Community Action in Integrated and Market Oriented Feed-Livestock Production in Central and South Asia Project

Second Annual Workplan
1 July 2007 – 31 December 2008

ICARDA and NARS of Kazakhstan, Kyrgyzstan, Tajikistan and Pakistan

I Introduction

The first annual workplan for the period from 1 June 2006 to 30 June 2007 described the research sites and specified the project activities for each research theme in Central Asia and South Asia and for Theme 3 in each country. The second workplan for the period from 1 July 2007 to 31 December 2008 is a continuation of the first annual workplan. In collaboration with the village communities and individual farmers and based on the experience from the first year, the activities have been outlined in more detail. A major difference to the previous workplan is the addition of a second national team studying the sheep production systems in Central Tajikistan. The research site will be described below. The activities are being presented by region, themes and country.

Central Asia

While for theme 1 and theme 2 the general nature of the activities does not differ between the countries in Central Asia (CA), the activities under Theme 3 are more diversified.

In theme 1 "Socioeconomics" three activities were foreseen in the first annual workplan:

- Activity 1. Analysis of rural livelihoods in Kazakhstan, Kyrgyzstan and Tajikistan
- Activity 2. Ex ante valuation of the technological options on rural livelihoods in Kazakhstan and Kyrgyzstan
- Activity 3. Analysis of market chains and farmers' market access in Kazakhstan (lambs), Kyrgyzstan (lambs), and Tajikistan (Mohair goat fiber)

Basic data collection (informal surveys and rapid rural appraisals) related to the analysis of the livelihoods have been completed in most countries. In the second project year the main emphasis will be on analysis of the markets and in-depth analysis of livelihoods as outlined under Theme 1 below. The ex-ante economic analysis (Activity 2) will require detailed biophysical data, which will be available mid or end 2008. The data requirements will be discussed and outlined in interdisciplinary project meetings.

In theme 2 "Range and Forage Productivity" two general types of activities are distinguished in Central Asia:

- Activity 4 "Participatory evaluation and dissemination of improved fodder crops and agronomic packages to increase the feed resource base", and
- Activity 5 "Promoting efficient use of fodder crops, crop residues and agro-industrial by-products for increased meat and milk".

The rationale for these two activities was given in the first annual workplan and in general does not differ between the countries in Central Asia. However, the concrete interventions were adapted to the resource situation in the communities and to the expertise available in the three CA countries.

In Theme 3 "Livestock productivity" 17 different interventions are being tested in CA. These interventions target different livestock species and products. Four major types of interventions are undertaken:

- Introducing improved management packages including more cost effective flock structures, strategic feeding, animal health care) in Kyrgyzstan and in Tajikistan
- Early lambing & weaning in Kazakhstan
- Product diversification in sheep production through milk production in Kazakhstan and Kyrgyzstan
- Community-based breeding schemes in Tajikistan (Khujand) and in Kyrgyzstan
- Value addition through processing in Kazakhstan, Kyrgyzstan and Tajikistan

South Asia (Pakistan)

In South Asia (Pakistan) activities related to all three themes are being implemented in two research sites, one in the rainfed and one in the irrigated zone of Punjab Province. In Pakistan community-based approaches have been introduced by other research and development projects. Thus, it has been relatively easy to organize men and women farmer groups and to discuss proposed interventions in a participatory manner.

The main research focus is on the introduction and testing of new forage crops and improved varieties to overcome feed shortages in May and in December/January (Theme 2). Thus, winter and summer crops are being tested along with methods of conserving the feeds for use in the periods of feed scarcity. The new feeds are then being tested in feeding trials with buffalo and cattle for milk production and fattening (Themes 2 and 3).

Furthermore, supporting interventions are being undertaken in the communities, namely exploring the possibility of establishing a small scale feed mill to produce concentrate mixtures, the purchase of improved breeding buffalo bulls and the facilitation of an efficient delivery of animal health services (Theme 3). The milk technologists from NARC and from the University of Faisalabad are working on improved milking techniques and hygiene, and local processing methods for home-made butter and yoghurt to increase conversion rates, quality and shelf life of milk and dairy products with the women groups. Marketing options for new dairy products will be carefully evaluated and processing tested with interested women.

Theme 4: Knowledge exchange and capacity building in the countries

The activities planned under Theme 4 aim at knowledge exchange between participating scientists to achieve an integrated research process, at learning from related research and development projects, at disseminating knowledge between participating farmers and farmers from neighboring communities, and at informing other relevant stakeholders about the project results, including both successes and failures. Biannual meetings of collaborating scientists including students at one research site and annual planning meetings at country level will ensure knowledge exchange and integration of research activities. Training of farmers is an important component of most project activities, for example in fodder crop production, forage preservation, strategic feeding, milking techniques and processing of yogurt and cheese. Field days and workshops will be organized inviting relevant stakeholders to discuss successes and failures and to redirect project activities where required.

Regional activities

The focus of regional activities is on facilitating the research activities in the four countries. Where appropriate, in particular in Theme 1, across site analyses will be conducted.

The external support required for capacity building differs between Central and South Asia. While in Pakistan the training of scientists can be mainly organized in the country, for Central Asian scientists training at ICARDA is foreseen.

The regional workshops are aimed at an exchange of experience and at providing the opportunity for discussing differences in research and development approaches between the two regions. However, the language barrier is a major hindrance to direct exchange between the scientists participating in the project. A webpage in Russian and English will be developed as a tool to enhance exchange of information between the regions. However, timely translation of documents will not be easy with the human resources available at Tashkent office.

II Country Activities

1 Central Asia

Theme 1: Socioeconomics

The principal investigator to lead in this theme on behalf of ICARDA is Dr. Aden Aw-Hassan.

Kazakhstan

Background

The growing demand driven mainly by rising income levels has led to the recovery of the livestock sector. However, market constraints can limit the benefits of such economic boom, particularly for smallholders. The market surveys conducted in the first year of this project found certain market conditions which could potentially affect producers' income. These conditions include low density of markets and low frequency of market days. There are only 3 markers in the Arys district and only two markets in the greater Shimkent city areas. All these markets operate only on certain days and not open all working days of the week. This has certainly limited farmers' choices of the timing of selling animals and the location of sales. The effect of such constraint on producers' income has not been established in the economies in transition. Government policies have a great role to play in developing markets and in regulating the market practices including days of operation. Hence, the results of this research will have important policy implications.

Main output

Recommendations for removing the constraints to market access by smallholder sheep producers and for supporting community-based institutions that facilitate their access to remote rangelands.

Objectives

The objectives are

- to determine the effects of market constraints on the income of smallholder livestock producers
- to identify the determinants of livestock keepers' access to remote rangelands and the effects of that on the market value of sold animals and their income of smallholder producers.

Activities	Milestones	To be completed by
1. Complete the market description through multi-agent interviews, market visits (This is a continuation of the first year activity and completion of market survey)	– Flow charts of marker value chain drawn and fully described; marketing margins for market agents computed; product value shares computed for different market agents; prices at different points along the chain and by location analyzed.	30 October, 2007
2. Develop sampling frame using a clear geographical territory and farm household typologies.	– Sampling procedure defined and sample selected; list of villages and lists of households made available	30 October, 2007
3. Develop production and market survey.	– Household questionnaire adapted and tested for local conditions	30 Nov. 2007
4. Train enumerators and researchers	– Trained enumerators	30 Nov. 2007
5. Conduct multi-theme survey of livestock keepers in the target area; data entry.	– Complete data set of field survey.	30 April. 2008
6. Analyze data and write report	– Research report	30 July, 2008
7. Knowledge sharing	– Socioeconomic workshop	30 Dec. 2008

Kyrgyzstan

Background
Research conducted during the first year showed that there is a low demand for mutton in rural areas of Kyrgyzstan. Demand for meat and live animals increases as the distance between the markets and major cities shortens, and it is the highest in Bishkek. This explains the willingness of livestock producers in urban village Kemin to sell their animals at the closest animal market located in Tokmok town regardless the marketing costs.
Fatteners keep animals for 3-4 weeks that explains their low share of value added in the retail price. In fact, this category of agents has the functions of middlemen speculating over time rather than real fatteners. They benefit from advantages including location of fattening farms within city limits and opportunity to get the maximum profit from sales without risks of additional marketing costs facing rural smallholders on returning of the unsold sheep to remote villages. One more advantage expanding marketing opportunities of middlemen is that two livestock markets located in Bishkek work seven days a week from morning till evening. And the livestock market in Tokmok town is open only on week-ends.

Main output
Recommendations for removing the constraints to market access by smallholder sheep producers and for supporting community-based institutions that facilitate their access to remote rangelands.

Objective
The objective is to determine the effects of market constraints on the income of smallholder livestock producers.

Activities	Milestones	To be completed by
1. Complete the market description through multi-agent interviews, market visits (This is a continuation of the first year activity and completion of market survey)	– Flow charts of marker value chain drawn and fully described; marketing margins for market agents computed; product value shares computed for different market agents; prices at different points along the chain and by location analyzed.	30 Oct. 2007
2. Develop sampling frame using a clear geographical territory and farm household typologies.	– Sampling procedure defined and sample selected; list of villages and lists of households made available	30 Oct. 2007
3. Develop production and market survey.	– Household questionnaire adapted and tested for local conditions	30 Nov. 2007
4. Train enumerators and researchers	– Trained enumerators	30 Nov. 2007
5. Conduct multi-theme survey of livestock keepers in the target area; data entry.	– Complete data set of field survey.	30 April 2008
6. Analyze data and write report	– Research report	30 July 2008
7. Knowledge sharing	– Socioeconomic workshop	30 Dec. 2008

Tajikistan, Sogd province, Khujand site

Background

The first year investigation revealed the complete lack of standards, and quality consideration of mohair goat fiber production, storage, marketing and export. This leads to lost of opportunity for poor Angora goat producers to benefit from this valuable commodity. The investigation also revealed the complete lack of Government policy position on the monitoring and development of this valuable and unique production system. However, there is no systematic information on current market channels used by different producers and the determinants of these choices and the extent of domestic processing and the local knowledge of local fiber quality and ways of improving it. There is already tradition of household level processing of mohair but the extent of that processing and its value and prospects are not documented. These practices and information could be different in different household types. Household typologies can be defined by production system such as mountain ecologies (for example midrange altitude and high altitude) and by farm organizational type (for example household farm, large scale farms, cooperatives, private registered farm). Such information will provide fresh impetus to extension and policy makers to initiate serious efforts to develop this valuable sector for the benefit of the poor rural communities in Tajikistan.

Main outputs

- The effects of inefficiencies in the Angora goat fiber market on rural livelihoods quantified.
- Recommendations for improving the market vale share of Agora goat fiber for smallholder producers.

Objectives

The objectives are:

- to determine the marketing strategies and market channels used by different Angora goat producers and identify the determinants of these strategies and their economic effects.
- to determine the extent of mohair fiber processing at the household level and the quality perceptions and identify the factors influencing households' participation in value-addition activities.

Activities	Milestones	To be completed by
1. Complete the market description through multi-agent interviews, market visits (This is a continuation of the first year activity and completion of market survey)	– Flow charts of marker value chain drawn and fully described; marketing margins for market agents computed; product value shares computed for different market agents; prices at different points along the chain and by location analyzed.	30 Oct. 2007
2. Develop sampling frame using a clear geographical territory and farm household typologies by combination of farm organization type, mountain ecology type and distance.	– Sampling procedure defined and sample selected; list of villages and lists of households made available	30 Oct. 2007
3. Develop survey including production, marketing and value-added activities.	– Household questionnaire adapted and tested for local conditions	30 Nov. 2007
4. Train enumerators and researchers	– Trained enumerators	30 Nov. 2007
5. Conduct multi-theme survey of Angora goat keepers in the target area; data entry.	– Complete data set of field survey.	30 April 2008
6. Analyze data and write report	– Research report	30 July 2008

7. Organize multi-stakeholder workshop to discuss the problems along the value chain and identifying solutions	– Workshop is held, list of problems and possible solutions are identified	30 Sept. 2008
8. Knowledge sharing	– Socioeconomic workshop	30 Dec. 2008

New research site: Tajikistan, Vahdat district, Dushanbe site

Description of location

Dusti "jamoat" (former village council) is located in Vakhdat district in central Tajikistan, 35 km from Dushanbe. The total 11,500 ha of agricultural land comprises 993 ha irrigated land, 50 ha rainfed land, 143 ha orchards, 400 ha cotton, 317 ha cereals, 255 ha forage crops, and 10,400 ha rangelands, including 3,900 ha winter ranges (October to April) and 6,500 ha summer ranges (June to September).

In Dusti community there are 3,344 households and a total population of 25,800 people. More than 96% of them are farmers and land owners. Farmers are mainly involved in crop production (mainly cereals, vegetables, and melons and gourds) and household livestock production. The numbers of livestock are: 6,245 heads of cattle, 4,689 sheep including 2,698 ewes, 5,065 goats, 4,897 chickens, 297 horses, 634 rabbits, and 100 beehives.

Background

During the rapid study it was found out, that demand for lamb meat in rural areas of Tajikistan is satisfactory. The demand for meat and live lambs grows as the distance between markets and urban areas shortens. The highest demand is recorded in Khujand and Dushanbe cities. Sheep breeders in the rural areas of the jamoat Dusti mainly sell their animals at markets located in Vakhdat and Rudaki districts and markets around Dushanbe city.

The rapid survey and review conducted in the first year of the project show a big gap in prices between the regions with good natural resources endowments of pasture where animal production conditions are satisfactory and supply is the highest and around the major urban centers of Dushanbe market where the demand is the highest and production conditions are not as favorable. Currently dealers and middlemen are taking advantage of these prices differentials, but there is no evidence that producers are benefiting form the high prices at where the demand is the highest. Mart constraints such as poor transportation facilities, poor development of market points and potential monopolies could be responsible for such price differences which reach up to 40-60% between markets in Dushanbe and mountain and foothill zones and remote districts, such as Muminabad, Parkhar, and Pyadj. The effect of such market conditions will be different among different household types depending on their capacity to mobilize resource to access markets. We hypothesize that smallholders will be most affected. Government policy can develop programs that increase market competitiveness by investing in livestock markets. The study will provide evidence on the effects of such policies on the income or smallholder livestock producers.

Another finding of the first year's rapid assessment was that different types of producers have emerged after the dissolution of former collective farms and large joint stock companies. These types are similar to those in Kazakhstan described above and they are defined by their capacities to organize themselves and resources to access remote range lands. It is perceivable that mostly large producers will benefit from remote rangelands. The differences in cost of production due to access and use of remote rangelands could be highly significant hence affecting farm income. The conditions that influence the utilization of remote rangelands and their effect on the income of smallholder producer have not been studied. This activity will address this gap and develop information for extension and policy makers to improve forage supply for small producers.

Main output

- Methodology for spatial price analysis adapted for sheep markets
- Recommendations for enhancing community-based institutions for accessing remote rangelands

Objectives

The objectives are

- to determine the extent and causes of price differences between major production centers and demands markets through multi-market price analysis,
- to identify the determinants of livestock keepers' access to remote rangelands and the effects of that on the market value of sold animals and their income of smallholder producers.

Activities	Milestones	To be completed by
1. Complete the market description through multi-agent interviews, market visits (This is a continuation of the first year activity and completion of market survey)	– Flow charts of marker value chain drawn and fully described; marketing margins for market agents computed; product value shares computed for different market agents; prices at different points along the chain and by location analyzed.	30 Oct. 2007
2. Collect multi-market price data of slaughter sheep, goats, cattle and poultry over the past 10 years.	– Multi-market price data set made properly documented made available.	30 Oct. 2007
3 Multi-market livestock price data analysis	– Research report	30 Oct. 2007
4 Develop sampling frame using a clear geographical territory and farm household typologies.	– Sampling procedure defined and sample selected; list of villages and lists of households made available	15 Nov. 2007
5 Develop production and market survey.	– Household questionnaire adapted and tested for local conditions	30 Nov. 2007
6 Train enumerators and researchers	– Trained enumerators	30 Nov 2007
7 Conduct multi-theme survey of livestock keepers in the target area; data entry.	– Complete data set of field survey.	30 April 2008
8 Analyze data and write report	– Research report	30 July 2008
9 Knowledge sharing	– Socioeconomic workshop	30 Dec. 2008

Theme 2: Range and Forage Productivity

The principal investigator to lead this theme on behalf of ICARDA is Dr. Asamoah Larbi

Kazakhstan

Activity 4: Participatory evaluation and dissemination of improved fodder crops and agronomic packages to increase the feed resource base

Location: Akdala village, Arys District

Collaborating scientists:
Scientists: Abdraimov Seyfulla, Ibragimov Talgat, Eskaraev Nurali, Sartaev Ergen (South-Western Scientific Production Center for Agriculture), Shabanova Ludmila from Astana University
Farmers: Abdukhalik Kasymbay, Duysen, farmers Kojanov Yusup, Ibragimov Oraz and Arynbayev Orinkhan.

Activity 4.1: Community action for improving the carrying capacity of degraded rangelands around settlements

Background:
After the Soviet era, ownership of land and livestock were transferred to individual farmers, and the state organized feeding system disrupted. Millions of poor small-scale farmers who keep a limited number of livestock for subsistence purposes are now emerging in Central Asia. They lack resources to ensure proper management of the communal rangelands, and to produce and store fodder for winter feeding. As a result, rangelands closer to homestead are overgrazed and degraded, and those that are far from the homestead are under utilized. Technologies are needed to improve the productivity of degraded rangelands around homesteads such options include oversowing and proper grazing management.

Objectives:

To compare the productivity of rangeland oversown with pasture and fodder crops with the non-improved rangeland;
To compare the effect of rotational grazing with continuous grazing on rangeland productivity.

Methods
Two activities will be conducted at the same time. Experiment 1 and 2 will address objectives 1 and 2 respectively.

