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STATUS OF ANIMAL NUTRITION RESEARCH AND DEVELOPMENT ACTIVITIES IN TAJIKISTAN, KYRGYZSTAN AND AZERBAIJAN

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STATUS OF ANIMAL NUTRITION RESEARCH AND DEVELOPMENT ACTIVITIES IN TAJIKISTAN, KYRGYZSTAN AND AZERBAIJAN

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Preface

Around 2.6 billion people in the developing world are estimated to have to make a living on less than US$2 a day and of these, about 1.4 billion are 'extremely' poor; surviving on less than US$1.25 a day. Nearly three quarters of the extremely poor – that is around 1 billion people – live in rural areas and, despite growing urbanization, more than half of the 'dollar-poor' will reside in rural areas until about 2035. Most rural households depend on agriculture as part of their livelihood and livestock commonly form an integral part of their production system. On the other hand, to a large extent driven by increasing per capita incomes, the livestock sector has become one of the fastest developing agricultural sub-sectors, exerting substantial pressure on natural resources as well as on traditional production (and marketing) practices.

In the face of these opposing forces, guiding livestock sector development on a pathway that balances the interests of low and high income households and regions as well as the interest of current and future generations poses a tremendous challenge to policymakers and development practioners. Furthermore, technologies are rapidly changing while at the same time countries are engaging in institutional 'experiments' through planned and un-planned restructuring of their livestock and related industries, making it difficult for anyone to keep abreast with current realities.

This 'Working Paper' Series pulls together into a single series different strands of work on the wide range of topics covered by the Animal Production and Health Division with the aim of providing 'fresh' information on developments in various regions of the globe, some of which is hoped may contribute to foster sustainable and equitable livestock sector development.

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Introduction

Livestock play an essential role in the agrarian economy of developing countries. Livestock production has been shown to make an important contribution to national economies as well as to increasing incomes and security at the community and individual levels. About 70 percent of the world's 1.4 billion extreme poor depend at least in part on livestock for their livelihood (FAO, 2009). Proper feed and feeding is imperative for achieving high and sustained livestock productivity. The success of animal reproduction and health programmes rests on proper animal nutrition. There is growing concern with environmental issues in animal agriculture. Imbalanced feeding leads to productivity losses and increase in emission of pollutants in the form of methane (6 to 12 percent of feed energy is lost in the form of methane) and nitrogen and phosphorus release in water channels (60 to 70 percent of the nitrogen and phosphorus fed in intensive production systems is lost to the environment) causing water and air pollution, which results in degradation of biodiversity, deterioration in human health and decrease in agricultural productivity. Proper animal nutrition could play an important role in addressing ongoing and emerging challenges imposed by increasing human population, global warming, land degradation, water shortage and pollution, biodiversity erosion and increasing energy prices.

Inadequate feed quality and quantity, combined with low producers' prices often force farmers to accept low levels of production, compensated by large numbers of animals. Population and income growth have increased the demand for animal products. Therefore demands for feed and feed supplements are rising. Health and food safety concerns are exerting pressure on good quality feed ingredients. Feed resources and feeding strategies exert a large influence on the degree and extent of negative environmental effects from livestock. Matching the feed availability with the requirements of the livestock population is important for both the subsistent and the commercial small and large farmers.

Feed cost generally accounts for more than 50 percent of the animal rearing costs. Inadequate feed resources are recognised as a major constraint to the productivity of mixed crop–livestock systems. Without proper technologies, feed production and disposal of animal wastes will impose further stress on already degraded natural resources. This will result in fewer opportunities to enhance the livelihoods of small scale farmers. Resource-poor farmers have to make difficult choices between the nutrients returned to the soil and those fed to livestock. However, a prerequisite for feeding a balanced diet is the existence of the capability to determine chemical composition of various feedstuffs and knowledge to use this information for developing and using sustainable feeding strategies. Good knowledge base and a good laboratory infrastructure is a must. *Only sound research can lead to formulation of relevant and effective policies. In addition, sound research and good knowledge base coupled with strong extension and technology transfer work is imperative for generation of high impact at the grass root level.*

