Russian Government Funded Activities: Increase livestock productivity to improve availability of animal proteins to the households and increased revenues and wellbeing of livestock keepers

Progress Report

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Contents

1 Introduction

Meat, milk, fiber and pelts from small ruminants are key income sources for agro-pastoral communities living in mountainous regions in Tajikistan or on marginal salt-affected land in Uzbekistan. As their main source of fodder, sheep and goats depend on rangelands which occupy a large proportion of the total land area within Central Asia (approximately 260 million hectares or approximately 65% of the total land). The project aims to increase livestock productivity to improve availability of animal proteins to households and increase revenues and wellbeing of livestock keepers. The livestock project applies a comprehensive approach by combining value chain analysis with rangeland, forage and livestock research to create integrated packages of improved management practices. The main objective is to increase the returns from keeping sheep and goats on marginal lands in the Aral Sea basin and Fergana Valley through integrated livestock and rangeland management. This report gives a brief overview of the progress in the different research activities and interventions.

Figure 1 Angora goat farmer in Tajikistan

1.1 Study Area

The project was initiated with a planning meeting in Dushanbe from 19-20 May 2014. The objective of the meeting was to establish partnerships, define criteria for selecting field sites within the larger Dryland Systems action sites and identify major intervention areas (*"Planning Workshop on Livestock Productivity - a component of the Dryland Systems CRP in Dushanbe, Tajikistan, 19-20 May 2014"*). To build on ICARDA's expertise and to achieve impact through livestock related interventions, it was agreed to focus on small ruminant production in agro-pastoral livelihood systems.

Within the Fergana Valley action site, Asht and Gafurov districts in Sogd Province were selected to build on an earlier IFAD Grant Project that had been completed in September 2013 (IFAD Project). It was agreed to continue working with the target farmers and communities. An important challenge for securing future livelihoods of Angora goat keepers and consequently for women Mohair processors, was increasing the fiber quality to reach international quality standards in fiber and fiber products. Another important challenge was to support continued access of Angora goat keepers and agro-pastoral communities to productive rangelands given the

dynamics created by the new rangeland law. Thus, research plans were developed to analyze and document the changes in rangeland access complemented by analyzing utilization patterns and related rangeland and livestock productivity. Ecological sampling conducted in the project is going to be joined with other ICARDA datasets to provide large scale maps that cover areas outside the project. Such information sources are important for policy decision making as they show the current status of rangelands in Uzbekistan and Tajikistan.

A number of explorative missions were undertaken to potential target districts in Karakalpakstan where intensive discussions were held with district administrators and livestock farmers. Karauzyak district was selected as target site; and target communities for the rangeland, forage and livestock interventions under the Russian Fund project and CRP Dryland Systems identified including the livestock cooperative "40 Let Karakalpakstana.

2 Rangeland tenure and management

2.1 Rangeland tenure

Introduction: Currently rangeland policies are changing in Central Asia and in some areas people are becoming more sedentary. It is important that land tenure policies secure rights, access, and promote sustainable management of rangelands for the agro-pastoral communities. To address this objective, the project is studying the transition-period of pastoral land tenure arrangements at both target sites to develop policy options for key decision-makers and rangeland users.

Methods: Primary data were collected through key informant interviews, questionnaires, focus group discussions, participatory mapping tools. Secondary data were collected from published articles in peer-reviewed journals, reports and project documents, statistical and analytical materials. Grounded theory approach, supported by an inductive reasoning study, was used in sampling respondents and field data. At least four field visits were conducted by ICARDA scientists in 2015 for primary data collection from both project sites in Asht and Gafurov districts of Tajikistan and in Karauzyak district of Karakalpakstan.

Results: The results show that the local authorities have started to implement the new Tajik Pastoral Law from 2012. The law provides an institutional framework for community-based management of pastoral resources and it prescribes local land authorities to register traditional pastoral land users, to grant land use rights, and to issue certification of land ownership. However, the practical implementation of this law has revealed some challenges in targeting users and side effects in registration of new pasture owners. Traditional pastoral community members were often unaware of the new law on pasture land certification, and they also had a lack of knowledge about the official procedures for land certification. To address this issue, the project team and Tajik national partners have been working at the community and district level to raise awareness of recent changes and procedures for traditional pastoral land users. This was accomplished through advocating and capacity building activities.