Activity 4.1.1 Effect of planting on productivity of degraded rangeland

Two demonstration sites will be established in the project site area to evaluate two different planting technologies in two experiments. These experiments are as follows:

Experiment 1
A site will be selected to improve productivity of the native rangeland near by settlements. The site will be planted in combinations of: planting with a Haloxylon and Kochia mixture, Haloxylon, Kochia separately. The natural rangeland will be used as control.

Treatments:

- Natural rangeland (control or farmer practice)
- Natural rangeland + fodder crops e.g. black Haloxylon and Kochia
- Natural rangeland + Haloxylon
- Natural rangeland + Kochia

Observations
- Plant cover
- Biomass production at monthly intervals
- Nutritional analysis (total digestible nutrients)

Experiment 2

Different seeding rates of the Haloxylon and Kochia plants will be studied in the experiment 2 and will be compared with natural rangelands (control or farmer practice). Seed germination tests in the laboratory will be conducted for the Haloxylon and Kochia. These results will be compared with demonstration sites under natural conditions.

Treatments:

- Natural rangeland (control or farmer practice)
- Control + Haloxylon 4 kg/ha
- Control + Kochia 3
- Control + Haloxylon 5 kg/ha
- Control + Kochia 4 kg/ha

Observations

- Plant cover
- Biomass production at monthly intervals
- Nutritional analysis (total digestible nutrients???)

Activity 4.1.2: Effect of continuous and rotational grazing on productivity of natural pastures

Two 300-ha plots will be selected at two private farms, Kasymbay and Duysen and divided into four plots of 75 ha as shown in Table 1. The four plots will be rotationally grazed by sheep in spring, summer, autumn and winter. In the continuous grazing treatment, sheep will graze the entire 75 ha during the respective season, while in the rotational grazing system each of the four plots will be divided into three subplots, and the sheep rotated among the subplots. The grazing trial was started in May 2007 and it is planned to continue the experiment for two years. Preliminary results will be examined after the first year and management adapted accordingly if required.

Scheme 1: Rotational grazing system versus unsystematic grazing system

Treatments	Large grazing plots			
	Plot 1	Plot 2	Plot 3	Plot 4
Rotational grazing	1.1: March grazing	2.1: June grazing	3.1:September grazing	4.1December grazing
	1.2 April grazing	2.2 July grazing	3.2 October grazing	4.2 January grazing
	1.3 May grazing	2.3 August grazing	3.3 November grazing	4.3 February grazing
Continuous grazing	Spring	summer	autumn	winter

Treatments:

- Continuous grazing (control or farmer practice)
- Rotational grazing

Observations:

- Plant cover by monthly and seasonal interval
- Botanical composition by monthly and seasonal interval
- Forage quality for each months separately
- Plot yield monthly intervals
- Changes in liveweight of sheep

Time frame for the activities

Activities	**2007**						**2008**											
	J	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Activity (4.1.1) - Experiment 1																		
Site selection and biomass determination																		
Seed collection																		
Land preparation and sowing																		
Biomass production monitoring																		
Activity (4.1.2) - Experiment 2																		

Plant cover and biomass estimation																		
Plot yield at monthly intervals																		
Liveweight measurements																		

Expected outputs/milestones	Completion
Productivity of community rangelands improved by 10% from oversowing	July 2008
Grazing management system for improved rangeland and livestock productivity	November 2008

Activity 4.2: On-farm demonstration of improved fodder production options

Background and justification
Planting fodder crops for fresh fodder, hay, silage has potential to reduce the feed gaps experienced by many smallholder crop and livestock farmers. However, the practice is not common among small-scle farmers. Also, farmers who grow fodder crops use poor agronomic practices e.g sub-optimal seeding rate, irrigation and fertilization.

Objectives:
- Demonstrate improved practices for fodder crop production on-farm
- Demonstrate best agronomic management practices for grain production on farm

Methods

Fodder crop production will be demonstrated on one large farm 'Kasymbay" and three small farms (Kojanov Yusup, Ibragimov Oraz, Arynbayev Orinkhan and Akhmedov Erkin). This will involve the use of improved practices of winter wheat, maize and alfalfa, and planting dates, seeding and fertilization rates and harvesting methods.

Experiment 1
Two different seeding rates will be evaluated to determine growth and plant height, and biomass yield at monthly intervals. The seeding rates are 15 and 20 kg and the control is wheat fallow.

Treatment
- Wheat fallow
- Wheat/mung bean (15 kg/ha)
- Wheat/mung bean (20 kg/ha)

Observations:
- Seed germination
- Days to maturity
- Grain Yield
- Biomass yield
- Cost benefit analysis

Experiment 2
Improved maize hybrid will be planted with different planting dates and seeding rates at four farmers' field to study yield potential of the crop and analyze economics of fodder production.

Treatments:

Farmer 1	**Farmer 2**	**Farmer 3**	**Farmer 4**
15.04.08 Maize	15.04.08 Maize	Maize – 35 kg/ha	Maize – 35 kg/ha
30.04.08 Maize	30.04.08 Maize	Maize – 25 kg/ha	Maize – 25 kg/ha
15.05.08 Maize	15.05.08 Maize		
30.05.08 Maize	30.05.08 Maize		

Observations
- Seed germination
- Plant density
- Plant height
- Days to maturity

- Grain yield, Biomass yield
- Nutritional analysis
- Economics of fodder produced will be estimated at market rates

Experiment 3
The assessment of different ammophos application rates with alfalfa will be conducted on one large Kasymbay farm and three small households. Ammophos will be applied at different rates e.g. 40 and 60 kg. Each treatment will be conducted at four replications.

Treatment
- Alfalfa cut farmers' practice
- Alfalfa 40 kg ammophos
- Alfalfa 60 kg ammophos

Observations
- Plant height
- Green fodder yield
- Dry fodder yield
- Nutritional analysis
- Cost benefit analysis

Time frame for the activities

Activities	**2007**						**2008**											
	J	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Activity 4.2 – Experiment 1																		
Winter wheat planting																		
Nitrogen application																		
Irrigation																		
Harvesting																		
Biometric data																		
Data analysis																		
Activity 4.2 – Experiment 2																		
Maize planted and harvested																		
Phenological observations																		
Nutritional analysis																		
Activity 4.2 – Experiment 3																		
Alfalfa cut																		
Ammophos application																		
Monitor green and dry fodder yield																		
Cost benefit analysis																		
Data analysis																		
Activity 4.2																		
Field days with farmers and communities																		
Reporting																		

Expected outputs

Expected outputs/milestones	**Date**
Improved fodder crop cultivars and agronomic practices disseminated	October 2008
Reduced winter feed gaps through increased alfalfa and maize production	June 2009

KYRGYZSTAN

Activity 4: Participatory evaluation and dissemination of improved fodder crops and agronomic packages to increase the feed resource base

Location: Ak-Beket (Alimseit), Kemin district, on bir jilga (Kenesh), Chuy district

Collaborating scientists:
Scientists: K. Joldoshev, T. Attokurov, B. Asanakunov, I. N. Pohomarenko (Kyrgyz Research Institute of Livestock, Veterinary, and Rangelands)
Farmers: Asanov Rysbek, Abdimajitov Nurjan

Background/Justification
Forage produced on irrigated fields and from hay produced on natural hayfields provide about 50-80% of winter feed on the farms “Alymseit”, “Kenesh” and in the neighboring communities. In summer animals are grazed on natural mountain rangelands. However, productivity of irrigated fodder is low due to the use of poor agronomic practices (fertilization and seeding rates, low-yielding cultivars, mono-cropping), and that of the natural hay fields is low due to poor grazing management e.g. continuous grazing.

Objectives

The objective of this activity is to undertake a series of activities to improve the supply of high quality feed. Specific objectives include:

- to compare productivity of natural grassland versus natural grassland overseeded with sainfoin
- to compare the effect of fertilization on productivity of hay fields
- to integrate alfalfa into the traditional wheat and barley mono-cropping systems

Methods

Activity 4.1: Effect of over-sowing and ammonium nitrate fertilization on productivity of hayfields

These technologies were applied in combinations of: application of nitrogen, oversowing with sainfoin in different tillage methods namely ploughed and minimum, and different seeding rates. This activity will be conducted on two medium scale farms Alimseyit and Kenesh.

Experiment 1

Nitrogen is the only nutrient whose cycling through the ecosystem or plant is to increase productivity of the hayfields. Hayfields on two farms at Alymseit and Kenesh will be selected and divided into two. One portion will be applied with nitrogen. The other portion will not be applied nitrogen and will be used as control.

Treatments:
- Natural hayfield (control)
- Natural hayfield + of 50 kg ha-1

Observations:

- Seedlings 1, 8, 12, 16 (weeks)
- Plant height
- Plant cover
- Botanical composition
- Biomass yield at monthly intervals
- Cost benefit analysis

Experiment 2

Tillage operations natural rangelands can vary from plowing to minimum tillage methods. It is well known that the tillage method will affect to plant stand and consequently to productivity of the hayfield. That is why three different tillage methods are chosen to plant sainfoin. This experiment will be conducted in March in two farms Alimseyit and Kenesh to compare the effects of two different tillage systems (plow and minimum tillage) and natural hayfield will be used as control.

Treatments:

- Natural hayfield (control)
- Hay field seeded with sainfoin (ploughed)
- Hay field seeded with sainfoin (minimum tillage)

Observations:

- Seedlings 1, 8, 12, 16 (weeks)
- Plant height
- Plant cover
- Botanical composition
- Biomass yield at monthly intervals
- Cost benefit analysis

Experiment 3

Two different seeding rates will be evaluated to determine growth and plant height, plant cover and biomass yield at monthly intervals. The seeding rates are 60 and 70 kg and natural hayfield will be used as control.

Treatments:

- Natural hayfield (control)
- Control + Sainfoin 60 kg seed
- Control + Sainfoin 70 kg seed

Observations:

- Seedlings 1, 8, 12, 16 (weeks)
- Plant height
- Plant cover
- Botanical composition
- Biomass yield at monthly intervals
- Cost benefit analysis

Part of the sustainable use of natural resources is promoting community awareness of land degradation problems and the benefits of ovesowing and application nitrogen. Taking into account two training courses for participating households and pilot farms in Kemin and Chuy district are planned for March 2008: **(1) "Rational use of pastures" and (2) "Options of improving the productivity of hay fields to increase the forage supply in winter"**

Time frame for the activities

Activities	**2007**						**2008**											
	J	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Activity 4.1 – Experiment 1																		
Application ammonium nitrate																		
Biometric data																		
Data analysis																		
Activity 4.1 – Experiment 2 and 3																		
Soil tillage and planting																		
Record plant height																		
Plant cover																		
Botanical composition																		

Biomass yield at monthly intervals																	
Cost benefit analysis																	
Data analysis																	
Plant cover and biomass estimation																	
Liveweight measurements																	
Activity 4.1																	
Field days with farmers and communities																	
Reporting																	

Expected outputs

Expected outputs/milestones	**Completion**
Productivity of community hayfield improved by 10% from oversowing and nitrogen application	July 2008
Different soil tillage method for improved hayfield and livestock productivity	August 2008

Activity 4.2: Integration of food/feed legumes into cereal cropping systems

Integration of mung bean and cereals (maize and pearl millet) crops into continuous wheat and barley cropping to increase supply of quality feed and improve soil fertility will be demonstrated. A field continuously planted to wheat or barley will be selected on farms.

Experiment 1

Two different early and late maturing varieties of mung bean crop will be planted after wheat harvest as double crop which is not common practice in the conditions of Kyrgyzstan. The best variety will be selected to be used in the farm conditions and introduced to the households.

Treatments:

- Wheat
- Wheat + mung bean (early maturing variety)
- Wheat + mung bean (late maturing variety)

Observations:

- Plant height
- Days to maturity
- Grain yield
- Forage yield
- Cost benefit analysis

Experiment 2

Crop diversification is already started in Kyrgyzstan. Traditionally, cultivation of an increasing number of crops as opposed to one or two major crops is the practice. Wheat, barley and maize have been continued to be the major crops grown by the private and public sectors. There is an opportunity to introduce pearl millet to the existing crop production system in the households. Taking into account above mentioned we decided to grow pearl millet in Kyrgyzstan.

Treatments:

- Farmers' practice - maize (control)
- Pearl millet early mature variety
- Pearl millet medium mature variety
- Pearl millet late mature variety

Observations:

- Plant height
- Days to maturity
- Grain yield
- Forage yield
- Cost benefit analysis

Experiment 3

This experiment will be conducted at three households' field to identify integrated crop management practices in corn that are effective and economical agro techniques.

Treatments:

- Irrigation - (control or farmer's practice)
- Irrigation + weeding by hand + inter-row cultivation
- Irrigation + herbicide use + inter-row cultivation

Observations:

- Plant height
- Days to maturity
- Grain yield
- Forage yield
- Cost benefit analysis

Time frame for the activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Activity 4.2 – Experiment 1																		
Winter wheat planting																		
Nitrogen application																		
Wheat harvesting																		
Land preparation																		
Mung bean planting as double crop																		
Field observations																		
Mung bean Harvest																		
Data analysis																		
Activity 4.2 – Experiment 2 and 3																		
Planting maize and pearl millet																		
Nitrogen and herbicide application																		
Irrigation and weeding																		
Monitor green and dry fodder yield																		
Cost benefit analysis																		
Data analysis																		
Activity 4.2																		
Field days with farmers and communities																		
Reporting																		

Expected outputs

Expected outputs/milestones	Date
Improved agronomic practices disseminated	October 2008
Improved soil fertility and reduced winter feed gaps through increased maize and pearl millet production	December 2008

Activity 5: Promoting efficient use of fodder crops, crop residues and agro-industrial by-products for increased meat and milk
Location: Kemin district: Ak-Beket (Alimseit), Chuy district: On bir jilga (Kenesh)

Collaborating scientists:
Scientists: R.Z. Nurgaziev, I.N. Ponomarenko, K. Joldoshev, T. Attokurov, B. Asanakunov (Kyrgyz Research Institute of Livestock, Veterinary, and Rangelands)

Background and justification:

Low-quality cereal crop residues, especially wheat straw are important feed resources in the smallholder crop-livestock systems. Developing strategic supplementation option to optimize the use of the crop residue will increase meat and milk outputs and household food security.

Objective:
-Test strategic supplementation options to increase the use of cereal crop residues for lamb fattening

Methods
Improved ration based on available crop residues and agro-industrial by-products will be composed and compared with farmers' practices for lamb fattening and milk production. To provide experiments two group of lambs for fattening in the farm Alimseyit in Kemin district.

Experiment 1

Treatments:
- Control – hay, straw (separately) in natural form + concentrated feed
- Control + hay, straw (separately) in grinded form + concentrated feed

Observations:
- Average daily gain
- Wool production
- Liveweight measurements

Experiment 2

Two households in the village Akbeket were selected to provide experiments, in control group (Toktogunov Erkin) quantity of lambs are 20 heads and are feeding with straw in natural form, while in second experiment group (Rysbekov Shaken) feeding the animals with coarse fodder providing in grinded form, for this purpose a chopper was given.

Treatments:
- Control – hay, straw (separately) in natural form
- Control + hay, straw (separately) in grinded form

Observations:
- Average daily gain
- Wool production
- Liveweight measurements

Time frame for activities

Activities	**2007**						**2008**											
	J	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Experiment 1 and 2																		
Prepare rations																		
Conduct feeding trials and collect data																		
Liveweight measurements																		
Analyze data and write reports																		

Expected outputs/milestones	**Date**
Feeding systems to improve meat and milk production	October 2008
Training course* for participating households and pilot farms in Kemin and Chuy district	November 2007

*Theme of the training course: "**Importance of preparation of balanced rations including crop residues for increasing livestock productivity"** planned for 10 November 2007.

TAJIKISTAN

Sogd province, Khujand site

Activity 4: Participatory evaluation and dissemination of improved fodder crops and agronomic packages to increase the feed resource base

Location: B. Gafurovskiy district, Jamoat Ismoil, villages: Korajingil, Takli, Ouyas and Kurgancha

Collaborating scientists:
Responsible scientists: Abdumutalib Jamoliddinov, Makhmoud Kasymov (Tajik University of Technology)
Post graduated students:
Magistrates:
Data collections: Khudayberdiev Burkhon, Abdurakhmanov Kushmurad, Madaliev Turgunbay

4.1. Effect of over-sowing and ammonium nitrate on productivity of natural pastures

Objective
Creation demonstration sites to rehabilitate pastures around the villages through over-seeding high productive none traditional pasture forage crops.

Method
Two different experiments will be conducted in the selected site and divided into two parts, where one portion will analyze nitrogen effect and the second experiment will study growth and development of sainfoin, saltwort and sainfoin+saltwort mixed.

Experiment 1

Nitrogen application is a way to improve natural pasture productivity in Central Asia. The nitrogen will be applied at the rate of 50 kg in the pastures near by settlements. The site will be selected and divided into two treatments around settlement Takli on 1 hectare for each treatment. One treatment will be applied with nitrogen, and second treatment will not be applied with nitrogen and remained as control.

Treatments
- Natural pasture (control)
- Control + of 50 kg ha-1 N

Observations
- Seedlings
- Plant height
- Botanical composition
- Biomass yield (before, during and after grazing)
- Cost benefit analysis

Experiment 2

A site will be selected to improve productivity of the native pastures around settlements. The site will be planted in combinations of: oversowing with a saltwort and sainfoin mixture, saltwort, sainfoin individually. The natural rangeland will be used as control.