Research can provide the technologies, policies and strengthen institutions required to stop the cycle of poverty and resource degradation. *A systematic evalua-*

tion of the status of animal nutrition research and development activities in Tajikistan, Kyrgyzstan and Azerbaijan was undertaken to enable identification of challenges and opportunities for strengthening animal nutrition activities in the Research and Development (R & D) institution and the feed manufacturing industry; and to assist in the formulation of an action plan. It is a vital first step that would contribute to the development of sound and effective national and regional strategies for development of livestock sector in the targeted countries. The information was generated through a survey conducted using a bi-lingual (English and Russian) questionnaire.

Overall Executive Summary

RESEARCH AND DEVELOPMENT STATUS IN RESEARCH AND DEVELOPMENT ORGANIZATIONS

Tajikistan

Livestock production in Tajikistan accounts for about 30 percent of total agricultural production. The imbalance between feed demand and supply is perhaps the most important limiting factor for sustainable development of the livestock sector in Tajikistan. The pastures provide more than 50 percent of the nutrients to the livestock population. Livestock yields in Tajikistan are the lowest in the Commonwealth of Independent States.

All the five institutions surveyed in Tajikistan are in the public sector and are engaged in research and development (R & D), extension and outreach activities in animal nutrition. The major emphasis of the work conducted in these institutions is on pasture and grazing management and on improvement in the feed situation. Most of the work is being carried out on ruminants and to a lesser extent on poultry. No work is being carried out on pig nutrition. The main nutritional strategies envisaged by these institutions include nutritive quality evaluation of feeds, improvement in quality and yield of feeds, optimum and rational use of locally available feed resourses, introduction of new fodder varieties, fodder conservation and nutrient requirement of yaks and poultry. ***There is a need to impart training to staff especially on the latest techniques of feed analysis and nutritive quality evaluation. The training is required in almost all routinely used (in other parts of the world) techniques in animal nutrition, for example digestibility estimation, the in vitro gas production technique, Tilley & Terry and nylon bag techniques, amino acid analysis, polymerase chain reaction (PCR) techniques and microbial protein estimation.*** The staff has shown desire to learn more about yak nutrition. Most of the institutions have basic laboratory equipment i.e. oven, balance, Kjeldahl apparatus Soxhlet apparatus and distillation unit but most of the equipment are over 20 years old. The institutions have the necessary facilities for conducting animal experiments on rabbits, sheep and cattle but very limited basic slaughter house facilities. Most of these institutions wish to procure an amino acid analyzer, gas liquid chromatography, all-glass distillation apparatus and apparatus for feed quality estimation (e.g. the *in vitro* gas production system).

There is no ongoing R & D or extension project in animal nutrition in any of the five institutions. The institutions evaluate impact of R & D activities in the area of animal nutrition through a special approbation commission. Almost all of the staff has limited skills in English language and prefer the literature in Russian language. The staff members would like to undertake short-term courses in English language. These institutions have national collaborations mainly for establishing linkages with local farmers and producers and for getting information on scientific investigations on animal feeding. The suggestions given by these institutions for improving R & D activities in animal nutrition are:

- Improvement in funding for the laboratories;
- Modernization of laboratory equipment;
- Training of young professionals in latest techniques of feed evaluation;
- Availability of qualified and trained staff for feed analysis and feed formulations;
- Development of fodder resources;
- Setting up of demonstration plots for fodder crops;
- Enlargement and sharing of knowledge base on feed quality and forage production;
- Fostering of contract with feed industries and livestock breeders; and
- Production of commercial feed and mineral mixture.

The major emphasis should be on strengthening of laboratory infrastructure (funding, equipment, training), pasture management and introduction of superior pasture fodder varieties.