In Uzbekistan, the pastoral law is in the development process with state agencies in collaboration with ICARDA and a number of international organizations. A round table on developing a new

Uzbek pastoral law was organized in March, 2016 with the participation from: pastoralists, farmers, the Association of Uzbek Farmers, the Center for Support of Farmers and Entrepreneurs, decision-makers and leaders from the Uzbek Liberal Democratic Party, Members of the Parliament, law makers, and national scientists. The parties discussed the current status of rangeland utilization, policy options, and opportunities for the future. Many topics were discussed, such as: pastoral land tenure amendments, establishment of pastoral land users associations, access to rangeland water sources, rangeland degradation and rehabilitation-related services, grazing animal density norms, and monitoring approaches and others were discussed.

Our analyses of primary data collected from target sites in Karakalpakstan have shown that institutional and governance challenges are bottom-lines of the present unsustainable rangeland system management. We conclude from our data analyses that the key bottleneck here is a lack of professionally trained rangeland managers in livestock cooperative farms. Institutional gaps such as unclear property rights and poorly contracted pastoral tenure arrangements among livestock cooperatives and smallholder agro-pastoralists cause a conflict of interest between those resource users. Most of the smallholder pastoralists continue to increase numbers of their sheep and goats in spite of insecure access to grazing areas and limited carrying capacity of rangelands near villages and water wells. They act opportunistically by capturing only short-term benefits, and therefore natural resources degradation is likely to progress if a new Law on Rangelands will not be adopted by Uzbek government in the nearest future to fill those institutional gaps.

Lack of funding for mapping seasonal inventory of rangeland vegetation, poor investments for pasture rehabilitation and for water infrastructure maintenance create major technical issues in utilizing remote areas of productive pastures. For example, the Koybak livestock cooperative currently uses only 15% of the total area of allocated rangelands due to these technical obstacles. Our field observations and interviews, conducted in Karauzyak district, have shown that there is a lack of legal responsibility for pastoral resources depletion, poor monitoring and no sanctioning towards local authorities and resource users that can prevent rangelands from degradation.

Many policy options such as community-based schemes, for example, can be adapted to enhance rangeland utilization, to optimize land tenure systems and to raise livestock productivity. However, from practical perspective the both governments in Uzbekistan and Tajikistan need to invest or to mobilize technical resources, firstly, to develop a cost-effective planning tool for taking accurate and deliberate decisions for the sustainable landscape-level management of rangelands and its fragile ecosystems. This tool has to include: climatic data, borders of rangeland zones, seasonal dynamics of rangeland carrying capacity, available water resources, requirements for animal flocks, options for animal mobility and grazing rotation based on valid palatable vegetation.

Conclusion: Tajikistan and Uzbekistan experience a rapid transformation to a new system of pasture management. Pastoral land tenure policies are also in rapid stages of institutional development in both target countries, and ICARDA's livestock project and national partners are involved in these processes. ICARDA primary role has been to carefully analyze the current transition period changes and to suggest country-specific policy options and viable practices for

sustainable livestock and pasture management based on regional and international experience. One of such recommendations is to develop a decision-making tool (e.g. it can be a seasonal mapping tool or simulation model) that can help respective state authorities, policy-makers and resource users to accurately plan a long-term utilization of agro-pastoral resources and to project corresponding socio-economic and environmental benefits.

2.2 Rangeland status and management

Introduction: The objective of this study is to improve feed availability for livestock from rangelands. To do this it is necessary to understand the current practices of rangeland management. Understanding current practices and their ecological implications is important to inform policies. This is particularly important as land degradation has caused a 3% loss in the GDP in 2009 alone (Mirzabaev *et al*, 2015).