Treatments

- Control
- Natural pasture seeded with saltwort
- Natural pasture seeded with sainfoin
- Natural pasture seeded with sainfoin + saltwort

Observations

- Seedlings
- Plant height
- Botanical composition
- Biomass yield (before, during and after grazing)
- Cost benefit analysis

Time frame for the activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Activity 4.1 – Experiment 1																		
Application ammonium nitrate																		
Biometric data																		
Harvest (cut)																		
Data analysis																		
Activity 4.1 – Experiment 2																		
Land preparation and planting																		
Botanical composition																		
Biomass yield at monthly intervals																		
Cost benefit analysis																		
Data analysis																		
Activity 4.1																		
Field days with farmers and communities																		
Reporting																		

Expected outputs

Expected outputs/milestones	Completion
Oversowing and nitrogen application will improve productivity of community rangelands	July 2008 October 2008

4.2.1 Introduce none traditional crops into existing crop rotation

Evaluating, demonstrating and facilitating the use of new crops, technologies for a forage production in the households' field. None traditional cereal crops' varieties will be sown at recommended seed rate of that crop for fodder production (by locally made seeder).

Treatment

- Wheat – fallow
- Wheat – corn
- Wheat – sorghum
- Wheat – pearl millet

Each treatment is 200 m^2 in village Uyas in two farmers' field separately (Mamatkulov Rajabboy, Khudoyberdiev Burkhon, plot size 50 m^2 total size of the experiment is 1600 m^2).

Observations

- plant height
- tillering capacity

- number of leaves
- biomass production
- grain yield
- nutritional analysis

Time frame for the activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Activity 4.2.1																		
Site selection																		
Land preparation and planting																		
Nitrogen application and irrigation																		
Field observations																		
Data analysis																		
Field days with farmers and communities																		
Reporting																		

Expected outputs

Expected outputs/milestones	Date
Improved soil fertility and reduced winter feed gaps through increased maize and pearl millet production	December 2008

Activity 4.2.2 On-farm demonstration of improved agronomic packages
Improved maize hybrid will be planted with different planting dates and seeding rates at four farmers' field to study green yield potential and analyze economics of fodder production. The crop will be planted on four different households in Karajingil village (farmer 1 and 3) and Uyas (farmer 2 and 4). Plot size is 500 m^2.

Treatment

Farmer 1	Farmer 2	Farmer 3	Farmer 4
Uskanov A.,	Mamatkulov K	Kilichev T	Abdurakhmonov X
20.04.08 Maize	20.04.08 Maize	Maize – 60 kg/ha	Maize – 60 kg/ha
30.04.08 Maize	30.04.08 Maize	Maize – 50 kg/ha	Maize – 50 kg/ha
10.05.08 Maize	10.05.08 Maize	Maize – 70 kg/ha	Maize – 70 kg/ha

Time frame activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Activity 4.2.1																		
Site selection, seed collection and seed preparation																		
Preparation machines to plant and planting the seeds																		
Nitrogen application and irrigation																		
Monitoring and biomass record																		
Data analysis																		
Reporting																		

Expected outputs/milestones	Completion
On-farm demonstration of introduced new agricultural crops	October 2009

Activity 5: Promoting efficient use of fodder crops, crop residues and agro-industrial by-products for increased meat and milk

Location: B. Gafurovskiy district, Jamoat Ismoil, villages: Korajingil, Takli, Ouyas and Kurgancha
Collaborating scientists:
Responsible scientists: Abdumutalib Jamoliddinov, Makhmoud Kasymov (Tajik University of Technology)
Post graduated students:

Master's students:
Data collections: Mamatkulov Radjabboy, Matazimov Abdunazar, Askarov Rakhmon, Madaliev Turgunbay

Background and justification:
Low-quality cereal crop residues, especially rice straw are important feed resources in the smallholder crop-livestock systems. Developing strategic supplementation option to optimize the use of the crop residue will increase mohair, goat meat outputs and household food security.

Objective:
Test strategic supplementation options to increase the use of cereal crop residues for goat fattening. The experiment will use a Randomized Complete Block Design (RCDB) and involve 12 households.

Treatment

- Traditional (no chopping - control) – Uskanov Abduvakhob, Khudoyberdiev Burkhon
- Traditional + components (rice straw mixed with grinded maize) – Mamatkulov A., and Mamatkulov R.
- Traditional + minerals – Matazimov Abdunazar and Askarov Rakhmon
- Traditional + components +sesame seed cake + minerals – Madaliev T., Umarova C

Observations:

- Voluntary intake
- Average daily gain
- Wool production
- Wool quality
- Susceptibility to helminthosis

Time frame for activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Prepare rations																		
Conduct feeding trials and collect data																		
Liveweight measurements																		
Analyze data and write reports																		
Mineral feeding																		

Expected outputs/milestones

Expected outputs/milestones	Date
Feeding systems to improve mohair and meat production	October 2008
Training course* for participating households in Uyas and Karajingil	March 2008

*Theme of the training course: "**Importance of preparation of balanced rations including crop residues for increasing livestock productivity"** planned for 10 March 2008.

Vahdat district, Dushanbe site

Location: new research site in central Tajikistan: Vahdat district, Jamoat Dusti

Activity 4: Joint evaluation and distribution of improved fodder crops and agronomic packages to increase fodder resource base.

Collaborating scientists:
Leading scientists: Abdullo Madaminov, Tajik RI of Livestock, TAAS, PhD, Madali Maysupov Tajik RI of livestock, TAAS, Mavlon Pulodov, NGO "Ziroat" TAAS,
Other scientists: Muhitdin Khalikov, Institute of Botanic Academy of Sciences, RT
Postgraduate student: Ismoil Yuldoshev (Tajik Agrarian University)
Farmers: Madjid Bobishoev Mansur Bobishoev, Mamadsharif Niyozov,
Khurshed Davlatov (village Nematabad), Rashid Azizov, Rajab Temurv (village Buzbit)

Introduction
Dehkan or farmers units are characterized by a small number of animals and small area of arable land to produce of food and fodder crops as well as technical crops. Usually sheep are grazed on remote high mountain rangelands in summer and during autumn-winter-spring season on rangelands near the villages. During winter season there is shortage of fodder. The area of village rangelands is limited, their plant cover is highly degraded and yield is low due to overgrazing. On irrigated and rainfed fields, the yield of fodder crops is low due to suboptimal agronomic practices.

Objectives
- to organize and conduct demonstration trials on rehabilitation of productivity of village rangelands and natural hayfields jointly with the farmers,
- to test new varieties and types of fodder crops, and a package of cropping technologies to increase productivity of irrigated and rainfed fields,
- to train farmers in production of fodder crops by conducting of traveling workshops.

Methods
Two subactivities will be undertaken (see below).

Activity 4.1: Improving carrying capacity of degraded rangelands and hay pastures and, effect of nitrogen fertilization on productivity of hay fields

Demonstration trials will be conducted on rehabilitation of fodder productivity of natural hayfields and rangelands by sowing legumes and improving pattern of mineral dietary of plant cover.

Experiment 1

A site will be selected to improve productivity of the natural hayfield around villages. Different seeding rates of Sainfoin crop will be tested in the experiment 1 and compared with natural hayfield (control or farmer practice).

Treatments
- Natural hayfield (control)
- Control + sainfoin 60
- Control + sainfoin 80

Experimental design
Plot size is 25 m^2 (8,3x3 m). The experiment will be provided according to the methods of state variety testing commission for agricultural crops. Each treatment has three replications. Plots will be randomized across to slope: I replication – 1, 2, and 3; II replication – 2, 1, and 3; III replication – 1, 3, and 2.
The experiment will be provided in natural hayfields of two households. Total area of the experiment is 450 m^2.

Experiment 2

Hayfields near by settlement Nematabad will be selected to study nitrogen effect at different rates and its influences to the productivity.

Treatments

- Natural hay field (control)
- Control + 45 kg N/ha
- Control + 60 kg N/ha

Experimental design

Plot size is 25 m^2 (10x2.5m) with three replications and will be randomized. The experiment will be provided in natural hayfields of two households. Total area of the experiment is 450 m^2.

Observations

- Seed germination
- Plant height
- Plant cover
- Botanical composition
- Biomass production at monthly intervals
- Nutritional value

Time frame for the activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Activity 4.1 – Experiment 1																		
Site selection, land preparation and planting																		
Biometric data																		
Data analysis																		
Reporting																		
Activity 4.1 – Experiment 2																		
Site selection																		
Nitrogen application																		
Botanical composition																		
Cost benefit analysis																		
Data analysis																		
Activity 4.1																		
Field days with farmers and communities																		
Reporting																		

Expected outputs

Expected outputs/milestones	Completion
Productivity of community hayfields improved by 10% from oversowing and nitrogen application	July 2008

Activity 4.2: Integration of legumes into cereal cropping systems

In the pre-mountain zone of Tajikistan the majority of the cattle owners are small farmers, who are now renting land from government and are started to cultivate different agricultural crops.
Experiment 1
Early and late maturing varieties of mung bean will be tested in the households' field as a double crop after wheat harvest. Days to maturity, grain yield, biomass yield and cost benefit analysis will be studied in the experiment. Whet fallow will be used as control.

Treatment

- Wheat/fallow (control)
- Wheat/mung bean (early maturing)
- Wheat/mung bean (late maturing)

Experimental design

The experiment will be provided at irrigated site in a household. Seeding rate is 18 kg/ha. Plot size is 25m^2 (8,3x3 m). Three replications and will be randomized. Total area is 225 m^2.

Observations:

- Seed germination
- Days to maturity
- Grain Yield
- Biomass yield
- Cost benefit analysis

Experiment 2

Two different seeding rates will be evaluated to determine growth and plant height, and biomass yield at monthly intervals. The seeding rates are 15 and 20 kg and the wheat fallow is control.

Treatment

- Wheat fallow
- Wheat/mung bean (15 kg/ha)
- Wheat/mung bean (20 kg/ha)

Experimental design

The experiment will be provided at irrigated site in a household. Plot size is 25m^2 (8,3x3 m). Three replications and will be randomized. Total area is 225 m^2.

Observations:

- Seed germination
- Days to maturity
- Grain Yield
- Biomass yield
- Cost benefit analysis

Experiment 3

The assessment of different nitrogen application norm with alfalfa will be conducted on four households. Nitrogen will be applied at different rates e.g. 40 and 60 kg. Each treatment will be conducted at four replications

Treatment

- Alfalfa cut farmers' practice
- Alfalfa 40 kg ammophos
- Alfalfa 60 kg ammophos

Experimental design

The experiment will be provided at four households. Plot size is 25m2 (8,3x3m), replication is fourfold. Plots are randomized. Total area is 1200 m^2.

Observations

- Plant height
- Green fodder yield
- Dry fodder yield
- Nutritional analysis
- Cost benefit analysis

Time frame for the activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Experiment 1 and 2																		
Site selection and planting double crops																		
Identification of fodder crops yield																		
Monitoring of crop growth and yield																		
Cost benefit analysis																		
Experiment 3																		
Site selection and planting alfalfa																		
Ammophos application																		
Monitoring of crop growth and yield																		
Cost benefit analysis																		
Reporting																		

Expected outputs/milestones

Expected outputs/milestones	Date
Legume crops integrated into cereal cropping systems	October 2008
Food/feed systems to increase grain and fodder.	November 2008

Theme 3: Improvement of livestock productivity

The principal investigators are Dr. Barbara Rischkowsky and Dr. Luis Iñiguez, the latter in particular for the issues concerning crossbreeding and genetic improvement of goats.

Kazakhstan

Activity 6: Early lambing for targeting lamb sale during Navruz (March) involving a genotype comparison in household flocks

Location: Ak-Dala village (Arys district)

Collaborating scientists:
Responsible scientist: Marat Tuekbasov, Aydar Kashkarov
Other scientists: T. Bigara (teacher at Southern Kazakhstan State University)
PhD student: Ms. Z. Tuganbaeva
MSc thesis: I Mambetov from South-Kazakhstan State University

Research results on early lambing will be included into the thesis of Mr. I. Mambetov called “Utilization of early lambing methods for Karakul sheep to generate additional income”
Research results on early lambing will be also considered in one chapter of Ms. Z. Tuganbaeva’s thesis.
I. Mambetov and Z. Tuganbaeva will undertake monitoring of mating and lambing, will conduct classification (appraisal) of lambs, and measure their constitution and live weight.
A. Kashkarov, T. Bigara will study issues of the reproductive abilities of Karakul and fat-tailed sheep (the number of lambs per 100 ewes, the fertilization rate, survival rate for lambs and ewes, productive qualities of lambs, marketing in Arys and Shymkent towns.

Background
There are opportunities to market lambs that are born beginning of January at a high price during Navruz in March. The targeting of this market is possible by shifting the traditional lambing period from March to January. It is expected from earlier studies that by March early lambed lambs will acquire desirable marketing weights with direct benefit to farmers. It is also expected that this change in

management will decrease the grazing pressure on seasonal ranges near villages. This strategy will require special feeding management and adequate housing during winter.

Objective
The main objective to test impact of early lambing on performance of ewes and lambs and on farm economics

Methods
Research approach:
The suggested technology is early lambing technology will be tested versus the traditional lambing. The following steps have to be taken for early lambing

- early weaning in April is a precondition for early lambing: traditional weaning of lambs takes place in August, and mating in October. In preparation for the experiment lambs were weaned from ewes in May and mating will be conducted in August
- preparing rams for artificial insemination (AI) or mating (July, August); supplementation of rams depends on their condition
- mating/AI of ewes (in August and in October)
- determining physiological condition of ewes (August to December in the improved system and October to Fe in the traditional system)
- additional feeding of pregnant ewes in the improved system (November-December)
- lambing in January and in March
- early weaning of lambs in March and traditional weaning in August

Experimental design:
The Karakul and/or fat-tailed sheep ewes of the households were divided into two groups and ear-tagged. One group is being managed for early lambing and the second group according to traditional management. Total number of sheep is 300.

	Participating farmers	Karakul sheep	Fat-tailed sheep
		number of heads	number of heads
1	Farm “Kasimbay”	100	100
2	Household “Abdukarim K.”	-	40
3	Household “Ergesh”	10	20
4	Household “Andas”	20	10

Data to be collected:

- reproductive performance: mating dates, lambing date, (to calculate conception rate, lambing percentage), litter size (twinning rate)
- feed intake of ewes
- lamb and ewe survival
- lamb birth weight, ewes weight and body condition score at lambing, body weights and body condition scores from ewes and lambs every 2 weeks until marketing time
- biochemical blood indices
- data concerning all costs and all income generated (economic evaluation)

Time frame for the activities

Activities	**2007**						**2008**											
	J	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Identification of farmers											**x**	**x**						
Preparation of ewes and rams to mating	**x**											**x**						
Mating period	**I**	**I**		**T**									**x**					
Monitoring of the physiological condition of ewes			**x**	**x**	**x**	**x**	**x**	**x**						**x**	**x**	**x**	**x**	**x**
Supplementation of ewes						**x**	**x**	**x**							**x**	**x**	**x**	
Lambing							**I**		**T**									**I**
Additional feeding of lambs							**I**	**I**	**I**									
Weaning of lambs (sale or further fattening)									**I**					**T**				

I=improved; T=traditional

Expected outputs/milestones	Date
Training of framers in managing ewes and lambs (feeding, housing)	October 2007
Differential income (cost/benefit analysis) due to early lambing versus traditional lambing evaluated for the first season	August 2008
Workshop with farmers, extension services and project staff to define and evaluate advantages and disadvantages of the intervention	August 2008

Activity 7: Early weaning and fattening (Nagul) of lambs for lamb marketing and milking of early weaned ewes for value addition in household flocks

Location: Ak-Dala village (Arys district*)*

Collaborating scientists:
Responsible scientists: J. Parzhanov, B. Baytashov, E. Kanceitova, K. Tlegonova (South-western Scientific Production Center for Agriculture, SWRCA)

Background
During September-October the market price for lambs is promising in Kazakhstan. This could be targeted by early weaning of lambs (at 60 days) following the Nagul system (raising lambs in the summer ranges) in combination with extra feeding for sustaining rapid growth. It is expected that by September and October the lambs will reach marketable weights. In addition early weaned ewes will be milked to add needed additional source of income to farmers and/or improve the diet of the family.

Objective
The main objective is to test impact of early weaning on performance of lambs and on milk production of ewes as well as the effect on the farmers' income.

Methodology
Research approach:
Early weaned lambs will be fattened in the Nagul system with strategic supplementation and compared with lambs raised in the traditional system.

	Early weaning	Traditional weaning
Mating period	August	October (Activity 6)
Lambing	January	March (Activity 6)
Weaning	after 60 days (in March)	in August
Start of Fattening	March	August
Feed used for fattening	Nagul and supplementation	no supplementation
Milking of ewes	after weaning	no milking

Experimental design:
The experiment will be conducted with two different sheep breeds: Karakul and fat tailed sheep. The experiment will use the same households and the offspring of the ewes from Activity 6, the lambs of the two groups of ewes (improved versus traditional) will be treated as described above will be investigated and will be split in two groups.

Data to be collected:
- data till weaning will be collected in Activity 6
- liveweight of weaned lambs and body condition scores each 10 days
- feed intake of lambs
- milk records each week from weaning till end of lactation
- liveweight of weaned lambs and body condition scores each 10 days
- liveweight and body condition scores of ewes till mating
- milk yields of ewes till end of lactation
- data concerning all costs and benefits will be collected (economic evaluation)

Farmers will be involved in data collection as much as possible.

Time frame for the activities

Activities	2007	2008

	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Training of farmers for new management strategy						x												
Start of the experiments							x											
Liveweight and survival of lambs							x	x	x	x	x	x	x	x				
Liveweight and milk yields of ewes							x	x	x	x	x	x	x	x				
Assess income from early weaning, fattening of lambs and milking									x	x	x	x	x	x				

Expected outputs/milestones	Date
Training of farmers in creep feeding the lambs for early weaning	December 2007
Training of farmers in milking hygiene	February 2008
Differential income (cost/benefit analysis) due to early weaning versus traditional weaning evaluated for the first season	October 2008
Workshop with farmers, extension services and project staff to define and evaluate advantages and disadvantages of the intervention	October 2008
First technical report	November 2008

Activity 8: Community-based household cow and sheep milk processing improvement and sausage making for value addition and income increasing.

