

CARBON SEQUESTRATION THROUGH CLIMATE INVESTMENT IN FORESTS AND RANGELANDS IN KYRGYZSTAN (CS-FOR)

GCF project:

*Contribute to the development of climate-resilient and sustainable rural communities and
reduce emissions through improved NR governance and ecosystem approach*

Working paper on the results of FAO mission to Osh and Bishkek regions,
October 1-15, 2017

Prepared by Khabibulo Khamdamov, Livestock specialist



CURRENCY EQUIVALENTS

Currency Unit = Kyrgyzstani Som (KGS)
(Exchange Rate Effective October 1, 2017)

USD1 = 69.2 KGS

FISCAL YEAR

January 1 – December 31

ACRONYMS AND ABBREVIATIONS

Aiyl aimak (AA) rural municipality area

Aiyl okmotu (AO) local government of aiyl aimak

Aiyl kenesh (AK) local council of aiyl aimak asl above sea level

AISP Agricultural Investment Support Project

ASSP Agricultural Services Support Project

CBFM Community Based Forest Management

CFM Collaborative Forest Management

CPMP Community Pasture Management Plan

CS-FOR Carbon Sequestration through Climate Investment in Forests and Rangelands

FE State forestry enterprise, *Leskhoz*

FGD focus group discussions

GAO Gross Agricultural Output

GOSREGISTER State Agency for Registration of Rights to Land and Immovable Property

IFEMP Integrated Forest Ecosystem Management Project

IFI International Financial Institution

IREI Inter- Regional Environmental Inspection

ISF The Irrigation Service Fee

Jaiyt Committee (JC)

Jaiyt or Pasture Committee – executive body of the Pasture Users' Association

JICA Japanese International Cooperation Agency

KAFLU Kyrgyz Association of Forest and Land Users

KGS Kyrgyz som

Kolkhoz State collective farm

Leskhoz State forest enterprise

LFEPDFS Local Funds of Environmental Protection and Development of Forestry Sector

LRF Land Redistribution Fund

MoA Ministry of Agriculture

NAP National Action Plan

NFEPDFS National Fund of Environmental Protection and Development of Forestry Sector

NGO Nongovernmental organization

NTFP Non-timber forest products

Oblast Region

PD Pasture Department

PUA Pasture Users' Association

Rayon District

RDF Rural Development Fund

SAEPF State Agency for Environment Protection and Forestry

Sovkhoz Soviet farm

SFM sustainable forest management

SLF State Land Fund

SFF State Forest Fund

SRF State Reserve Fund

TDEPDFE Territorial Division of Environmental Protection and Development of Forestry Ecosystems

UNDP United Nations Development Program

UFF Unified Forest Fund includes all forests and forest lands of the country

WB World Bank

WUA Water Users' Associations

EXECUTIVE SUMMARY

Kyrgyz Republic is an agrarian state, with about 65 percent of people living in rural areas, and more than 30 percent are employed in the agriculture sector. The rural population depends on crop and livestock sales, which constitute over one-third of their income. Farming is extremely fragmented, with more than 90 percent of agricultural products in Kyrgyzstan produced by small-scale producers. Livestock is not only an important source of livelihood for 90 percent of the rural population, but also plays a prominent cultural role and is a valuable asset to respond to households' sudden needs and financial shocks. Livestock output makes up almost half of the total agricultural output, while forestry output accounts for less than 1 percent. A recent baseline survey for IFAD's Livestock and Market Development Project noted that about 90 percent of the rural population owns livestock.

The number of livestock is steadily growing. Animal husbandry is especially prevalent in the central and eastern mountainous regions of the Kyrgyz Republic, where other economic opportunities are limited. The number of livestock has been increasing rapidly during the last decade. According to official data, there were more than 6 million sheep and goats in Kyrgyzstan in 2016, but anecdotal evidence suggests that this number is significantly underestimated, with the real number of sheep and goats likely approaching 8 million.

Livestock production systems have also changed significantly in association with changes in the number and composition of livestock. Pasture- and forage-based production systems now predominate, whereas systems relying on concentrate feed prevailed before independence. Cattle are now more important than sheep with regard to overall feed requirements, and sheep are grown for meat rather than wool. The emphasis has thus shifted to meat and dairy production for domestic and regional markets and away from fine-wool production for international markets.

In addition to production losses, livestock disease in the Kyrgyz Republic is also a risk to human health and livestock export earnings. The priority disease risks for livestock are brucellosis, anthrax, foot and mouth disease (FMD), echinococcosis, pestes des petits ruminants (PPR), avian influenza, and rabies. Rabies and anthrax were reported in most years, although their impact on livestock production and human health is regarded as low. On average, FMD outbreaks occur every second year, with most outbreaks (99 percent) occurring in cattle. Losses are higher than reported, as the Kyrgyz Republic does not have a slaughter and destroy policy for FMD, although actual production losses are considered low. Less than 0.5 percent of cattle were reported as infected in the worst outbreak in 2011. The potential impact is much higher, however, with approximately 10 percent of cattle reported as susceptible in the outbreak in 2011. FMD outbreaks in 2007 and 2011 also resulted in a Russian ban on Kyrgyz exports of meat and live animals and a Kazakhstani ban on Kyrgyz meat and dairy products. Brucellosis poses the greatest risk, not only to production but also to human health and exports. Outbreaks were reported to the OIE in 11 of the 14 years from 1999 to 2013, for both cattle and small ruminants. No deaths were reported for these outbreaks, but an average of 2,340 cattle and 2,830 small ruminants were slaughtered or destroyed in each year of occurrence. The continued inability to control brucellosis in both people and livestock led Kazakhstan to ban all dairy exports from the Kyrgyz Republic in 2012–13, depriving farmers and processors of an important source of revenue and depressing milk prices on domestic markets. During a seven-month period, this ban cost the sector an estimated som 5 million per day (US\$10,000), according to MAWR officials.

Natural pastures are the principal source of forage and fodder for livestock. A very limited area, only about 330,000 ha of cultivated land and hayfields in Kyrgyzstan, is sown with fodder crops (compared to 9 million ha of natural pasture land). Although this cultivated fodder area expands every year to respond to the growing livestock number, it is still far from sufficient to feed even the officially declared livestock population over the winter. Thus, natural pastures remain the primary source of fodder and forage year round, with the meadows in the sub-alpine and alpine zones used for summer grazing, and foothills providing grazing areas in spring, autumn and winter. The maximum carrying capacity of Kyrgyzstan's grazing-land is estimated at 7 000 000 sheep equivalents. This includes all ruminant stock (cattle; yaks; sheep and goats) and horses (the accepted ratio is: one horse = 6 sheep; one cow or yak = 5 sheep; one goat = 0.7 sheep). Official estimates of sheep equivalents is about 15 000 000. Though sheep numbers are significantly reduced the number of 'sheep equivalent' is not when cattle and horses using the pastures and the abandonment of the outlying grazing is taken into account. Previously large numbers of cattle were managed under intensive conditions, and fewer grazed on natural pasture.

The main Government body responsible for livestock sector in Kyrgyzstan is the Ministry of Agriculture, Food Industry and Melioration where the Department of pastures, livestock and fish farming is coordinates main activities for sustainable livestock production. There are other governmental bodies directly related to livestock

in the republic: State Agency on Environment Protection and Forestry, State Inspection of Veterinary and Phytosanitary Safety, State Inspection on Environmental and Technical Safety. Subordinate organizations of the Ministry of Agriculture are State Agency for Veterinary, Agency for pasture, Agency for fishery, Agency for plant quarantine, protection and chemistry, Agency for supply of machine and energy, Agency for development of water resource and land, National Center for Veterinary Diagnosis, National Center for Breed Improvement and Transmission, National Center for Seed Management, National Center for Breed Analysis, Center for Veterinary Medicine Certification, State-owned company “KYRGYZGIPROZEM” Land Management State Laboratory, Center for Cereal Crop Quarantine, Agro bio Center. Livestock research system is consisted of Livestock and Pasture Research Institute, Veterinary Research Institute that work under supervision of Kyrgyz National Agrarian University. The VRI research program focus on research to support implementation of national animal disease control strategies. The staff of VRI is receiving training and equipment to do this. What is less unclear is the future direction, funding levels, and skills capacity in the other research institutes. The LPRI is benefiting from international technical assistance in pasture assessment and improvement but has scant resources. Extension of LPRI research results to farmers has been very limited.

Under the Pasture Law, oblast and raion administrations transferred responsibility for management to Local Self Government Body (LSGB) and LSGB delegated management responsibility to Pasture User Unions (PUU) in each Aiyl Okmotu (AO) for a period of 49 years. To date 454 Pasture User Unions have been registered (Jalal-Abad oblast – 68, Naryn oblast – 68, Osh oblast - 88), each managed by its executive body, the Pasture Committee (PC). Besides Governmental bodies there are non-governmental organizations related to livestock such as National pasture users' Association of Kyrgyzstan “Kyrgyz Jayity”, a voluntary association of legal entities and a non-profit organization dedicated to improving the ability of pasture users, Pasture User Unions and Pasture Committees to effectively manage and use pasture resources.

The main tasks of the law №91 on Animal Identification in the Kyrgyz Republic (6 June 2013) started for implementation in 2017 with fastening ear-tags to cattle and small ruminants. In spite of apparent advantages of the animal identification, this activity needs on external support in regards of establishing National Animals Registration System which require material and technical inputs.

Recommendations on project's interventions related to livestock management

Developing a sustainable green livestock production chain

The sub component will focus (besides the other activities) on decreasing the pressure on pastures and methane emissions reduction by promoting income diversification and more productive livestock generating higher returns. A major outcome of the sub component: “A stable system of diversified and high prolific livestock production to ensure sustainable NRM is developed and implemented” has two expected outputs – (i) Innovative low methane emission livestock husbandry practices are piloted and documented at the local and national levels; (ii) Upgraded approaches decreasing the pressure on pastures are tested and implemented in all project areas with dissemination of best practices within the country.

Rationale

Livestock production has the largest impact to natural resources mainly through overgrazing and methane emissions. Overgrazing is the greatest cause of degradation of pastures and the overriding human-influenced factor in determining their soil carbon levels. Consequently, in many systems, improved grazing management, such as optimizing stock numbers and rotational grazing, can result in substantial increases in carbon pools. Improved pasture management is a major area where soil carbon losses can be reversed leading to net sequestration, by the use of trees, improved species, fertilization and other measures. Since pasture is the largest anthropogenic land use in Kyrgyzstan, improved pasture management could potentially sequester more carbon than any other practice.

Methane emissions by ruminants are not only an environmental hazard but also a loss of productivity, since methane represents a loss of carbon from the rumen and therefore an unproductive use of dietary energy (US-EPA, 2005). Emissions per animal and per unit of product are higher when the diet is poor. The most promising approach for reducing methane emissions from livestock is by improving the productivity and efficiency of livestock production, through better nutrition and genetics. Greater efficiency means that a larger portion of the energy in the animals' feed is directed toward the creation of useful products (milk, meat, draught power), so that methane emissions per unit product are reduced. The trend towards high performing animals and towards monogastrics and poultry in particular, are valuable in this context as they reduce methane per unit of product.

The ability of livestock farmers to harmonize the use of their pastures to sustainable NRM is constrained by many problems, including the low breed value of grazed animals, not diversified livestock production and poor husbandry practices with high methane emissions, lack of technical knowledge of small livestock holders, poor governance arrangements on pasture management, inefficient management of community livestock, shortage of feed during the winter months, environmental degradation, and lack of access to quality fodder seed and infrastructure - all of this further exacerbated by climate change. The component will address these constraints in an effort to reduce livestock methane emission and ensure households maximize their returns while guaranteeing the sustainable management of pastures. Enforcement of animals' health care system will complement such an effort.

Developing a sustainable livestock breeding system

1. The most promising approach for reducing methane emissions from livestock is by improving the productivity and efficiency of livestock production, through better nutrition and genetics. Greater efficiency means that a larger portion of the energy in the animals' feed is directed toward the creation of useful products, so that methane emissions per unit product are reduced. Main cattle breeds on project areas consisted of low productive breeds as a result of spontaneous and uncontrolled mating. Improved breed composition will allow to decrease or at least control the cattle number under current index and achieve two project's targets: decrease pressure to NRM and reduce methane emissions. Improving breed and accordingly increasing animals value will allow to decrease the general number of animals, grazed on pastures. Cattle breeds need to be improved through breed improvement plan (AI and proper animal selection for breeding); It is important that correctly organized AI for cow breed improving should be used. Most of AI points are not functioning due to limited access to liquid nitrogen and low skills. So appropriate planning AI (enforcement of liquid nitrogen delivery on regular base and effective on-job training on AI), establishing AI centers with well trained personnel and infrastructure will for sure guarantee distribution of quality and high productive breeds and finally decrease the pressure to pastures.

2. Main sheep population consist of low productive Kyrgyz coarse-haired fat-tail sheep that urgently needs to be improved. Delivering best Hissar rams to sheep flocks in project areas on a constant/continued way from neighboring countries (Tajikistan and Uzbekistan) will ensure steady improving of sheep breeds. Thus farmers/householders can keep 2 pedigree sheep instead of outbred 3 that will result on a pasture pressure decrease and reducing methane emissions. Some communities are buy Hissar rams (the biggest sheep breed in the world) from Tajikistan market to introduce to flock and use them as sires for breed improving. The project will implement several approaches on improving sheep flocks breed: community based Hissar nuclear flock or individual breed improving plans with sire rams rotation, developing a flocks/herds Breeding plans with selection criteria for males.

Diversifying livestock production and Improving husbandry practices to reduce methane emissions

1. Even with current low genetics the livestock productivity is far below its potential due to poor husbandry practices. Local cattle breeds have a potential to increase current milk yield two times whereas improved breeds could produce much more. Average milk production can be increased twice and more. Methane emissions per animal and per unit of product are higher when the diet is poor. Poor culling system of males for beef and mutton production is also delivering to low income generation pursuing householders to keep more animals. There are too many male cattle of different ages amongst the herds. Many PU keep them till 3-year age, that is completely not effective and causing almost double pressure to pastures. Through introduction of effective livestock management plan more cattle will be kept under intensive fattening conditions and decreasing the number of animals grazed on natural pasture. Removing from herd /restricting to graze animals older 1-year age will considerably reduce the pasture pressure. Different growing and intensive fattening system of culled males in cowshed conditions will result not only to reducing the pressure on pastures and decrease in methane emissions, but reflect directly to households income, speeding up the growing and fattening period and allowing to direct obtained money to small business development. By this activity project can achieve at least 20% decrease of pasture pressure. The project will conduct trainings of farmers/householders on effective livestock management plan, intensive fattening methods, preparing rations, identifying animals' age (PC members), propagation of multicut hybrid fodder for Hay and Silage making, addressing nutritional deficiencies throughout winter/early spring period, new livestock production technologies resulting to decrease in methane emission, introduction of correct manure processing practices, sheltering/housing improvement, decreasing dependence from pastures). This activity will be supported by introduction of new high yield fodder variety (corn and lucerne

hybrids), stimulating manufacturing and propagation of use Total Mix Ration (kombikorm), grains (barley, wheat, corn etc), establishing forage shops at kishlak level and developing a revolving system of distribution of mineral and vitamin supplements along with them.

2. Before the Soviet Union collapse beekeepers produced more than 12 thousand tons of honey per year. There are about 1 thousand beekeepers and 90 thousand honey-bee-colonies that produce about 3 thousand tons of honey/year (4 times less than in Soviet times). So there is vast vista for intensive grow of the sector, that will result on better pollinating of plants and increasing their number. Intensification of beekeeping practices will enforce the vegetation/recovery on pastures and forests. There is an opportunity to increase honey production to at least 13 thousand tons per year (almost 5 times – the production level of 1990). Different approaches to increase honey-families and beekeepers: institutional (support with export opportunities); increase interest in beekeeping amongst householders along with delivering trainings on this practice; providing necessary infrastructure and equipment (hives, medicines), loans, packing and certification. Besides the positive effect to natural resources dissemination of honey production practice will draw householders' effort from livestock production thus allowing to reduce their number.