Methods: To understand present grazing behavior, this study looks at the vegetation biomass and composition along frequent grazing routes. Transects are placed in Uzbekistan around wells and in Tajikistan around grazing households with large flocks. Maps of vegetation classification were used to select representative wells and households. Sampling looks at the difference in grazing intensity across distances from wells and households. Vegetation maps will be compared across seasons and years. GPS collars have also been placed on representative livestock herds for year-round monitoring of the grazing patterns. In the livestock cooperative "40 Let Karakalpakstana" herds composed of sheep and goats owned by the cooperative, the herder and village households were equipped with GPS collars. Another 5 GPS collars were placed on goat herds in the Sogd Province in Tajikistan. Data has been downloaded every two to three months. Blood samples from reference animals in the selected herds have been collected seasonally (when animals change from summer to winter pastures, before mating and lambing seasons) for assessment of changes in the blood profile of nutritionally-linked metabolites. A total of at least 300 blood samples corresponding to 4 grazing seasons have been analyzed in a local laboratory. The combined data will show rangeland status, feed availability, grazing patterns, nutritional conditions of animals and thereby help to identify management, input and service needs for a sustainable animal production in rangelands.

Figure 2. Packing vegetation samples for laboratory analysis, Uzbekistan, Spring 2016

Figure 3. Vegetation Sampling, Tajikistan, Spring 2016

Results: To date sampling has been conducted at the beginning of plant growth in the spring and at the end of plant growth in the fall for 2014 till present. Sampling in Tajikistan in the fall of 2015 was collected with distant advisory support to local partners due to Tajik entry visa issues. Data will be analyzed upon the last collection in the fall of 2016. Changes in vegetation derived from differences in vegetation maps will be calculated and logistically regressed with changes in climate as well as grazing frequency and intensity.

Conclusion: The analysis will determine the relationship between management practices and degradation. The project data will be incorporated into already existing ICARDA spatial datasets to derive informative maps beyond the project area. The results will be shared through policy briefs.

2.3 Methodology for Assessing and Monitoring Rangeland Vegetation

Introduction: Rangeland cover mapping has become a widely used and an important resource for characterizing rangeland structure and function. With recent technological advances in image access and image analysis software, it might be possible to develop new methods for measuring vegetation that are more precise and more cost-effective than the techniques currently in use. Near earth as well as satellite remote sensing can be an effective tool for characterizing and monitoring rangeland condition and trend. Our objective is to develop a toolkit for monitoring and assessing rangeland vegetation that could be rapidly implemented while retaining accuracy. We wanted to retain the following qualities in our technique: speed and efficiency, a quantifiable level of accuracy, verifiable results, statistical robustness, and easily interpreted results. The methodology should be flexible enough to be deplyed in similar rangeland ecosystems in the dry areas.

Methods: We selected 2 sites which are distinctive in terms of environmental condition (climate, soil, topography and vegetation structure). The first action site represents typical sandy rangelands of Kyzylkum desert in Karakalpakstan in West Uzbekistan, whereas the second site is located in Kurama mountain ranges in North Tajikistan. The current rangeland vegetation in each site represent the dominated type which is highly shaped by livestock grazing. The dominant native species in the Kyzylkum desert in Karakalpakstan is white saxaoul (*Haloxylon persicum* Bunge ex Boiss. & Buhse) while the *Ferulafoetida* (Bunge) Regel is widely expanded in areas with high load of livestock grazing. Vegetation data of spring season were collected during 01-05 May in Karakalpakstan and 15-20 May in Tajikistan. The vegetation measurements basically included biomass, cover and density of perennial plants, biomass of annuals. We have used indices such as Enhanced Vegetation Index (EVI) and Land Surface Water Index (LSWI) along with indices derived from the land surface temperture (LST) to assess the dynamics of the grassland condition and productivity. The individual spectral bands in each of the 8-day composite surface reflectance MOD09A1 datasets were used to calculate four spectral indices: (1) Normalized Difference Vegetation Index (NDVI), (2) Enhanced Vegetation Index (EVI), (3) Land Surface Water Index (LSWI), and (4) Normalized Difference Snow Index (NDSI).