Location: Ak-Dala village (Arys district)

Collaborating scientists:
Responsible scientists: A. Ombaev, B. Norbuta, E. Kunanbaeva (SWRCA)
PhD student: A. Saniyazova (SWRCA): one chapter of her thesis is directly concerned with this activity
Master students: R. Shimelkova, Junior Scientist at the laboratory of the gene pool, morphologies, and biochemistry
Student of SKPU: A. Kaldykozova
Entrepreneur: G. Kuleeva from Ak-Dala

Background
The early lambing/early weaning technology will be associated with milk production of ewes (activities 6 and 7). To generate additional income to farmers the surplus milk can be processed into fresh cheese and yogurt which are demanded in the markets. The project proposes to train farmers in processing milk products and promote community action for efficient processing and eventually marketing of products. This activity will also include milk from cows. A new type of sausage using camel fat has been developed at the SWRCA. The processing method will be introduced to the communities.

Objective
The main objective is to develop plans of processing milk and meat with improved methods to produce products with market demand.

Methods/Approach
The alternative preparation and processing of sheep and cow's milk will be evaluated. There is a high market demand for the dairy products "Chechil" and "Brynza". Local processing methods have been studied and optimized methods have been developed in collaboration with a private entrepreneur and will be demonstrated to interested communities in Ak-Dala and neighbouring villages. The project will conduct participatory workshops with interested households including those participating in the program of livestock productivity to discuss the advantages of creating a community-based milk processing center. According to farmers' decisions individual or community-based processing will be organized. Farmers will be trained practically on methods involving milk pasteurization for making yogurt and fresh cheese. The same and/or other interested households will be introduced to sausage making. Marketing options and prices for the new/improved products will be tested and a cost/benefit analysis conducted in order to evaluate the impact on farmers' income.

Time frame for the activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Training of farmers for milk processing						x			x									x
Training of farmers for homemade sausages						x												
Preparation and evaluation of processing sheep and cow milk, and homemade sausage									x	x	x	x	x	x				
Marketing of products									x	x	x	x	x	x				

Expected outputs/milestones	Date
Participatory planning workshop with communities	October/November 2007
Training workshops for milk processing with interested households	December 2007
Training workshops for sausage production with interested households	December 2007
Documentation and analysis of market acceptance of the products	October 2008
Preliminary analysis of adoption and impact of new processing (technical report)	December 2008

Kyrgyzstan

Activity 9: Household improvement of livestock management for improved productivity: integrating management of lambing period, animal health, feeding system, lamb management

Location: Kemin district – Alimseyit farm, Chuy district – Kenesh farm; 10 households in settlement "Donaryk" Chuy district and 9 households in Akbeket village Kemin district.

Collaborating scientists
Principal investigators: R.Nurgaziev, A.Ajibekov, K.Abdikerimov
Post graduate: T.Katosheva, D.Nazarbekov, N.Abdikerimov, K.K.Abdikerimov
Other staff: T. Tursunov**,** J. Kasymbekov

Introduction
As a result of economic reforms the structure of rural producers in Kyrgyzstan has completely changed. For the time being major producers of livestock products include owners of households that produce 54% of meat, 55% of raw milk, 49% of eggs, and 49% of wool.
Households due to limited land resources and, consequently, a small forage base own different numbers of animals, from 10-15 heads to 100-150 heads of sheep. They have limited knowledge on sheep management, selection of animals for breeding and disease prevention and treatment, s well as little access to information. As a result, the productivity of animals is low, and they generate low income. Many farmers keep mixed flocks of fine-wool and coarse-wool sheep which hinders efficient selection within the flocks.

Goals and objectives
The main objective is to improve farmers' and households' knowledge of livestock management in small and medium scale farms through implementation of improved husbandry practices.

Methods
Research approach:
Improved husbandry practices will be implemented on the farms "Alimseyit" and "Kenesh" and in the households located in the small town "Akbeket" Kemin district and in "Donaryk" Chuy district.
Improved husbandry practices include:
- Optimum ratio of rams to ewes (1:25)

- Mating the ewes with high productive rams from pedigree farm "Orgochor" Jetioguz district;
- Artificial insemination ewes (organizing and training)
- Optimum sheep grazing with additional feeding in late autumn, winter and early spring period;
- Well organized grazing with access remote pastures;
- Winter animal feeding, close to balanced rations;
- Monitoring sheep lambing;
- Monitoring growth and development lambs';
- Early weaning
- Sorting ewes
- Veterinary and prophylactic measures with partial provision crucial necessary medicals at the project costs;
- Training farmers to new methods of livestock production
- Training farmers and households to diagnoses, prophylactics of sheep diseases

Experimental design:
Farmers and households will be divided into two groups to compare the effects of the improved husbandry with the traditional practices on flock productivity and on farmers' income. In "Akbeket" 9 households and in "Donaryk" 10 households participate in this activity; they keep fine-wool Merino and coarse-wool fat tail sheep.

Data to be collected:
- Fertility
- Lambs survival at weaning
- Lambs live weight at birth, in two months, and weaning period
- Ewes live weight in spring and autumn
- Shearing
- Expenses and profit
- Labor inputs

Time frame for the research activities

Activities	**2007**						**2008**											
	J	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Weaning of lambs, select best pastures with good grasses		**x**												**x**				
Trenching (anthelminthics) against intestinal parasites		**x**												**x**				
Selection of rams and introduction of highly productive rams from state pedigree farm "Orgochor" Jetioguz district. Testing bloods rams for brucellosis		**x**	**x**											**x**	**x**			
Autumn selection of ewes, weighing of lambs, preparing rams for mating			**x**												**x**			
Provide autumn washing sheep against itching, preparation of sheds (mechanical cleaning, disinfected)				**x**												**x**		
Organizing mating of ewes					**x**												**x**	
Vaccination of sheep against clostridial diseases						**x**												**x**
Organizing winter feeding of animals balanced rations for late gestation and lactation						**x**	**x**											**x**
Prepare sheds for lambing of ewes (mechanical cleaning, disinfection), training farmers to organize shed keeping								**x**										
Monitoring of lambing and lamb weighing									**x**									
Testing of milk investigation for brucellosis									**x**									
Mineral feeding of newly-born kids (chalk, fluorine-free phosphate, salt, meat-bony flour)										**x**								
Evaluation of wool yield from coarse-wool											**x**							

sheep																	
Evaluation of wool yield from fine-wool sheep											x						
Trenching lambs against monieziosis (tape worms)											x						
Health examination of animals, organization of summer grazing on remote ranges												x					

Expected outputs/milestones	**Date**
Comparative experiment started	August 2007
Evaluation of comparative flock productivity for the first cycle	August 2008
Cost/benefit analysis for the first cycle	September 2008
First technical report	November 2008
Training course* for participating households and pilot farms in Kemin and Chuy district	December 2007 & February 2008

*Themes for the training courses: (1)**"Time schedule to prevent infectious and invasive diseases, including animal brucellosis"** planned for 5 December, 2007; (2)**"Veterinary and sanitary measures to improve lanb lamb survival and growth"** planned for 10 February, 2008.

Activity 10: Production diversification: Improvement of milk productivity in sheep breeding

Location: Chuy district – Kenesh farm

Collaborating scientists
Principal investigators: R. Nurgaziev, A. Ajibekov,
Post graduate: T. Katosheva, D. Nazarbekov, N. Abdymajidov
Other staff: T. Tursunov, J. Kasymbekov

Introduction
In the transition period from a planned economy to a market economy and with the appearance of new farm types such as medium and small scale private farms and household farms livestock scientists and specialists have changed their former perception of priority of wool production. Instead hey are now searching for alternative products to increase the farmers' income from sheep production under the conditions of low market prices for wool and smaller flock sizes.
One option is diversification of production through the introduction of sheep milk production on the basis of local low productive coarse-wool fat-tailed sheep. To improve the milk yield of the local breed Awassi rams, a dairy sheep breed from the Near East, were imported. Crossbreeding of dairy Awassi rams with coarse wool fat-tail ewes was undertaken as follows:
An Awassi ram was brought from Kazakhstan to Kyrgyzstan in 2003. At present, crossbred animals with different level of Awassi genes exist in the pilot flock (from ½ to ¾ Awassi).
Besides, high milk productivity, Awassi sheep breed shows good growth and development which can lead farmers of the country to work with profitable business, such as production and realization of lambs.

Goal and objectives
The main objective is to diversify sheep milk production to generate additional income from a small number of animals in a situation of at existing low prices on wool and wool production.

Methodology
Research approach:
The performance and body conformation of crossbred Awassi (A) x local coarse-wool fat tail (LCW) genotypes will be studied: 1/2 AxLCW, 1/4 AxLCW, 3/4 AxLCW in the farm "Kenesh" (Chuy district) under the same management system.

Experimental design:
In the mating period in 2007 local coarse-wool fat tail ewes will be mated with Awassi rams, and 1/2 AxLCW with local coarse-wool fat tail ram. To prevent inbreeding two Awassi rams will be imported from Kazakhstan. Growth and development of the lambs born in 2007 and 2008 will be studied.

Weaning will take place 9-10 weeks after birth. Ewes will be milked during 55-60 days, two times a day in the morning and evening. Milk will be processed into ayran. The nutritional value will be determined and the taste assessed through degustation in comparision with ayran from cow milk.
The management of the Awassi crossbred will follow the management plan (best husbandry practices) outlined under Activity 9.

Data to be collected:
- Liveweight of lambs at birth, at the age of 2, 4, 8 and 12 months
- Body conformation: at birth, at the age of 2, 4, 8 and 12 months
- Fertility
- Survival rates of lambs and ewes
- Milk production: daily for the period 55-60 days

Time frame for the research activities

Activities	**2007**						**2008**											
	J	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Weaning lambs from ewes, determining survival rates of lambs; weighing and taking body measurements of lambs, evaluate body conformation		**x**											**x**					
Import of two Awassi rams from Kazakhstan to introduce more genetic variability and avoid inbreeding; testing bloods of all rams for brucellosis			**x**															
Weighing of ewes, organization and monitoring of mating of ewes					**x**												**x**	
Monitoring lambing of ewes, weighing of ewes										**x**								
Weighing and taking body measurements of lambs										**x**	**x**	**x**	**x**					
Testing milk for brucellosis												**x**						
Monitoring of milking of ewes (yields and quality)												**x**	**x**	**x**				
Evaluation and selection of ewes															**x**	**x**		

Expected outputs/milestones	**Date**
First analysis of comparative productivity of Awassi crossbred (different genotypes) versus local sheep	December 2007
Training course* for participating households and pilot farms in Kemin and Chuy district	December 2007
Cost/benefit analysis of Awassi crossbred versus local sheep under optimized management and improved males	December 2008
Field days (demonstration and participatory evaluation of Awassi sheep production with neighboring small farms)	April and July 2008

*Theme for the training course: (1)**" Importance of sheep milk production to diversify income"** planned for 21 December, 2007.

Activity 11: Set the basis for a decentralized and participatory breeding plan for farmers to access improved animals

Location: Kemin district: “Alimseyit” farm" and households in “Akbeket" village, Chuy district: "Kenesh" farm, households in "Donaryk" village

Collaborating scientists
Principal investigators: R. Nurgaziev, A. Ajibekov, I. Razzakov, K. Abdukerimov
Post graduate: T.Katosheva, D. Nazarbekov, N. Abdymajidov

Goal and objectives
The main objective is to facilitate access of small farms to genetically improved animals through decentralized breeding systems.

Methodology
Approach:
Community based breeding schemes will be developed in the villages also involving larger farms to share highly productive rams from pedigree farms and start recording schemes
To improve the genetic potential of sheep in the households of "Donaryk" and "Akbeket" villages and on the farms "Jilkildek", "Onbirjilga" one and two year old highly productive rams of the Kyrgyz's merino breed will be brought from the pedigree farm "Orgochor" Jety-Ogyz district and fat tailed breed from pedigree farm "Aykol" in Ton district, Issyk-Kul province according to the scheme of the selection. The rams will be used in the mating season of 2007. They will be delivered at shared costs between farmers and the project.

Data to be collected:
- Rate of ewes conceived
- Number of mated/inseminated ewes
- Duration of mating period
- Duration of lambing period
- Lambing results

Time frame for the research activities/Expected outcomes and benefits

Research activities, time frame and expected outcomes will be elaborated in detail after the planning meeting involving Asanbek Ajibekov, Mat'azim Kosimov, Luis Iñiguez, and Joaquín Mueller (consultant, INTA, Argentina) from 15-20 September 2007 and the subsequent field mission of Joaquín Mueller in Kygryzstan (21-25 September 2007). The mission report of Dr. Mueller including the suggested workplan will be translated and discussed with the Asanbek Ajibekov and finalized by mid November 2007.

Activity 12: Community-based household cow and sheep milk processing improvement for value addition and income increasing

Location: Kemin district: "Alimseyit" farm" and households in "Akbeket" village, Chuy district: "Kenesh" farm, households in "Donaryk" village

Collaborating scientists
Principal investigators: R. Nurgaziev, A. Ajibekov, I. Razzakov, K. Abdukerimov
Post graduate: T. Katosheva, D. Nazarbekov, N. Abdymajidov

Introduction
Almost all households keep cows to produce milk for their own consumption; surplus milk is sold in the market. If surplus milk was processed into milk products, this could provide an additional source of income for the farmers.

Goal and objectives
The main goal is to generate additional income from processing sheep's and cow's milk and marketing the products

Methods
A participatory workshop will be held with farmers and households interested in milk processing. The participants will discuss and agree on milk processing technologies to be tested and on options for organizational structures for milk processing units (models of collaboration, size, cost sharing). Then a first training on the chosen processing technologies will be organized for interested farmers and later a seminar on milk processing technology will be held in the milk processing unit in Tokmok. Sheep milk from Awassi crossbreds will be processed at Kenesh farm and cow's milk in the participating households. Based on these experiences models for mini processing units will be proposed.

Data to be collected:
- Documentation of the community approach including the training workshops for developing milk processing

- Description of milk processing technologies and adaptation to households' needs
- Testing of products with potential costumers and marketing options

Time frame for the activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Search through internet options for mini milk processing unit, low price and suitable for the communities	x	x	x	x	x	x												
Organizing the community for milk marketing and processing			x	x														
Train community members in milk processing and marketing				x	x	x												
Provide seminar in Tokmok town in the premises of the milk processing unit with members of the community							x	x										
Milking of Awassi crossbred and training of "Kenesh" farm and community members in Chuy district to process ayran, brynza and cheese													x	x				
Propose options for mini processing units															x	x		

Expected outputs/milestones	Date
Participatory planning workshop with communities to define organizational structures for milk processing and interest in mini processing units	September/October 2007
Training workshops for milk processing with interested households	October- December 2007
Seminar in the milk processing unit in Tokmok for targeted households	January-February
Documentation and analysis of market acceptance of the products	December 2008
Preliminary analysis of adoption and impact of new processing methods (technical report)	December 2008

Tajikistan, Sogd province, Khujand site

Activity 13: Improvement of goat breeding in households for improved productivity (flock structure, feeding, selection/culling and animal health)

Location: Sogd province, villages Koradjingil, Takli, Uyas

Collaborating scientists:

Responsible scientists: Dr Mat'azim Kosimov (Director, Sogdian branch of Tajik RI of Livestock production)

Candidates: R. Mamatkulov, F.F. Kosimov, (Sogdian branch of Tajik RI of Livestock production);
Master students: A. M. Kosimov (Khudjand branch of Tajik University of Technology);

Other staff: J. Samadov (Sogdian branch of Tajik RI of livestock production), T. Kilichov (farmer)

Introduction

Private producers of wool goats in Tajikistan have little skills in animal breeding and very limited access to technologies that can improve productivity of their animals. They do not practice optimal management of bucks, either keeping too many, or an insufficient number in their flocks. Some livestock farmers keep low quality and low-fertility female goats, with obvious consequences of extra feeding expense and overgrazing of pastures. It is proposed that optimizing the gender and age balance in the flocks, selection and culling, and improved more strategic feeding, would provide a basis for improvement of flock performance. It is necessary to train farmers to more effectively manage their flocks, to generate higher benefits from the feed supplies.

Goal
The main goal is to test a number of low-cost husbandry practices to improve flock productivity and farmers' incomes.

Specific objectives are:
- to examine farmers' flock structures and to optimize them in relation to the planned breeding schemes (activity 15).
- to select the best ewes and bucks and culling of non-productive goats with special attention on growing young stock with good characteristics
- to improve feeding and animal heath care of goats

Methods
Research approach:
Low-cost improved management strategies will be developed:

(optimum gender and age balance in the flock, selection of best animals for mating and culling of the low productive individuals, follow an animal health plan, introduction of performance monitoring system)

The following activities will be conducted to implement these strategies:
- tattooing of farmers' goats for monitoring (numbers are tattooed on the internal side of ear; this is the cheapest, easiest and most reliable method, and the inner side of goat ear is light, making numbers more visible)
- individual evaluation of female and male goats based on phenotype (body length, fineness, hair density, age and size of the animal) and information from the owners
- selection and culling based on individual evaluation of male and female goats
- selection will also consider an optimum sex and age balance in goat flocks
- development and introduction of a convenient (simple) performance monitoring system (the Soviet method of animal monitoring will be simplified)
- more efficient feeding practices based on available feed, taking into account goats' requirements at different physiological stages (this subactivity will consider new forages available though Theme 2)
- development of training module and training on introduction of selection principles involving young farmers;
- timely performance of veterinary activities according to animal health plan.

Experimental design:

The interventions will take place in both farming zones prevalent at the research site. The upper zone, includes Karajingil and Takli villages, and the lower zone includes Uyas village. In both zones farmers were assigned to two groups:
Group I (improved): This group will practice improved management practices. Farmers' preparedness to apply these strategies, was the main criterion for their selection.
Group II (traditional): Traditional goat breeding system will be practiced with no interventions.