3. Chicken production is considered as a system with lowest methane emissions. Due to specifics of digestion system they don't produce methane at all. Intensive chicken production has a great potential for project areas. Big market demand for chicken meat and eggs and availability of labor forces make this opportunity feasible to be developed within the project. In comparison with ruminants chicken don't produce methane and there is no need in vast grazing areas. Larger flock sizes can easily arise once mortality is reduced through vaccination and improved hygiene. Another approach to disseminate best broiler breeds is to ensure delivering on a constant base 1-day old chicken at reasonable price for broiler production and 4-month old laying hens for eggs production. The following main constraints should be addressed for sustainable chicken production: disease risk, predators, housing, feed and water, genetic potential, marketing. For this issues wide propaganda and training activities on chicken production in household conditions along with small grants (for demonstration plots) and loans will be discussed with communities for proper planning and implementation. Once the profit from chicken production is prevailed to income of cattle and sheep the number of ruminants will decrease due to shift of livestock producers' efforts to less harmful for NR business.

4. Developing turkey production, that is also doesn't produce methane, and grazing on winter pastures (around kishlaks) instead of traditional cattle and sheep grazing have also good perspectives. Commercial turkey farming is a profitable business moreover impact to environment is much less in comparison with ruminant animals. Turkey grows faster like broiler chickens and become suitable for slaughter purpose within a very short time. The project can support households for basics steps for starting commercial turkey farming business: introduction/delivering best breeds (several days old chicken), advising on housing and fencing, feeding and watering, care and management, marketing issues.

5. Prices for livestock and their products are significantly varying from villages level to urban markets. Almost 90% of cattle and small ruminants are sell alive on livestock bazars allowing to gain large share of profit to middlemen and butchers. Development of District Livestock Business Development Centers for consultation and providing price database for livestock producers on village level will allow to avoid price misbalance and to gain higher income for householders.

6. The wool from meat breed sheep (main breed population on project sites) is almost of no value as well as other livestock byproducts, such as skin, horns etc. The project will study different practices for production value added products for wool, leather: establishment of craftsmen cooperatives for carpet and other handmade goods.

Decreasing pressure to pastures

1. For householders of project areas cattle is now the most important form of livestock production, followed by sheep and goats in all three project's oblasts. In comparison to small ruminants, cattle's effect is less harmful to pastures whereas small ruminants are better adapted to mountain areas and can utilize highlands hard-to-reach for larger animals such cattle. Besides the ability of sheep and goat graze on slope mountain pastures they don't need to drink water so often as cattle that is also a problem on most distant pastures. The summer jayloo, spring jaztoo and autumn guzdo pastures consist principally of perennial grasses and Cyperaceae, which are reasonably resilient under heavy grazing. Shift in proportion of livestock species grazed in different pastures - more cattle in close (winter, spring/autumn) pastures and prevalence of small ruminants share in remote pastures will not only address to overgrazing problems of closely located pastures

but improve the quality of remote pastures that are underused resulting as well in degradation for this reason. This shift in livestock species proportion will be undertaken through PUU/PC, in way of restriction for number of small ruminants allowed to graze on close pastures. The activity will be advanced with wide consultation with pasture users elucidating perspectives of such shift and discussing the animals' proportion.

2. Another approach of shifting the householder attention from traditional grazing on close pastures ruminants is yaks production. In all project's areas there are highland pastures where only yaks excellent adapted. The number of yaks is amounts to 12% of total cattle population in Naryn oblast. Yak physiology is well adapted to high altitudes, having larger lungs and heart than cattle found at lower altitudes, as well as greater capacity for transporting oxygen through their blood due to the persistence of foetal haemoglobin throughout life. Yak consume the equivalent of 1% of their body weight daily while cattle require 3% to maintain condition. In Kyrgyzstan number of yaks decreased from 55.3 thousand in 1990 to 38.5 in 2016. For the past 30-year period there was no any activity on improvement of yak's breed as well as the activities on improvement of their productivity. The milk from yaks can be used as high value added product after processing (sterilization) and tetra packing for long time storage. The project will support this production system through propagation of its advantages and stimulating householders to change their businesses from cattle/sheep production in lower lands to yaks production. Small grants and favorable loans supported by training activities will be used for implementation of this activity.

Enforcement animals' health care system

1. Together with degradation of pastures, major diseases, such as brucellosis, echinococcosis and foot-and-mouth disease as well as parasites negatively impacts to livestock production, pursuing householders to keep large number of animals in a hope that diseases will harm part of them. The health of animals has deteriorated with the reduction in veterinary services and there is now a considerably reduced veterinary service, though there are attempts to strengthen the service, primarily through support for private vets and by building up the capacity of community vets. Diagnostic services have obsolete and out of work equipment and lacking in diagnostic means. For this issue the project will invite the OIE experts to conduct baseline condition of diagnostic services (the last mission has been held in 2007) and develop recommendations on strengthening of four project's District diagnostic laboratories. Further the project will develop plan for enforcement district diagnostic facilities with capacity building and infrastructure development program. The program will include accreditation of veterinary labs for certification of livestock products to promote export of livestock products and sell it for higher prices.

2. Animal health is fundamental input to ensure healthy and productive livestock essential to rural livelihoods. The high prevalence of animal diseases not only causes high mortality and low productivity, but poses a significant public health risk. The 91% of vets are aged individuals (54 years and older). Graduates from vet faculty possess substandard academic skills with almost no practical experience. The simple example of unsuccessful experience on AI practice shows the needs to enforcement of veterinary service on kishlak level. As part of veterinary service responsibility information on animal movement and their traceability is not tracking. It is difficult or even impossible to get true data on animals' population due to absence of animals' registration system, the responsibility of veterinarians. The project will work on the following activities to address this issue: provision of mobility to field veterinary staff and ensuring further support from available state revolving fund; provision of updated technology and missing facilities at field formation (including mobile mapping); development of cold chain infrastructure from vaccine production to utilization; establishment of Model Veterinary Poly Clinic at rayon level; establishment of technical bridge between academia, research and field formation by strengthening existing research institutions (stipendiary researches for young scientists); support on Animal identification activities (started by State Vet Agency in 2017) through developing separate database server and establishment animal tracking system and establishment of Animal identification, Traceability and Tracking System; establishing vet medicine drug stores in kishlaks with high number of animals.

Institutional Aspects and Implementation Arrangements

The State Agency for Environmental Protection and Forests (SAEPF), in its capacity of the National Designated Agency (NDA) will have the overall responsibility for project management on behalf of the Government of Kyrgyz Republic. A dedicated Project Management Unit will be established under the NDA to be responsible for overall management, coordination, oversight, monitoring, procurement and financial management,

knowledge management and evaluation of the project. **The State Inspectorate for Veterinary and Phytosanitary Security (SIVPSS) and Kyrgyz National Agrarian University under the guidance of the NDA will be responsible for implementing Sub-Component “Developing a sustainable green livestock production chain”.** The project will work under the guidance of a Steering Committee (SC) formed by the following institutions: SAEPF (NDA and Chair of the SC), MAFIM, MES, the State Agency for Local Self-Government and Inter-Ethnic Relations; the State Agency of Architecture, Construction, Housing and Communal Economy and FAO.

Expected Benefits

Through improved management of livestock – improved breed composition and controlling further growth of animals population (over improving PUU management and establishment of Animal identification, Traceability and Tracking System), diversifying livestock production, increasing pollinating of plants, improving husbandry practices to reduce methane emissions and decreasing pressure to pastures - the project will contribute to reducing GHG emissions of about **75,000 (TBC with exact data obtained for 4 project districts on animal population)** tonnes of CO2 eq.

Monitoring and Evaluation

The project's interventions to livestock sector in its positive impact to NRM will be monitored through selected criteria: improved breeds, control of animals' population, number of households diversified livestock production and number of poultry originated from diversification activities, estimated decrease in methane emissions

Risks and Mitigation

Impossibility to change livestock keepers trend in growth in animal population. Mitigating factors – enforcement PUU/PC authority on animal number restriction; vast propaganda of project's proposals on diversification of livestock production system.

Lack number of vet/paravets on project areas to support Animal Identification and Health Care activities. Mitigating factors – provide incentives for young people in the major livestock keeping areas to enter the veterinary faculty/vocational schools to become a community vet

Livestock diseases. The priority disease risks for livestock are brucellosis, anthrax, foot and mouth disease (FMD), echinococcosis, pestes des petits ruminants (PPR), avian influenza, and rabies. Mitigating factors – enforcement veterinary system; development of cold chain infrastructure for vaccine usage

Sustainability

Once implemented the sub component activities will be sustainable in a long run due to obvious advantages such as improved and high productive livestock, reliable income from diversification, maintainable natural resources and good level of vet services.

Conclusions

Poor husbandry practices and increasing livestock population delivering considerable harm to natural resources. The ability of livestock farmers to harmonize the use of their pastures to sustainable NRM is constrained by many problems, including the low breed value of grazed animals, not diversified livestock production and poor husbandry practices with high methane emissions, lack of technical knowledge of small livestock holders, poor governance arrangements on pasture management, inefficient management of community livestock, shortage of feed during the winter months, environmental degradation, and lack of access to quality fodder seed and infrastructure - all of this further exacerbated by climate change. To address these issues the project will implement different activities (besides the other activities) on developing a sustainable green livestock production chain. More specifically, the project will focus on decreasing the pressure on pastures and methane emissions reduction by promoting income diversification and more productive livestock generating higher returns. Enforcement of animals' health care system will complement such an effort.

Through improved management of livestock – improved breed composition and controlling further growth of animals population (over improving PUU management and establishment of Animal identification, Traceability and Tracking System), diversifying livestock production, increasing pollinating of plants, improving husbandry practices to reduce methane emissions and decreasing pressure to pastures - the project will contribute to reducing GHG emissions and to restoration and sustainable use of pasture resources.

Country Background

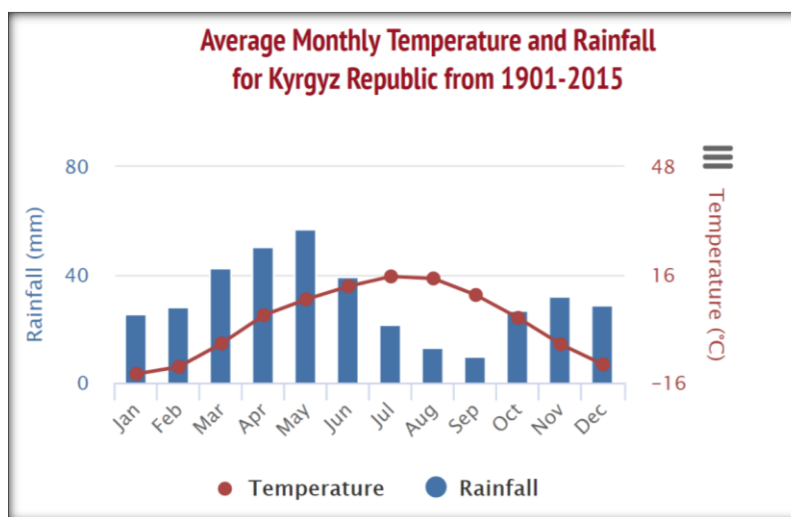
Kyrgyz Republic is a country with a territory of about 200 000 square kilometers and a population of 5.8 million people. It is landlocked in the middle of Eurasia at the juncture of the Tian Shan and the Pamir mountain systems.

Kyrgyzstan is divided into seven regions (oblast), administered by appointed governors. The capital, Bishkek, and the second largest city Osh are administratively independent cities with a status equal to a region. The regions, and independent cities, are: 1. City of Bishkek; 2. Batken; 3. Chuy; 4. Jalal-Abad; 5. Naryn; 6. Osh; 7. Talas; 8. Issyk-Kul; 9. City of Osh. Each region comprises a number of districts (raions), administered by government-appointed officials (akim). Rural communities (ayıl ökmötü), consisting of up to 20 small settlements, have their own elected mayors and councils.



Pict 1. Kyrgyzstan's regions

The climate varies regionally. The low-lying Fergana Valley in the southwest is subtropical and extremely hot in summer, with temperatures reaching 40 °C and above. The northern foothills are temperate and the Tian Shan varies from dry continental to polar climate, depending on elevation. In the coldest areas temperatures are sub-zero for around 40 days in winter, and even some desert areas experience constant snowfall in this period. In the lowlands the temperature ranges from around -6 °C in January to 24 °C in July.



Pict 2. Source: World Bank Climate Change Knowledge Portal

Kyrgyzstan's forests and pastures and the communities that depend on these resources will be disproportionately exposed to risks associated with a changing climate. The country is primarily made up of

mountainous regions with high geographic exposure combined with a relatively high share of agriculture as a portion of GDP (20.8 % of GDP in 2013), high and increasing poverty rates and inequality, as well as relatively poor social services and public infrastructure, leaving it vulnerable to climate change impacts. Key resources and sectors such as water, land and forests, biodiversity and ecosystems, agriculture, energy and human health will be adversely affected. Average annual temperatures across the region have increased since the mid-20th century by 0.5°C in the south to 1.6°C in the north and impacts are already being observed, from melting glaciers in upland areas to droughts and floods in the lowlands. Warming in the Central Asian region is projected to be above the global mean land warming, 2.5°C above the 1951-1980 base period compared to 2°C for the rest of the world until the end of this century, and 8.5°C above base levels by 2100 in a 4° world. By 2050, it is anticipated that there will be a 31.3 percent increase in the population living in climate change hotspots. Model projections estimate that there will be 31-66 percent glacier volume loss in Central Asia in a 2° world, and 50-78 percent loss in a 4° world which will affect the Kyrgyz Republic's Tien Shan glaciers.¹

Sector background

Agriculture is an important sector of the economy in Kyrgyzstan. By the early 1990s, the private agricultural sector provided between one-third and one-half of some harvests. In 2016, agriculture accounted for 14.9% of GDP and about half of employment (World Bank national accounts data, and OECD National Accounts data files). Kyrgyzstan's terrain is mountainous, which accommodates livestock raising, the largest agricultural activity, so the resulting meat, dairy and wool products are major commodities. Main crops include wheat, sugar beets, potatoes, cotton, tobacco, vegetables, and fruit (see *Pict. 3*).

Kyrgyz Republic is an agrarian state, with about 65 percent of people living in rural areas, and more than 30 percent are employed in the agriculture sector. The rural population depends on crop and livestock sales, which constitute over one-third of their income. The share of agriculture in gross domestic product has been declining, while the sector's share in total employment remained at about the same level. Crop production and livestock shares in the gross agricultural output of Kyrgyzstan are almost equal – about 51 percent and 47 percent respectively; the share of other sub-sectors (agricultural services, forestry, and fishery) does not exceed two percent. Forests have by law a solely protective function and cannot be used for production purposes, unless the use of forest resources serves improvement and maintenance tasks. Domestic producers do not supply enough for the national consumption; therefore, the import of agricultural products (mainly fruits and vegetables) from countries like China and Uzbekistan, has increased remarkably over the last decade.²

Recent years for the country are described as disastrous ones from the perspective of land degradation. Due to economic activities and the influence of several natural factors, a significant part of the soil cover has undergone the process of ablation. Of the existing 10.7 million ha agricultural lands, more than 88% are recognized as degraded and prone to the processes of desertification. The area of secondary salinization has increased and reports 75% of the whole arable fund of the country; more than half of the arable lands in the country are affected by outwash and soil drifting. About half of pasture territories are categorized as degraded both from the vegetation point of view and due to the soil condition. A significant reduction is reported on the areas under perennial plantations and vineries; trees and shrubs of field shelter-belts get eradicated extensively.

Soil degradation causes a big economic damage. Soil degradation of various degrees decreases yield capacity of agricultural crops by 20-60 %. With the change in ownership form, the agricultural sector has experienced disintegration of the system of collective land use, while the introduced institute of private ownership of land gave birth to small-field land-use (84% of households have the area of arable land under 1 hectare), which are constrained in terms of their ability to undertake crop rotation, resource-intensive melioration, activities to support soil fertility with the sufficient use of organic and mineral fertilizers, organization of anti-erosion works that contribute to the saving and improvement of fertility on arable lands.

The agriculture sector in the Kyrgyz Republic is highly reliant on irrigation water, and climate change will have a great impact on water availability and agricultural productivity; changing precipitation regimes, reduced runoff, increasing temperatures and extended periods of above-average temperatures will increase stress on agricultural crops leading to decreases in plant productivity. As a result, in the context of already-degraded pasture lands, pasture growth and regeneration rates are expected to decline, potentially placing even more pressure on pastures in Forest Fund Land, while the risk of food insecurity is projected to increase. This change

¹ World Bank. 2014. Turn Down the Heat: Confronting the New Climate Normal. Washington, DC: World Bank. License: Creative Commons Attribution—Non-Commercial—No Derivatives 3.0 IGO (CC BY-NC-ND 3.0 IGO).