Results: Dryland vegetation can be characterized in a number of ways, and here we developed a simple and robust way to delineating desert vegetation to understand the dynamics of the grazing lands. The single pixel assessment of the production dynamics using MODIS satellite data shows trends of the vegetation changes at a 8-days interval to depict inter and intra annual dynamics. Similar assessment can be done but with higher spatial resolution from less than a meter to 30m. As observed from the in-situ data, there is lot of the back scattered reflectance from the land surface due to desert or very sparse vegetation often less than 15% canopy cover which may hinders picking up of the vegetation cover which can be overcome by using high resolution data to segregate mixed pixels. The vegetation condition measured at the ground level plots (or transects) such as vegetation condition, spatial matrix/arrangements, density, biomass and species composition (e.g., palatable, non-palatable, C3, C4) can be link to individual pixel to establish the relationship between the ground and space borne imaging to quantify to map and monitor the dynamics of the livestock feedstock across the scales. In this pilot study, we analyzed seasonal dynamics of three vegetation indices (NDVI, EVI and LSWI) in the study area to understand the spatio-temporal dynamics of the grasslands.

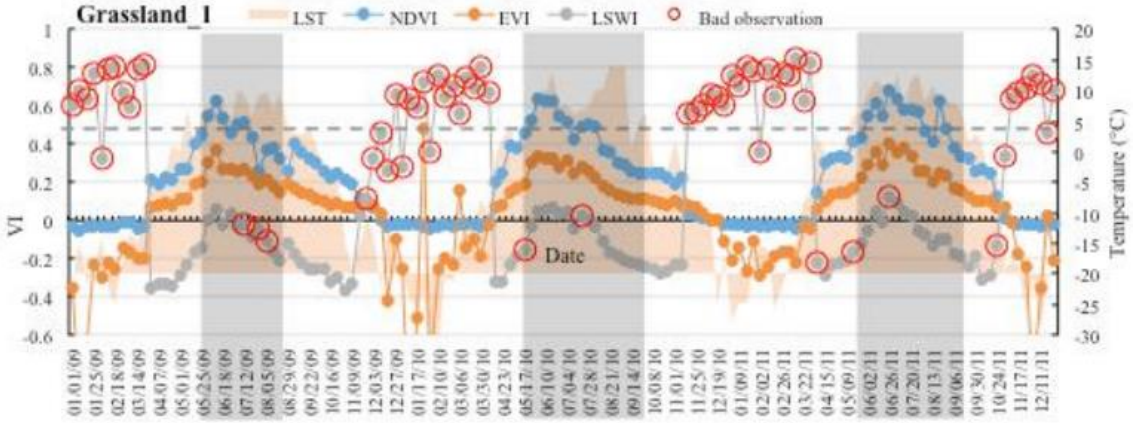

Figure 4. Seasonal dynamics of NDVI, EVI, LSWI and NDVI for a grassland pixel

Conclusions: The resultant maps and methodology need to be further evaluated through systematic and stratified sampling of the in-situ data collected across the spatial and temporal scales to represent the varying degree of the grasslands/rangelands which help us quantify and characterize the grassing lands for sustainable livestock management in the region.

The obtained ground truth vegetation data and key findings in both action sites will be overlayed to environmental and management conditions. The results then will be incorporated into GIS and RS technologies to characterize spatial and temporal dynamics of rangeland vegetation. Satellite remote sensing data will be incorporated at different spectral and spatial resolutions. The most cost effective approach and tools will be outscaled. The results may lay on the basis of development of operative methods in assessing rangeland condition of different ecological zones.

3 Sheep and goat management

3.1 Rapid assessment of sheep and goat value chains

Introduction: The goal of the rapid value chain assessment was to understand the current situation of small ruminant value chains such as milk, meat and Mohair/pelt production, processing/packaging, retailer networking, transportation and marketing relations within target rural communities. The assessment also identifies main value chain actors and aims at developing potential interventions that support rural households and other value chain actors to generate more income along the value chain.

