 07-08

The expenditure budget for FY 2007 – 2008 is summarised in the table below. A formal acquittal for the period July 2007 - June 2008 has been provided separately.

ASLP code	Short title	Balance 30-Jun-07	FY 07-08 AOP forecast	FY 07-08 30-Jun-08
A.1.1	Diagnosis of dieback and malformation	0	0	0
A.1.2	Workshop mango production	-5,972	0	0
A.1.3	Training modules mango production	-10,415	300,890	300,890
A.1.4	R&D project mango diseases			
A.1.5	R&D project orchard/water management			
A.2.1	Scoping study/supply chain analysis	0	0	0
A.2.2	Industry exposure visit	8,336	0	0
A.2.3	Training modules mango supply chain	-955	352,487	401,532
A.2.4	R&D project supply chain mgt			
B.1.1	Expert visit citrus production	7,493	0	0
B.1.2	Workshop citrus production	7,874	0	0
B.1.3	Training modules citrus production	-97,619	197,394	183,478
B.1.5	R&D project citrus production			
B.1.4	Industry exposure visit	0	0	0
C.1.1	Scoping study/constraints analysis	-18,234	0	0
C.1.2	R&D project dairy animal productivity	275,000	438,313	438,313
C.1.3	Training modules dairy production			
C.1.6	Evaluation of germplasm			
C.1.4	Industry exposure visit	105,000	40,000	20,000
C.1.5	Sourcing and transfer of germplasm	12,012	0	0
	Contingency for changed priorities	50,000	0	0
	<i>Subtotal - program activities</i>	<i>332,520</i>	<i>1,329,084</i>	<i>1,344,213</i>
	PSO salary and operating	-2,766	31,500	30,449
	Travel	-6,130	15,000	9,206
	<i>Subtotal ASLP management costs</i>	<i>-8,896</i>	<i>46,500</i>	<i>39,655</i>
	<b>Total ASLP</b>	<b>323,624</b>	<b>1,375,584</b>	<b>1,383,869</b>

Overall, the ASLP has been operating close to budget. Variations are explained below:

- A.2.3-A.2.4: higher payment following a variation to accommodate higher than anticipated travel costs.
- Some savings in ASLP program management and travel to offset over-expenditure in A.2.3-A.2.4.
- C.1.4: savings by combining the exposure visit with a dairy project team visit to Australia; some carry-over into FY 08-09.

## 4.2 FY 08-09

The projected budget for FY 2008-2009 is summarised below, followed by explanations to variations.

ASLP code	Short title	Projected balance 30-Jun-08	FY 08-09 as per ASLP plan	FY 08-09 forecast as per AOP
A.1.1	Diagnosis of dieback and malformation	0	0	0
A.1.2	Workshop mango production	0	0	0
A.1.3	Training modules mango production	}	300,000	311,368
A.1.4	R&D project mango diseases			
A.1.5	R&D project orchard/water management			
A.2.1	Scoping study/supply chain analysis	0	0	0
A.2.2	Industry exposure visit	0	0	0
A.2.3	Training modules mango supply chain	}	150,000	339,844
A.2.4	R&D project supply chain mgt			
B.1.1	Expert visit citrus production	0	0	0
B.1.2	Workshop citrus production	0	0	0
B.1.3	Training modules citrus production	}	150,000	191,724
B.1.5	R&D project citrus production			
B.1.4	Industry exposure visit	0	0	0
C.1.1	Scoping study/constraints analysis	0	0	0
C.1.2	R&D project dairy animal productivity	}	350,000	561,306
C.1.3	Training modules dairy production			
C.1.6	Evaluation of germplasm			
C.1.4	Industry exposure visit	5,000	0	0
C.1.5	Sourcing and transfer of germplasm	0	0	0
	Contingency for changed priorities	0	104,000	0
	<i>Subtotal - program activities</i>	<i>-40,129</i>	<i>1,054,000</i>	<i>1,404,242</i>
	PSO salary and operating	1,051	31,000	20,000
	Travel coordinator	10,794	15,000	10,000
	Review	0	0	50,000
	<i>Subtotal ASLP management costs</i>	<i>11,845</i>	<i>46,000</i>	<i>80,000</i>
	<b>Total ASLP</b>	<b>-28,284</b>	<b>1,100,000</b>	<b>1,484,242</b>

A projection of the whole of ASLP budget into the outyears is provided in appendix 5.3. At this point in time, it is anticipated that the ASLP will be about AU\$ 91k overspent. This increase is mainly to cater for increases to project budgets. The shortfall will be made up out of the ACIAR core Pakistan program and a budgetary provision has been made to that effect. There will be some carry-over into FY 09-10, which will require an unfunded extension of the RoU to the 31<sup>st</sup> March 2010 between AusAID and ACIAR. The main variations over the life of the ASLP have been to budgets of the three horticulture projects, partly by absorbing savings from some of the other activities, and partly through re-allocation of contingency funds.