Kyrgyzstan

Animal husbandry is a significant part of the agricultural economy of Kyrgyzstan. Forty–four percent of the land is used as pastures for livestock but the yield is low. Large seasonal variations in animal body weights indicate that animal feeding is for survival and not for production. A large percentage of Kyrgyz livestock are poorly managed and fed inadequate diets, particularly during winter.

The major thrust of the six institutions that participated in the study from Kyrgyzstan is on pasture management, fodder production and feed improvement. All the institutions, except the Kyrgyz National Agrarian University, are involved in R & D activities. There is no scientific or technical staff engaged in poultry or pig nutrition. The ongoing projects in R & D are mainly on the chemical composition of pasture plants. Practically no ongoing extension activities exist.

No institute in Kyrgyzstan has any means to monitor and evaluate impact of R & D activities in the area of animal nutrition. The laboratory activities in the country are not at all satisfactory. No feed analysis activity at Kyrgyz National Agrarian University, Department of Production of Agricultural Products and at Kyrgyz Veterinary Research Institute exist. Only nitrogen, ether extractives and crude fibre estimations are being conducted at other institutions. Funds are scarce. **Since the staff in most of the institutions is not exposed to any training, exposure to almost all the aspects of feed analysis including the *in vitro* gas production, PCR techniques and NIRS and pasture management is required.** The staff has desired to undertake lessons to improve English language skills.

The situation with regard to the availability of equipment is not encouraging either. Many of these institutions have very few and very old equipment in their laboratories. All of these institutions would like to procure all modern equipment for animal nutrition studies. The facilities for conducting animal experiments are also inadequate. Most of the institutions do not have animal cages or slaughter house facilities. The linkages with feed industries and farmers are moderate. Increased funding, increased scientific and technical staff, implementation of research recommendations and political stability are some of the suggestions given by the institutions to improve R & D activities in animal nutrition.

The following constraints were identified:
- Insufficient and outdated equipment;
- Inadequate financing;
- Inadequate exposure of staff to animal nutrition research methods;
- Inadequate information;
- Poor feedback mechanisms;
- No means to monitor and evaluate R & D activities; and
- Insufficient investment in feed manufacturing.

Azerbaijan

Azerbaijan is the largest country in the Caucasus region of Eurasia. Small-scale livestock farmers with few cattle are the principal source of milk and meat. It is estimated that small-scale farmers are producing at only 40 percent of their efficiency due to poor animal health and low rates of animal growth.

Only one filled questionnaire from R & D organization was received from Azerbaijan Scientific Research Institute of Forages, Meadows and Pastures. This institution has two ongoing projects, being carried out at farmers' fields, and are due to conclude in December, 2011. There is no ongoing extension project. The institution does not have any means of obtaining feedback from farmers, farmers associations and feed industry about the effectiveness of the extension/outreach activities. The priority areas for R & D work in animal nutrition are identified through close contacts with the farmers. Inputs are not obtained from other stakeholders or the feed industries. The institution does not have a formal means to monitor and evaluate impact of R & D activities. No information has been provided on the type of specific animal nutrition strategies that have been passed on to farmers, farmers' associations or feed industries.

Laboratory activities are practically insignificant. The laboratory facilities are inadequate. **There is hardly any equipment and the staff is also not aware of the recent feed evaluation techniques including those that give information on feed safety and are used routinely in animal nutrition research in other parts of the world.** The laboratory equipment available is not listed but the institution would wish to procure all modern equipment required for animal nutrition research. The institution has no facilities for animal experiments. The staff is willing to undergo training for improving qualification and skills and is also willing to have detailed information in the area of animal nutrition. Lack of knowledge of English language has been identified as a constraint and the staff has desired to undertake short courses in English language. The linkages of animal nutrition groups with feed industry, farmers' associations and individual farmers are moderate. The main reasons for poor R & D activities in animal nutrition are:
- Lack of laboratory equipment;
- No training for the staff;
- Inadequate funding;
- No formal means to monitor and evaluate R & D activities in animal nutrition;
- No means of obtaining feedback from end-users; and
- Weak research-extension-user linkage.