Figure 5. Field visit during the value chain assessment

Methods: ICARDA's national staff was trained in Ethiopia; subsequently the toolkit for the small ruminant value chain assessment developed by the CGIAR Livestock and Fish research program was adjusted to Tajik and Uzbek conditions and translated to Russian ("Toolkit for rapid assessment of small ruminant value chains in Central Asia"). This was followed by an intensive on-the-job training of NARS researcher for implementation in Sogd Province. Two rapid assessments of small ruminant value chains (RVCA) were conducted in Sugd province of Tajikistan (arid mountain) and in Karauzyak district in Uzbekistan in 2015. Primary data were collected from Key Informant Interviews, Focus Group Discussions and Participant Observations, and secondary data were obtained from district statistics, journals and official reports.

Results: Our study has shown that the small ruminant value chains are not well developed in the target sites as livestock market infrastructure, storage and cooling facilities, certification services and logistics are in an early development stage. Capacities of value chain participants, especially of the producers, need to be developed through field trainings to raise their awareness on how to meet required quality standards, safety measurements, hygienic procedures, and to better understand market demand trends and consumer preferences.

Conclusion: As a result of these conditions the households face high transaction costs in marketing of livestock commodities, and local retailers generate only marginal incomes through the value chains. Based on the results of the small ruminant RVCA, team of ICARDA scientists shall develop a number of case-specific interventions to address incomes, quality and animal productivity issues.

3.2 Genetics improvement of Angora goats

Introduction: In Tajikistan, an artificial insemination (AI) campaign with frozen semen from Texas Angora bucks was conducted in October 2014 to continue the Angora goat breeding program initiated by an earlier ICARDA project. 196 selected goats belonging to the supernucleus flock owned by the Tajik Livestock Research Institute (TLRI) and a private elite Tajik Angora goat flock were synchronized and inseminated (see blog story; report on AI results under preparation). The data collection for a first comparison of 'crossbred' with local offspring was completed in 2014. ICARDA's SR reproduction specialist provided technical backstopping for the Artificial Insemination (AI) campaign to the scientists from the Sogd branch of TLRI through detailed instructions for goat synchronization and procuring appropriate equipment and supplies. The project also facilitated support for the Tajik team during the actual insemination of the goats with frozen semen by an AI specialist from the Uzbek Research Institute (UzRI) of Karakul Sheep Breeding and Desert Ecology in October 2014.

Methods: The goats were inseminated using the universally adopted synchronization protocol using a progestogen impregnation for 11 days (using impregnated sponges with 40 mg fluorogestone acetate) and a concomitant double injection of a prostaglandin analogue (Enzaprost) and a gonadotropin. In order to improve conception rates, only goats which displayed estrus at 30 hours after sponges' removal were inseminated. This was carried out using aproned bucks. Out of the initial 196 selected does, only 153 exhibited estrus and were inseminated (Table 1). Frozen semen was defrosted at a temperature of 36^0 C in a stationary water bath for 30 seconds. The straw was removed from the bath, dried with tissue paper and then immediately loaded into the AI gun. Every 10 straws, a droplet of the defrosted semen was placed under a microscope and individual motility was assessed by the team. On average, individual motility reached 3.4. In order to ensure mating of the does not conceiving to AI, bucks were reintroduced in the flocks 10 days after the inseminations. This allowed servicing return estrus and also precise calculation of the conception rates on AI.