## 5. Appendices

### 5.1 Minutes of 2<sup>nd</sup> ASLP Steering Committee meeting Islamabad, 18.4.08

#### Agenda item 1: Apologies and confirmation of agenda

The Steering Committee (SC) confirmed the agenda with an inclusion under Item 5 to discuss the future outlook for the ASLP. Apologies were given for the Secretary MINFAL and the Australian HC, who both had other commitments and were not able to attend. Also not in attendance was a representative from EAD. Committee members and others attending were:

- Mr M Saleem Khan, Additional Secretary MINFAL (Co-chair)
- Mr Mark Tattersall, First Secretary, AusAID (Co-chair)
- Mr Amjad Nazir, Joint Secretary MINFAL
- Dr Tusneem, Chairman PARC
- Dr Iftikhar Ahmed, Member PARC
- Dr Afzal, CEO Livestock and Dairy Development Board
- Mr Iqbal, CFO, Pakistan Horticulture Development and Export Board
- Dr Akhlaq Hussain, DG Federal Seed Certification & Registration Dept.
- Dr Syed Ijaz Hussain, Director Horticulture Research Inst., NARC
- Mr David McGill, ACIAR Dairy project
- Dr Christian Roth, ACIAR ASLP Coordinator
- Mr Sosheel Solomon, ASLP Program Officer
- Mr Suhail, Section Officer MINFAL

#### Agenda item 2: ASLP Coordinator's report for FY 06-07

The ASLP coordinator briefly talked to the report, given that the project leaders were due to give a more detailed update on progress in their presentations under Item 3. Both Chairs requested that future reports be structured to report against milestones (as per log frame in the ASLP Implementation Plan) and also requested that the workplan for the out year be provided in future SC meetings. The ASLP Coordinator anticipated the next ASLP report to be distributed in June 2008.

#### Agenda item 3: Update by ASLP Project Leaders

Four progress reports were provided through presentations given by Dr Iftikhar (mango production and citrus projects), Mr Iqbal (mango supply chain project), Dr Afzal and David McGill (dairy project). Each presentation was followed by discussion led by the Additional Secretary.

##### *Mango production*

The SC noted the good progress the project has made (e.g. the clarification of the agents causing MSDS, providing a basis for the development of MSDS management strategies), but urged the Pakistan PL Dr Iftikhar to further strengthen linkages to other Pakistan Govt. initiatives, such as the HEIS and the certification and registration of new germplasm with the Federal Seed Certification & Registration Dept., in order to enhance additional up-scaling of

project results. The PL indicated that through partnerships with the National IPM program and the Punjab FVDP a greater level of outreach was being achieved.

#### *Mango supply chain*

It was noted that this project is also progressing well, with good prospects for widespread uptake of simple postharvest techniques (lime wash) likely to significantly enhance the quality and price achieved by mangos on selected international and domestic markets. A partnership has been established with Metro that might lead to the export of 16,000t higher quality mangos to European markets. The Additional Secretary noted the need for ongoing focus on increasing shelf life of mangoes, which is being undertaken by the project.

#### *Dairy development*

Noting the good achievement of this project, the Additional Secretary pointed out that supply of feed and fodder will require continued attention, with a need to consider possible residues of chemicals in exports of halla meat. He also suggested the project consider whether it was possible to source low cost stock water supply systems to help farmers provide enough water to dairy animals. Dr Afzal also provided an update on the outcome of the Austrade facilitated import of high performance dairy cattle from Australia, which on balance has been positive in those cases where cattle went to corporate farms.

#### *Citrus production*

It was noted that this project has been somewhat slower in its progress, partly due to the late start, but also having been affected by the inability of key Australian experts to travel to Pakistan. Certification issues were again raised by the Additional Secretary and the DG Federal Seed Certification & Registration Dept. (FSCR), with a request that Dr Iftikhar ensure that data on the new germplasm introduced by the project to Pakistan be passed to the FSCR for registration. Dr Iftikhar also alerted the SC to the fact that the project does not have sufficient resources to address key citrus disease issues. Supplementary funds are required to enable Australian disease experts to travel to Pakistan to support the work being carried out through several Pakistan-funded disease projects.