The suggestions given to improve R & D activities in the institution include strengthening financial position, sharing information regarding experiments and enhancing staff skills.

RESEARCH AND DEVELOPMENT STATUS IN FEED INDUSTRIES

Tajikistan

All the three feed industries in Tajikistan have moderate linkages with research institutions.

All of these industries have basic set up for proximate analysis, including minerals and vitamins, of feed ingredients. The industries wish to procure modern equipment for feed analysis and evaluation. All the three industries have collaborations for research or consultancy. The source of information for these feed industries include professional journals, books, websites, conferences, CDs and technical pamphlets. The feed industries would like to have more detailed information but mostly in Russian language. The industries are interested to have detailed information and training on the latest methods of feed evaluation, feed formulation and production of compound feeds for cattle and poultry. English is not a preferred language. The staff would like to undergo training in English language. Lack of feed ingredients for the preparation of compound feeds and absence of well equipped laboratory for feed quality evaluation are listed as constraints. The suggestions by these industries for improving feed analysis and feed formulation in feed industry are:

- Provision of professional training;
- Improvement in the feed production process;
- Provision of latest and modern equipment;
- Collaboration with specialists in foreign enterprises; and
- Improvement in marketing.

Kyrgyzstan

The filled questionnaires received from three feed industries in Kyrgyzstan do not provide any information on the production capacity, annual production or the type of feed analysis being conducted by these industries. No information has been provided regarding the existing equipment or equipment to be procured. The detailed information regarding new technologies has been requested and the preferred language for this is Russian. Translation of literature in native language would be preferred. No information has been given by any of the feed industry on how to improve feed analysis. The linkages and collaborations with research institutions are strong but with farmers' associations and individual farmers are moderate.

Azerbaijan

Three feed industries from Azerbaijan participated in the study. These feed industries are running at over 70 percent of their capacity. Surprisingly, only one sample is analysed per month. Similar to the situation in R & D organizations, the staff is not aware of the recent feed evaluation techniques and hardly any equipment is available in the laboratories for such analyses. The staff has some exposure to professional journals, conferences and books but would like to have detailed information, mostly in Russian language. The staff would like to take English language

courses to improve their language skills. Strengthening of staff position and improvement in the financial situation have been proposed as the ways to improve the feed analysis. All the three industries have collaboration in the area of feed analysis and formulation with Azerbaijan Scientific Research Institute of Cattle-Breeding and Azerbaijan Scientific Research Institute of Forages, Meadows and Pastures.

Most of the equipment listed for procurement by feed industries are the same as identified by R & D organizations.

The survey has established that there is

- Weak resource base;
- Inadequate financing;
- Insufficient and outdated laboratory equipment;
- Lack of qualified staff;
- Lack of training;
- Limited availability and access to improved technologies;
- Absence of formal means to monitor and evaluate R & D activities;
- Limited means of obtaining feedback from end-users;
- Weak research-extension-user linkage;
- Lack of information systems and inadequate information;
- Insufficient investment in feed manufacturing; and
- Inadequate marketing facilities.

It is interesting to note that in a recent study (CACAARI, 2010) on the Priorities in Agricultural Research for Development in Central Asia and the Caucasus by the Central Asia and the Caucasus Association of Agricultural Research Institutions (CACAARI) identified key researchable issues which included the following:

- Need for greater investments in agricultural research and restructuring of the research system to coordinate the national agricultural research system and to meet the national agricultural development goals;
- Introduce changes in agricultural education system in line with the goals of agricultural research and development;
- Create an effective extension system for the country to create linkages with farmers, researchers and civil society organizations and to facilitate technology transfer;
- *Need for capacity development in research infrastructure and enhancing research capabilities of the researchers and technicians;* and
- Need to strengthen agricultural research and development linkages at sub-regional, regional, inter-regional and global levels.