The mating period is September, so the interventions have to be started in this period.

Table 1: Participating farmers

Group I (integrated)

№	Full name	Total		Inc. female goats	
		heads	%	heads	%
Karajingil (upper zone)					
1	*Asad Tojiev (A. Malik Khochi)*	110	100	31	28,2
Uyas, Gulobod (lower zone)					
2	*Abdumalik Kanayev*	90	100	37	41,1
3	*Nurali Yakhshilikov*	70	100	22	31,4
4	*Abduvokhid Mamatkulov*	85	100	24	28,2

Group II (traditional)

№	Full name	Total		Incl. Female goats	
		head	%	heads	%
Karajingil, Takli (upper zone)					
1	Abdurakhmon Hayitmatov	40	100	11	27,5
2	Boir Karishboyev	60	100	19	31,6
3	Abdujalil Usmonov	80	100	28	35,0
4	Usmon Akramov	65	100	17	26,1
5	Sotiboldi Akramov	32	100	12	37,5
6	Omon Mirzovaliyev	34	100	13	38,2
7	Tuychi Yuldoshev	27	100	11	40,7
8	Rustam Mirzovaliev	50	100	15	30,0
9	Kholdor Mirzovaliyev	64	100	18	28,1
10	Khabibullo Chinibekov	90	100	33	36,6
11	Kholikul Kholmirzoev	25	100	8	32,0
12	Yousuf Urozkulov	34	100	9	26,4
13	Ortikboy Usmonov	40	100	12	30,0
14	Abdukhamid Isokulov	35	100	15	42,8
Ouyas, Gulobod (lower zone)					
15	Komil Mamatkulov	25	100	9	36,0
16	Ravshan Dushaboyev	60	100	18	30,0
17	Murod Kuyliboyev	45	100	13	28,8
18	Boir Parpiyev	50	100	17	34,0

Data collection:

- Liveweight and body condition score of female and male goats
- Individual evaluation (body length, fineness, hair density, animal age and size) of female and male goats (Autumn)
- Development of liveweight of kids (at birth, at 1-,3-,6 months age)
- Survival rate of kids before weaning (kids at weaning/kids born)
- Fertility (does kidded/ does mated)
- Fiber production (volume and quality)
- Cost-benefit analysis

Time frame for the activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Preventive veterinary measures			x												x			
Development of a simple monitoring system			x															
Individual evaluation (body length, fineness, hair density, animal age and size) of female and male goats.			x	x										x	x			
Tattooing of goats in improved and control flocks			x	x											x	x		
Determining liveweight and body condition score of female and male goats			x	x											x	x		
Preliminary individual evaluation (body length, fineness, hair density, animal age and size) of female goats and male goats.			x	x											x	x		
Selection of the best improved females in the herd and use of best males			x	x											x	x		
Optimize flock structure (gender and age balance)				x	x	x								x	x	x		
Preparation and carrying out mating /AI campaign				x	x	x									x	x	x	
Development of recommendations with a time schedule of the major activities					x	x												
Efficient use of available feed, considering					x	x	x	x	x								x	x

physiological state																	
Kidding								x									
Liveweight of kids born (at birth, at 1-,3-,6 months' age)								x	x	x	x			x			
Measure fiber production										x							
Weaning														x			
Survival rate of kids before & after weaning														x	x		

Expected outcomes/benefits

Outputs/Milestones	Date
Description and time schedule of improved husbandry practices developed	December 2007
Comparative experiment started	September 2007
Comparative flock productivity evaluated	August 2008
Cost/benefits assessed	September 2008
First technical report	October 2008

Activity 14: Improvement of shearing and classification of fiber, standardization, based on the international standards, by quality, impurity and age

Location: Sogd province / villages Koradjingil, Takli, Uyas

Collaborators:

Responsible scientist: Dr Mat'azim Kosimov

Candidates: Mumin Umarov (Sogdian branch of Tajik RI of livestock production);

Master students: Alisher Kosimov (Khudjand branch of Tajik University of Technology);

Other staff: F.F. Kosimov (Sogdian branch of Tajik RI of livestock production), Abduvokhid Mamatkulov (farmer);

Introduction

Mohair fiber from Angora type goats has better marketing opportunities than coarse wool from sheep. However, the fiber from Angora type goats of different age and gender differs dramatically in quality, e.g. male goats have coarser wool than female.

In the world market there is higher demand for fine wool than for coarse wool. The price per unit weight for fibers with smaller diameter can be 3-5 times higher than for coarser fibers. In the markets in Tajikistan paradoxically it is the opposite – the coarser the mohair fiber, the higher is the price.

The majority of the farmers, after shearing their goats, sell goat's fiber at the markets without any prior grading. Lack of knowledge in quality aspects reflects negatively on the limited income of farmers.

Thus, farmers will be encouraged to sort their raw material at least according to sex ae groups during goat shearing to sell a uniform quality to the market.

This will allow a more rational and targeted marketing of raw material by farmers.

Current standards for Mohair fiber do not correspond to international market demands. In the current standards no sorting by fiber diameter is foreseen, although fiber diameter is one of the main criteria of the quality and technological value of raw fiber and its potential uses. Amended new standards will be developed that include quality of mohair, to also direct breeding guided by the world market standards.

Furthermore, more attention will be paid to select goats with desirable mohair production farmer product

The users of the research results are buyers of the raw material from external markets, intermediaries, wool producers (farmers, private person) and processing workers.

Objective

The objective of this activity is to improve market prices achieved for Mohair fibre through assortment in different quality classes at least by age and sex during shearing.

Methods

It is proposed that the farmers classify their fibers for marketing. New standard will be developed for different classification of mohair goats of angora type taking into account world commercial demands. This will also require the sampling and evaluation of fibers, its variability and quality in an internationally authorized laboratory (as the fiber laboratory of INTA-Argentina), in addition to an intensive training of farmers and scientists in the matter. Fiber samples will be taken from different parts of the goat body, in addition to average quality of fiber behind shoulder. For very valuable individuals quality will be also studied on the legs.

For the introduction of improved fiber management, two groups of farmers will be formed: one group will be trained to separate fibers by types and quality during the shearing and pack and market them separately, the other group will follow the traditional system. The cost/benefits of the additional processing will be calculated and compared with bulk marketing. Community-action (farmer association) will be promoted for the marketing of fiber.

Following activities will be undertaken:

- Training of farmers in improved methods of fiber separation of wools by age and sex
- Study the marketability of different fiber categories
- Development of new standard on the basis of international trade
- Mobilization of the communities to the wool marketing by type of associative base.
- To solve the raised issues there is a need to develop new draft of wool standards on mohair with adequate world standards.
- Develop recommendations on requirement of mohair quality for breeding of Tajik goat breed of woolly goats.
- Provide training farmers and scientists on international quality standards

Data collection:

- Collect fibers from different sex and age groups, from different farms and villages to assess variability (also for activity 16)
- Evaluation of fiber quality in fiber laboratory in Almaty
- Countercheck results of fiber analysis from Almaty in an internationally authorized laboratory (INTA laboratory in Argentina)
- Parameters different types of wool associative base (wool output, thinness and length)
- Assessment of market prices and possibilities of different fiber qualities

Time frame for research activities

Activities	**2007**						**2008**											
	J	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Collect fibers from different sex-age groups on a large number of farms										**x**	**x**							
Training farmers in separating fibers depending on age and sex										**x**	**x**							
Marketability of different categories of fibers												**x**	**x**	**x**	**x**			
Laboratory analysis												**x**	**x**	**x**				
Recheck results of analysis of wool from Almaty in INTA laboratory					**x**													
Develop draft of new standards on the basis of international trade																		**x**
Training scientists to analyze fiber according to international quality of standards	**x**																	**x**
Training farmers to grade the fiber by international quality standards																		**x**

Expected outputs/milestones	**Date**
First analysis of variability of fiber quality and prices	December 2007
Training of farmers in grading the fiber into different categories	April 2008
Cost/benefit analysis of marketing according to quality categories (in collaboration with the market analysis in Theme 1)	November 2008

Develop draft of new standards on the basis of international trade	December 2008
Training of scientists and farmers according to new standard	December 2008/January 2009

Activity 15: Set the basis for a decentralized and participatory breeding plan for farmers to access improved animals

Location: Sogd province, Karajingil, Takli and Uyas villages

Collaborating scientist:
Principal investigator: M. Kasimov, onsultancy: Joaquin Mueller (INTA, Bariloche, Argentina)

Post graduate student: B. Khamzaev, R.U. Mamatkulov (Soghd Branch Tajik Research Institute of Livestock)

MSc students: Khasan Makhmudov (Khojand Branch of Tajik Technology University)

Collaborators for data collection: J. Samadov (Soghd Branch Tajik Research Institute of Livestock), farmers T. Kilichov and T. Khaitmatov

Introduction
After the breakdown of the Soviet Union all Mohair goat breeding systems in Tajikistan deteriorated. Householders follow an erratic if not chaotic breeding management. The compounded effect of the lack of breeding plans followed by small farmers and households is a deterioration of the national breeding stock as these farmers keep most of the goats in the country. Farmers claim that they cannot access improved animals so that bucks used for breeding purposes are mostly of inferior genetic quality. There is a need to set the basis for small farmers to purposefully select the best breeding animals from their flocks and provide access to improved genetic material from outside if appropriate.

Goal
The goal of the activities is to create decentralized community based breeding schemes to facilitate access of farmers to improved animals (if required, sperm or improved goats will be imported from Australia, South Africa or USA).
The followings activities are undertaken to reach this goal:

1. Formation of breeding flocks formed by the best goats in the village and neighbouring villages participating in the activity
2. Development of breeding plans by the communities informed by market assessments
3. Farmers' training for pedigree selection and establishment of simple monitoring schemes
4. Framing at farmers knowledge of composition of perspective plans for the near future years

Methods
The methods will be refined after the consultancy of Joaquin Mueller in September 2007. The activity will be informed by the successful example o an open decentralized breeding scheme that was applied in goat breeding small scale farms in Argentina. The activity requires intensive collaboration work with communities and adapted research. If improved genetic material is required from outside (e.g. Australia, South Africa or the US), will depend on the results from the evaluation of fiber quality undertaken in activities 13 and 14.

The activity will be started with the group of farmers in Karajingil, Takli and Uyas villages that have agreed to implement improved management practices. They will serve as the basis (pilot farmers) to start collaborative breeding schemes in the villages. The farmers have to discuss breeding goals and define desirable traits.

Research Approach/Activities to be undertaken

- Community meetings will be held before main mating period to discuss with pilot and non-participating farmers the planned breeding activities and to attract more participants
- selection within the village flocks for best genetic material (and import of related genetic material via bucks or AI for genetic improvement if required for the next mating season)
- participating breeders need to define their breeding objectives based on market demands and formulate a joint breeding plan with full support of scientists.
- the strategy will be flexible and adapted to the organizational structure of the communities, starting with a simple exchange of bucks(and does) up to more sophisticated methods, including data collection.

- Does in the participating flocks will be selected on the basis of phenotypical assessment, and farmers' knowledge and assessment.
- training course on artificial insemination for interested farmers in the second mating period

Data collection:

- Individual assessment of breeding values (wool length, thinness, thickness and age and animal size)
- Select and procure bucks from other regions
- Development training module to provide artificial insemination of goats
- Provide training on artificial insemination of goats
- Recording mating (October-November, 2007) and lambing (March-April, 2008)
- weight development of lambs (weight at birth, 1, 3, and 6 months)
- Kid survival before weaning (weaning kids/born kids)
- Fertility (lambed /mated dos)
- Monitoring shearing of wool

Time frame for the activities

Activities	**2007**						**2008**											
	J	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Identification participating farmers (goat breeding communities)												**x**						
Assessment of breeding values (wool length, thinness, thickness, age and animal size)			**x**	**x**											**x**	**x**		
Formation of suitable breeding flocks			**x**												**x**			
Registration mating and lambing				**x**	**x**				**x**	**x**								
Live weight (weight at birth, 1, 3, and 6 months)									**x**			**x**			**x**			
Fertility (lambed she goats/mated she goat with bucks)											**x**							
Kids survival before weaning (weaned kids/born kids)															**x**			
Monitoring wool shearing										**x**	**x**							
Select and bringing sperm or bucks from other zones													**x**	**x**	**x**			
Development of a training module on artificial insemination of goats															**x**			
Provide training on artificial insemination of goats															**x**	**x**		
Development of training module on the simple breeding practices				**x**	**x**											**x**	**x**	
Delivering of the training						**x**												**x**

The research activities, time frame and expected outcomes will be revised/elaborated in detail after the planning meeting involving Asanbek Ajibekov, Mat'azim Kosimov, Luis Iñiguez, and Joaquín Mueller (consultant, INTA, Argentina) from 15-20 September 2007 in Bishkek and the subsequent field mission of Joaquín Mueller in Sogd Province/Tajikistan. The mission report of Dr. Mueller including the suggested workplan will be translated and discussed with Mat'azim Kosimov and finalized by mid November 2007.

Activity 16: Value added local processing of goat fibers by women and assessing the characteristics of naturally colored mohair and the potentials for its marketing

Location: Sogd region, villages: "Katabulak", "Adrasman", "Takli", "Karadzhingil" and "Taboshar"

Collaborating scientists:

Responsible scientists: Dr. Liba Brent (University of Wisconsin) and Dr. Matazim Kosimov (Sogd-Branch Tajik Livestock Research Institute)

Background

In order to alleviate poverty, new opportunities for generating income are required. There is also a need to incorporate the role of women in the production systems and their local knowledge in manufacturing and processing of local products. There is the potential in the region for processing white and naturally colored mohair, as a considerable number of animals with these characteristics exist. Based on research conducted during the first project year, Tajik women have a unique opportunity to add value to local mohair and produce mohair and silk handspun yarns for the US market. Samples of such yarns were produced in the spring of 2007 and test marketing in the US has been successful – yarn stores in Madison, WI showed interest in selling the yarns and ordered yarn from several artisans. Based on preliminary calculations, the Tajik women could sell the yarn for approximately $140/kg, which is a much higher price than they currently receive by selling handspun mohair to Russia.

Objective

The main objective is to develop market opportunities for value added fiber products, in particular naturally colored mohair and silk yarns, dyed white mohair and silk yarns and knitted handicrafts.

Methodology

Research approach:

An evaluation of the physical characteristics of the colored and white fibers will be made in a recognized lab and a market evaluation will be conducted locally and outside the country (USA). Participatory work will be done with women from the villages. Groups of women will be trained in washing and carding fiber and dying and spinning yarns for the American market. Samples of various types of handspun mohair and silk yarns will be produced and tested by professional American knitters and retailers. Eventually the women will also be trained in manufacturing knitted mohair handicrafts. Yarns and handicrafts that receive the highest rating from American knitters will be standardized and larger quantities of those yarns will be produced and test-marketed. Based on the results of experimental sales in the USA a marketing chain for the handspun mohair yarns and handicrafts will be developed. These activities will be based on experience already developed in Central Asia by the University of Wisconsin.

Design:

Small groups of women were selected for fiber processing in the villages “Katabulak”, “Adrasman”, “Takli”, “Karadzhingil” and “Taboshar.” For the initiation of the yarn-spinning activity 5 groups with 18 women were formed. To study the local knowledge and processing methods, the women manufactured samples of different types of yarns to be tested on the American market. Information on each participant and her samples was entered into a database. The samples were evaluated by a group of professional American knitters and yarn retailers who knitted swatches from each sample. The knitters and retailers provided information on the quality of different samples to the artisans. The information was entered into the database and each artisan will receive an evaluation of her samples in September. Some of the samples were of a very high quality and the women who produced those already received orders for their yarns. Others received specific comments about improvements that need to be made for their yarn to be marketable.

Data to be collected:

- Availability of different colors and colorations of Angora fiber in the goats’ flocks
- Availability of different colors and colorations of Angora fiber on the market
- Market prices of Mohair fiber depending on quality, origin and color
- Fiber samples collected for evaluation of physical-mechanical characteristics of fiber in Almaty laboratory to determine their market value and appropriate usage in processing
- Groups of women producers will be organized in pilot villages and trained in yarn production technologies and production of knitted mohair handicrafts
- Different types of yarns will be produced from colored fibers and from dyed white mohair by women’s groups in pilot villages
- The yarns will evaluated by knitters and yarn retailers in the USA and the Tajik women participants will receive direct market information on the samples they produce

- Standardization, production and marketing of the most competitive yarns will be developed
- Stable and affordable access to all needed tools and supplies to produce quality yarns (spinning wheels, carding machines, dyes, silk yarn, silk batting, classed mohair) will be established
- Labor-saving technologies will be introduced
- US trainers for the Tajik artisans will be brought through the Farmer to Farmer Program
- Information on the Tajik spinners will be collected and publicized in the US through a short video, photographs and articles in newspapers and magazines. A website on the activity will be developed

Time frame for the activities

Activities	**2007**						**2008**											
	J	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Laboratory evaluation of colored fibers	**x**	**x**								**x**	**x**	**x**	**x**	**x**				
Organization of women farmers			**x**	**x**	**x**													
Organization of supplies (classification and sorting of mohair fibers, production and import of spinning wheels and carding machines, delivery of dyes from Kazakhstan and production of silk threat and silk batting for mohair/silk blends).			**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**
Manufacturing of different samples of handspun yarns and knitted products from colored and dyed mohair by the groups			**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**
Testing and test-marketing of different types of yarns and knitted goods in stores in the United States			**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**
Collection and distribution of information about the results of test-marketing, application of market feedback into the production process, selection of marketable yarns and knitted goods for production.			**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**
Organization of sustainable production & marketing chain (ordering, production, quality control, payment system, shipping) based on a fair trade model.			**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**
Collecting and producing information on the Tajik artisans and the project (website, photographs, articles, video) for the yarn retailers, consumers and the US public.			**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**

Expected outputs/milestones	**Date**
Working with women's groups in Tajikistan to develop the production of competitive yarns and establishing reliable sources of equipment and other supplies	September 2007, January & April 2008
Conducting sample testing and test marketing with yarn storeowners and knitters in the United States and developing a reliable marketing network	October 2007, February & May 2008
Feedback on the yarn samples entered into the existing database and distributed to the Tajik spinners	November 2007, March & June 2008
Creating a website on the artisans, their products and the project, producing a short video on the women's groups and writing articles to magazines and newspapers addressing knitters, retailers, academic audiences and the general public in the USA	July-September 2008
Producing a report on the project activities	December 2008

Tajikistan, Bakhd district, Dushanbe site

Activity 17: Improving sheep breeding management in the communities, the aspects of feeding, lamb breeding, maintaining and sheep reproduction

Location: Dusti jamoat, Bakhd district

Collaborating scientists
Responsible Scientists: A.Karakulov, F.Ikromov , X.Davlatov, O.Ulugov (Tajik Research Institute of Livestock)
Other staff: A. Mirzoev (Tajik Agrarian University)
Farmers: Asanov Rysbek, Abdimajitov Nurjan
Graduate student: B. Turaev (Tajik Agrarian University)

Background/Justification
In Tajikistan livestock and crop production are the main sources of income in the rural area. The rural markets offer good opportunities for marketing sheep meat.
Gissar sheep are known for the production of high quality meat and fat and the market demand for the breed is high. Thus, households are very interested to keep and breed them. However, often the private farms and households do not possess appropriate management skills for feeding and reproduction of sheep to improve productivity of their flocks. They often keep low quality or even nonproductive rams, in surplus numbers in the flock, as well as low productive and nonproductive ewes not paying attention to the additional costs of feeding these animals, in particular overgrazing of pasture. Obviously this mismanagement negatively affects farmers' income. Farmers often keep a mix of sheep, namely fat-tailed, Karakul and Gissar. Gissar sheep show the best productivity when purebred. Crossing them with other breeds does not give better results. It is necessary to train farmers and households to effectively manage their flocks, in order to generate higher incomes from their flocks through improved feeding and sheep reproduction.