### **Agenda item 4: Terms of reference for review of ASLP**

In general terms the SC was supportive of the proposed TORs for the review. However, some sharpening of the TORs was requested to include an explicit reference to assessing the cost-effectiveness of the ASLP. It was suggested this could be facilitated by sending out a questionnaire to the project teams to compile data on in-kind contributions and additional leverage of funds in Pakistan. The Additional Secretary and the Chairman PARC also indicated they would consider possible alternative Pakistan reviewers. Nominations were to be forwarded to the ASLP coordinator within the next weeks. It was also requested that the review schedule be synchronised as to enable an inception workshop involving both reviewer sub-teams before these split into separate horticulture and dairy itineraries. If the security conditions permit, the horticulture team should also visit the NFWP. The ASLP coordinator undertook to revise the TORs on the basis of these comments and circulate the final version within three weeks.

**Agenda item 5: Other business**

On the request of several SC members, an exploratory discussion was held to consider options for future follow-up and an extension of the ASLP program into a second phase. The Additional Secretary proposed consideration be given to establishing a more permanent liaison mechanism, possibly by basing an Australian technical expert with PARC to facilitate ongoing linkages to a broader range of Australian research institutions (e.g Ug99, Avian influenza, other issues common to both countries). He also suggested a more formal framework be set up to facilitate the placement of Pakistan scientists for training in Australia. The First Secretary AusAID noted that the development of sustainable institutional linkages between research bodies in Australia and Pakistan required strong commitment from both sides. Where this commitment can be demonstrated, there is the opportunity for short-term placements through the AusAID Leadership Awards –Fellowships program. The First Secretary AusAID also reiterated that any decisions on the provision of additional funds to bridge the ASLP into a new phase and the continuation of the ASLP into a second phase were contingent on the outcomes and recommendations of the ASLP review in October.

In general there was consensus that any second phase of ASLP would continue to retain its focus on horticulture and dairy, possibly expanding the scope in horticulture to include grapes and temperate fruits in Baluchistan, as well as broadening the dairy focus to include rangeland management (and rehabilitation). In this context, the Additional Secretary also requested that AusAID consider funding a continuation of the USAID food security project in Baluchistan post 2009. It was agreed that this would have to be considered in conjunction with the ASLP review.

## 5.2 Terms of Reference for ASLP Review

### TERMS OF REFERENCE

#### REVIEW OF THE PAKISTAN-AUSTRALIA AGRICULTURE SECTOR LINKAGES PROGRAM

##### 1 INTRODUCTION

In May 2005, the Government of the Islamic Republic of Pakistan and the Government of Australia agreed to establish the Agriculture Sector Linkages Program (ASLP). The purpose of the ASLP is to build linkages between the agriculture sectors of Australia and Pakistan. The ASLP, with a total budget allocation of 6.6M AUD over 4 years, has been structured into four components:

- 1. Market Linkages:* Conduct an agriculture market expansion feasibility mission to Pakistan for a bilateral trade & investment consortium of key Australian companies. This mission is led by Austrade.
- 2. Academic Linkages:* A total of seven agriculture research/postgraduate scholarships limited to a maximum duration of 24 months placed in key Australian institutions on issues of priority to the Pakistan agriculture sector. The seven scholarships are managed by AusAID in accordance with the Australian Development Scholarship Program.
- 3. Agriculture Linkages:* Implementation of a program of technical activities (up to 3 years in duration), comprised of projects to build linkages between the agriculture sectors of the two countries. This component constitutes the main thrust of the ASLP (5.06M AUD).
- 4. Linkages Program Review:* A joint review to be commissioned in year three of the initiative. The review will analyse each of three program components and compile outcomes and provide comment on the impact the initiative is having on strengthening linkages between Australia and Pakistan.

Under a Record of Understanding with AusAID, ACIAR agreed to manage and implement components 3 and 4 above. This document directly relates to component 4. The review will be conducted in Pakistan during the second half of October 2008.

##### 2 OBJECTIVES

The objective of this review is to evaluate the progress and impact of the ASLP, its implementation and its ability to foster linkages between Australia and Pakistan. This will form the basis for recommendations to AusAID and other stakeholders on modifications to the current program and possible future initiatives.