In general, these countries have limited resources. The animal nutrition activities are characterised by lack of standard procedures and poor laboratory infrastructure. Research and extension need a reorientation to inter-disciplinary understanding of the multiple functions of livestock for rural households including the future high demand of animal products by increasing urban population and the strong interaction with cropping systems.

SUGGESTED ANIMAL NUTRITION APPROACHES FOR LIVESTOCK DEVELOPMENT

- Countrywide systematic mapping and quality evaluation of feeds and fodder resources;
- Assessment of the current and potential yield of pastures and improvement of their productivity, quality and carrying capacity;
- Development of appropriate forage production and conservation systems;
- Optimum use of locally available feed resources and development of appropriate systems of their upgradation and supplementation;
- Development of feed quality control systems;
- Nutrient requirement and balanced feeding of animals including yaks;
- Assessment of mineral status of feeds, soil and livestock; and
- Development of strong linkages among researchers-extension workers-farmers.

The future programmes must address: a) the training of personnel (scientific, technical, extension and supporting) to improve skills and knowledge in feed evaluation, and b) the improvement of laboratory infrastructure, both in R & D institutions and feed industries.

Tajikistan

EXECUTIVE SUMMARY

Approximately 55 percent of rural inhabitants in Tajikistan live in poverty. The country's total land area is 143 100 sq km. Its population is approximately 7.3 million, with 67 percent of its labour force engaged in agriculture. Livestock production accounts for about 30 percent of total agricultural production. The main focus is on improvement in milk and poultry production. Two-thirds of feed demand in Tajikistan is associated with beef and dairy cows while only 24 percent is with sheep and goats. Pastures provide more than 50 percent of the nutrients to the livestock population. The imbalance between feed demand and supply is perhaps the most important limiting factor for sustainable development of the livestock sector in Tajikistan. Tajikistan has a significant deficit of cultivated feed.

Research and development status in research and development organizations

Five filled questionnaires were received namely from the Sugd Branch of the Livestock Institute, the Livestock Institute of Tajik Academy of Agricultural Science, the Institute of Agriculture of the Tajik Academy of Agricultural Science, the Tajik Agrarian University Shirinsho Shotemur and the Experiment Station Pamir. All these institutions are under public sector and engaged in R & D, extension and outreach activities in animal nutrition. All these five institutions receive funds from national government while four of these also receive competitive international grants.

The vision of the institutions in Tajikistan include improvement in pasture and grazing management and in the feed situation, development of complete feeds for different animal species, fodder conservation, modernization of feed analysis and feed evaluation laboratories and raising the level of research and production. The main nutritional strategies of the institutions include improvement in feed base, optimum use of locally available feed resources, improvement in knowledge and skills for feed evaluation, development of effective technologies for cultivation of fodder crops, round-the-year use of irrigated land for fodder production, nutritional evaluation of forages, formulation of balanced rations for high yielding cows and sheep, supplementation strategies for livestock, nutrient requirement and balanced feeding of yaks, farm animals and birds and improvement in yield and nutritive value of pastures. The total number of staff at these five institutions is 583. The total number of staff engaged in animal nutrition activities is 20, 126, 353, 66 and 18 at the Sugd Branch of the Livestock Institute, the Livestock Institute of Tajik Academy of Agricultural Science, the Institute of Agriculture of the Tajik Academy of Agricultural Science, the Tajik Agrarian University Shirinsho Shotemur and the Experiment Station Pamir respectively. No work is being carried out on pig nutrition. The staff at these institutions has not undergone any long term training. However, short term training (20–30 days) has been undertaken by few of the staff. There is a need

for imparting training to staff especially on the latest techniques of feed analysis and nutritive quality evaluation.