Currently three general management systems are found in the villages:
System I: Year-round grazing of sheep. In winter and spring (December to April) sheep are grazed on winter rangelands (restricted access for some farmers), and in summer (June to September) on high mountain rangelands. For summer grazing the farmers form a flock of sheep (500-600 heads) and arrange their grazing with a shepherd.
System II: Summer mountain grazing-winter stall-fed system. Small farmers organize a flock of sheep that are taken in summer to the high mountain range, and during winter sheep are kept at home using rangelands around village.
System III: Stall-fed system. These farmers do not take their livestock to remote rangelands and keep them near their home and graze them all year on rangelands around the village.
System I is seen as the preferred and most productive system. However, the access to winter rangelands is limited so that this option is not open for all farmers. Farmers are encouraged to form joint flocks and send their sheep to summer grazing. Improved management interventions are mainly directed at systems I and II because system III is not seen as a sustainable way to manage the sheep.

Objective
The objective of this activity is to test improvements in management strategies with regard to feeding and lambing to be easily adopted by farms and households.

Methods
The following strategies will be tested:
- Early mating of ewes through additional feeding
- Early weaning of lambs and fattening
- Optimal feeding strategies for lambs and ewes during all physiological stages

The respective treatments in the improved flocks are:
(1) Supplementation of ewes during preparation for mating and early mating of ewes (mating in September)
Control (no supplementation and mating in October)

(2) Additional feeding during late gestation and lactation (concentrates will be supplied at 0.3 kg per head and day)
Control (no supplementation)

(3) Early weaning of lambs (after 3 months) and subsequent fattening
Control (lambs will stay with ewes 4-5 months)

Time frame for activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Evaluation of stored forage in the households to create sufficient feed resources during the winter time	x	x	x															
Weaning of lambs, monitoring of ewes and lambs liveweight, survival rate in the groups depending on methods of keeping		x																
Supplementation of ewes as preparation for mating			x	x														
Mating of ewes with selected rams				x														
Fattening of culled ewes					x													
Evaluation of forage supply for ewes kept in the winter ranges							x											
Additional feeding of ewes in last weeks of gestation								x										
Monitor lambing									x	x								
Monitor development of liveweight of lambs and ewes									x	x	x	x						
Preparing sheep for moving to summer pastures											x							
Early weaning of lambs and monitor their growth on pastures with additional feeding													x	x	x			
Weaning lambs from ewes in the control group														x				
Early mating of ewes in the improved group															x			
Fattening of lambs for marketing															x	x	x	

Expected outputs/milestones	Date
Rations for feeding ewes developed	September/October 2008
Rations for fattening lambs on pastures developed	June 2008
Cost benefit analysis of improved management	December 2008

Theme 4: Knowledge exchange

Activity 18: Enhancing knowledge exchange for increased feed and livestock production

Background
There is need for closer linkages between civil societies, research/development staff, and policy makers to exchange knowledge on the development and dissemination of sustainable integrated feed-livestock production systems to reduce food insecurity, poverty and environmental degradation in poor rural communities. In order to improve research efficiency and dissemination of successful interventions scientific and technical capabilities of researchers and extension workers as well as their awareness of current research on feed-livestock interaction need to be enhanced. Thus, this activity aims at establishing a knowledge exchange network between farmers, research/development staff and policy makers to promote adoption of sustainable feed-livestock systems through direct exchange and circulation of information and experience.

Approach:
Multidisciplinary teams have been established for each research site involving different institutions (for example in Kyrgyzstan researchers from the Kyrgyz Research Institute of Livestock, Veterinary and Pasture, the Bishkek University of Economy and Business, the Kyrgyz Agrarian University, and the Ministry of Agriculture, Water Resources and Processing Industry are part of the research team).
Team meetings and national workshops are being organized to discuss progress on implementation and integrate the project activities in the different themes. The Professional Officers, one for each disciplinary theme, being based at the ICARA Tashkent office, play an active part in the planning o the project activities and link the national researchers o he principal Investigators at ICARDA.
Graduate students are being encouraged to use some of the project activities for their field research. Training in the country, at ICARDA and/or other institutes is planned to improve their competence in research methodology, data analysis, and publication of results. Technical reports on project activities will be prepared after completion of full cycles of interventions and at the end of the project.
Training courses and participatory workshops for farmers and extension staff are integral part of many project activities and are scheduled according to the seasonal production cycle. Often these trainings and workshops will involve small household farms and medium size farms to establish and/or enhance an exchange of experience between different types of farmers in the communities.
Field days and workshops for a wider range of stakeholders will be organized in the second half of the project to discuss successes and failures of the different interventions.

2 South Asia-Pakistan

Theme 1: Socioeconomics

Rainfed and irrigated research sites

Activity 1.1: Baseline Study of smallholder feed-livestock production systems rainfed and irrigated sites of Pakistan

Location: Rainfed site: Lodhay village, Tehsil Gujar Khan, Irrigated site: Chak No. 74 SB & Chak No. 105 SB villages

Collaborating scientists:

Responsible Scientists: Muhammad Zubair Anwar, Dr. M. Azeem Khan Dr. M. Saddiq and Sartaj Khan

Ph.D Student: Khalid Mahmood, IFCN, Dairy Research Centre, Germany

Master Student: 1 from University of Agriculture Faisalabad (name will be communicated)

Background

Livestock is an integral component of the rainfed farming system. Livestock rearing is considered as a substitute for crop farming. The livestock provide security against crop failure due to uncertain weather conditions. Livestock production in the rainfed areas has tremendous potential for development. The sector confronts host of constraints which if circumvented can double the output of livestock products. The present project was initiated to develop the productive and sustainable livestock based system in the rainfed areas through the integration of range, livestock and crop production, with a view to improving the income and welfare of the small holders. This project was initiated with active participation of the farmers and the direct involvement of the national agricultural research system. The applied research approach linked farmers to research in developing market driven technological packages for feed and livestock production.

Policy-makers, donors and their partners, development workers and researchers increasingly demand evidence of the impact of interventions and investments for research, development and implementation in agriculture in developing countries like Pakistan. Feed resources development now understood as the underpinning factor for achieving required growth in livestock productivity. Spread of improved Feed-Livestock Management (FLM) projects impact assessment has become more demanding and complex. The community based feed-livestock development approach aims at generating suitable technology packages with the particular emphasis on crease in feed as well as livestock productivity and market oriented products development. The ultimate purpose of participatory applied research is to achieve a significant improvement in the feed resources availabilities and promote improved livestock management for sustainable and profitable feed-livestock production.

Study is planned to generate baseline data for impact evaluations and to draw important inferences for improving programme planning and implementation strategies.

Objectives

The specific objectives of the study are:

- to collect data on pre-identified and verifiable indicators for short-term and long-term impact assessments
- to specify the nature and types of the integrated feed-livestock production system
- to estimate share of livestock in the livelihood of small farmers
- to estimate poverty profile of small farmers practicing different feed-livestock production systems
- to develop empirical basis for recommending policy interventions, institutional changes and up-scaling validated feed-livestock development packages

Methodology

The study area includes three integrated research sites situated in rainfed Gujar Khan Tehsil and irrigated area of Sargodah district. Data will be collected from three project and three control villages representing different feed-livestock production systems. The selection of control area and villages would be critical to meet the precondition of selection of these at a larger distance with identical farm features of project locations. Location of these villages at a larger distance is required to have restricted flow of information from project locations to control area. The sample will include 100 participating farmers from 3 project villages, 60 non-participating farmers from project villages and 60 from control villages.

A comprehensive and thoroughly pretested questionnaire would be used on pre-determined feed-livestock project impact indicators. A framework is developed to conduct a focused study considering important process and outputs from project interventions including feeding cost, feed availabilities, balanced feeding, milk productivity, milk processing, marketing margins, resource conservation, attitude and behaviour, organization, gender considerations, gross margins, price and production risk, poverty profile and income inequalities.

Research Approach: Participatory

Time frame for activities (July-December 2008)

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Informal survey				x														
Questionnaire designing				x														
Pre-testing				x														
Finalization of questionnaire				x														
Data Collection					x													
Data editing and entry						x												
Analysis						x												
Report Writing							x	x										
First draft report									x	x								
Finalized report													x					

Expected outputs/milestones	Date
Data collection completed	December 2007
First draft report	April 2008
Finalized report on baseline study	July 2008

Activity 1.2 Economic Evaluation of Feed-Livestock Production Technologies at Integrated Research Sites

Location: Rainfed site: Lodhay village, Tehsil Gujar Khan, Irrigated site: Chak No. 74 SB & Chak No. 105 SB villages

Collaborating scientists:

Responsible Scientists: Muhammad Zubair Anwar, Dr. M. Azeem Khan, Dr. M. Saddiq

Master Student: 1 from University of Agriculture Faisalabad (name will be communicated)

Background

The applied research at project sites is being conducted in collaboration with national and international research institutes. Viable technological components from national institutes were identified and tested for wider dissemination at project sites. Scientists from the Fodder Research Institutes, Animal nutrition Departments, Food Technologists, and Social Sciences Institutes were collaborating to execute integrated applied research agenda for rainfed and irrigated ecologies.

These programs are working on three Project locations for the last one year. They are in a process to develop appropriate technologies that would adequately address the dry and irrigated agricultural productivity issues. This study is planned specifically to assess the short-term effects and long-term impacts of individual project components. The study also aims to understand the technology choices and their impacts on the incomes of the farming community of the project area. The spillover effects of some of the matured technological components would also be measured. The prime intention of the study is to explore the development status of feed-livestock production technologies and farmers' adoption behavior. This would serve as a feed back to the researchers and development agencies involved in this project.

Objectives

- to evaluate economic viability of the technological interventions tested by all components of the project.
- to examine the compatibility of project interventions with the farm situations and rural livelihood strategies.
- to understand farmers' perceptions of the adoption of project interventions.
- to provide feed back to the concerned scientists and development departments.

Methodology

Data from research experiments and demonstration plots will be collected through involving collaborating scientists, communities and development practitioners. Data will be also collected form participating and non-participating farmers and other stakeholders (development departments, NGOs in the study area, women groups, etc) to solicit their perceived and observed benefits and costs of the technologies as well as their opinions on its potential adoption in different farm situations.

The compatibility of technologies to the farm resource situations and their livelihood strategies will be established to improve the relevance of the technologies. Costs and benefits of the technologies and understand the potential constraints. Monthly prices of agricultural and consumer goods and market situation in the integrated research sites will be collected in order to identify the marketing issues and price fluctuations that may affect technology adoption. This study will be very closely linked with the rural livelihood characterization study and acceptability and utility of different technologies for different types of households will be determined.

Research Approach: Participatory

Time frame for activities (July-December 2008)

Activities	**2007**						**2008**											
	J	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Kharif fodder crops season 2007				x	x	x										x	x	x
Rabi fodder crops season 2007/2008											x	x	x					
Feed supplementation									x	x	x	x	x					
Fodder preservation									x	x	x	x	x					
Fattening of calves					x	x	x					x	x	x				
Value addition in milk										x	x	x	x					
Village based seed enterprises				x	x						x	x						
Input prices and output marketing	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Expected outputs/milestones	**Date**
Preliminary cost/benefit analysis and community evaluation of forages tested in the Kharif fodder season	February 2008
Preliminary cost/benefit analysis and community evaluation of forages tested in the Rabi fodder season	September 2008
Preliminary cost/benefit analysis and community evaluation of supplementation experiments	
Preliminary cost/benefit analysis and community evaluation of interventions concerning value addition in milk	October 2008
Preliminary cost/benefit analysis and community evaluation of calf fattening	November 2008
Preliminary cost/benefit analysis and community evaluation of village based seed enterprises	November 2008

Theme 2: Forage production

Rainfed research site, Lodhay village

Activity 2.1: Participatory on-farm evaluation and dissemination of winter and summer cereal legume mixtures and agronomic practices.

Location: Lodhay village, Tehsil Gujar Khan

Collaborating scientists
Responsible scientist: Dr. Muhammad Ansar
Master students: 2 (one in summer crop and one in winter crop)
Other staff: Lab Assistant (Soil and Plant Analysis)

Background
Livestock in rainfed area of Pothwar is mostly sustained on cereal fodders crops and their residues which are nutritionally not rich source as animal feed. Therefore, the health of the animal and their productive potential are very low compared to healthy animals. Farming community mainly depends on cereal fodder to sustain their livestock because of higher cereals are produce high dry matter yield than legumes. Cereals and legumes grown in mixture as fodder crop have great potential for livestock of rainfed areas. The cereals constitute more carbohydrates while legumes tend to be higher in protein and mineral contents. The improvement in the quantity and quality of the forage can be accomplished through appropriate improved cereal–legume combinations of fodder crops.

Objectives
The objectives of this activity are
- to evaluate the performance of different cereal-legume forage crops under rainfed conditions
- to test the quality (TDN, crude protein) of different forage crops and their mixtures
- to disseminate and demonstrate the latest best improved package of forage mixtures
- complementary practical on-farm participatory training and capacity building of researchers and farmers.

Methodology
Improved cereal and legumes will be sown in combination and compared with the control treatment (farmer's practice=cereals only). The following winter and summer cereals and legumes will be tested:

No	Winter Crops	Summer Crops
1.	Oats sole crop (Framer practice)	Maize sole (Farmer practice)
2.	Barley sole (Farmer practice)	Millet sole (Farmer practice)
3.	Wheat sole (Farmer practice)	Sorghum sole (Farmer practice)
4.	Vetch sole (Improved)	Guar Sole (Farmer practice)
5.	Oats + Vetch (Improved)	Cowpea sole (Farmer practice)
6.	Barley + Vetch (Improved)	Maize + Guar (Improved)
7.	Wheat + Vetch (Improved)	Millet + Guar (Improved)
8.		Sorghum +Guar (Improved)
9.		Maize + Cowpea (Improved)
10.		Millet + Cowpea (Improved)
11.		Sorghum + Cowpea (Improved)

Experimental design:
The experiment will use a Randomized Complete Block Design (RCDB) and involve 25 farmers. The cereal-legume mixture will be sown at 50:50 ratios while the sole crop will be sown at recommended seed rate of that crop for fodder production (using broad cast seeding method). Soil samples will be collected at 0-6 and 6-12 cm depth for moisture content, and for soil nutrient analysis at the time of sowing and harvesting.

Data collection:
Germination rate, plant height, green fodder yield, dry fodder yield, leaf:stem ratio and nutritional analysis (total digestible nutrients) at different growth stages.

Time frame for the activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Evaluation of summer cereal-legume mixtures	x	x	x	x	x								x	x	x	x		
Evaluation of winter cereal-legume mixtures				x	x	x	x	x	x	x					x	x	x	x
Fodder crops seed production				x	x	x	x	x	x	x	x							

Expected outputs/milestones	Completion
Second cycle of testing of new and high yielding varieties of winter and summer fodder crops completed	November 2008
Improved fodder production packages including agronomic practices for winter and summer crops introduced	November 2008
Promising fodder crop germplasm identified for next cycle of on-farm testing of winter cereal-legume mixtures	June 2008
Increased access to quality seed and seed producer groups established	May 2008
Use of wider range of fodder legume and non legume germplasm established in the communities	July 2009
Ex-post assessment of benefits of integrating legumes in farming systems.	November 2009

Activity 2.2: Preservation/conservation of fodders as hay for feeding during scarcity periods

Location: Lodhay village

Collaborating scientists

Responsible scientists: Dr. Imdad Hussain Mirza; Mr. Sartaj Khan; Mr. Tariq Aziz; Mr. Muhammad Zubair
Master students: 2
Other staff: Staff of PBG department, UAF

Background

In rainfed (Barani) areas there are two scarcity periods in terms of fodder availability, namely May-June and December-January. During these lean periods farmers feed their animals on low quality dry roughages, which results in low productivity of livestock. To overcome these fodder scarcity periods, hay making needs to be introduced. High quality hay can substitute green fodder. It is expected that the usual decrease in productivity in these periods can be minimized, and that the technique can be easily adapted by farmers.