² Toktoraliev K. (2013): An analysis of phytosanitary policies and practices in the Kyrgyz Republic. MSc thesis. Asia Pacific University, p.27

in water resource availability coupled with population growth will increase the challenge of balancing water demands for hydropower generation and agriculture/forestry. Particularly at risk are income-earning opportunities from agriculture and forest products, like non-timber forest product provisioning areas like the walnut forests; increased variability in temperature and precipitation regimes and seasonality could influence yields and the incomes of neighboring communities. Droughts will also very likely result in increased desertification. Approaches to address some of these climate change adaptation challenges are being piloted in the regional program: Climate Adaptation and Mitigation Program for Central Asia (CAMP4CA) of which Kyrgyzstan is a part, through tackling the non-climatic drivers of vulnerability in the region, such as inefficient infrastructure, unsustainable land and water management, rural poverty, and low adaptive capacity to ongoing and future changes.

According to the Constitution of the Kyrgyz Republic, land, underground resources, air, water, forests, plant and animal world, and other natural resources in the country are the property of the Kyrgyz Republic and can be under government, communal, private, or other forms of ownership.

According to the data of the State Registration Service of the Kyrgyz Republic the area of land in state ownership is 18,626,840 hectares (93.16%), municipality – 112,150 hectares (0.56%), and private – 1,255,930 hectares (6.28%).

Following table indicates the area of land in the Naryn, Jalal-Abad and Osh regions, where the proposed project activities are expected to be implement.

Table 1. Land area by Region and Ownership

№	Regions	State-owned		Municipal		Private		Total '000 ha
		'000 ha	% of region territory	'000 ha	% of region territory	'000 ha	% of region territory	
1	Osh	2678.75	92.00	6.74	0.23	226.15	7.77	2911.64
2	Jalal-Abad	3072.63	94.78	3.81	0.12	165.37	5.10	3241.81
3	Naryn	4308.72	97.57	2.55	0.06	104.73	2.37	4416

* Source: State Registration Service of the Kyrgyz Republic

According to the Article 10 of the Land Code of Kyrgyzstan, the lands of the Kyrgyz Republic include farmland and non-farm land, and are divided into following categories according to their purpose (Table 2):

- 1) Farmland;
- 2) Lands of populated areas (cities, townships, and rural settlements);
- 3) Lands for industrial, transportation, communications, defense, and other purpose;
- 4) Lands of strictly protected areas;
- 5) Forestry lands;
- 6) Water basin lands;
- 7) Reserve lands;

Table 2. Area by Land Category and Region

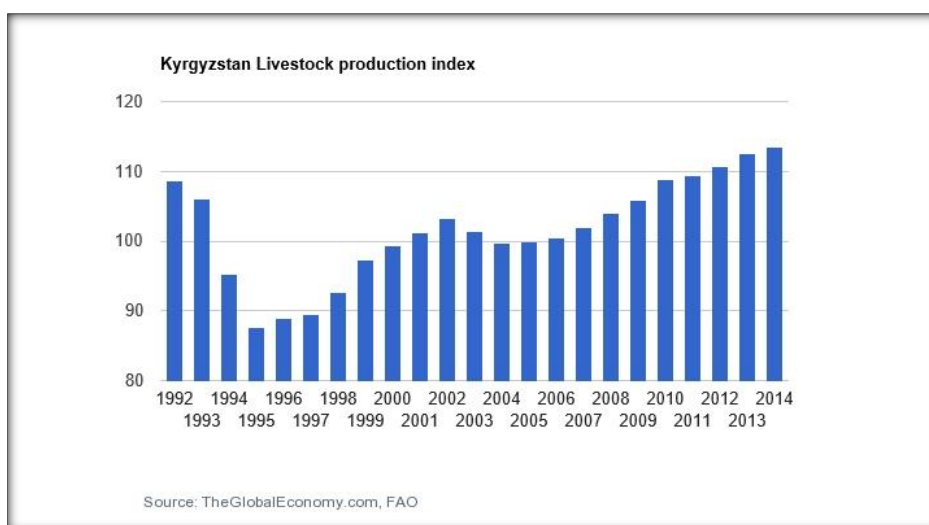
№	Land Categories of the Kyrgyz Republic	Jalal-Abad '000 ha	Naryn '000 ha	Osh '000 ha	Total Lands Nationwide	
					'000 ha	%
1	Farmland	1183.53	1304.97	817.52	5684.49	28.43
2	Lands of populated settlements	38.45	21.06	49.26	263.26	1.32
3	Industrial and other lands	13.58	27.15	44.08	223.58	1.12
4	Lands of strictly protected zones	193.39	57.83	25.8	707.41	3.54
5	Forest lands	753.48	390.69	551.13	2613.72	13.07
6	Water basin lands	40.97	58.43	20.18	767.36	3.84
7	Reserve lands	1018.4	2555.88	1403.68	9735.1	48.69
8	Total	3241.80	4416.01	2911.65	19994.92	100.00

Source: State Registration Service of Kyrgyzstan

Livestock production is important in all regions, providing an important source of food and cash income on the small, mixed farms that predominate in the Kyrgyz Republic. It also helps to stabilize incomes in rural households when either crop production or crop prices fall. Cattle are now the most important form of livestock production, followed by sheep and goats, but most farms own some combination of all three. Most herds are small, and productivity is low, as farmers are allocating more land and labor to crop production—except in more mountainous and upland areas.

Livestock is also plays a prominent cultural role and is a valuable asset to respond to households' sudden needs and financial shocks. Livestock output makes up almost half of the total agricultural output, while forestry output accounts for less than 1 percent. A recent baseline survey for IFAD's Livestock and Market Development Project noted that about 90 percent of the rural population owns livestock. Livestock is used for various traditional ceremonies and events as well as function as rural savings accounts where animals can be sold to cope with sudden financial needs and crises.

FAO provides data for Kyrgyzstan Livestock production index from 1992 to 2014 (2004-2006 = 100). The average value for Kyrgyzstan during that period was 101.64 index points with a minimum of 87.68 index points in 1995 and a maximum of 113.46 index points in 2014.



The number of livestock is steadily growing. Animal husbandry is especially prevalent in the central and eastern mountainous regions of the Kyrgyz Republic, where other economic opportunities are limited. The number of livestock has been increasing rapidly during the last decade. According to official data, there were more than 6 million sheep and goats in Kyrgyzstan in 2016, but anecdotal evidence suggests that this number is significantly underestimated, with the real number of sheep and goats likely approaching 8 million.

Table 3. Dynamics in livestock population in 1990-2016 (in thousands)

Livestock	Year	1990	2006	2008	2010	2012	2013	2014	2015	2016	% to 2015
Cattle		1205	1116	1224	1299	1367	1404	1458	1492	1527	102.4
Small ruminants		9996	4046	4502	5038	5424	5641	5829	5929	6022	101.6
Horses		313	347	362	378	399	407	432	449	467	103.9
Poultry			4472	4364	4749	5076	5385	5420	5586	5673	101.6

Source: Ministry of Agriculture, Food Security and Melioration of Kyrgyzstan

Beef accounts for 14 percent of total GAO and sheep meat for 6 percent. Beef production has increased since 1995 and as for 2016 total meat production amounts to 388 thousand tons in live weight. Cow's milk is the most important livestock commodity, with 24 percent of GAO. Production has increased more than 150 percent since 1996, due mainly to an increase in the number of cows. Milk yields increased until 2004, but have fallen slightly since due to reduced availability of feed. They remain low, at approximately 2,000 kilograms per cow/year³. The Kyrgyz Republic produces over one million tons of milk annually, but only processes 2.5% of its production.

³ Kyrgyzstan MoA Database for 2017

Sheep numbers are now half of what they were before independence, while poultry numbers are 31 percent and pig numbers are 15 percent of their pre-independence levels⁴. In contrast, cattle numbers have increased 20 percent and goat numbers have increased more than 600 percent. Livestock production systems have also changed significantly in association with changes in the number and composition of livestock. Pasture- and forage-based production systems now predominate, whereas systems relying on concentrate feed prevailed before independence. Cattle are now more important than sheep with regard to overall feed requirements, and sheep are grown for meat rather than wool. The emphasis has thus shifted to meat and dairy production for domestic and regional markets and away from fine-wool production for international markets.

According to the data of the Ministry of Economy (2017) share of the livestock sector in agriculture amounts to 44.3%. In 2016, economic entities of all categories of the republic produced 388.5 thousand tons of meat in live weight, which by 8.3 thousand tons or 2.2% more than 2015, which is provided by increasing the number of livestock and poultry. The production of milk amounted to 1,524.6 thousand tons, which is 43.5 thousand tons, or 2.9% more than in 2015. Growth in the production of livestock and poultry, as well as milk is provided in all regions of the republic. 469.7 million eggs were produced, which is 36.8 million more, or 108.5% of the 2015 level.⁵ In spite of positive growth indexes of the livestock sector the following strong and weak features as well as the future probable perspectives and probable problems have been identified.

Main livestock breeds in Kyrgyzstan

Cattle

Alatau (Alatauskaya) breed

Alatau breed is the basic breed in the republic and is bred during the long period by reproductive crossing of local Kyrgyz cattle with brown swiss and the Kostroma breeds. As an independent breed, it was authorized in 1950. Animals of this breed are very close with brown swiss, have a little rather short body, a deep breast and lower legs position. The cow's udder capacity is well developed and a daily yield of milk is 10-15 kg. Due to the productive and adaptable qualities to conditions of hot dry summer and severe winter, breed has found wide use in the republic and out of it.

Kyrgyz black - motley cattle

The Kyrgyz black - motley cattle is represented by two subpopulations - Alatau-Holstein and Aulieatino-Holstein hybrids of different generations. The breed is spread basically in Chui and Talas oblasts of the republic.

Aulieatanskaya breed

Aulieatanskaya breed of cattle has been created in 1974 by crossing local cattle with bulls of the Dutch breed, and distributed mainly in Talas areas. Color is black - motley.

Yaks

Yaks are high-mountainous animals, they well adapt and transfer low temperatures. Yaks are very steady against extreme conditions, which are typical for mountain regions of the republic. The basic yaks' production is meat. Yaks meat is considered as an ecologically clean product, and according to the quantity of dry substance and crude protein it surpasses meat of other cattle. The live weight of yaks-cows varies from 260 up to 320 kg, bulls - 380-400 kg. Yaks are spread (distributed) practically on the whole high-mountainous territory of the republic.

There are several farms mainly in Chuy and Talas oblasts rearing purebred imported cattle, such as Holstein, Simmental and Brown swiss. But the number of this cattle is small to be considered as breeds spread in Kyrgyzstan.

Sheep

Kyrgyz coarse-haired fat-tail sheep

Sheep breeding of Kyrgyzstan at the beginning of XX century was limited exclusively to breeding only local fat-tail sheep with coarse-haired (rough) wool. Kyrgyz coarse-haired fat-tail sheep is a unique native breed in the republic. Sheep have strong constitution, satisfactory meat - fat qualities, precocious (early growth), well fatten,

⁴ Sandra Broka, etc. World Bank Group Report Number 103078-KG (2016)

⁵ Information on the results of the social and economic development of the Kyrgyz Republic for 2016. Kyrgyzstan's Ministry of Economy report.

steady against various diseases and easily overcome significant distances. They have large enough size of body, fat tail of round medium-size shape. The average dams' live weight is 55-60 kg, rams' - 70-80 kg. Colour mainly is brown, red, and partly black. Annual wool clip is 1,8-2,0 kg. Last years this breed was crossed to rams of Gissar and Edilbaev breeds, with the purpose to increase live weight and fat tail. It is spread on the whole territory of Kyrgyzstan.

Kyrgyz fine-fleeced or Merino breed

Kyrgyz fine-fleeced breed is the basic in the republic occupying in Soviet times more than 90% according to the number and production. Present time this breed occupies about 30% (or even less) from the whole sheep livestock. Kyrgyz fine-fleeced is bred by complex reproductive crossing of local fat tail coarse-haired dams with rams of fine-fleeced breeds: New Caucasian merino, Siberian Rambulye, Wurttemberg and precos. The breed was probated in 1956. After the improvement introduction crossing was carried out with Groznenskaya, Stavropol breeds and since 1971 with Australian merino. Kyrgyz sheep of fine-fleeced breeds possess good adaptable characteristics to the conditions of high-mountainous pasturable areas and have high-wooly efficiency. Wool clip (shear) in the best breeding herds on the average reaches 4,2- 4,8 kg in the original and 2,3-2,5 kg in washed form, dams' live weight achieves 55-56 kg, productivity is 110-115 lambs on 100 dams. This breed is widespread on the whole territory of Kyrgyzstan. In various regions of the republic there are 5 factory herds, in each of which of them has 5-6 factory lines.

Tyanshanskaya semi-fine-fleeced breed of sheep

Tyanshanskaya semi-fine-fleeced breed of meat-wooly sheep was bred in the result of complex reproductive crossing of precos-fat-tail dams with rams of Lincoln breed of English reproduction. It was authorized in 1956 as independent factory breed. Sheep of Tyanshanskaya breed produce excellent quality meat and valuable crossbred wool. Distinctive features of tyanshan sheep are their high live weight, early growth (precocity), good wool clip and excellent fitness to high mountains conditions. The big size, sturdy and strong constitution, proportionality of the constitution, well developed skeleton and muscles are their characteristics. The average alive weight of rams is 105-110 kg, dams - 60-65 kg. Wool clip in original is 3,5-4,0 kg, and average dams' productivity upon 100 dams is 110-115 lambs. This sheep breed is distributed in Naryn and Jalal- Abad oblasts. There are 4 factory lines.

Alai semi-coarse-haired sheep breed

Alai breed of meat-fat-wooly sheep was bred during the long reproductive crossing process of coarse-haired dams with precos and saradja breeds. In 1981 it has been approved as independent breed. Alai sheep is bred in meat, bacon and qualitative semi-coarse-haired carpet wool purpose. Sheep of Alai breed optimally combine high meat-fat-wooly productivity, early growth, a strong constitution and adaptedness to extreme conditions of high mountains. Nature characteristics of Alai sheep, fixed genetically, are white colour, good weight of the body, well-defined meat forms and correct form of a medium-sized fat tail. The average live weight of rams - breeders is 105 kg, dams - 62 kg. Alai sheep breed is spread in Osh, Jalal-Abad and Chui oblasts.

There are also populations of crossbreeding sheep, received as a result of unsystematic crossing of coarse-haired rams with fine-fleeced and semi-fine-fleeced dams. Now such type of sheep submits the majority of sheep with color wool in the republic. However there are herds of sheep where the homogeneous livestock of fat tail sheep with good fat (suet) – meat qualities appeared as a result of absorbing crossing method of fine-fleeced dams with gissar rams.

Goats

The Kyrgyz downy goats breed

The given breed is bred by crossing of native Kyrgyz goats with Pridonskaya and, partially, with Angora breeds. Breeding animals in fleece wool, on the most part of their body, have in prevalence downy fibers, which contents or mass (according to the weight) are 60-75 % and more. Downy fibers, on the most part of the body, are longer than barb fibers. Length of down of adult goats and dams is 8-10 cm, diameter of fibers is 18-21 microns. Down mainly is light grey, dark grey, and white. The goats – breeders produce on the average 600-700 grams of down, and from breeding dams there are 450-500 grams. Goats are rather large in size and have good meat characteristics. The live weight of male goats in average is 60-65 kg, and dams' is 36-38 kg. Dams' productivity in average is 125-130%. Downy goats are generally bred in Osh and Batken oblasts.

Kyrgyz wooly goat breed

Goats of Kyrgyz wooly breed have strong constitution, differ with high fitness and adoptability to the mountain - pasturable keeping and are characterized by good productive qualities. These goats were bred by reproductive crossing of the hybrids received from transforming crossing of native Kyrgyz goats with the Angora breed. According to the key parameters the wool of Kyrgyz goats approaches to the wool of the Angora type - mohair. Goats - breeders give on the average 2,6-2,8 kg of wool, dams give 1,5-2,0 kg. The length of wool in average is 20 cm, and an output of wool is 80-86%. The average live weight of goats - breeders is equal to 56-58 kg, and dams - 35-37 kg. Reproductive qualities of wooly goats is satisfactory - 105-115%. Kyrgyz wooly goats well use stony and semi-deserted pastures, they are mainly distributed in Jalal-Abad oblast.