##### 3 SCOPE OF SERVICES

1. The review team will review and analyse each of the three program components and compile outcomes and provide comment on the impact the initiative is having on

strengthening linkages between Australia and Pakistan, as well as assessing the impact the program is having on linkages within Pakistan, with existing programs and on adoption of new technology. Special regard will also be given to the cost-effectiveness of the ASLP and additional leverage it has achieved.

2. The review team will provide recommendations to the participating Governments on modifications or alternative activities to be carried out in the final operational year (year 4).
3. The review team will provide recommendations to the participating Governments on whether a second stage ASLP is warranted, and if so, which sectors it should target.

#### **4 PERSONNEL, COORDINATION AND SUPERVISION**

##### *Membership of the review team*

- Dr William Thorpe, Interim Coordinator CGIAR Systemwide Livestock Programme (formerly Director of the South Asia regional office of the International Livestock Research Institute in Delhi)
- Dr Keith Chapman, international horticulture consultant (formerly with FAO regional Office in Thailand)
- Mr Hashim Laghari, Pakistan horticultural consultant (formerly with the Pakistan Agriculture Research Council; to be confirmed by MINFAL)
- Dr. Sajjad Zaheer Malik, DG Extension for Livestock & Dairy Development, Govt. of Punjab (to be confirmed by MINFAL)

The review team will work closely with Dr Christian Roth, ACIAR ASLP Coordinator, Mr Les Baxter, ACIAR Research Programme Manager for Horticulture, Mr Sosheel Solomon, ASLP Program officer and Mr Imran Saeed, Austrade, who will all accompany the review team on its itinerary. The team will also be accompanied by an AusAID rural development expert from AusAID Canberra.

##### *Supervision*

During the review the team will report jointly to Mr Mark Tattersall, First Secretary Development Cooperation, Australian High Commission, Islamabad and Dr Christian Roth, ACIAR ASLP Coordinator.

#### **5 WORKPLAN AND TIMEFRAME**

The review will take place during the second half of October 2008. In general terms, it is proposed to structure the review into two separate review sub-teams for horticulture and dairy, each comprising one international and one Pakistan reviewer.

Each sub-review team could broadly follow the following schedule:

- Day 1: Inception meeting and workshop with presentation by ASLP partners covering project overviews, progress against objectives, key achievements
- Days 2 – 5: Field trips to key project sites (Faisalabad, Sargodha, Multan, Mirpurkhas, Karachi for horticulture; Okara, Bhakkar for dairy)
- Day 6: Both sub-review teams re-converge and have joint Punjab provincial/private sector stakeholder workshops/meetings in Lahore
- Day 7/8: Review team meets with key Islamabad-based stakeholders

Depending on security, the horticulture review team will also travel to NFWP. Prior to the above itineraries, reviewers will be provided with all relevant ASLP documentation, including individual project proposals and reports.

*Key stakeholders and partners to be consulted by the review team*

- Federal Ministry for Food, Agriculture and Livestock, Islamabad
- Federal Ministry of Industry Production and Special Initiatives, Islamabad
- Central Planning Commission, Islamabad
- Pakistan Agriculture Research Council, Islamabad
- National Rural Support Program, Islamabad
- Livestock and Dairy Development Board, Islamabad
- Federal Seed and Registration Dept., Islamabad
- Quarantine Dept., Islamabad
- Pakistan Dairy development Corporation, Lahore
- Pakistan Horticulture Development and Export Board, Lahore
- Punjab department of Agriculture, Lahore
- Punjab Department of Livestock Development, Lahore
- Punjab Department of Agri-Marketing, Lahore
- Sindh Department of Agriculture, Karachi
- Sindh department of Livestock, Karachi
- Mango Growers Association Pakistan, Multan
- Nestle Pakistan, Lahore
- Halla Dairy Cooperative, Lahore
- Other private enterprises (e.g. Asim Agriculture Farms, Roshan Enterprises)
- Pakistan Initiative for Strategic Development and Competitiveness, USAID, Islamabad

## **6 OUTPUTS AND REPORTS**

Key outputs for the mission will include:

- An executive report (of no more than 5 pages) outlining the team's main conclusions and recommendations pertinent to the current ASLP, delivered within 2 weeks of the review;
- A concept note (of no more than 5 pages) outlining the team's conclusions and recommendations on the business case for a second stage ASLP, including what priority areas in the agriculture sector could be usefully targeted, delivered within 2 weeks of the review;
- A more detailed review report of no more than 30 pages providing a more comprehensive compilation of observations, learnings and supporting documentation for the above two documents, delivered within 6 weeks of the review.