Mostly farmers in these areas use cereal fodders for their livestock in the growing season, while low quality dry roughages are fed during scarcity periods. These cereal fodders are relatively low in protein, as well as calcium and phosphorous, which results in poor productivity. We therefore, plan to introduce mixtures of cereals with legumes.

Forages alone and especially low quality crop residues cannot meet all the nutritional requirements of high producing buffaloes. Hence, supplementation with concentrates is required. Traditional concentrates with traditional versus improved forages will be tested. Commercially prepared concentrates are not considered for this trial because of availability problems.

Objectives

Overall objectives of this study are

- to improve fodder quantity and quality; in particular the availability of quality dry roughages during scarcity periods;
- to improve buffalo's productivity;
- to compare the nutritional quality of conventional low quality roughages with improved conserved cereal/legume mix fodders;
- to evaluate the effects of the feeding practices on milk quantity and quality; and

- to evaluate the impact of this technology on the welfare and income of livestock farmers who are keeping buffaloes as commercial milk producing animals.

Methods

Farmer will be provided with the seed of improved varieties of sorghum and Guar for summer fodders along with improved agronomic practices, and oats plus vetch for winter fodder, which will be sown as a mixture. Hay will be made at 50% flowering stage of the crop,

Two treatments will be tested, i.e.1) mixture of cereal plus legume to be fed in the form of hay, in December-January, and May-June, along with supplementation of traditional concentrates, after calculating nutritional needs; 2) traditional fodder of low quality dry roughages supplemented with traditional concentrate according to farers' practices. Hay will be offered at the rate of 2% of the body weight of the animal, and concentrate will be offered according to the nutritional requirements of the animals in case of improved feeding practices, while in the traditional system we shall follow the normal practices of the farmer without any interventions. Cotton seed cake and wheat bran will be purchased from local market.

Milk yields will be measured daily by the farmers and samples will be collected fortnightly for analysis. Similarly feed samples will be taken monthly for analysis. Cost/benefit analysis will be used to compare the two treatments.

Research approach:

The traditional/control treatment includes cereal crop residues supplemented with cotton seed cake, wheat bran, and ground wheat grain, while the improved treatment includes high yielding cereal plus leguminous fodder hay, supplemented with concentrates in a balanced ration.

Experimental design:

Number of farmers: 12-18
Breed: Nili Ravi
Duration: 2 months

We plan to include 12 to 18 farmers, and 24 to 36 lactating buffaloes of Nili-Ravi breed, with half of the animals on improved feeding practice, and the other half on traditional feeding practice. Each experiment (summer crops and winter crops) will be of 60 days duration.

Data to be collected:

- Weight of animals at the start and end of experiment
- Daily milk production, i.e. morning and evening
- Milk quality every 14 days
- Daily feed intake
- Nutritional quality of all feeds
- Labor input, expenditures and income

Time frame for the activities

Activities	**2007**						**2008**											
	J	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Hay making from summer and winter fodder crops				x	x					x	x					x	x	
Testing of feeding rations including hay						x	x				x	x						x
Cost benefit analysis								x	x				x	x				

Expected outputs/milestones	**Date**
Increased farmer skills in preservation and storage of fodder	July 2008
Effect of feeding hay plus supplements on the performance of buffalos tested	July 2008
Preliminary cost/benefit analysis of feeding hay in periods of feed scarcity	July 2008

Activity 2.3: Development of green forage selling enterprise using dug-well irrigation

Location: Lodhay village, Tehsil Gujar Khan

Collaborating scientists:

Responsible scientist: Dr. Muhammad Ansar

Background

There are acute shortages of green fodder for livestock during May-June and December-January in the rainfed areas in specific. During this period livestock productivity suffers. To cover this shortage of green fodder during the lean period the following options are available:

- Preservation/conservation of good quality cereal legume hay that a farmer can produce on his farm.
- To make available green fodder from irrigated land under dug-well (few farmers have this opportunity).
- Use of concentrates (relatively expensive option and few farmers can afford it).

In the project area there are 20 dug-wells and about 40 acres lands can be irrigated from these wells. Some of the farmers have already started the business of green fodder production for sales. Therefore it is suggested to work with these farmers and study the impact as well as to improve the green fodder production from these enterprise by introducing improved technology packages.

Objectives

- to increase green fodder availability in the lean periods in the project area
- to raise income of the farmer through fodder selling enterprises
- to minimize cost for concentrates and hence costs of milk production by providing green fodder during lean periods.

Methods

The feasibility and profitability of fodder selling enterprises will be tested with 5-8 interested farmers. The farmers will be trained in improved agronomic practices. Maize will be sown in spring (March) and berseem & oats in winter (October) for fodder production. Improved varieties of maize, berseem and oats will be planted using improved agronomic practices.

Data collection:

Percent germination, plant height, green fodder yield, dry fodder yield, will be determined. The price of green fodder per 40 kg will be recorded as well as who buys the green fodder and how that person is going to utilize the fodder to evaluate what changes this intervention will cause in the traditional livestock feeding systems.

Time frame for the research activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Evaluation of selling maize as spring season fodder crop for market								x	x	x	x	x						
Oats and berseem as winter season fodder crops for market				x	x	x	x	x	x	x	x							

Irrigated research site, Sarghoda

Activity 2: Comparison of yield and nutritional value of improved fodder crops varieties with local fodder crops. Seed production and preservation/conservation of fodder crops through hay and silage making and cultivation of multi-cut hybrids, Mott grass and multiple planting of maize crops for lean period.

Location: Chak No. 74 SB & Chak No. 105 SB villages

Collaborating scientists
Coordinator: Dr. Akhtar Ali
Responsible scientists: Dr. Ghulam Mohy-ud-Din
Other Staff: two field assistants

Background
Fodder crops are the cheapest food source for animals. FRI has developed many varieties of fodder crops which are not only high yielding but also of high nutritive value. There is dire need to test these fodder crops on farmers' fields to replace the local varieties and to disseminate improved varieties with the appropriate agronomic practices among farmers. Furthermore, these can be tested for palatability and effect on animal's performance. The high yielding varieties of cereal fodder (sorghum, pearl millet and maize in summer and oats in winter) and leguminous fodder crops (cowpeas and cluster bean in summer and berseem in winter) enhance the green fodder yield as well as nutritive value of the animal's feed. It affects the performance of the animals as well as generates more income by marketing the green fodder. Farming communities mainly depend on cereal fodder to sustain their livestock because cereal fodders produce higher dry matter yield than legumes. Cereals and legumes grown in mixture as fodder crops have a great potential for livestock feeding. The cereals are richer in carbohydrates while legumes have higher protein and mineral contents.
Thriving fodder markets in peri-urban and urban areas provide opportunities for farmers to sell fodder to generate income and improve their livelihoods. Fodder production and conservation can also reduce the feed gaps in May-June and December-January. However, on farm fodder production is low due to poor adoption of improved varieties and agronomic packages, shortage of quality seed, low nutrient and water management, poor integration of fodder legumes into cropping and fallow systems and lack of multi stakeholders' alliances to promote market oriented fodder production and policies. This activity also aims at increasing livestock production through community based net working and establishment of multi stakeholder's alliances for dissemination of improved fodder varieties, cropping systems and agronomic packages.

Objectives
The objective of this activity is to increase forage availability in particular in lean periods in order to increase animal productivity and farmers' income.
Specific objectives are:

- to evaluate the yield of different newly improved varieties of cereal and legume forage crops in comparison with the local varieties on irrigated fields
- to determine the nutritional quality of different forage crops and their mixtures
- to test making hay and silage making for lean periods
- to evaluate multi-cut fodder crops and multiple planting of maize crop varieties
- to determine economics of seed production of fodder crop varieties
- to demonstrate and disseminate improved agronomic practices in addition to the forage mixtures
- to provide complementary practical and on farm participatory training of researchers and farmers.

Methods
Newly developed fodder crop varieties and associated agronomic packages will be demonstrated on farms using farmers' varieties and their agronomic practices as controls. Each variety or package will be demonstrated on 16 farms in each of the two villages 74/SB and 105/SB to enable statistical comparison of treatments.

- Fodder and food legumes will be integrated into the traditional wheat/maize and wheat/fallow systems to increase the availability of fodder and to improve soil fertility. Fodder production from different cereals and cereal legume combinations such as oats + berseem, sorghum, Pearl millet and maize alone and sorghum and pearl millet in combination with compress and cluster bean will be compared. Each system will be established on 4 farms using recommended

agronomic practices. Fodder will be harvested at 50% flowering and fed as green or conserved as hay or silage to growing or lactating small and/or large ruminants for 30-60 days. Stagger planting of fodders will be done to feed fodders at a stage of high nutritive value.

- Conservation of fodder as hay and silage will be tested and promoted.
- Multi-cut hybrid/varieties and multiple planting of maize crop will be tested to overcome the lean periods.
- Selected farmers will be trained in fodder/seed production and value addition through processing, storage, and marketing of seeds.
- Germplasm of existing and potential fodder crops will be acquired from gene banks (e.g. ICARDA, ICRISAT, ILRI, IITA, CIAT) and screened to identify the best accessions for future testing in crop livestock farms and fodder improvement programs. Species to be considered include berseem, oats, cowpea, sorghum, pearl millet, mott grass and maize for fodder etc.

Research approach:
Experiment will be sown with sixteen farmers at Chak no. 74/SB and sixteen farmers at Chak No. 105/SB for evaluation of green fodder yield, nutritional analysis (Dry Matter, Crude Protein, Crude Fiber Ethanol Extract, Ashes and NFE) of fodder grown and hay /silage making for fodder crop conservation, multi-cut fodders and multiple planting of maize each will be done with 4 farmers in each village. Whereas the fodder crops for seed production will be sown with 6 farmers. In Chak No. 105 SB the same interventions will be repeated.

(1) Evaluation of forage productivity and quality of improved varieties, sole cereal and cereal-legume mixtures
Treatments: one acre plots of fodders (mixed and sole crops) using latest approved varieties will be planted each with four farmers. The other farmers will plant local fodder crops using their traditional production technology in comparison with the improved fodder crops varieties and production technology.

Summer fodder crops (4 farmers per treatment):
T1: 32 kg Sorghum + 40 kg maize
T2: 16 kg Sorghum + 3 kg Pearl millet
T3: 16 kg Sorghum + 3 kg Pearl millet + 3 kg Cowpeas
T4: 16 kg Sorghum + 12 kg cluster beans

Winter fodder crops (4 farmers per treatment):
T1: 8 kg Berseem
T2: 32 kg Oats
T3: 16 kg Berseem + 6 kg Oats
T4: 6 kg Alfalfa

Experimental design:
Split Plot Design
Fodder crops will be sown in sub plots of farmers' fields
Replications = 4
Plot size = 4 acres for each treatment
Number of farmers = 16 (4 for each treatment)
Standard agronomic practices and fertilizer doses will be applied for the crops.

Data to be collected:
Crop germination, plant height at booting stage, green fodder yield at 50% heading stage and nutritional value (crude protein, crude fiber, ethanol extract, ashes and NFE). Economics of fodder produced will be estimated at market rates.

(2) Fodder crops for hay making for lean periods
Summer fodder crops: Cluster bean and Cowpeas
Winter fodder crops: Berseem and Oats

(3) Evaluation of multi-cut fodder crops for lean periods
Sorghum x sudan grass hybrid (Sadabahar)
Multicut pearl millet
Mott grass (Hairy)
Multiple planting of maize crop

(4) To study economics of seed production of improved fodder crop varieties

(5) Demonstration and dissemination of improved packages of fodder production.

For all activities, field days and travel workshops will be organized for farmers and policy makers during the cropping cycle to promote information exchange and encourage adoption. Farmers' perceptions and preference will be monitored. Economic impact of the traditional and improved technologies will be assessed.

Time frame for research activities

June 2007 to October 2007	for summer fodder crops
November 2007 to April 2008	for winter fodder crops
February 2008 to June 2008	for summer fodder crops
July 2008 to October 2008	summer fodder crops
November 2008 to April 2009	winter fodder crops

Expected outputs/milestones	Completion
Second cycle of testing of new and high yielding varieties of existing winter and summer fodder crops completed	July 2008
Improved fodder production packages including agronomic practices for winter and summer crops introduced	July 2008
Promising fodder crop germplasm identified for next cycle of on-farm testing	July 2008
First testing of sustainable fodder cropping systems to reduce feed gaps completed	Aug/Sept 2008
Increased farmer skills in storage and marketing of fodder	July 2009
Increased access to quality seed and seed producer groups established	August 2008
Use of wider range of fodder legume and non legume germplasm established in the communities	July 2009
Improved feeding systems for higher milk and meat outputs	July 2009
Ex-post assessment of benefits of integrating legumes in farming systems.	November 2009

Theme 3: Livestock Productivity

Rainfed research site, Lodhay village

Activity 3.1: Feedlot fattening of calves (cattle)

Location: Lodhay, Tehsil Gujar Khan

Collaborating scientists:
Responsible scientists: Dr. Imdad Hussain Mirza; Mr. Sartaj Khan;
Mr. Muhammad Zubair
Master students: 2
Other staff: Staff of PBG department, UAF

Background
There is deficiency of animal protein sources (milk, meat, egg, etc.) in Pakistan. This deficiency is affecting the health status of the human population, and sources of animal protein are also becoming more expensive every day because of their scarcity. On the contrary, income of the population is increasing, which results in a higher demand for animal protein sources in the future.
Because of increased demand and higher prices of milk, most of the commercial dairy farmers, cannot afford to feed sufficient milk to the calves, especially the male calves, because it is economically not feasible. As a result of this situation, most of the young male calves die due to inadequate milk supply, or they are sold at a very young age. This is resulting in wastage or underutilization of this very good source of beef.

If these calves can be fed with calf starters at an early age and properly fattened, supreme quality beef can be produced in reasonable quantities.
If cattle calves are stall-fed to target the eve of Eid-ul Adha, they can fetch special prices. By feedlot fattening, high quality beef can be produced in shorter duration, which can fetch premium price.

Objectives
The main objectives of this study include:
- increasing quality beef production in shorter duration;
- providing increased quantity and quality beef available in the market;
- reducing the loss of valuable resource of available male cattle calves;
- increasing the use of industrial by-products in livestock feed;
- increasing the income of the livestock farmer; and
- improving the health of the human population.

Methods
We plan to use two treatments in this study. One farmer will use his traditional methods of feedlot fattening (control), while the other farmer will be provided with calf starter and concentrates for feedlot fattening, along with other technical information.

Research approach:
The control treatment is the traditional method of raising cattle calves, while the improved practice means using proper feedlot fattening principles. The roughage in the control group will be traditional low quality roughages, while in the other group good quality hay will be included as roughage source.

Experimental design:
Number of farmers: 12-16.
Breed: Local
Duration: 3 months
six animals per treatment

Data to be collected:
- Daily feed intake
- Weight of animals at the start and end of experiment
- Economic comparison of two treatments.

The experiments will be set up as soon as good quality hay is available and a sufficient number of young animals at the right age are present in the participating farms.

Expected outputs/milestones	**Date**
First batch of caves fattened using hay produced from summer crops in 2007 and performance assessed	April 2008
Second batch of caves fattened using hay produced in May 2008 and performance assessed	December 2008
(Preliminary) technical report on this activity	February 2009

Activity 3.2: Feeding trial on buffalos for milk production

Location: Lodhay village, Tehsil Gujar Khan

Collaborating scientists:
Responsible scientists: Dr. Imdad Hussain Mirza; Mr. Sartaj Khan, Mr. Muhammad Zubair
Master students: 2
Other staff: Staff of PBG department, UAF

Background
Fodders alone and especially low quality crop residues cannot meet all the nutritional requirements of high producing buffaloes. Hence, supplementation with concentrates becomes nutritionally and economically feasible. It is planned to test traditional concentrates with traditional versus improved fodders. In this case we are not testing the commercially prepared compound feed because of its availability problems.

Objectives

- to improve buffalo's productivity;
- to compare efficacy of conventional dry low quality roughages with improved conserved cereal plus leguminous fodders;
- to see the benefits of different feeding practices on milk quantity and quality; and
- to see the impact of this technology on the welfare and income of livestock farmers who are keeping buffaloes as commercial milk producing animals.

Methods

It is planned to provide the farmer with the seed of improved verities of sorghum and Guar for summer fodders along with improved agronomic practices, and Oats plus Vetch for winter fodder, which will be sown as a mixture crop (activity 2.1). The seed ratio of sorghum and guar as well as oats and vetch will be 50:50. There will be two treatments i.e.

- Mixed fodder of cereal plus legume which will be fed in the form of hay, in December-January, and May-June, along with supplementation of traditional concentrates, after calculating nutritional needs;
- Traditional fodder of low quality dry roughages supplemented with traditional concentrate without calculating nutritional needs.

Hay will be made at 50% flowering stage of the crop, while the cotton seed cake and wheat bran will be purchased from local market.

Hay will be offered at the rate of 2% of the body weight of the animal, and concentrate will be offered keeping in view the nutritional requirements of the animal, in case of improved feeding practices, while in the traditional system we shall follow the normal practices of the farmer without any intervention.

Milk samples will be collected fortnightly for analysis. Similarly feed samples will be taken monthly for proximate analysis.

Economic analysis will be calculated to see differences in 2 treatments.

Research approach:

Traditional treatment includes cereal crop residues supplemented with cotton seed cake wheat bran, and ground wheat grain, while improved treatment includes high yielding cereal plus leguminous fodder hay, supplemented with nutritionally calculated amount of the same concentrate as mentioned in traditional treatment.