There are no ongoing R & D or extension activities in the area of animal nutrition at any of the institutions. Although 16 R & D and 20 extension projects were listed but all these projects are old and have been completed. All the institutions depend on personal contacts with producers for feedback in addition to surveys. The priority areas in animal nutrition are identified mainly on the basis of the needs through contacts with farmers and feed industry and government data. The monitoring and evaluation of R & D activities is through special approbation commissions and scientific staff of the University. The staff at all the institutions in Tajikistan has access to professional journals, books, technical pamphlets and workshop and conference proceedings for updating their knowledge in animal nutrition. Almost all of them have little skills in English language and prefer the literature in Russian language. The Sugd Branch of the Livestock Institute and the Experiment Station Pamir have access to the Internet facility while this facility is lacking at other three institutions. The institutions would like to have short term courses on English language. The main nutritional strategies include nutritive evaluation of feeds, improvement in quality and yield of feeds, optimum and rational use of locally available feed resourses, introduction of new fodder varieties, fodder conservation and nutrient requirement of yaks and poultry.

All the five institutions have facilities for analysis of nitrogen, ether extract, crude fiber and minerals. Three institutions have facilities to determine digestibility by Tilley & Terry and *in sacco* techniques. The feeds commonly analysed are lucerne, hay, compound feed, grasses, wheat straw, oat, triticale, maize, wheat, rye, draft, grapes press, silage, soybeans, sorghum, sugar beet, Sudan grass, peas, vetch, sainfoin and cottonseed cake.

The training is required in almost all routinely used techniques in animal nutrition e.g. digestibility estimation, the *in vitro* gas production technique, Tilley & Terry and nylon bag techniques, amino acid analysis, PCR techniques and microbial protein estimation. The staff has shown interest to learn more about yak nutrition. Most of the institutions have basic laboratory equipment i.e. oven, balance, Kjeldahl apparatus, Soxhlet apparatus and distillation unit. Most of the equipment is old. The maintenance facilities are available either within the institution or through private agencies. The Tajik Agrarian University Shirinsho Shotemur is best equipped among all. The institutions have the necessary facilities for conducting animal experiments on rabbits, sheep and cattle but do not have slaughter house facilities. Most of these institutions wish to procure amino acid analyzer, gas liquid chromatography, all-glass distillation apparatus and apparatus for feed quality estimation. The institutions have national collaboration mainly for establishing links between local farmers and producers, getting information on scientific investigations on animal feeding and also as consultants.

The suggestions given by these institutions for improving R & D activities in animal nutrition are:

- Improvement in funding for the laboratories;
- Modernization of laboratory equipment;
- Training of young professionals in latest techniques of feed evaluation;
- Availability of qualified and trained staff for feed analysis and feed formulations;

- Development of fodder resources;
- Setting up of demonstration plots for fodder crops;
- Contract with feed industries and livestock breeders;
- Sharing knowledge base on feed quality and forage production; and
- Commercial feed and mineral mixture production.

The major emphasis should be on strengthening of laboratory infrastructure (funding, equipment and training), pasture management and introduction of superior pasture fodder varieties.

Research and development status in feed industries

Three filled questionnaires were received from feed industries in Tajikistan. The Zahirai Gala Gift Khatlon (grain stocks in Khatlon) has a staff strength of 104 and is operating at only 25 percent of its capacity. The Grain Company has a staff strength of 190 and runs at 88 percent of the capacity. The third feed industry 'Aviculture Khujand' Bobojon Gaffurov Area Sugd region is the oldest and has a staff strength of 90. The yearly production capacity of this industry is 100 000 tonnes and the actual production is 50 000 tonnes. The number of staff involved in feed related activities is 10, 35 and 7 in Zahirai Gala Gift Khatlon, Grain Company and 'Aviculture Khujand' Bobojon Gaffurov Area Sugd region respectively. All the three feed industries have moderate linkages with research institutions.