Other breeds:

Dairy goats: their livestock is small and basically is represented by hybrids of zaanin, toggenburskaya, and etc. dairy breeds. However, the local population has a great demand on dairy goats as goat milk is used as a dietary product. These animals are remarkable for their productivity and precocity.

Local native and hybrid goats are bred in the whole territory of the republic, and their number is more than 50% from the whole livestock of goats. Native goats are perfectly adapted to local conditions and serve mainly for meat and leather (goatskin) production.

Horses

New Kyrgyz horses breed

New Kyrgyz horses breed has been approbated in 1954 by crossing of local Kyrgyz horses with the Don breed. Horses of New Kyrgyz breed are large enough, the live weight of stallions in average is 450-460 kg, and height in withers is 155 cm, mares correspondingly - 440-450 kg and 151 cm. These horses are used for horses-flesh meat and mare milk, riding, classical and national kinds of equestrian sport. New Kyrgyz horses breed is spread (distributed) on the whole territory of the republic.

Local Kyrgyz horse

Local horses were kept practically in all regions of the republic, though their number is small. In mountain conditions they are indispensable or irreplaceable. Despite of small size, these animals are hardy, unpretentious, viable, and steady against various diseases and hypoxia.

Other breeds

Don, Oryol and Russian trotter breeds of horses are bred in the republic in a small amount. The small population of these horses is kept in Issyk-Kul and Chui oblasts.

With the collapse of the fine wool market and the high price of meat, farmers in many regions are changing from Kyrgyz fine-fleece and other fine/semi-fine-fleece type of sheep to traditional fat-tail and fat-rump, coarse, coloured wool types, which survive on poorer pastures and lower quality fodder and produce a preferred quality of mutton. The return to the indigenous type of sheep is occurring by default rather than as part of any deliberate breeding policy and the result is an untidy mess of mongrel sheep. There are notable exceptions, however, where farmers have retained management control over sizeable flocks and some semblance of the old management structure. Some forward thinking farm farmers are deliberately breeding their ewes to fat-tail/fat-rump rams using breeds such as the Hissar. Some pure bred fine, white wool flocks remain and have their passionate advocates. In 1998 several hundred pure bred Merinos, ewes and rams, were imported from Australia, under a World Bank Project, to 'improve local stock'. This met with considerable, vocal local criticism.

Interest in horses has increased and horse numbers continue to rise. Horses are valued by the Kyrgyz as a source of meat, milk, transport and sport (long distance racing and olak tartu - a team game, played with a dead goat or calf), but not for ploughing or cultivation, though for raking hay. Horse numbers may be higher than the official figures. The low cost of herding and feeding horses and the popularity of horse meat and koumiss make them an attractive proposition for many. Horses play an important part in many Kyrgyz domestic 'events'. In particular, funerals demand the slaughter of horses.

Cattle and sheep numbers have increased but yields and other indicators of livestock productivity, such as calving rates, have changed little.

Livestock feeding in winter is particularly difficult. In Soviet times imported feed amounted to 1 600 000 tonnes; by 1993 it had dropped to 700 000 tonnes and by 1999 to virtually nothing. It is estimated that grain shortfalls are at least 50%, hay 30% and silage 40%. Spring, summer and autumn grazing deficiencies, though less severe, are due to the continuous rather than seasonal, use of pastures, which has and continues to lead to

their deterioration, while neglecting the herbage on the distant summer pastures due to the abandoning of transhumance.

Table 4. Livestock population in Jalal-Abad, Naryn and Osh oblasts (in thousands), as for end of 2016.

Livestock	Jalal-Abad		Naryn		Osh*	
	Number	% to 2015	Number	% to 2015	Number	% to 2015
Cattle	312	102.4	154	105.4	357	101.7
Yaks (in cattle population)	0.305	100.7	18.810	119.8	5.940	101.4
Small ruminants	1266	101.5	1023	101.8	1137	101.0
Horses	65	104.4	108	103.3	94	102.5
Poultry	1067	102.1	192	101.2	947	104.7

*Except Osh city

Source: Ministry of Agriculture, Food Security and Melioration of Kyrgyzstan

Livestock Diseases

In addition to production losses, livestock disease in the Kyrgyz Republic is also a risk to human health and livestock export earnings. The priority disease risks for livestock are brucellosis, anthrax, foot and mouth disease (FMD), echinococcosis, pestes des petits ruminants (PPR), avian influenza, and rabies. Table 5 presents the incidence and impact of these diseases on livestock production, based on official reports to the International Office of Epizootics (OIE) for the period 1996–2013. These data probably underestimate the true incidence and impact of these diseases, however, as they are based on the level of in-country surveillance and reporting to the OIE.

Table 5 Incidence and Impact of Livestock Disease in the Kyrgyz Republic, 1996–2013

Disease	Outbreaks	Susceptible animals	Cases	Deaths	Destroyed	Slaughtered
Anthrax	34	4,235	46	42	11	—
Brucellosis	4,158	15,984,473	62,954	3	8,786	53,305
FMD	98	587,865	7,313	—	—	—
Rabies	251	326,189	324	324	—	—

Source: OIE.

Note: — = none reported.

There were no reported outbreaks of PPR or avian flu. Rabies and anthrax were reported in most years, although their impact on livestock production and human health is regarded as low. On average, FMD outbreaks occur every second year, with most outbreaks (99 percent) occurring in cattle. Losses are higher than reported, as the Kyrgyz Republic does not have a slaughter and destroy policy for FMD, although actual production losses are considered low. Less than 0.5 percent of cattle were reported as infected in the worst outbreak in 2011. The potential impact is much higher, however, with approximately 10 percent of cattle reported as susceptible in the outbreak in 2011. FMD outbreaks in 2007 and 2011 also resulted in a Russian ban on Kyrgyz exports of meat and live animals and a Kazakhstani ban on Kyrgyz meat and dairy products.

Brucellosis poses the greatest risk, not only to production but also to human health and exports. Outbreaks were reported to the OIE in 11 of the 14 years from 1999 to 2013, for both cattle and small ruminants. No deaths were reported for these outbreaks, but an average of 2,340 cattle and 2,830 small ruminants were slaughtered or destroyed in each year of occurrence. In all cases these losses were less than 0.5 percent of total livestock, although there is good evidence that actual infection rates were much higher.⁶ The Kyrgyz Republic also has one of the highest incidences of human brucellosis in the world, with 362 cases per 1 million people (Bonfoh et al. 2012). The continued inability to control brucellosis in both people and livestock led Kazakhstan to ban all dairy exports from the Kyrgyz Republic in 2012–13, depriving farmers and processors of an important source of revenue and depressing milk prices on domestic markets. During a seven-month period, this ban cost the sector an estimated som 5 million per day (US\$10,000), according to MAWR officials.

⁶ Bonfoh et al. (2012) report seroprevalence rates for brucellosis in the Kyrgyz Republic of 2.8 percent for cattle, 3.3 percent for sheep, 2.5 percent for goats, and 8.8 percent for humans.

Disease control measures are implemented with varying levels of effectiveness. Vaccinations are supposed to be carried out twice yearly, with government paying for vaccines and farmers paying veterinarians to administer the vaccines. Government is also supposed to pay for the slaughter and destruction of infected animals, for compensation for farmers (up to 75 percent of the value of the animal), and for planning and enforcement of quarantine and movement restrictions.

Many of the major livestock diseases in Central Asia are highly contagious, trans-boundary diseases that are impossible to control at the national level (for example, FMD, brucellosis, PPR). In the Kyrgyz Republic, these diseases are transmitted by domestic animals, wild animals, people, and vehicles across 3,878 kilometers of border, including 2,150 kilometers with Uzbekistan and Kazakhstan. Support for regional livestock disease surveillance and control offers a means not only to reduce the risks of these diseases, but also to strengthen the capacity of weaker national veterinarian systems.

Natural pastures are the principal source of forage and fodder for livestock. A very limited area, only about 330,000⁷ ha of cultivated land and hayfields in Kyrgyzstan, is sown with fodder crops (compared to 9 million ha of natural pasture land). Although this cultivated fodder area expands every year to respond to the growing livestock number, it is still far from sufficient to feed even the officially declared livestock population over the winter. Thus, natural pastures remain the primary source of fodder and forage year round, with the meadows in the sub-alpine and alpine zones used for summer grazing, and foothills providing grazing areas in spring, autumn and winter. The pasture area, estimated at some 89 000 km², consists of 39 000 km² of summer pasture (above 2 500 m.), 27 000 km² of spring-autumn pastures (between 1 500 and 2 500 m) and 23 000 km² of winter pastures. The summer jayloo, spring jaztoo and autumn guzdo pastures consist principally of perennial grasses and Cyperaceae, which are reasonably resilient under heavy grazing. The winter pastures – kyshtoo/kishlak generally closer to the settlements, are mainly crop residues and aftermaths, or perennial browse and shrubs, which are more prone to being lost if consistently and heavily grazed; though hardy, drought tolerant and cold resistant they are being replaced by woody weeds and unpalatable plants. There are supporting areas of sown, generally irrigated, fodder mainly lucerne and sainfoin and hay meadows, which may also be irrigated.

The maximum carrying capacity of Kyrgyzstan's grazing-land is estimated at 7 000 000 sheep equivalents⁸. This includes all ruminant stock (cattle; yaks; sheep and goats) and horses (the accepted ratio is: one horse = 6 sheep: one cow or yak = 5 sheep; one goat = 0.7 sheep). Official estimates of sheep equivalents is about 15 000 000. Though sheep numbers are significantly reduced the number of 'sheep equivalent' is not when cattle and horses using the pastures and the abandonment of the outlying grazing is taken into account. Previously large numbers of cattle were managed under intensive conditions, and fewer grazed on natural pasture.

The reduction of sheep numbers from 14 500 000 in the late 1980s to 3 000 000 or less in the middle of 1990s should have resulted in a general and gradual improvement of all the pastures. But there has been no policy to bring stock numbers into line with the carrying capacity of the land. The mountain summer pastures, now hardly grazed at all, are under utilised, while the winter and the traditional spring and autumn pastures are hard grazed out of season all the year round.

The 2009 Pasture Law reconnects management of winter, spring autumn and summer pastures and provides more equitable and transparent allocation of pasture rights. Using headage-based pasture tickets and improving pasture assessment and planning skills will better align stocking rates with pasture-carry capacity, and provide a mechanism to increase user contributions to pasture-improvement costs and increase tax revenues. Nation-wide implementation of these arrangements is progressing well.

Besides to large impact to pasture degradation livestock production has another negative impact to natural resources such as methane emission that is delivering 20 times more impact to global warming than CO₂. Sejian and coauthors estimated CH₄ emission rate in developed countries as 55, 7.9 and 5 kg/year per cattle, sheep, and goat, respectively⁹.

Institutions, State support and Ongoing National programs

⁷ KyrgStat. Land fund by type of farmland (2015)

⁸ Anthony Fitzherbert (2006): Country Pasture/Forage Resource Profiles – Kyrgyzstan. FAO: <http://www.fao.org/ag/agp/agpc/doc/counprof/kyrgi.htm>

⁹ Sejian, V., Lal, R., Lakritz, J. and Ezeji, T. (2011) Measurement and Prediction of Enteric Methane Emission. *International Journal of Biometeorology*, **55**, 1-16. <http://dx.doi.org/10.1007/s00484-010-0356-7>

The main Government body responsible for livestock sector in Kyrgyzstan is the Ministry of Agriculture, Food Industry and Melioration where the Department of pastures, livestock and fish farming is coordinates main activities for sustainable livestock production. There are other governmental bodies directly related to livestock in the republic: State Agency on Environment Protection and Forestry, State Inspection of Veterinary and Phytosanitary Safety, State Inspection on Environmental and Technical Safety. Subordinate organizations of the Ministry of Agriculture are State Agency for Veterinary, Agency for pasture, Agency for fishery, Agency for plant quarantine, protection and chemistry, Agency for supply of machine and energy, Agency for development of water resource and land, National Center for Veterinary Diagnosis, National Center for Breed Improvement and Transmission, National Center for Seed Management, National Center for Breed Analysis, Center for Veterinary Medicine Certification, State-owned company "KYRGYZGIPOZEM" Land Management State Laboratory, Center for Cereal Crop Quarantine, Agro bio Center. Livestock research system is consisted of Livestock and Pasture Research Institute, Veterinary Research Institute that work under supervision of Kyrgyz National Agrarian University. The VRI research program focus on research to support implementation of national animal disease control strategies. The staff of VRI is receiving training and equipment to do this. What is less unclear is the future direction, funding levels, and skills capacity in the other research institutes. The LPRI is benefiting from international technical assistance in pasture assessment and improvement but has scant resources. Extension of LPRI research results to farmers has been very limited. Many research institute specialists individually support rural advisory services, but linkages among research and advisory services programs are limited.

Under the Pasture Law, oblast and raion administrations transferred responsibility for management to Local Self Government Body (LSGB) and LSGB delegated management responsibility to Pasture User Unions (PUU) in each Aiyl Okmotu (AO) for a period of 49 years. To date 454 Pasture User Unions have been registered (Jalal-Abad oblast – 68, Naryn oblast – 68, Osh oblast - 88), each managed by its executive body, the Pasture Committee (PC). Besides Governmental bodies there are non-governmental organizations related to livestock such as National pasture users' Association of Kyrgyzstan "Kyrgyz Jayity", a voluntary association of legal entities and a non-profit organization dedicated to improving the ability of pasture users, Pasture User Unions and Pasture Committees to effectively manage and use pasture resources.

The Agricultural sector in general, and livestock in particular, has an important place in the National Sustainable Development Strategy of the Kyrgyz Republic for 2013-2017, which recognizes the urgent need to raise the productivity levels of the sector, and address the declining quality of the animal genetic resources. Main tasks set for the Strategy are: 1) Improve the system of management of the agricultural sector, improve efficiency and effectiveness of regulation; 2) Improve the quality and composition of the servicing and technical services for the agriculture, create prerequisites for the technical and technological modernization of agricultural production; 3) Create conditions for the development of cooperation, improve product quality; 4) Establish a modern market infrastructure for the agricultural complex aiming at promoting wholesale forward markets; 5) Increase production and exports of the agricultural complex, develop export-oriented clusters; 6) Annually introduce new lands; 7) Develop the processing industry with a focus on fodder production, meat and dairy processing, and preservation of produces; 8) Increase effectiveness and efficiency of land use; 9) Decrease natural disaster risks and strengthen preparedness to them; 10) Environment protection; 11) Gender disparity.

The main tasks of the law №91 on Animal Identification in the Kyrgyz Republic (6 June 2013) started for implementation in 2017 with fastening ear-tags to cattle and small ruminants. In spite of apparent advantages of the animal identification, this activity needs on external support in regards of establishing National Animals Registration System which require material and technical inputs.