Table 1. Number of inseminated females by buck ID

Gr.#	Farm	Inseminated ewes (n)	Females inseminated by buck ID							
			45	9	19	59	20	21	23	25
1	Gafur Fozilov	79	28	11	11	0	12	7	5	5
2	Supernucleus	74	0	24	13	0	0	5	27	5
	Total AI	**153**	**28**	**35**	**24**	**0**	**12**	**12**	**32**	**10**

Results: Overall conception rate after AI was 30% (Table 2). This figure can be considered as satisfactory bearing in mind that frozen semen was used and that at one stage, the storage conditions of the semen in liquid nitrogen were not optimal. The overall figure of 30% is also satisfactory in terms of sustaining the crossbreeding program undertaken few years back for an improved fiber production. The superiority of conception rate in Gafur flock (10 % higher) in comparison to the Supernucleus flock is most likely attributed once again to differences in

management as all other sources of variation (synchronization protocol, inseminators, semen) were similar between the flocks. We again stress the detrimental effect which may have been associated with the suckling status of the goats in the Supernucleus flock. Unfortunately, liveweight prior to insemination of the goats in Gafur flock were not recorded and this could have represented another indicator to compare the status of the females in both flocks at the time of insemination.

Table 2. Calculated reproductive performance

Variable	Pooled flocks	Supernucleus	Gafur
Apparent conception rate (%)	111/153 (72.5)	45/74 (60.8)	66/79 (83.5)
Actual conception rate (%)	134/153 (87.6)	61/74 (82.4)	73/79 (92.4)
Abortion rate (%)	15/153 (9.8)	11/74 (14.9)	4/79 (5.1)
Infertility rate (%)	19/153 (12.4)	13/74 (17.6)	6/79 (7.6)
AI conception rate (%)	39/130 (30.0)	14/58 (24.1)	25/72 (34.7)
Litter size at birth (± s.d.)	1±0	1±0	1±0

3.3 Karakul Sheep Improvement

Introduction: Central Asia is a homeland for Karakul sheep since the second century BC. Karakul sheep are well adapted to the dryland pastoral conditions of the Kyzylkum deserts with a high endurance for heat and cold stress. It has been particularly valued for its unique pelt, marketed locally and internationally for winter fashion industry. Large areas of desert rangelands were used for Karakul sheep grazing in the former Soviet period, but are now experiencing land degradation due to resource mismanagement and unsustainable animal grazing. The post-Soviet changes in production systems and new market economy conditions demand a new product varieties and higher quality standards from Karakul pelt industry. ICARDA collaborates with national research partners to improve quality standards of Karakalpak Karakul pelts by establishing an Elite flock for production of Karakul Sur pelts that are highly valued and demanded by regional markets.

Methods: In early 2015, ICARDA and the Karauzyak district authorities agreed to support the establishment of an elite Karakul flock in livestock cooperative '40 Let Karakalpakstana' that has 0.5 million hectares of desert rangelands, including 800 ha of rainfed and arable areas for forage crops cultivation. In summer 2015, two scientists from the Uzbek Karakul Research Institute and ICARDA team visited the target livestock cooperative in Karauzyak district to carefully study the current Karakul flock composition and to select the best quality Karakul Sur sheep for improved reproduction. In total, 317 heads of Karakul Sur female sheep were selected to form a new elite flock. In late September 2015, ten heads of elite pedigree rams were purchased from the Turtkul district Karakul Pedigree Factory. They were cross-bred with selected Karakul ewes during mating season in October-November, 2015. All elite flock animals were recorded and eartagged. Winter forage and record keeping instructions were provided to the

senior shepherds. All newborn Karakul lambs were screened for pelt quality, ear-tagged and recorded by the scientists of the Karakul Research Institute and ICARDA.

Figure 6. Pedigree Karakul rams

Figure 7. Scientist demonstrates elite quality of the newborn Karakul lamb.

Results: An elite flock of Karakul Sheep was established by mating 10 heads of pedigree Karakul Sur rams with 317 heads of Karakalpak ewes of Karakul Sur. As a result, in spring 2016 lambing season, a total number of 164 heads of elite and first class Karakul Sur lambs were selected for breeding. The scientists of the Karakul Research Institute collaborated with ICARDA by providing extended expertise in weaning season in 2016.

Table 3. Quality evaluation of the newborn Karakul Sur in the Elite flock.