Feed ingredients are analysed for nitrogen, ether extract, crude fibre, neutral detergent fibre, acid detergent fibre, minerals and vitamins. All of these industries have basic set up for proximate analysis of feed ingredients. The industries wish to procure modern equipment for feed analysis and evaluation. Most of the equipment listed for procurement include amino acid analyser, analyser 'Mikrofoss', NIRS, autoclave, Kjeldahl apparatus, analytical balance, muffle furnace and Soxhlet apparatus. All the three industries have collaborations for research or consultancy.

The sources of information for these feed industries include professional journals, books, websites, conferences, CDs and technical pamphlets. These industries would like to obtain more detailed information but mostly in Russian language. The industries are interested to have more information or training on the latest methods of feed evaluation, feed formulations and on manufacture of compound feeds for cattle and poultry. English is not a preferred language. Translation of relevant literature into Russian language has been suggested. The staff would like to undergo training in English language.

Lack of feed ingredients for the preparation of compound feeds and absence of well equipped laboratory for determination of feed quality are listed as constraints. The suggestions for ways to improve feed analysis and feed formulation activities in feed industry, as suggested by these industries, are:

- Provision of professional training;
- Improvement in the feed production process;
- Provision of latest and modern equipment;
- Collaboration with specialists in foreign enterprises; and
- Improvement in marketing.

INTRODUCTION

Tajikistan is located in Central Asia, with China to its west and Afghanistan to its south. Tajikistan is a poor nation, with one of the lowest per capita GDPs among the 15 former Soviet Union republics. The country's total land area is 143 100 sq km. Its climate is mid-latitude continental with hot summers and mild winters and semi-arid to polar in the Pamir Mountains. According to the World Bank, 55 percent of rural inhabitants in Tajikistan live in poverty. In 1990–1992 the proportion of undernourished in the total population was 34 percent and the corresponding figures for 2005–2007 was 30 percent. The livestock sector has a significant share in agricultural production which however has decreased in recent years partly caused by the lowered export potential. The Sugd region is characterized as a valley zone. The main focus is on improvement in milk and poultry production and as such feed and feeding management is of paramount importance. Lucerne, maize, sorghum and wheat are traditionally cultivated and surplus fodder is conserved as silage or haylage. The imbalance between feed demand and supply is perhaps the most important limiting factor on the sustainable development of the livestock sector in Tajikistan.

AGRICULTURE AND TRADE SITUATION

The agricultural sector plays an important role in both income generation and employment provision. Tajikistan's population is approximately 7.3 million, with 67 percent of its labour force engaged in agriculture. Of Tajikistan's total land area, only 7 percent is utilised for cultivated crops, while another one percent supports permanent crops such as fruit and nut bearing trees. Agriculture is the main source of living for an estimated 72 percent of the total population in the country. The share of agriculture to total GDP was 36.7 percent in 1995 and decreased to 19.9 percent in 2009. In 1995 the labour force in agriculture as a percentage of total labour force was 37.4 percent. The corresponding figure for 2009 was 28.1 percent.

The value of food exports increased from US$ 21 million in 1995 to US$ 101 million in 2008. In 1995–2000 the average growth rate of exports was 46 percent. The corresponding figure for 2005–2008 was 18.7 percent. The share of food exports in total merchandise exports increased from 2.79 percent in 1995 to 7.15 percent in 2008. The value of food imports increased from US$ 160 million in 1995 to US$ 341 million in 2008. In 1995–2000 the average growth rate of exports was –5.1 percent. The corresponding figure for 2005–2008 was 9.4 percent. The share of food imports in total merchandise imports decreased from 19.79 percent in 1995 to 10.43 percent in 2008.

In the beginning of 1989 the area under feed crops started declining. Grain and pulses replaced this area. Over the entire period from 1991 to 2007 the area under feed crops fell by 43 percent. Feed area in 2007 as a portion of total sown area is now at the level of the late-1950s (Sedik, 2010).