Strengths, Weakness, Opportunities and Threats analysis (SWOT) of the livestock sector in Kyrgyzstan

Strengths

The strength of the livestock sector in Kyrgyzstan and measures to keep this strength balanced in regards of sustainable NRM is composed in the following table:

Strength of the livestock sector	Measures to keep this strength sustainable and balanced for NRM
Livestock Wealth/ Animal Genetic Resources:	

Share of livestock in total agriculture production is 44.3%;	Improved animal productivity per animal's head with measures to control further increase of population;
Livestock is an important source of food and cash income in public sector;	Ensuring sustainable livestock production for providing reliable income source. Provision of Disease control measures;
Cattle are now the most important form of livestock production, followed by sheep and goats. In comparison to small ruminants, cattle's effect is less harms to pastures. But small ruminants are better adapted to mountain areas and can utilize highlands;	Shift in proportion of livestock grazed in different pastures: more cattle in close (winter, spring/autumn) pastures and prevalence of small ruminants share in remote pastures (besides the ability of sheep and goat graze on slope mountain pastures they don't need to drink water so often as cattle that is also a problem on most pastures);
Some farms are introducing Hissar rams to improve flock breed quality;	Delivering best Hissar rams to sheep flocks in project areas on a constant/continued way from neighboring countries (Tajikistan and Uzbekistan) will ensure steady improving of sheep breeds. Thus farmers/householders can keep 2 pedigree sheep instead of 3 that will result on a pasture pressure decrease;
Yaks are unique animals excellent adapted to remote highland pastures;	Number of yaks decreased from 55.3 thousand in 1990 to 38.5 in 2016. This production system has to be supported and its advantages needs good propagation. For the past 30-year period there was no any activity on improvement of yak's breed as well as the activities on improvement of their productivity. The milk from yaks can be used as high value added product after processing (sterilization) and tetra packing for long time storage.
Honey sector has the highest potential to grow. There are about 1 thousand beekeepers and 90 thousand honey-bee-colonies that produce about 3 thousand tons of honey/year;	Before the Soviet Union collapse beekeepers produced more than 12 thousand tons of honey per year. So there is vast vista for intensive grow of the sector, that will result on better pollinating of plants and increasing their number.
Unique Geographical distribution:	
Natural pastures are the principal source of forage and fodder for livestock. Their yield varies from 200 kg to 800 kg (and more for best pasture areas) of dry matter per hectare.	Different institutional and practical pasture improvement activities should be implemented: elimination of pasture weeds, irrigation and fertilizing, additional sowing, improving pasture management and monitoring, etc.
The summer jayloo, spring jaztoo and autumn guzdo pastures consist principally of perennial grasses and Cyperaceae, which are reasonably resilient under heavy grazing.	Increase in use of remote pastures: better planning and proper allocating, improving infrastructure, collecting of grass with conservation as hay. Conversion of Livestock farm (sheep) in to commercial as pilot in public sector (cooperatives). This will result on decrease on winter pasture pressure.
Feed Resources:	
Availability of Agro land (arable and hay lands), bye products	Propagation of multicut hybrid fodder for Hay and Silage making; Propagation of Total Mix Ration (kombikorm), grains (barley, wheat, corn etc) at kishlak level at fair price shops Introduction of new high yield fodder variety (corn and lucerne hybrids)
Disease Surveillance / control	
Diagnostic services	Strengthening of District diagnostic laboratories with capacity building and infrastructure development

Availability of public and private vets in almost all kishlaks	Provision of mobility to field veterinary staff on project's support and further on from available state revolving fund. Provision of updated technology and missing facilities at field formation (including mobile mapping);
State Vet Agency provides vaccines against main diseases	Development of cold chain infrastructure from vaccine production to utilization;
Availability of public vet clinics on rayon levels	Establishment of Model Veterinary Poly Clinic at rayon level;
Marketing Potential:	
Ecological clean meat and milk products. Export potential.	Establishment of fair price shops for livestock products / by products at oblast/rayon level. Development of District Livestock Business Development Centers for consultation and providing price database for livestock producers. Value addition setup at kishlak level by engaging dairy industry.
Value added products for wool, leather	Establishment of craftsmen cooperatives for carpet and other handmade goods

Weaknesses

Weaknesses of the livestock sector	Measures to overcome weaknesses
Livestock Management:	
Poor Husbandry Practices	Through introduction of effective livestock management plan more cattle should be managed under intensive conditions and fewer grazed on natural pasture. Capacity building of farmers/householders on effective livestock management plan;
Poor Culling System: a lot of poor breed animals, many of animals amongst herds/flocks are over aged (keeping 2-4 year old bulls and rams is not effective)	Effective combination of grazing and subsequent intensive feeding of culled animals in household/farm conditions.
Poor selection of male genes	Developing a flocks/herds Breeding plans with selection criteria for males
Nutritional deficiencies throughout winter/early spring period. Fodder/grain were exported from Soviet Union before impendence. But now livestock has half of their need.	Improving State policy on importing forage grains. Propagation of Total Mix Ration (kombikorm), grains (barley, wheat, corn etc) at kishlak level at fair price shops; Introduction of new high yield fodder variety (corn and lucerne hybrids); Developing a revolving system of distribution of mineral and vitamin supplements
Poor disease control strategy on district, kishlak and households level	Involving specialists on development of disease control strategies for different target groups; Provision of mobility to field veterinary staff on project's support and further on from available state revolving fund. Provision of updated technology and missing facilities at field formation (including mobile mapping); Strengthening of District diagnostic laboratories with capacity building and infrastructure development
Depletion of Animal Feed Resources	Different institutional and practical pasture improvement activities. Increase in use of remote pastures. Delivering trainings of good pasture

	management and livestock practices. Propagation of multicut hybrid fodder.
Institutional and Human Resources Development:	
Shortages of vet/para vet staff (Technical staff) and inputs (Vaccine, Medicines and equipment). 91% of vets are aged individuals (54 years and older). Substandard academic skills.	System approach to enforce vet system: government and projects' support for improving vet academia, enhancing wages and professional attractability, increasing state funding.
Dual Administration of some pastures under Leskhoz allocation, conflict of interests of PU and Leskhoz. From existing 9 mln ha of pastures 1.2 mln belongs to State Agency on environment protection and forestry (SAEPF). The Pasture law doesn't regulate the usage of pastures in SAEPP territories.	Possible reallocation of conflict pastures to pasture fund (PUU). The definition of the belonging of pasture grounds needs to be followed up and ascertained for the single Ayil Okmotys for the future land use.
Lack of accredited veterinary labs for certification of livestock products impedes to export livestock products and sell it for higher prices.	Support to vet labs in purchasing equipment for further undergo accreditation procedure.
Improper/absence of extension services	Establishing of extension service units for livestock producers/PUs on oblast and rayon levels. Ensure regular contacts with R&D institutions
Poor cooperative farming	Cooperative farming opportunities could be tested within project activities
Achieving true data of livestock: Receiving the real data of the livestock situation in kishlaks is difficult. Farmers often do not relinquish their true number of livestock but understate them. They don't want to be charged additional costs.	Enforcement of PUU function in calculating true number of livestock and the fair calculation of the pasture ticket prize (which is subjected to necessary investigations for the animals' composition, shared pasture infrastructure)
Marketing and Investment:	
Nonexistence of proper marketing infrastructure	Development of District Livestock Business Development Centers for consultation and providing price database for livestock producers. Value addition setup at kishlak level by engaging dairy industry.
Lack of information on animal movement & their traceability	Support on Animal identification activities (started by State Agency in 2017) through developing separate database server and establishment animal tracking system
Communication Network	
Livestock website / helpline	Through project activities can be developed Livestock website with features to ensure its sustainability in future (such as including special trade part, advertisements etc). Consultants of different livestock issues can answer online questions from farmer. Web site can be enriched by different Supportive material

Opportunities

Opportunities	Proposed Measures to avail Opportunities:
Livestock Management:	
Increasing the breed quality is an important and effective method to decrease the pressure on pastures. Improving breed and accordingly increasing animals value will allow to decrease the general number of animals, grazed on pastures.	It is important that correctly organized AI for cow breed improving should be used. There were some unsuccessful attempts to introduce AI to jayit committees (based on the info the mission got - Turkish project) and this is not an exemption from global practice. In almost all countries of Central Asia organizing 1 successful AI is alternate with 3

	<p>unsuccessful cases. So appropriate planning AI, establishing AI centers with well trained personnel and infrastructure will for sure guarantee distribution of quality and high productive breeds and finally decrease the pressure to pastures. As for sheep, some communities are buy Hissar rams (the biggest sheep breed in the world) from Tajikistan market to introduce to flock and use them as sires for breed improving. The project can implement several approaches on improving sheep flocks breed – community based Hissar nuclear flock or individual breed improving plans with sire rams rotation.</p>
<p>Strict restriction from jayit committees on number of animals allowed to graze on pastures will prevent harmful effects to pastures.</p>	<p>Enforcement of jayit committees in counting procedures (possible modern technologies can be used)</p>
<p>Removing male cattle (bull-calf) from herds. There are too many male cattle of different ages amongst the herds. Many PU keep them till 3-year age, that is completely not effective and causing almost double pressure to pastures.</p>	<p>Removing from herd /restricting to graze animals older 1-year age can reduce the pasture pressure considerably. So different growing and intensive fattening system in cowshed conditions will result not only to reducing the pressure on pastures, but reflect directly to households income, speeding up the growing and fattening period and allowing to direct obtained money to small business development.</p>
<p>Intensification of beekeeping practices – will enforce the vegetation/recovery on pastures and forests. There is an opportunity to increase honey production to at least 13 thousand tons per year (almost 5 times – the production level of 1990)</p>	<p>Different approaches to increase honey-families and beekeepers: institutional (support with export opportunities); increase interest in beekeeping amongst householders; providing necessary infrastructure and equipment (hives, medicines), loans, packing and certification;</p>
<p>Average milk production can be increased twice and more: currently cows produce about 2000 kg of milk per year (i.e. 6-7 l per day). Local breeds have a potential to increase current milk yield two times whereas improved breeds could produce much more.</p>	<p>Improving dairy cows' breeds, herd management (including using improved rations) and developing dairy value chain;</p>
<p>Effectively use of remote pastures by increasing number of yaks (that are excellent adapted to remote highland pastures). Underuse of pastures is also resulting to their degradation.</p>	<p>State/project support on yak production. The milk and meat from yaks can be used as high value added product after processing (sterilization) and tetra packing for long time storage. Also internal organs and blood in high demand for medicine factories</p>
<p>Intensive chicken production has a great potential for project areas. Big market demand for chicken meat and eggs and availability of labor forces make this opportunity feasible to be developed within the project. In comparison with ruminants chicken don't produce methane and there is no need in vast grazing areas.</p>	<p>Larger flock sizes can easily arise once mortality is reduced through vaccination and improved hygiene. Another approach to disseminate best broiler breeds is to ensure delivering on a constant base 1-day old chicken at reasonable price for broiler production and 4-month old hens for eggs production. The following main constraints should be addressed for sustainable chicken production: disease risk, predators, housing, feed and water, genetic potential, marketing.</p>
<p>Developing turkey production and grazing on winter pastures (around kishlaks) instead of traditional cattle and sheep grazing have also good perspectives. Commercial turkey farming is a profitable business. Turkey grows faster like broiler chickens and become suitable for slaughter</p>	<p>The project can support households for basics steps for starting commercial turkey farming business: introduction/delivering best breeds (several days old chicken), advising on housing and fencing, feeding and watering, care and management, marketing</p>

purpose within a very short time. The impact to environment is much less in comparison with ruminant animals.	
Economic Factors:	
Large consumer market. Regional markets	Kyrgyzstan's food market has lack in delivery milk, meat (specifically chicken) and eggs. Better livestock management will help in increase livestock production and ensuring less harm to NRM: improved cow's breed, rations allowing to less methane producing by ruminants, developing intensive egg and chicken production within household conditions.
Demand for value added products	Some households/farmers can shift their activity from livestock production to collecting, processing and delivering livestock products to areas with demand on livestock products of good quality.
Export of carpet, leather and wool products	Establishment of craftsmen cooperatives for carpet and other handmade goods. State/project support on export opportunities
Shifting of investors towards livestock sector	The cost of raw milk is lower than in neighboring Kazakhstan. While foreign investors cannot own farmland, joint ventures with local partners who own land could further decrease production costs and guarantee a consistent supply of raw milk. Milk yields can also be substantially increased from the current 2-4 liters per day to 15 liters per day. Due to local inefficiencies, milk, butter, yogurt, cheese and other dairy products sold in the Kyrgyz Republic generally are sourced from more expensive producers in Russia and Kazakhstan. With investment in the local dairy industry, Kyrgyz products could reverse this trade flow.

Threats

Identification of threats	Proposed Measures to combat Threats:
Environmental Factors:	
Extreme weather conditions, natural calamities in Kyrgyzstan are often reported for last decades: extremely cold winter and heavy snowfalls, rainy springs and autumns, mudslides, enormously hot summers, droughts	Increasing farms/households resilience: fodder reserves, sheltering/housing improvement. Developing early warning system. Decreasing dependence from pastures (mainly through intensive household production systems)
Endemics, epidemics and zoonotics	Empowering veterinary system: capacity building support, enhancing wages and professional attractability, increasing state funding.
Pollution and negative environmental impact (pasture degradation, methane emission, improper manure management)	Complex measures to address each impact: sustainable pasture management, new livestock production technologies resulting to decrease in methane emission, introduction of correct manure processing practices;
Risk of increased livestock numbers	Measures on herd management and quality management. Breeding for achieving higher quality breeds.
Goat numbers have strong increasing trend (this kind of livestock delivering the most negative impact to pastures due to grazing specifics): increased more than 600 percent (190.5 thousand in 1992 and 856.9 by 2016)	Strict restrictions from PUU to number of goat in flocks: from 10% in the first years to 5% during next 5 years.

Economic Issues:	
Closing borders with Kazakhstan and other neighboring countries can stop export of livestock products	Diversification of international market channels, accreditation of vet labs according to OIE standards to allow them reliable product certification.
Socio cultural factors:	
Theft of valued animals	Establishment of Animal identification, Traceability and Tracking System
Human Resources, low income/poverty: migration of householders and specialists to Russia and Kazakhstan	Visionary change in rural community through Livestock theme based learning for adults; Propagation of livestock income generating activities as cottage industry through skill development concept.
Technological Issues:	
Lack of problem oriented research. Lack of extension services for dissemination of technology	Through government/project support establish a program to boost problem oriented research with solutions and extension to the industry;
Shortage of quality medicine	Establishing vet medicine drug stores in kishlaks with high number of animals
Traditional/unhygienic slaughtering/selling of meat	Establishing and making functional the mini abattoirs on updated technology
Conflict potential between Pus themselves and with Leskhazes	Possible reallocation of conflict pastures to pasture fund (PUU). Enforcement of PUU roles in predicting potential conflicts and solve

Past and Ongoing Development Projects/Programmes

The World Bank and the International Fund for Agricultural Development (IFAD) are supporting implementation of the 2009 Pasture Law through three major projects that focus on the law and other interventions to improve forage supply, animal health, veterinary services, and dairy marketing. The World Bank has supported the Agriculture and Services Project and, since 2014, the Pasture Management Improvement Project, which addresses pasture management, health of livestock (veterinary training and kits, brucellosis control), and value added (dairy, cooling points). Together the IFC and the World Bank are working to support dairy processing by building the capacity of private processing companies and their supply chains. The U.K. Department for International Development, the FAO, the German Development Agency, the Global Environment Fund, IFAD, Australia International Development Agency, and USAID are all active in the agriculture sector.

The Japan International Cooperation Agency has conducted several projects in the Kyrgyz Republic, including the Data Collection Survey on the Dairy Industry (May–November 2013) and various trainings in Japan related to the dairy industry and to milk and dairy products safety and policy. The Project for the Support of Joint Forest Management in the Kyrgyz Republic (2009–14) sought to improve forest co-management. The Community Empowerment Project through Small Business Promotion by the One Village One Product Approach in Issyk-Kul Region, known as the One Village One Product Project, was initiated in 2007 and is currently in its second phase. The project is working with 74 local communities to develop local products and support local economic development. In 2015 it will initiate the Project for a Master Plan on the Inspection of Quality and Safety of Milk and Dairy Products (August 2015 to April 2016), followed by the Project for Improvement in Technology for the Sanitary Management of Milk in Chuy Province (2016–21).

An FAO-supported pilot project on animal identification will provide one oblast with physical ear tags, a database, and scanning equipment for inputting information. Tagging will begin in the dairy industry and at breeding farms. It is expected that 50 percent or more of all households in the village will be active in the pilot. For the purpose of ear tagging and trace back, herds will be co-mingled into groups of 500 head.

In close partnership with UNICEF, the World Food Programme, governmental departments and non-state partners, FAO developed the National Food Security and Nutrition Programme, which is now being finalized by the Ministry of Agriculture and Melioration in collaboration with stakeholders. Activities have been carried out under the European Union-funded project, “Strengthening of the Food Security Information System in the Kyrgyz Republic”. This is the first case of a broad, multi-sectoral food security instrument being implemented in the country.

Since 2012, FAO has been partnering with the International Fund for Agricultural Development (IFAD), WFP and UN Women in a five-year Joint Programme on Rural Women's Economic Empowerment. Kyrgyzstan is one of seven target countries (together with Nepal, Guatemala and Ethiopia, Liberia, the Niger and Rwanda). FAO sees this Joint Programme as a unique opportunity to expand its work on gender and to strengthen collaboration with other UN agencies for maximum impact at the country level.