Evaluated Karakul lambs	Period of evaluation		
	23-29 March, 2016	4-9 April, 2016	Total
Total evaluated	171	151	322
including: Female	81	78	159
Male	90	73	163
Total Karakul Sur	149	122	271
including: Elite	34	28	62
1st class	57	46	103
Selected pedigree:			
Female	47	36	83
Male	43	38	81

Our early analyses of benefits from ICARDA's interventions has identified that during autumn-winter seasons of 2016, the piloted livestock cooperative sold in total 108 heads of Karakul sheep (including 58 heads of Karakul Sur rams) for an amount equivalent to 23 650 000 UZS. Shepherd families received from the cooperative 50 heads of Karakul sheep as honorarium for good work. Karakul pelts of moderate quality (90 pieces) were sold in domestic market with an additional amount of 2 700 000 UZS.

For a better and more efficient use of the improved rams, it was scheduled to use artificial insemination during the mating season of 2016. Unfortunately, delays in shipping the hormones for synchronization coinciding with an unusual drop in temperatures in the district area forced

the management in the cooperative to cancel the AI campaign and to initiate natural mating in the flocks.

Conclusions: During the project implementation period, ICARDA team established a trustful working relations with the livestock cooperative "40 let Karakalpakstana", with Karakul Research Institute in Samarkand, and with administrative leaders of the Karauzyak district of Karakalpakstan. The project partners were open for collaboration and supported the initiative of the local governor of Krauzyak to establish a nucleus Karakul-Sur flock at the livestock cooperative farm "40 Let Karakalpakstana". First results of the project intervention have shown decent benefits obtained from Karakul sheep improvement. Based on available funds, ICARDA team and national scientists in Karakul Sheep Research Institute will continue the genetic improvement program of the pelt quality at Koybak livestock cooperative by advisory support in next seasons of mating, lambing and selection of improved lambs.

3.4 Improved milk processing

Introduction: The targeted agropastoral communities in Toboshar, Cartepa, and Garfur keep Angora and local goats for Mohair, meat and milk production. To improve household incomes and food safety, the project studied current milking and milk processing practices in order to develop low-cost interventions.

Methods: Participatory workshops were conducted in 2015 by ICARDA and the Tajik Livestock Research Institute to gather key information on milk production and processing at the three sites. The three workshops featured two consecutive sessions. The first was to capture the core problem through the participation of the majority of community farmers. In the second part we conducted a visit to two farms to validate the information.

Figure 8. Dairy Training in Taboshar village, Tajikistan

Results: The workshops and visits showed a lack of facilities for milking, which causes a myriad of problems including reduced milk production. A milk yield reduction was also observed from milking procedures. A simple animal capturing system was explained in a training in 2016 to address this. Milk fermentation was also observed which reduces marketability. A special

training was developed and conducted in Zartepa and Toboshar in May 2016 to address this issue. The training also addressed hygiene and was attended by 51 women and 12 men. Butter is a dairy product that can increase incomes, since it fetches the highest price in markets. As a result, the project introduced a manual milk fat separator to reduce labor and improve time efficiency in making butter. The skimmed milk, which is a residual product of the butter making process, can be used to make fat free cheese, further increasing added value and incomes. A recent training taught project beneficiaries how to make white fresh cheese from the skim milk as well as feta and ricotta from full fat milk. Follow-up surveys of the target dairy communities have shown that at least 12 households continue using knowledge obtained during the training sessions in producing yoghurt, curd and milk for the household consumption and for selling within the villages. Due to seasonal nature of milk availability, expansion of household dairy production and their access to markets remain limited.