Experimental design:

Number of farmers: 12-18.
Breed: Nili Ravi
Duration: 2 months

It is planned to include 12 to 18 farmers, and 24 to 36 lactating buffaloes of Nili-Ravi breed, with half of the animals fed according to improved feeding practices and the other half according to traditional feeding practices. Each experiment (summer crops and winter crops) will be of 60 days duration, i.e. the total duration of 120 days for two experiments.

Data to be collected:

- Daily milk production, i.e. morning and evening
- Daily feed intake
- Weight of animals at the start and end of experiment

The experiments will be set up as soon as improved fodder or good quality hay is available and a sufficient number of lactating animals are present in the participating farms.

December 2007 to January 2008 hay from summer fodder crops
May to June 2008 hay from winter fodder crops
December 2008 to January 2009 hay from summer fodder crops

Expected outputs/milestones	**Date**
Effect of feeding lactating animals with balanced rations including hay from improved summer crops assessed	March 2008 March 2009
Effect of feeding lactating animals with balanced rations including improved winter crops assessed	August 2008

Irrigated research site, Sarghoda

Activity 3: Evaluation of effect of different fodder crop varieties (green fodder and hay/ silage) and concentrates on milk yield and quality in buffalos & cows and on meat production in buffalo and cow calves,

Location: Chak No. 74 SB & Chak No. 105 SB

Collaborating scientists
Coordinator: Dr. Akhtar Ali
Responsible scientist: Dr. Qurban Ali
Other staff: 2 Field Assistants (one for 74/SB and one for 105/SB)

Background
The animals with the farmers are mostly under fed and the fodder used in feed are mostly of low quality. Since the animal under nourished hence the optimum out put of milk and meat is not obtained. Improved fodder crop varieties and balanced rationing supplemented with concentrates help in balancing the feed. The scarcity of fodders get severs during lean periods. The planting of Multicut fodders and multiple planting of crop like maize can help in over coming the lean period. Hay and silage may also overcome the scarcity in lean period. There are two lean periods in terms of fodder availability. These periods normally fall in May-June, and December – January. During these lean periods farmers feed their animals on low quality dry roughages, which results in low productivity of livestock. To overcome these fodder scarcity periods, we need to introduce the technology of hay making, which can nutritionally replace the green fodders, and decrease in productivity can be minimized, and is easily adapted by farmers.
Mostly farmers in these areas use cereal fodders alone for their livestock in the normal season, while low quality dry roughages are fed during lean periods. These cereal fodders are having relatively low levels of protein, as well as calcium and phosphorous, which also results in poor productivity. We therefore, plan to introduce mixtures of cereals with legumes.
Fodders alone and especially low quality crop residues cannot meet all the nutritional requirements of high producing buffaloes. Hence, supplementation with concentrates becomes nutritionally and economically feasible. We plan to test traditional concentrates with traditional versus improved fodders. In this case we are not testing the commercially prepared compound feed because of its availability problems.
Sales of livestock and their products (milk and dairy products, meat, wool) are major sources of income for small holder livestock producers in the target communities. But most small scale farmers do not add value to their products to capture potential markets niches. In a few cases where value addition is practiced, inefficient and labour intensive traditional methods are used resulting in low quality products. Helping farmers to add value to their products could improve household income and reduce rural poverty. This activity is aimed at presenting opportunities to poor livestock keepers in the target area to move from subsistence to market oriented production systems in order to improve household income. Specific objectives are to disseminate options for market oriented milk processing and lamb fattening.

Objectives
The objectives are:
- to assess the effect of different improved fodder crops and comparing with local fodder crops.
- to balance the feed of animals through cereal and leguminous fodder crops.
- to balance the ration for livestock through concentrates, low cost and rich in protein.
- to asses the effect of different rations on fat percentage and snf.
- to asses the effect of different improved fodder crops concentrates on fattening of meat animals.

Methods
We plan to provide the farmers with the seed of improved varieties of sorghum, pearl millet, maize, cluster bean and cowpeas for summer fodders along with improved agronomic practices. Oats, berseem and Alfalfa will be tested for winter fodder and will be sown as sole crops and as mixtures. The seed ratio of sorghum and cowpeas as well as oats and berseem will be 50:50. We plan to test 4 treatments each for summer and 4 treatments for winter crops.
Hay will be made at 50% flowering stage of the crop, while the concentrates will be purchased from local market.

To test the effect of the improved feeding regimes the milk productivity of animals will be evaluated both quantitatively and qualitatively by recording milk yield and determining milk quality (fat, SNF, protein).
Fattening of large ruminants to capture market niches during special or festivals will be promoted. Medium and low cost fattening or economic rations will be formulated from on farm feed resources and tested with farmers' practices as control. Each feeding regime will be assigned to 4-6 farmers and fed for periods ranging from 60 in case of summer fodder and 90 days for winter fodder.
Proven disease control strategies will be applied to all experimental animals (improved and control animals); this will include vaccinations and control of external (e.g. ticks) and internal parasites.

Research approach:
The following fodder crops will be tested in feeding trials:

Summer crops
Cereals: (1) Sorghum / maize, (2) Sorghum + pearl Millet
Cereal + Legumes: (3) Sorghum + pearl Millet + Cowpeas, (4) Sorghum + cluster bean

Winter crops
Cereals: (1) Oats
Legumes + cereals: (2) Berseem +wheat straw, (3) Alfalfa + wheat straw, (4) Berseem +oats

For the improved feeding treatment the fodder crops will be supplemented with concentrates to arrive at balanced rations. The control farmers will follow their traditional practices (local fodders supplemented with cotton seed cake).

Experimental design:
At least 4 to 6 animals for each treatment
Experimental animals: lactating animals and calves (buffalos and cattle) of the farmers

Data to be collected:
- Daily milk production
- Fat percentage and SNF from the milk
- Daily feed intake
- Liveweights of experimental animals at the start and end of experiment, and at 14 day intervals for fattening trials
- Labor input, costs and benefits for each treatment
- Farmers' perceptions of livestock health, value and economic returns.

Time frame for research activities

For lactating animals

September 2007 to October 2007	for summer fodder crops
February2008 to March 2008	for winter fodder crops
September 2008 to October 2008	for summer fodder crops

For fattening animals

July 2007 to October 2007	for summer fodder crops
November 2007 to April 2008	for winter fodder crops
February 2008 to June 2008	for summer fodder crops
July 2008 to October 2008	for summer fodder crops
November 2008 to April 2009	for winter fodder crops

Expected outputs/milestones	**Date**
Effect of feeding lactating animals with balanced rations including improved summer crops assessed	December 2007 December 2008
Effect of feeding lactating animals with balanced rations including improved winter crops assessed	May 2008
Effect of fattening buffalo and cattle calves with balanced rations including improved summer crops assessed	December 2007 August 2008 December 2008
Effect of fattening buffalo and cattle calves with balanced rations including improved winter crops assessed	June 2008 June 2009

Rainfed and irrigated research sites

Activity 4: Adding value to livestock products through preservation and processing of milk

Location: Rainfed site: Lodhay village, Tehsil Gujar Khan, Irrigated site: Chak No. 74 SB & Chak No. 105 SB villages

Collaborating scientists at rainfed site:
Responsible scientists: Tariq Aziz (NARC)
Other scientists: Sartaj Khan (NARC), M. H. Mirza (NARC), M. Ansar (UAAR) and M. Zubair Anwar (NARC).
Other staff: one Laboaratory/ Field Asst

Collaborating scientists at irrigated sites:
Coordinator: Dr. Akhtar Ali
Responsible scientist: Dr. Nuzhat Huma
Ph. D Student: 1
Master Student: 1
Other staff: One lab. Assistant

Background
Sales of livestock and their products are major sources of income for smallholdings in the target communities. But most small scale farmers do not add value to their products to capture potential markets niches. In a few cases, where value addition is practiced, inefficient and labor intensive traditional methods are used resulting in low quality products. Helping farmers to add value to their dairy products could improve household income and reduce rural poverty. This activity is aimed at presenting opportunities to poor livestock keepers in the target area to move from subsistence to market oriented dairy production in order to improve household income.

Objectives
The specific objective is to disseminate options for market oriented milk production with regard to milk quality and value added dairy products through improved milk hygiene, milk preservation and milk processing.

Methods
Farmers' milking, processing and marketing practices will be documented. Small scale dairy farmers will be encouraged to form interest groups. The project will link the group(s) to dairy enterprises such as Nestle to help establish milk collection centers to sell their milk.
Hygienic milk harvesting practices will be introduced which will include teat dips and improved milk containers and other equipment. This will directly add to milk quality by reducing bacterial load of raw milk. This will also reduce incidence of sub-clinical mastitis in animals thereby improving productivity and economic return to the community. As a result of healthy udders the market value of females will increase.
Raw milk preservation technology will also be introduced so that both morning and evening milk can be pooled and picked once a day thereby fetching premium price and reducing transportation cost.
The women from the interest groups will be trained in improved processing technologies. Traditional versus improved methods of processing milk to cheese, butter and yoghurt/Dahi etc. will be compared using 15 household for each method.

Research approach:
Farmers' milk production, processing and marketing practices will be documented before and after introduction of improved management practices. Hygienic quality of milk and status of sub-clinical mastitis will be recorded by performing standard test / procedures. Milk of individual animals as well as herd/ research groups will be tested for chemical / compositional quality by using state-of-the-art milk testing equipment. Dairy products will also be tested by this equipment. Links will be established with progressive dairy enterprises to help market dairy product at premium price.

Data to be collected:
- Prevalence of sub-clinical mastitis in the selected herds
- Bacteriological status of milk, TVC count and incidence of microbes of importance for public health
- Shelf life of milk and lactoperoxidase/thiocyanate content of milk.

- Chemical composition of milk (fat, protein, lactose, SNF, added water)
- Product Composition and organoleptic testing
- Cost/benefits of traditional versus improved methods.
- Economic return of milk processing

Time frame for the activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Mobilization and awareness of selected communities on quality and value addition of milk	x	x																
Awareness and adoption of clean milk production practices such as introduction of teat dips, standard hygiene protocols and utensils and monitoring of the impact			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Qualitative and quantitative evaluation of milk.				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
LP System will be introduced to preserve milk quality				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Establishment of small scale level processing units to produce quality yoghurt and/or cottage cheese depending on demand of nearby markets and availability / production capacity of the participating community members					x	x	x	x										
Training participating community members on dairy product preparation and enhancement of skills required to organize and manage small scale business operations					x	x	x	x	x	x	x	x	x	x	x	x	x	x

Expected outputs/milestones	Date
Farmers' interest groups for quality milk production and processing established	September 2007
Induction of raw milk preservation technology	Start October 2007
Improved milk hygiene adopted	January 2008
Improved milk processing skills	March 2008
Options for increased income from sale of milk and dairy products assessed	December 2008
Opportunities for employment generation through milk processing assessed	June 2009

Theme 4: Knowledge Exchange

Rainfed and irrigated research sites

Activity 5: Enhancing knowledge exchange for increased feed and livestock production

Location: Rainfed site: Lodhay village, Tehsil Gujar Khan, Irrigated site: Chak No. 74 SB & Chak No. 105 SB villages

Collaborating scientists:
Responsible scientists at rainfed site: Dr. Imdad Hussain Mirza; Mr. Sartaj Khan; Mr. Tariq Aziz; Mr. Muhammad Zubair
Responsible scientists at irrigated site: Dr. Qurban Ali, Dr. Ghulam Mohy-ud-Din and Dr. Akhtar Ali
Other staff at both sites: field assistants

Background:
The background and main goal of this activity is similar to what is stated for CA.

Objectives

Specific objectives for Pakistan are:

- to disseminate the fodder production technology in farmer communities
- to motivate the farmer communities to adopt improved varieties and improved agronomic practices
- to get feed back from the farmer communities to solve emerging problems
- to improve scientific and technical capacities of participating staff in research for development
- to improve the competency of scientists and technicians in research methodology, data analysis and reporting of results (report writing and presentation) and publications of results

Approach

Quarterly meetings with participating staff and annual national meetings will be organized to discuss progress on implementation. About 30 families in each of three villages are involved in the project activities and take part in the community meetings when project activities are introduced, discussed and agreed. Special training workshops will be conducted on improved milk processing techniques based on traditional processing methods.

Field days and workshops will be organized for farmers and other stakeholders to exchange knowledge on improved fodder and production technology and on milk processing.

Graduate students will be encouraged to use some of the project activities for their dissertation research. Preliminary technical reports on project activities will be prepared after completion of one cycle.

Time frame for the activities

Activities	2007						2008											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Quarterly meetings of teams to discuss progress on implementation					×			×			×			×			×	
Field days, and workshops for stakeholders to exchange knowledge				×					×							×		
Progress reports on project activities							x											
Training of stakeholders in fodder crops production, preservation and feeding			×						×						×			
Training of farmers in value addition of milk (increasing shelf life, yogurt production techniques)							x					x						

Expected outputs/milestones	Date
Farmers field and exchange visits	2008 & 2009
Socio economics research training course	2008
Forage evaluation training course	2008 & 2009
Integrated crop livestock production training course	2008 & 2009
Experimental design and analysis training course	2008
Milk processing and value addition training course	2008 & 2009
Scientific writing reporting and data presentation course	2007 & 2008

IV Regional Activities

Activity 1: Regional (across site) analysis for Theme 1 "Socioeconomics" in Central Asia

Collaborators: PI (Aden Aw Hassan), National Principal Investigators for theme 1 in Kazakhstan, Kyrgyzstan, and Tajikistan, and NPO (Nariman Nishanov).

This component is designed to (1) support the national programs through capacity building activities including training in research methods, methodology workshops, educational visits to ICARDA and cross country visits for sharing experiences and support for students, and (2) to initiate cross country analysis to ensure high level international public good.

Outputs

- Capacity of national participants in market-value chain analysis enhanced.
- Three master students theses completed.
- Cross-country analysis of the interactions between production systems, sources of market inefficiencies, and constraints to and strategies for market access by small holder producers.

Activities	Milestones	Implementation period
Selection of MSC students completed	MSc thesis proposal approved	30 October 2007
Nariman to visit ICARDA for completing research design	Draft Research methods and questionnaires	1-15 November, 2007
Regional training on methods Survey instrument design and testing Participation of Dr. D. Mainville of Virginia Tech University, USA.	Training material circulated and translated in Russian Questionnaires finalized	17-23 November 2007
Compile cross country data English and fully document for analysis	Data set available	30 July 2008
Analyze data	Draft cross country analysis available	30 November 2008

Activity 2: Capacity building: training of scientists in the area of integrated feed resources and livestock production at ICARDA and in the countries

Collaborators: PIs (Luis Iñiguez, Aden Aw Hassan and Assamoah Larbi), National Coordinators of Kazakhstan, Kyrgyzstan, and Tajikistan; and Project Coordinator.

Key scientists involved in the project will be trained at ICARDA in the area of integrated feed resources and livestock production, for a period of 15 days. It is expected that the leading scientists will become leaders in the area of training organization within countries and contribute to training among the Central Asian countries. The areas proposed for training include: Range and forage production, management of flocks with a market-oriented direction, socioeconomics, and the use of modern computerized techniques such as GIS for the characterization of sites and application of research results.
In Pakistan training of scientists will be organized locally.
Furthermore, for selected themes consultants will be employed to work with the national teams.

Expected outcomes:

- 1 month GIS training for three Tajik researchers at ICARDA in November 2007
- NPOs for Theme 2 and 3 trained in research methods and analysis for 15 days end 2007 or beginning 2008
- training of PhD and master students writing their thesis on project related topics, will be scheduled when all students have been recruited
- Training courses on experimental design and analysis, and scientific writing and data presentation course training course for participating scientists in Pakistan
- Liba Brent (University of Wisconsin) will work with the Tajik team on value addition to fibre production through improved local processing and Joaquín Mueller from INTA, Argentina, will work with the Kyrgyz and Tajik teas on community based breeding schemes.

Activity 3: Capacity building: English training of scientists to improve the international scientific exchange

Collaborators: Project Coordinator, PIs, Regional Coordination in Central Asia, National Coordinators of Kazakhstan, Kyrgyzstan and Tajikistan

A limiting problem confronted by central Asian scientists is their difficulty in communicating in English. This infringes negatively in the scientific exchange and determines isolation. Moreover, many training and funding opportunities are very often missed in view of this limitation. An English course for scientists engaged in the project will be offered to strengthening the research capabilities of the host institutions. The national teams will nominate scientists latest end of September to take part in the training. He participation of PhD student was encouraged.

Expected outcomes:

- 10-12 scientists from three participating countries trained in English language in Tashkent from December 2007 to February 2008

Activity 4: Project supervision and interregional knowledge exchange: regional workshops and SCM

Collaborators: Project coordinator, PIs and National Coordinators

Regional workshops ringing together scientists from CA and SA will be specifically linked to the project coordination that will be regional Meeting will be conducted prior to the Steering Committee Meeting (SCM) which will be held in one of the participants countries to review the progress of the work and approve financial and workplans issues.
shared among the Project Coordinator and the

Expected outcomes:

- SCM to be held in November or December 2008 in one of the participating countries or at ICARDA.

- At least one supervision visit of all PIs in both regions

Activity 5: Web based knowledge exchange (Virtual information Center)

Collaborators: Project coordinator, Regional coordinator in Tashkent, National Coordinators in all countries, NPO Theme 1

A stepwise approach will be taken. A webpage in Russian and English will be designed in Tashkent office in October to December 2007. A web designer has already started to set up webpages for all ICARDA projects in Central Asia.
An important feature of the webpage for the Integrated Feed & livestock project should be that it will allow easy modifications and addition of material at all participating institutes. “Rumela” developed in an IFAD funded Project in Latin America conducted by ICARDA will be used as a model. If required, the designer of Rumela will be invited to work together with the web designer in Tashkent. The NPO for Theme 1 Socioeconomics will facilitate the development of the webpage.
Once the design and technical specifications have been developed a scientist from each participating institute in all partner countries including Pakistan will be trained how to maintain the website at his/her institute. It is expected that the webpage and the training will be completed end 2008.