In 2014, the second phase of a successful project for "Sustainable Fish and Aquaculture Development in Kyrgyzstan" was launched. The project is directly in line with Kyrgyzstan's national agricultural development priorities, which sees a major role for fisheries in contributing to a right to food approach, improving food and nutrition security and strengthening rural development. The previous phase of the project resulted in the creation of fisheries associations to promote the participation of farmers and fishing communities in the management and development of aquaculture and fisheries, while two private-public partnerships were established to promote primary fish processing and equipment was supplied to a fisheries laboratory at the country's Institute of Biology. In addition, more than 1 000 fish farmers and fishermen, technical officers, academics and researchers improved their technical skills and knowledge of best practices through the project's training activities, and biodiversity indices and radiation levels were determined for fish and water in Issyk-Kul Lake.

The first single-country Global Environmental Facility (GEF) project to be implemented by FAO in the region became operational in Kyrgyzstan in September 2014. Entitled "Sustainable management of mountainous forest and land resources under climate change conditions", the four-year US\$5.5 million project aims to apply an integrated crosssectoral approach. It will consider the role of land and forest resources in the carbon balance, for example, while generating multiple global environmental and socio-economic benefits by sustaining flows of critical ecosystem services, including climate and water regulation, soil erosion control and regulation of natural hazards. New sustainable forest and land management approaches and practices will be promoted to increase the productivity of healthy forest and agroecosystems. The ultimate objective is to improve livelihoods of mountain people, including rural women and other disadvantage groups who largely depend on agriculture-based incomes.

Other FAO supported development projects in Kyrgyzstan are summarized as follow: GCP/SEC/001/TUR; GCP/SEC/003/TUR; TCP/KYR/3302; TCP/KYR/3401; TCP/KYR/3501; TCP/KYR/3404; TCP/KYR/3503; TCP/KYR/3504; TFD-13/KYR/001; GCP /KYR/014/ SWI.

Lessons Learned and Good Practices

Projects working on improving capacities and skills of farmers should consider the extent to which the expected outcomes may depend on other factors, like availability of machinery, seeds, fertilizers, and other resources needed to apply the learned practices.

Project design needs to pay greater attention to the technical and absorption capacity of the implementing agencies and parties. Low capacity of the Ministry of Agriculture, Livestock and Pasture Institute, as well as of beneficiaries undermined projects activities. Projects should not be too complex and fragmented in terms of implementation arrangements.

Projects need to be centered in the government agency with capacity building activities focused as much as possible on related governmental institutions to ensure replicability and sustainability of the results. With the high turnover in government agencies, this might be difficult to achieve and new approaches need to be considered to ensure that developed knowledge is well documented and widely disseminated to all stakeholders to ensure its availability and use.

External technical assistance need to be closely interlinked with implementing agencies and parties to ensure ownership and maintain commitment.

Investment in hardware (equipment, machine, etc.) without investment in operating skills leads to procurement of goods that are either not suitable or are under-utilized and as such a waste of resources.

Broad-spectrum change in a complex sector where there is limited experience can be made effective through a learning-oriented and continuously adaptive program approach aimed at establishing a platform for future development.

Project design and implementation arrangements need to correspond to the capacity of all implementing agencies and beneficiaries.

Major policy and legislative reform need extensive technical support and adopted through wide consultation processes.

A strong Monitoring and Evaluation (M&E) system is particularly important for projects that pioneer new approaches, and may need adjustment as implementation progresses. Monitorable indicators to measure achievements against the project objectives, and M&E arrangements, need to be detailed prior to project commencement including processes that enable learning from evaluation results.

Effective donor cooperation at the country and project levels significantly improves the prospects for achieving development objectives by generating positive synergies, minimizing duplication and overlap, avoiding conflicting and/or confusing advice, and facilitating mutual support across projects.

While financial independence for providers of agricultural services is generally desirable, selffinancing options need to take account of the public goods nature of some services, the special needs of poorer rural communities, and the rate at which communities and entrepreneurs can adapt to a pay-for-service environment.

Overall, it was possible to bring about quite far-reaching changes in the management of a key natural resource in the country. Critical to the success was the development of a vision on pasture management transfer and what the system would look like based on real life experience from an initial pilot. These principles then informed specific policy initiatives and the development of the legal framework.

The vision and strategy need to be built on consensus of all stakeholders. At that stage, all stakeholders agreed that pasture management system needs to be revised to reflect rapidly growing livestock number in smallholder farms coupling with increased resource degradation.

There is a weak capacity in government agencies to formulate policy and requires extensive technical support.

Policy needs to be geared towards social targets, such as increased access to pastures, economic factors such as improved animal productivity and profitability (in addition to increased number of livestock), and environmental targets, such as improved areas of pasture and increased areas under sustainable use.

Policy and strategy initiatives should have a clear Monitoring and Evaluation plan with allocated adequate resources and clear plan to implement it. An issue in assessing the effectiveness of reforms has been the relatively weak M&E system and reporting on outcomes in the project to implement the reforms. Projects should have planned outcomes, such as fee collection rate, financial solvency and quality of O&M of pasture areas. The ultimate outcomes are livestock productivity, farm income, rural standards of living, and human health. Projects need to have monitoring and evaluation system with indicators to monitor and measure reform, such as total cost of pasture management, adequacy of resources mobilized for pasture management, collection rate for pasture management fee, quality of the management (equity, timeliness, reliability, adequacy), organizational effectiveness of PUUs, profitability of grassland based livestock, and etc.

Institutional relationships are important. There are good institutional relationships evinced between the State Registration Agency and the Ministry of Agriculture which led to relatively easy title issuance and registration process. These need to be sustained. On the other hand, lack of cooperation and support from Giprozem limited access to necessary cadastral inventory data, legal information and maps. This needs to be resolved.

Knowledge needs to be experimented before massive transfer and up-scaling. Given the pioneering nature of the effort, there needs to be substantial learning by doing in order to develop the local governance and management institutions in order to perform well. It is imperative to develop approaches and test it on a small scale first before up-scaling on a country level to minimize cost and avoid frustration of beneficiaries.

There remains poor connections between policy, research and on ground practice of livestock farming. For instance, there has been various research undertaken by the Pasture Institute on fodder production which have not been translated into policy or capacity building of PUUs.

The absorbing capacity of knowledge on pasture management by the PUUs is low. PUU and PCs are still at the very initial stage. Trainings are attended by chairpersons and in some cases by accountants. Many of these people often lack basic understanding of the pasture management issues and are not able to absorb and apply received knowledge. Other members of PC are reluctant to participate in trainings since they often are not engaged in PC activities or engaged in a very limited way (collection of fees from specific groups). This then requires a two-track system of capacity building at the local level. Capacity-building related to participation in the direct reforms and programs of the project, such as the pasture improvement grants, can continue largely as in the past. However, substantive issues related to sustainable pasture resource management will require a longer-term program of instruction which is geared to the local level absorption capacity as well as the

particular needs of different communities and their management of pastures. Substantial resources need to be put into technically well-targeted training while also ensuring that this is put in terms that are relevant -- and hence implementable -- by the PUUs and PCs.

As is often the case with mass training, high turnover of participants - mainly chairpersons and accountants in PCs -- would lead to the complete loss of transferred knowledge.

Exchange visits of PC members to successful PUUs were regarded as very effective and appreciated by all participants. Evidently, poorly performing PCs were able to learn from peers and replicate good lessons in their work. Future training should likely target some of the best performing PC chairs to conduct knowledge exchanges in terms that are easily comprehended and accepted by others.

Guidelines for preparation of pasture management plans, and the plans themselves, should be simple, considering traditional and existing knowledge at the grassroots level. A few basic principles should be emphasized, above all that the plans must aim to ensure adequate seasonal movement of animals over the entire range of the available pastures. Furthermore, there must be a commitment to take effective measures to enforce the provisions of this plan in protecting pastures.

The use of the more distant pastures must be made obligatory for all livestock owners during the spring, summer and fall, when only a minimal number of animals, to cover the needs of the local households, should be allowed to graze on the near-village pastures. This is a fundamental prerequisite for the rehabilitation of the winter pastures, since they must have adequate time to recover and seed in the spring and early summer. The PCs should develop and enforce pasture management plans that are appropriate for the small farms and households, including the hiring of community shepherds. If necessary, stall feeding must be enforced for animals that are not sent to the more distant pastures. Monitoring mechanisms through use of mobile telephony can be considered to provide for enforcement.

Rotational grazing systems should be introduced to provide the plants the necessary rest periods and the possibility to produce seeds. An annual change of specific areas to be excluded from grazing should be considered if the introduction of a rotational grazing system is too difficult to realize.

Devolution on rangelands leads to an increasing influence of a powerful and affluent segment of livestock keepers and skilled urban absentee herd owners. This may be accompanied by an unequal distribution of productive assets and the emergence of new poverty groups if there are no proper safeguards in place.

The problem with rehabilitation of roads, bridges and other infrastructure that in mountainous areas they get deteriorated very fast. PUUs need to have access to machinery to maintain the infrastructure in the course of the O&M. The machinery can be owned jointly by several PUUs either at the rayon level or along the watershed boundaries depending on the size of pastures of the *Aiyi Aimak*, their proximity to each other.

Pasture improvement micro projects without adequate technical support can fail and lead to frustration and decrease of trust from the PUU members to PC. In one observed area, PC made investments in near village pasture area with seeding of improved fodder but at the end of the year it was severely degraded because of even increased pressure from the cattle. In other cases, PUU/PCs had limited knowledge and ability to address raised in Community Pasture Management Plan problems.

Recommendations on project's interventions related to livestock management

Component 3 - Green Value Chains Development

Sub component 3.1- developing a sustainable green livestock production chain

The component will support increasing carbon sinks and reducing GHG emissions by pasture and forest users' access to skills and technology through the establishment of productive partnerships at *ayil aimak* (sub-district) level, and improved collaboration amongst value chain actors. More specifically, Component 3 will focus (besides the other activities) on decreasing the pressure on pastures and methane emissions reduction by promoting income diversification and more productive livestock generating higher returns.

Sub component 3.2- outcomes:

A stable system of diversified and high prolific livestock production to ensure sustainable NRM is developed and implemented

Outputs:

- Innovative low methane emission livestock husbandry practices are piloted and documented at the local and national levels;
- Upgraded approaches decreasing the pressure on pastures are tested and implemented in all project areas with dissemination of best practices within the country.

Rationale

Livestock production has the largest impact to natural resources mainly through overgrazing and methane emissions. Overgrazing is the greatest cause of degradation of pastures and the overriding human-influenced factor in determining their soil carbon levels. Consequently, in many systems, improved grazing management, such as optimizing stock numbers and rotational grazing, can result in substantial increases in carbon pools. Improved pasture management is a major area where soil carbon losses can be reversed leading to net sequestration, by the use of trees, improved species, fertilization and other measures. Since pasture is the largest anthropogenic land use in Kyrgyzstan, improved pasture management could potentially sequester more carbon than any other practice.

Methane emissions by ruminants are not only an environmental hazard but also a loss of productivity, since methane represents a loss of carbon from the rumen and therefore an unproductive use of dietary energy (US-EPA, 2005). Emissions per animal and per unit of product are higher when the diet is poor. The most promising approach for reducing methane emissions from livestock is by improving the productivity and efficiency of livestock production, through better nutrition and genetics. Greater efficiency means that a larger portion of the energy in the animals' feed is directed toward the creation of useful products (milk, meat, draught power), so that methane emissions per unit product are reduced. The trend towards high performing animals and towards monogastrics and poultry in particular, are valuable in this context as they reduce methane per unit of product.

The ability of livestock farmers to harmonize the use of their pastures to sustainable NRM is constrained by many problems, including the low breed value of grazed animals, not diversified livestock production and poor husbandry practices with high methane emissions, lack of technical knowledge of small livestock holders, poor governance arrangements on pasture management, inefficient management of community livestock, shortage of feed during the winter months, environmental degradation, and lack of access to quality fodder seed and infrastructure - all of this further exacerbated by climate change. The component will address these constraints in an effort to reduce livestock methane emission and ensure households maximize their returns while guaranteeing the sustainable management of pastures. Enforcement of animals' health care system will complement such an effort.

The Project is sturdily associated with, and contributes to the priorities of the Kyrgyz Republic's Second National Communication (SNC) to UNFCCC, which identifies agriculture and livestock as one of the four most vulnerable areas to climate change. The Project is also aligned with other relevant national policy documents and initiatives, including: the Kyrgyz Republic's Strategy on Adaptation to Climate Change till 2020 (2013) and the National Strategy for Sustainable Development 2013-2017.

Detailed Description of Interventions

The Component will focus on decreasing the pressure on pastures and methane emissions reduction by promoting income diversification and more productive livestock generating higher returns through: (i) developing a sustainable livestock breeding system; (ii) diversifying livestock production and Improving husbandry practices to reduce methane emissions; (iii) developing a systematic approaches aimed to decreasing pressure to pastures; (iv) enforcement of animals' health care system.

Developing a sustainable livestock breeding system

3. The most promising approach for reducing methane emissions from livestock is by improving the productivity and efficiency of livestock production, through better nutrition and genetics. Greater efficiency means that a larger portion of the energy in the animals' feed is directed toward the creation of useful products, so that methane emissions per unit product are reduced. Main cattle breeds on project areas consisted of low productive breeds as a result of spontaneous and uncontrolled mating. Developed during Soviet times Alatau, Kyrgyz black-motley, Aulieatanskaya breeds along with local

Jaydara breed are well adapted to pasture conditions, though productivity is low. They currently produce on average 2 tons of milk per cow/year and average body weight at slaughtering time 300 kg. Improved breed composition will allow to decrease or at least control the cattle number under current index and achieve two project's targets: decrease pressure to NRM and reduce methane emissions. Thus increasing the breed quality is an imperative and effective methods to decrease the pressure on pastures. Improving breed and accordingly increasing animals value will allow to decrease the general number of animals, grazed on pastures. Cattle breeds need to be improved through breed improvement plan (AI and proper animal selection for breeding); It is important that correctly organized AI for cow breed improving should be used. There were some unsuccessful attempts to introduce AI to jayit committees (based on the info the mission got - Turkish project) and this is not an exemption from global practice. In almost all countries of Central Asia organizing 1 successful AI practice is alternate with 3 unsuccessful cases. Most of AI points are not functioning due to limited access to liquid nitrogen and low skills. So appropriate planning AI (enforcement of liquid nitrogen delivery on regular base and effective on-job training on AI), establishing AI centers with well trained personnel and infrastructure will for sure guarantee distribution of quality and high productive breeds and finally decrease the pressure to pastures.

4. Due to sheep wool prices and demand significantly decreased recent decades main sheep population consist of Kyrgyz coarse-haired fat-tail sheep. Some farms are introducing Hissar rams to improve flock breed quality. Delivering best Hissar rams to sheep flocks in project areas on a constant/continued way from neighboring countries (Tajikistan and Uzbekistan) will ensure steady improving of sheep breeds. Thus farmers/householders can keep 2 pedigree sheep instead of outbred 3 that will result on a pasture pressure decrease and reducing methane emissions. Some communities are buy Hissar rams (the biggest sheep breed in the world) from Tajikistan market to introduce to flock and use them as sires for breed improving. The project will implement several approaches on improving sheep flocks breed: community based Hissar nuclear flock or individual breed improving plans with sire rams rotation, developing a flocks/herds Breeding plans with selection criteria for males.

Diversifying livestock production and Improving husbandry practices to reduce methane emissions

7. Even with current low genetics the livestock productivity is far below its potential due to poor husbandry practices. Local cattle breeds have a potential to increase current milk yield two times whereas improved breeds could produce much more. Average milk production can be increased twice and more: currently cows in Kyrgyzstan produce on average about 2000 kg of milk per year (i.e. 6-7 l per day) whereas with improved feed rations and better management their yield can be 10-14 l daily. Methane emissions per animal and per unit of product are higher when the diet is poor. Poor culling system of males for beef and mutton production is also delivering to low income generation pursuing householders to keep more animals: a lot of poor breed animals, many of animals amongst herds/flocks are over aged (2-4-year-old bulls and rams). There are too many male cattle of different ages amongst the herds. Many PU keep them till 3-year age, that is completely not effective and causing almost double pressure to pastures. Through introduction of effective livestock management plan more cattle will be kept under intensive fattening conditions and decreasing the number of animals grazed on natural pasture. PC will introduce restrictions to age of male animals (on the same time preventing uncontrolled mating of female with low bred males) for elder 1 year-old with substitution of grazing to intensive fattening in household conditions: effective combination of grazing and subsequent intensive fattening of culled animals. Removing from herd /restricting to graze animals older 1-year age will considerably reduce the pasture pressure. Different growing and intensive fattening system of culled males in cowshed conditions will result not only to reducing the pressure on pastures and decrease in methane emissions, but reflect directly to households income, speeding up the growing and fattening period and allowing to direct obtained money to small business development. By this activity project can achieve at least 20% decrease of pasture pressure. The project will conduct trainings of farmers/householders on effective livestock management plan, intensive fattening methods, preparing rations, identifying animals' age (PC members), propagation of multicut hybrid fodder for Hay and Silage making, addressing nutritional deficiencies throughout winter/early spring period, new livestock

production technologies resulting to decrease in methane emission¹⁰, introduction of correct manure processing practices, sheltering/housing improvement, decreasing dependence from pastures). This activity will be supported by introduction of new high yield fodder variety (corn and lucerne hybrids), stimulating manufacturing and propagation of use Total Mix Ration (kombikorm), grains (barley, wheat, corn etc), establishing forage shops at kishlak level and developing a revolving system of distribution of mineral and vitamin supplements along with them.