### 5.3 Projections of ASLP Budget into Outyears

ASLP code	Short title	FY 05-06 as per ASLP plan	FY 05-06 actual		FY 06-07 as per ASLP plan	FY 06-07 actual	FY 07-08 as per ASLP plan	FY 07-08 30/06/2008 actual	FY 08-09 as per ASLP plan	FY 08-09 as per AOP forecast	FY 09-10 as per ASLP plan	FY 09-10 as per AOP forecast	Total as per ASLP plan	Total as per AOP forecast
A.1.1	Diagnosis of dieback and malformation	100.000	124.164		0	0	0	0	0	0	0	0	100.000	124.164
A.1.2	Workshop mango production	100.000	57.184		0	5.972	0	0	0	0	0	0	100.000	63.156
A.1.3	Training modules mango production	0	0	}										
A.1.4	R&D project mango diseases	0	0		500.000	268.876	450.000	300.890	300.000	311.368	0	162.253	1.250.000	1.043.387
A.1.5	R&D project orchard/water management	0	0											
A.2.1	Scoping study/supply chain analysis	100.000	108.455		0	0	0	0	0	0	0	0	100.000	108.455
A.2.2	Industry exposure visit	0	0		105.000	96.664	0	0	0	0	0	0	105.000	96.664
A.2.3	Training modules mango supply chain	0	0	}										
A.2.4	R&D project supply chain mgt	0	0		200.000	380.285	300.000	401.532	150.000	339.844	0	149.360	650.000	1.271.021
B.1.1	Expert visit citrus production	60.000	1.920		0	34.507	0	0	0	0	0	0	60.000	36.427
B.1.2	Workshop citrus production	100.000	3.184		0	22.126	0	0	0	0	0	0	100.000	25.310
B.1.3	Training modules citrus production	0	0	}										
B.1.5	R&D project citrus production	0	0		100.000	197.619	250.000	183.478	150.000	191.724	0	78.522	500.000	651.343
B.1.4	Industry exposure visit	105.000	104.840		0	0	0	0	0	0	0	0	105.000	104.840
C.1.1	Scoping study/constraints analysis	100.000	21.823		0	96.411	0	0	0	0	0	0	100.000	118.234
C.1.2	R&D project dairy animal productivity	0	0	}										
C.1.3	Training modules dairy production	0	0		375.000	0	425.000	438.313	350.000	561.306	0	198.107	1.150.000	1.197.726
C.1.6	Evaluation of germplasm	0	0											
C.1.4	Industry exposure visit	0	0		105.000	0	0	20.000	0	5.000	0	0	105.000	25.000
C.1.5	Sourcing and transfer of germplasm	60.000	0		20.000	67.988	0	0	0	0	0	0	80.000	67.988
	Contingency for changed priorities	29.000	16		78.500	0	113.500	0	104.000	0	0	0	325.000	16
	<i>Subtotal - program activities</i>	<i>754.000</i>	<i>421.586</i>		<i>1.483.500</i>	<i>1.170.448</i>	<i>1.538.500</i>	<i>1.344.213</i>	<i>1.054.000</i>	<i>1.409.242</i>	<i>0</i>	<i>588.242</i>	<i>4.830.000</i>	<i>4.933.731</i>
	PSO salary and operating	21.000	12.671		31.500	34.266	31.500	30.449	31.000	20.000	0	0	115.000	97.386
	Travel	15.000	30.081		15.000	21.130	20.000	9.206	15.000	10.000	0	0	65.000	70.417
	Review						50.000	0		50.000			50.000	50.000
	<i>Subtotal ASLP management costs</i>	<i>36.000</i>	<i>42.752</i>		<i>46.500</i>	<i>55.396</i>	<i>101.500</i>	<i>39.655</i>	<i>46.000</i>	<i>80.000</i>	<i>0</i>	<i>0</i>	<i>230.000</i>	<i>217.803</i>
	<b>Total ASLP</b>	<b>790.000</b>	<b>464.338</b>		<b>1.530.000</b>	<b>1.225.844</b>	<b>1.640.000</b>	<b>1.383.868</b>	<b>1.100.000</b>	<b>1.489.242</b>	<b>0</b>	<b>588.242</b>	<b>5.060.000</b>	<b>5.151.534</b>