4 Conclusion

The project has been successful in data collection and research activities due to the strength of its partnerships. The data gathering from blood metabolites, GPS collars, and vegetation sampling will help create a comprehensive picture how rangeland plant resources affect livestock production as well as how management can be altered to improve productivity. This will be complemented by a comprehensive rangeland vegetation assessment tool using Geo-information system and Remote Sensing techniques that is being developed in partnership by ICARDA team and local scientists. When linked with larger scale geographic datasets such information can also provide broader policy information. This research is timely as there are current policy changes in rangeland tenure in the region. Those innovative decision-making tools can be used effectively to improve governance of the pastoral resources and to enhance livestock productivity at low cost. Projects such as this help the policy-makers to make informed and deliberate decisions in the short- and long-term perspectives. The rapid value chain assessment of small ruminant commodities has helped to identify key areas that could improve dairy and meat value chains. The improvements in breeding and milk processing have been met with enthusiasm by project stakeholders. As the region and the culture is historically made up of pastoralists the need to improve livestock management and value chains will be a reoccurring theme for years to come, hopefully the needs will be less basic and more on technological capacity building. Given ICARDA's involvement in prior projects in the region it is noted that there is a gradual increase in capacity however further support will be needed to push both countries to the tipping point where they are more competitive on the global market and as result can sustain improvements in the sector.

5 References

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6 Capacity Development

№	Date	Title of event/ training/ workshop	Objectives	Number of participants			Country/ Location	Photo
				Male	Female	Total		
1.	10/2014	Artificial insemination of Angora goats with frozen semen	To improve mohair quality	9	3	12	Sugd, Tajikistan	
2.	11/2014 -1/2015	1 on-job and 1 field training on Rapid Value Chain Assessment (RVCA)	Rapid sheep and goat value chain assessment	5	8	13	Ethiopia, Tajikistan	
3.	3/2015	Training on utilization and adoption of biosaline forage production in saline environments	To improve household access to winter forage crops	25	1	26	Karauzyak, Karakal-pakstan	
4.	4/2015	Early screening and selection of goats and sheep before reproduction season	To improve herd manageme nt	12	1	13	Sugd, Tajikistan; Karauzyak, Karakal-pakstan	

5.	8/2015	Training for women groups on utilization and adoption of biosaline forage production	To improve household access to winter forage crops	2	42	44	Karauzyak, Karakal-pakstan	
6.	10/2015	Field training on pedigree book keeping, mating schedule and feed ration.	To improve herd manageme nt	6	2	8	Karauzyak, Karakal-pakstan	
7.	1 & 2/ 2016	Field training on early pregnancy detection through applying Mobile Ultrasound technology	To improve animal reproducti on and herd manageme nt strategies of pastoral farms	6	2	8	Sugd, Tajikistan; Karauzyak, Karakal-pakstan	
8.	1, 2, 4, 5/2016	Installation of GPS collars on pastoral animals, GPS data management, mapping and charging batteries	Mapping seasonal grazing pathways of pastoral livestock flocks	5	-	5	Sugd, Tajikistan; Karauzyak, Karakalpak stan	
9.	3/2016-4/2016	Lambing, labeling and screening of elite Karakul lambs by quality of color and texture of pelts	To establish elite Karakul Sur flock	20	2	22	Karauzyak, Karakalpak stan	

10.	10/2015, 2/2016, 5/2016	Blood sampling from pastoral animals, cooling and storing collected samples; Using centrifuge device and techniques of blood collection (vacutainers, needles and tubes)	To assess seasonal metabolic changes of pastoral animals	12	-	12	Sugd, Tajikistan; Karauzyak, Karakalpakstan	
11.	4/2016, 5/2016	Seasonal inventory of desert and mountain rangeland plants to identify vegetative composition and carrying capacity of selected pastures	To develop methods and maps reflecting seasonal changes of pasture vegetation	9	1	10	Sugd, Tajikistan; Karauzyak, Karakalpakstan	
12.	5/2016	Improved technologies of dairy processing: fat separation, improved milking, yoghurt, cream, butter and cheese preparation. Hygienic measures for milking and dairy processing.	To improve quality of milk products on household level and to introduce market products	13	52	65	Sugd, Tajikistan; Karauzyak, Karakalpakstan	

7 Publications and tools

7.1 ISI Publications

1. Alisher Mirzabaev, Mohamed Ahmed, Jutta Werner, John Pender, Mounir Louhaichi. 2015. Rangelands of Central Asia: challenges and opportunities. Journal of Arid Land. doi: 10.1007/s40333-015-0057-5.
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