8. Before the Soviet Union collapse beekeepers produced more than 12 thousand tons of honey per year. There are about 1 thousand beekeepers and 90 thousand honey-bee-colonies that produce about 3 thousand tons of honey/year (4 times less than in Soviet times). So there is vast vista for intensive grow of the sector, that will result on better pollinating of plants and increasing their number. Intensification of beekeeping practices will enforce the vegetation/recovery on pastures and forests. There is an opportunity to increase honey production to at least 13 thousand tons per year (almost 5 times – the production level of 1990). Different approaches to increase honey-families and beekeepers: institutional (support with export opportunities); increase interest in beekeeping amongst householders along with delivering trainings on this practice; providing necessary infrastructure and equipment (hives, medicines), loans, packing and certification. Besides the positive effect to natural resources dissemination of honey production practice will draw householders' effort from livestock production thus allowing to reduce their number.
9. Chicken production is considered as a system with lowest methane emissions. Due to specifics of digestion system they don't produce methane at all. Sustainable NRM needs diversification of livestock production for creating opportunities to balance its influence as well as to be adaptive to climate change. Intensive chicken production has a great potential for project areas. Big market demand for chicken meat and eggs and availability of labor forces make this opportunity feasible to be developed within the project. In comparison with ruminants chicken don't produce methane and there is no need in vast grazing areas. Larger flock sizes can easily arise once mortality is reduced through vaccination and improved hygiene. Another approach to disseminate best broiler breeds is to ensure delivering on a constant base 1-day old chicken at reasonable price for broiler production and 4-month old laying hens for eggs production. The following main constraints should be addressed for sustainable chicken production: disease risk, predators, housing, feed and water, genetic potential, marketing. For this issues wide propaganda and training activities on chicken production in household conditions along with small grants (for demonstration plots) and loans will be discussed with communities for proper planning and implementation. Once the profit from chicken production is prevailed to income of cattle and sheep the number of ruminants will decrease due to shift of livestock producers' efforts to less harmful for NR business.
10. Developing turkey production and grazing on winter pastures (around kishlaks) instead of traditional cattle and sheep grazing have also good perspectives. Commercial turkey farming is a profitable business moreover impact to environment is much less in comparison with ruminant animals. Turkey grows faster like broiler chickens and become suitable for slaughter purpose within a very short time. The project can support households for basics steps for starting commercial turkey farming business: introduction/delivering best breeds (several days old chicken), advising on housing and fencing, feeding and watering, care and management, marketing issues.
11. Prices for livestock and their products are significantly varying from villages level to urban markets. Almost 90% of cattle and small ruminants are sell alive on livestock bazars allowing to gain large

¹⁰ A number of technologies exist to reduce methane release from enteric fermentation. The basic principle is to increase the digestibility of feedstuff, either by modifying feed or by manipulating the digestive process. Most ruminants in the country live on a very fibrous diet. Technically, the improvement of these diets is relatively easy to achieve through the use of feed additives or supplements (e.g. dietary fat supplementation or increased grain feeding). Another technical option is to increase the level of starch or rapidly fermentable carbohydrates in the diet, so as to reduce excess hydrogen and subsequent CH₄ formation. US-EPA (2005) reports that greater efficiency of livestock production has already led to an increase in milk production in the USA while methane emissions decreased over the last several decades. The potential for efficiency gains (and therefore for methane reductions) is even larger for beef and other ruminant meat production, which is typically based on poorer management, including inferior diets. More advanced technologies are also being studied, though they are not yet operational. These include: reduction of hydrogen production by stimulating acetogenic bacteria; defaunation (eliminating certain protozoa from the rumen); and vaccination (to reduce methanogens).

share of profit to middlemen and butchers. Development of District Livestock Business Development Centers for consultation and providing price database for livestock producers on village level will allow to avoid price misbalance and to gain higher income for householders.

12. The wool from meat breed sheep (main breed population on project sites) is almost of no value as well as other livestock byproducts, such as skin, horns etc. The project will study different practices for production value added products for wool, leather: establishment of craftsmen cooperatives for carpet and other handmade goods.

Decreasing pressure to pastures

3. For householders of project areas cattle is now the most important form of livestock production, followed by sheep and goats in all three project's oblasts. In comparison to small ruminants, cattle's effect is less harmful to pastures whereas small ruminants are better adapted to mountain areas and can utilize highlands hard-to-reach for larger animals such cattle. Besides the ability of sheep and goat graze on slope mountain pastures they don't need to drink water so often as cattle that is also a problem on most distant pastures. The summer jayloo, spring jaztoo and autumn guzdo pastures consist principally of perennial grasses and Cyperaceae, which are reasonably resilient under heavy grazing. Shift in proportion of livestock species grazed in different pastures - more cattle in close (winter, spring/autumn) pastures and prevalence of small ruminants share in remote pastures will not only address to overgrazing problems of closely located pastures but improve the quality of remote pastures that are underused resulting as well in degradation for this reason. This shift in livestock species proportion will be undertaken through PUU/PC, in way of restriction for number of small ruminants allowed to graze on close pastures. The activity will be advanced with wide consultation with pasture users elucidating perspectives of such shift and discussing the animals' proportion.
4. Another approach of shifting the householder attention from traditional grazing on close pastures ruminants is yaks production. In all project's areas there are highland pastures where only yaks excellent adapted. The number of yaks is amounts to 12% of total cattle population in Naryn oblast. Yak physiology is well adapted to high altitudes, having larger lungs and heart than cattle found at lower altitudes, as well as greater capacity for transporting oxygen through their blood due to the persistence of foetal haemoglobin throughout life. Conversely, yaks have trouble thriving at lower altitudes, and are prone to suffering from heat exhaustion above about 15 °C. Further adaptations to the cold include a thick layer of subcutaneous fat, and an almost complete lack of functional sweat glands. Compared with domestic cattle, the rumen of yaks is unusually large, relative to the omasum. This likely allows them to consume greater quantities of low-quality food at a time, and to ferment it longer so as to extract more nutrients. Yak consume the equivalent of 1% of their body weight daily while cattle require 3% to maintain condition. In Kyrgyzstan number of yaks decreased from 55.3 thousand in 1990 to 38.5 in 2016. For the past 30-year period there was no any activity on improvement of yak's breed as well as the activities on improvement of their productivity. The milk from yaks can be used as high value added product after processing (sterilization) and tetra packing for long time storage. The project will support this production system through propagation of its advantages and stimulating householders to change their businesses from cattle/sheep production in lower lands to yaks production. Small grants and favorable loans supported by training activities will be used for implementation of this activity.

Enforcement animals' health care system

3. Together with degradation of pastures, major diseases, such as brucellosis, echinococcosis and foot-and-mouth disease as well as parasites negatively impacts to livestock production, pursuing householders to keep large number of animals in a hope that diseases will harm part of them. The health of animals has deteriorated with the reduction in veterinary services and there is now a considerably reduced veterinary service, though there are attempts to strengthen the service, primarily through support for private vets and by building up the capacity of community vets.

Diagnostic services have obsolete and out of work equipment and lacking in diagnostic means. For this issue the project will invite the OIE experts to conduct baseline condition of diagnostic services (the last mission has been held in 2007) and develop recommendations on strengthening of four project's District diagnostic laboratories. Further the project will develop plan for enforcement district diagnostic facilities with capacity building and infrastructure development program. The program will include accreditation of veterinary labs for certification of livestock products to promote export of livestock products and sell it for higher prices.

4. Animal health is fundamental input to ensure healthy and productive livestock essential to rural livelihoods. The high prevalence of animal diseases not only causes high mortality and low productivity, but poses a significant public health risk. For instance, the high rate of brucellosis and other zoonosis reduces potential off take, limits market access especially for export of animals and livestock products, and creates significant public health concerns. In spite of availability of public and private vets in almost all kishlaks their capacity to address effectively health problems of livestock is low. The 91% of vets are aged individuals (54 years and older). Graduates from vet faculty possess substandard academic skills with almost no practical experience. The simple example of unsuccessful experience on AI practice shows the needs to enforcement of veterinary service on kishlak level. Kyrgyz State Agrarian University and its research institutes lacking of problem oriented research. It should be also noted not existence of extension services for dissemination of vet technology. As part of veterinary service responsibility information on animal movement and their traceability is not tracking. It is difficult or even impossible to get true data on animals' population due to absence of animals' registration system, the responsibility of veterinarians. The project will work on the following activities to address this issue: provision of mobility to field veterinary staff and ensuring further support from available state revolving fund; provision of updated technology and missing facilities at field formation (including mobile mapping); development of cold chain infrastructure from vaccine production to utilization; establishment of Model Veterinary Poly Clinic at rayon level; establishment of technical bridge between academia, research and field formation by strengthening existing research institutions (stipendiary researches for young scientists); support on Animal identification activities (started by State Vet Agency in 2017) through developing separate database server and establishment of Animal identification, Traceability and Tracking System; establishing vet medicine drug stores in kishlaks with high number of animals.

Institutional Aspects and Implementation Arrangements

The State Agency for Environmental Protection and Forests (SAEPF), in its capacity of the National Designated Agency (NDA) will have the overall responsibility for project management on behalf of the Government of Kyrgyz Republic. A dedicated Project Management Unit will be established under the NDA to be responsible for overall management, coordination, oversight, monitoring, procurement and financial management, knowledge management and evaluation of the project. **The State Inspectorate for Veterinary and Phytosanitary Security (SIVPSS) and Kyrgyz National Agrarian University under the guidance of the NDA will be responsible for implementing Sub-Component "Developing a sustainable green livestock production chain".** Memoranda of Understanding (MOUs) would be drawn up between the PMU and implementing partners for implementation of project activities. The project will work under the guidance of a Steering Committee (SC) formed by the following institutions: SAEPP (NDA and Chair of the SC), MAFIM, MES, the State Agency for Local Self-Government and Inter-Ethnic Relations; the State Agency of Architecture, Construction, Housing and Communal Economy and FAO. The Steering Committee will include, as observers, representatives of civil society as well as of national academia and the research sector. The Steering Committee will have the following main functions: i) provide political and strategic orientation; ii) secure good inter-institutional coordination; iii) promote and enhance coordination within the donors' community; and iv) review and approve the annual work plans and budgets presented by the PMU. FAO will provide technical assistance, implementation support and supervision of the project through UTF arrangements with the GOK.

Expected Benefits

Through improved management of livestock – improved breed composition and controlling further growth of animals population (over improving PUU management and establishment of Animal identification, Traceability and Tracking System), diversifying livestock production, increasing pollinating of plants, improving husbandry practices to reduce methane emissions and decreasing pressure to pastures - the project will contribute to

reducing GHG emissions of about 75,000 (TBC with exact data obtained for 4 project districts on animal population) tonnes of CO2 eq.

Monitoring and Evaluation

The project's interventions to livestock sector in its positive impact to NRM will be monitored through selected criteria: improved breeds, control of animals' population, number of households diversified livestock production and number of poultry originated from diversification activities, estimated decrease in methane emissions

In order to collect evidence to respond to the study questions, a sequential mixed methods strategy will be applied. Mixed methods, including qualitative research techniques such as key informant interviews and Focus Group Discussions (FGDs) and quantitative techniques such as individual interviews with project beneficiaries, will be used to gather evaluative information related to programme relevance, effectiveness and impact, and sustainability. The wide information on pre- project situation (baseline) will be compared through intermediate and final situation. In order to identify and have evidence of the project outcomes quasi-experimental research design will be applied, when a control group of farmers, which were not covered by the project activities will be surveyed.

Risks and Mitigation

The main risks to Project's livestock husbandry improvement activities implementation are the following:

Impossibility to change livestock keepers trend in growth in animal population. Mitigating factors – enforcement PUU/PC authority on animal number restriction; vast propaganda of project's proposals on diversification of livestock production system.

Lack number of vet/paravets on project areas to support Animal Identification and Health Care activities. Mitigating factors – provide incentives for young people in the major livestock keeping areas to enter the veterinary faculty/vocational schools to become a community vet

Livestock diseases. The priority disease risks for livestock are brucellosis, anthrax, foot and mouth disease (FMD), echinococcosis, pestes des petits ruminants (PPR), avian influenza, and rabies. Mitigating factors – enforcement veterinary system; development of cold chain infrastructure for vaccine usage;

Sustainability

Once implemented the sub component activities will be sustainable in a long run due to obvious advantages such as improved and high productive livestock, reliable income from diversification, maintainable natural resources and good level of vet services.

Conclusions

The livestock sector accounts for about half of agriculture's contribution to GDP, and is one of the strongest components of the rural economy. Livestock products represent a substantial part of the diet and as much as 20 percent of total food consumption in kilocalorie (Kcal)/per capita. In 2016, the livestock industry accounted for 6 million sheep and goats, 1.5 million cattle (including yaks), 0.46 million horses and 5.6 million chickens. More than 90 percent of the livestock are owned by small-scale farmers.

Since 1995 livestock numbers have been increasing, particularly in recent years. From 2010-2016 the number of cattle, horses, sheep and goats increased by 17 percent, 19 percent and 23 percent respectively, increasing pressure on pasture reserves. As a result there is an imbalance in pasture utilization, marked by under-grazing of distant summer pastures and over-grazing of village/nearby pastures. This situation, together with insufficient quality feed in the winter and early spring, has resulted in low livestock productivity. Data show productivity per capita is stagnant, raising concerns about livestock management.

Poor husbandry practices and increasing livestock population delivering considerable harm to natural resources. The ability of livestock farmers to harmonize the use of their pastures to sustainable NRM is constrained by many problems, including the low breed value of grazed animals, not diversified livestock production and poor husbandry practices with high methane emissions, lack of technical knowledge of small livestock holders, poor governance arrangements on pasture management, inefficient management of community livestock, shortage of feed during the winter months, environmental degradation, and lack of access to quality fodder seed and infrastructure - all of this further exacerbated by climate change. To address these issues the project will implement different activities (besides the other activities) on developing a sustainable

green livestock production chain. More specifically, the project will focus on decreasing the pressure on pastures and methane emissions reduction by promoting income diversification and more productive livestock generating higher returns. Enforcement of animals' health care system will complement such an effort.

Through improved management of livestock – improved breed composition and controlling further growth of animals population (over improving PUU management and establishment of Animal identification, Traceability and Tracking System), diversifying livestock production, increasing pollinating of plants, improving husbandry practices to reduce methane emissions and decreasing pressure to pastures - the project will contribute to reducing GHG emissions and to restoration and sustainable use of pasture resources.

The list of Laws and normative documents related to livestock in Kyrgyzstan

Law No. 175 "On veterinary practice". Date of original text: 30 December 2014 (02 July 2015)

Law No. 133 "On pedigree stockbreeding". Date of text: 27 April 2009

Law on Veterinary. Date of text: 06 March 1992

Law No. 230 amending Law No. 67 "On technical regulation". Date of text: 30 December 2015

Law No. 178 amending Law No. 116 "On protection of traditional knowledge". Date of text: 20 July 2015

Law No. 4 amending Law on the legal protection of selection achievements. Date of text: 12 January 2015

Law No. 34 amending Law No. 133 "On pedigree stockbreeding". Date of text: 18 February 2014

Law No. 91 "On identification of animals". Date of text: 06 June 2013

Law No. 254 amending Law No. 30 "On pastures". Date of text: 28 December 2011

Law No. 91 amending Law No. 30 "On pastures". Date of text: 11 July 2011

Law No. 30 "On pastures". Date of text: 26 January 2009

Law on the legal protection of selection achievements. Date of original text: 26 May 1998 (31 March 2005)

Law on Introducing Amendments and Supplements in the Law of the Kyrgyz Republic on Veterinary. Date of text: 25 March 1998

Law on pastures. Date of text: 1997

Governmental Decree No. 381 amending Ministerial Decree No. 140 validating the Regulation on Fisheries Department under the jurisdiction of the Ministry of Agriculture. Date of original text: 19 June 2015 (11 November 2016)

Governmental Decree No. 245 validating the Statute of State enterprise "Center for development of ethnic culture and equestrian industry" under the state Agency of physical training and sports under the Government of the Kyrgyz Republic". Date of original text: 23 April 2015 (23 August 2016)

Governmental Decree No. 386 validating the Regulation on fees for use of pastures. Date of original text: 19 June 2009 (07 June 2016)

Governmental Decree No. 186 validating the Regulation on private veterinary practice. Date of text: 11 April 2016

Governmental Decree No. 580 validating the Regulation on saniatry and epidemiological inspection of physical persons, means of transport, commodities and cargo transferred through state border of the Kyrgyz Republic. Date of original text: 07 October 2014 (01 April 2016)

Governmental Decree No. 555 validating the Regulation on veterinary zoning of the national territory in relation to infectious animal diseases. Date of text: 03 August 2015

Governmental Decree No. 516 validating the Regulation on attribution and cancellation of status of pedigree stock farms. Date of text: 22 July 2015

Governmental Decree No. 377 validating Priority veterinary and sanitary requirements for prevention of animal diseases. Date of text: 18 June 2015

Governmental Decree No. 694 validating the Regulation on identification of livestock. Date of text: 05 December 2014

Governmental Decree No. 531 validating the Regulation on state institution "National pedigree breeding farm for artificial insemination of livestock "Elite". Date of text: 15 September 2014

Ministerial Decree No. 152 validating the Regulation on the National extraordinary antiepidemic and antiepidemic commission. Date of original text: 16 March 2010 (10 February 2014)

Ministerial Decree No. 35 validating the Regulation on Veterinary border inspection. Date of text: 20 January 2014

Ministerial Decree No. 582 "On support of pedigree farms". Date of text: 29 October 2013

Ministerial Decree No. 515 regarding allocation of pastures for purposes not related to grazing. Date of text: 13 September 2013

Ministerial Decree No. 444 validating Technical Regulation "On safety of veterinary drugs". Date of text: 05 August 2013

Ministerial Decree No. 173 validating Technical Regulation "On safety of veterinary equipment in vitro". Date of text: 05 April 2013

Ministerial Decree No. 138 on promotion of pedigree stockbreeding. Date of text: 18 March 2013

Ministerial Decree No. 464 validating the Regulation on Issyk-Kul pedigree horse-breeding farm. Date of text: 03 July 2012

Ministerial Decree No. 135 validating the Regulation on State Sanitary, Veterinary and Phytosanitary Inspection. Date of text: 20 February 2012

Technical Regulation No. 021/2011 "On safety of foodstuffs". Date of text: 09 December 2011

Ministerial Decree No. 616 validating the Regulation on State Veterinary Department under the jurisdiction of the Ministry of Agriculture. Date of text: 05 October 2011

Ministerial Decree No. 572 validating the list of plant species authorized for growing on the national territory and the list of protected agricultural animals. Date of original text: 28 August 1998 (24 June 2011)

Ministerial Decree No. 297 concerning interaction between ministries and departments for pest control and quarantine arrangements. Date of text: 10 June 2011

Ministerial Decree No. 60 validating the Regulation on State veterinary inspection under the Government of Agriculture. Date of text: 02 June 2010

Governmental Decree No. 107-R validating the Methodological Guidelines on registration of livestock and poultry in the farms of all categories on the national category. Date of text: 02 April 2010

Order of the Minister of Agriculture validating the Regulation on pedigree breeding farm. Date of text: 2010

Ministerial Decree No. 249 validating the List of species subject to compulsory veterinary inspection. Date of text: 30 May 2008

Governmental Resolution No.334 on licensing of veterinary practice. Date of text: 05 June 1998

Regulation of State Chief Veterinary Inspector on order of establishing and abolishing quarantine in case of the outbreak of infectious diseases. Date of text: 1998

•Resolution on the State of Cattle Rearing in the Republic and Measures Aimed at Increase of Its Efficiency in the Market Economy (No. 367 of 1997).Date of text: 07 August 1997

Decree on the establishment of the State Sanitary and Epidemiological Supervision Department under the Ministry of Health (No. 299 of 1997).Date of text: 28 May 1997

Regulation on the Department for State Inspection of Pedigree Business in Animal Breeding at the Ministry of Agriculture and Water of the Kyrgyz Republic. Date of text: 16 May 1997

Order on approval of status of pedigree farms and farms (No. 26 of 1997). Date of text: 05 February 1997

Decree of the Government of the Kyrgyz Republic on remote pasture plots on the territory of the Republic of Kyrgyzstan. Date of text: 1997

Order No. 162 of the Ministry of Agriculture and Food validating Interim Regulation on organization of zoovetservices for individual and peasant farms and other farming entities in agriculture. Date of text: 07 August 1996

Regulations on the State Veterinary Department under the Ministry of Agriculture and Water Resources. Date of text: 22 July 1996

Regulation on Central Veterinary Department of Scientific and Production Unit on Veterinary under the Ministry of Agriculture and Food. Date of text: 11 March 1994

Regulation on boundary veterinary control points. Date of text: 1994

Veterinary and Sanitary Requirements for apiculture. Date of text: 15 December 1976

Mission schedule

Of Ms. Anara Jumabayeva, Ms. Inna Punda, Ms. Youshiko Ishihara, Mr. Tommaso Alacevich, Ms. Altynai Achilova, Mr. Khabibulo Khamdamov, TCIC, Kyrgyz Republic, Bishkek

4 - 15 October 2017

Time	Event	Venue	Comments
6 October, Friday			
10.00-11.00	GIZ, Saltanat Asan	Ministry of agriculture, 96A Kievskaya str, 717 room	confirmed
11.00-12.00	SAEPF, Bakyt Yrsaliev	Department of forestry, 3 Lev Tolstoy str	confirmed
12.00-13.00	KOICA, Mr. Lee	Department of forestry, 3 Lev Tolstoy str	confirmed
13.30-14.30	Institute Kyrgyzgiprozem, Tashtemirov Adam Tashtemirovich	44 Orozbekova str	confirmed
14.50	Department of pastures Agricultural Projects Unit (APIU), Mr. Bekenov, Nagima Alymbekova		confirmed
7 October, Saturday			
03.00-04.00	Group # 1 <input type="checkbox"/> Ms Jumabayeva Anara <input type="checkbox"/> Mr. Baizakov Kanybek <input type="checkbox"/> Ms. Punda Inna <input type="checkbox"/> Ms Ishihara Yoshiko <input type="checkbox"/> Ms. Achilova Altynai <input type="checkbox"/> Mr. Isakov Azamat	Departure to Osh Manas Airport – Osh Airport Sunrise Hotel	confirmed
17.00 -18.00	Group #2 <input type="checkbox"/> Mr Alacevich <input type="checkbox"/> Mr. Chyngojoev A <input type="checkbox"/> Mr Khabibulo Khamdamov	Departure to Osh Manas Airport – Osh Airport Sunrise Hotel	Confirmed
21.40-22.40	<input type="checkbox"/> Mr. Isakov Azamat	Departure to Bishkek Osh Airport – Manas Airport	Confirmed
8 October, Sunday			

18.40 – 19.40	<input type="checkbox"/> Ms Jumabayeva Anara <input type="checkbox"/> Mr. Baizakov Kanybek <input type="checkbox"/> Ms. Punda Inna <input type="checkbox"/> Ms Ishihara Yoshiko <input type="checkbox"/> Ms. Achilova Altynai <input type="checkbox"/> Mr Alacevich <input type="checkbox"/> Mr. Chyngojoev A <input type="checkbox"/> Mr Khabibulo Khamdamov	Departure to Bishkek Osh Airport – Manas Airport	Confirmed
9 October, Monday			
11.30	FAO/ GEF Project Tommaso Alacevich		Confirmed
13.00-14.00	UNDP, Vladimir Grebnev	Maximum Business center, Turusbekova str, 109/1	TBC
15.00-16.00	WB, Umut Joldosheva	Department of forestry, 3 Lev Tolstoy str	Confirmed
10 October, Tuesday			
09.30-10.30	EBRD, Nurgul Esenamanova	Business-center “Orion” Erkindik str, 21	Confirmed
11.00-12.00	WFP, Dinara Abzhamilova, Tatyana Semenova,	150 Panfilova str.	Confirmed
14.00-15.00	Ministry of emergency situations, Gulmira Kalchakeeva, Gulshat Kadyrova	2/1 Toktonaliev str. Center for Crisis Management, Центр управления в кризисных ситуациях (ЦУКС)	Confirmed
11 October, Wednesday			
09.30-10.30	JICA, Nurlan Sultanov	Department of forestry, 3 Lev Tolstoy str	Confirmed
13.30-14.30	Kyrgyz-Russian Fund, Mr. Asrandiev Erkin (Board Member)	Business-center “Orion” Erkindik str, 21, 3 floor,	Confirmed
12 October, Thursday			
09.30-10.30	Aga Khan Foundation, Mr. Arslanbek Miiyashev (Executive Director)	Shopokova 93/2 Finca Building 7th floor	Confirmed
11.00-12.00	State Agency for Local Self-governance and Inter-ethnic Relations, Mr. Ikramov Sanzhar, State Secretary	96B Kievskaya str.	Confirmed
13.30-14.30	Rural Development Fund, Ms. Akmatova Kuliypa, Director	11 Geologicheskoy lane	Confirmed
15.00-16.00	Association of food industry enterprises	99 Timiryazeva str, 1 floor	Confirmed
16.30-17.30	Ministry of agriculture, Shamiev Azamat, Assistant of Deputy Minister	96A Kievskaya str, 2 floor	confirmed
13 October, Friday			

09.00-11.00	LLC "Bishkek Expo", Mr. Edil Myrzaliev,		confirmed
12.00-13.30	ProdImpex, Ms. Shailoogul Maylieva, Director general	Sokuluk district, Novo-Pavlovka village, 1A Baetova str	confirmed

List of people met during the Mission 4 - 15 October 2017
TCIC, Kyrgyz Republic, Bishkek

Organization	Name	Title	Address/Phone number
State Agency for Environmental Protection	Bakyt Yrsaliev	Deputy director of department on forest ecosystems development	Department of forestry, 3 Lev Tolstoy str
	B. Tolongutov	Director, the Centre of regulation in the field of environmental protection and ecological security	
	Venera Surappaeva	Department on monitoring and informational systems	
	B. Salykmambetova	Chief, department on international partnership	
Institute Kyrgyzgiprozem,	Adam Tashtemirov		44 Orozbekova str
	K. Isaev		
Agricultural Projects Implementation Unit (APIU)	Bekenov, Nagima Alymbekova ...	Department of pastures	
Ministry of emergency situations	Gulmira Kalchakeeva, Gulshat Kadyrova	Center for Crisis Management	2/1 Toktonalieva str.
State Agency for Local Self-governance and Inter-ethnic Relations	Mr. Ikramov Sanzhar	State Secretary	96B Kievskaya str.
Ministry of agriculture	Azamat Shamiev	Assistant of Deputy Minister	96A Kievskaya str, 2 floor
Kyrgyz Veterinary Research Institute	Elmira Akmatova	Director	0312 325 069 0777 949 670
	Kudaybergen Abdykerimov	Head, infectious diseases lab	0556 105 262
FAO Representation	Dorjee Kinlay	FAO Representative	Akhunbaeva 201, Bishkek tel. office (+996 312) 250827
	Dinara Rakhmanova	Assistant FAO Representative (programme)	
FAO/GEF project	Cholpon Alibakieva	Project Manager	Bishkek, 142 Gorkii Str, room 301
	Abdymital Chingojev	National Forestry Expert	
	Dyikanbai Kenjebaev	National Expert on Land Degradation and Pasture Rehabilitation	

Organization	Name	Title	Address/Phone number
GIZ	Saltanat Asan	Programme Professional	Ministry of agriculture, 96A Kievskaya str, 717 room
KOICA	Mr. Lee	advisor	
UNDP	Vladimir Grebnev		
EBRD	Nurgul Esenamanova	Climate Finance Officer	Business-center "Orion" Erkindik str, 21
WFP	Sharifbek Sohbnazarov	Programme Officer	150 Panfilova str.
	Dinara Abzhamilova,	Vulnerability Assessment and Mapping (VAM) officer	
	Tatyana Semenova	National Programme Officer	
JICA Project for Development of Rural Enterprises with Forest Products	Nurlan Sultanov	National Expert	Department of forestry, 3 Lev Tolstoy str
	Aisuluu Duishebaeva	National Expert	
WB/GEF Intergrated Forest Ecosystems Management Project	Umut Joldosheva	Director	0312 590 806 0779 101 201
	Gulmira Akhmatova	Monitoring specialist	0312 590 816 0553 070 742
Kyrgyz-Russian Fund	Mr. Asrandiev Erkin	Board Member	Business-center "Orion" Erkindik str, 21, 3 floor,
	Ms Osmonova Nurzada	Credit and investment specialist	
	Mr ???		
Aga Khan Foundation	Mr. Arslanbek Miiyashev	Executive Director	Shopokova 93/2 Finca Building 7th floor
	Jamil Uddin	Director Programs	
	Marc-Antoine Adam	Regional Partnership and Donor Relations Officer	
	Zholdoshbek Dadybaev	Manager of the Natural Resources Department, PF "MSDP" KG	0312 621 912 0552 520 561
ARIS	Almazbek Akmatalliev ...	Coordinator	102, Bokonbaev St., 720040, Bishkek, Kyrgyz Republic, + 996 (312) 301805, 620752
	Kuban Kanakaev	Economist/ Financial Analyst	
Rural Development Fund	Ms. Akmatova Kuliypa	Director	11 Geologicheskyy lane
Independent Ecological Expertise (NGO)	Oleg Pecheniuk	Chairman	30 h., 1 app., 7 microdistrict + 996 (312) 578372
	Elmira Djumakadyrova	Programme Officer	
Association of food industry enterprises			99 Timiryazeva str, 1 floor
LLC "Bishkek Expo"	Mr. Edil Myrzaliev		

Organization	Name	Title	Address/Phone number
ProdImpex,	Ms. Shailoogul Maylieva,	Director general	Sokuluk district, Novo-Pavlovka village, 1A Baetova str
Taurus Genetics LLC.	Mirbek Borubashev	CEO	Bishkek, Suyumbaeva 59 0773 511 112 0555 550 799
Manager – consultant on Livestock/ agricultural entrepreneurship	Aydyn		
Pasture Users Association, Jalal Abad oblast	Kadyrbek Orozaliev		0771 371 903
Kara Alma Ayil Ukmetu, Suzak district, Jalal Abad oblast.	Ilimbek Alimov	Head of Ayil Ukmetu	0771 657 716? (0) kara-olma1996@mail.ru
	Kamchibek Ailchiev	Vice/former head of Ayil Ukmetu	
Kurmanbek Ayil Ukmetu, Suzak district, Jalal Abad oblast.	Abdymalik Suyunbaev	Head of Jayit Komitet	0779 171 501
Bagysh Ayil Ukmetu, Suzak district, Jalal Abad oblast.	Kazbeck Kydyrbaev	Head of Jayit Komitet	0770 030 008, 0556 030 007
Osh oblast.	Abdulla Bakirov	Head of regional Jayit Komitet	0772 944 752 0550 054 020
Zargir Ayil Ukmetu, Uzgen district, Osh oblast.	Muhtarali Abdullaev	Head of Jayit Komitet	0559 300 365
Zargir Ayil Ukmetu, Uzgen district, Osh oblast.	Abdyrahim Musurmonkulov	Deputy head of Jayit Komitet	0551 719 476
Myrza ake Ayil Ukmetu, Uzgen district, Osh oblast.	Kamol Maturayimov	Head of Jayit Komitet	0777 560 342
Uzgen Leskhoz	R.Kadyrkulov	Director	
Kara Shoro National Park	Koilubaev S. and Davletov S.	Staff	