LIVESTOCK SITUATION

Livestock production accounts for about 30 percent of total agricultural production in 2007. Livestock yields in Tajikistan are the lowest in the Commonwealth of Independent States (CIS). The low-productivity livestock held in household farms form an important part of livelihoods in rural Tajikistan. More than 43 percent of

the value of household agricultural production in 2007 was derived from livestock products. A large share of livestock production comes from private plots; 63 percent in 1994, compared to only 37 percent from state and collective farms. Since 1988, total livestock production has dropped by 35 percent (CISSAT, 2008). However, livestock increased by 82 percent from 1998 to 2007, nearly exclusively as a result of growth in household farms.

The rise in inventories coupled with the fall in feed supplies mean that feed per animal has fallen dramatically along with livestock productivity. Two-thirds of feed demand in Tajikistan is associated with beef and dairy cows while only 24 percent is with sheep and goats. The major constraints that limit growth are: degraded grazing land, lack of veterinary care, insufficient supplies of fodder, minerals and vitamins. Pastures provide more than 50 percent of the nutrients to the livestock population. Farmers take their animals to the pasture adjacent to their village throughout the year and do not follow pasture management practices. All four breakout groups, Badakhasan Region, Khatlon Region, Sugd Region and Region of Republic of Subordination (RAST), identified pasture degradation as one of the major problems that needs to be addressed.

The cattle spend majority of their time in pastures near villages and eating cultivated feed or concentrates. The type of pastures in Tajikistan is shown in Table 1. Summer pastures in Tajikistan are located from 2 200 to 3 400 meters above sea level and are used between June and August. Spring-Fall pastures are usually located between 900 and 1 500 meters above sea level and are used from March to May and September to November. Winter pastures are used between November and March and are located 500 to 1 200 meters above sea level. All year pastures are located at the same level as winter pastures but used all year round. Average dry matter yield (tonnes/ha) for different pastures is: Winter 0.35; Spring-Fall 1.15; Summer 2.25 and all-year 0.29. Alpine pastures are inappropriate for cows. The pasture management system in Tajikistan remains largely unchanged since Soviet times. In some other CIS countries (e.g. Azerbaijan), pasture lands have been transferred into a separate category 22 of municipal lands with a municipal management structure. However, in Tajikistan, pastures are under state ownership, just as all agricultural land.

Table 1. Pasture types in Tajikistan (Sedik, 2010)

Pastures	Winter	Spring–Fall	Summer	All-year
Altitude (meters above sea level)	500–1 200	900–1 500	2 200–3 400	500 to 1 000–1 200
Months in use	Nov–Mar	Mar–May, Sep–Nov	Jun–Aug	Jan–Dec
Days in use	120–150	90–110	80–90	300–330
Total area (1.1.08) (1 000 ha)	699.0	675.9	2 081.3	400.0
Percent of total pasture area (%)	18	18	54	10
Area under farm units (1 000 ha)	625.0	598.6	1 334.6	360.0
Average yield dry matter (tonnes/ha)	0.35	1.15	2.25	0.29
Distance from villages (km)	0.8–1.4 to 4–5	1.2–1.8 to 30	200–600	less than 1 km

Legislation on pasture management has not been adapted to the post-land reform farming structure. The existing system of pasture management responsibilities in Tajikistan is ill-defined and not designed to involve the end-user in the management of pasture resources. Over 90 percent of animals are held in household farms.

The socialist system of livestock production was based on three important pillars: (1) an elaborate organization for procuring animal feed for winter feeding based on intensively-cultivated feed crops raised in large-scale state and collective farms, (2) sizeable imports of concentrates and (3) an organized structure of pasture management and utilization. The deterioration and elimination of these three pillars has transformed the livestock husbandry system in Tajikistan from intensive livestock farming to extensive livestock farming.

The main constraint to the development of the livestock sector in Tajikistan is an extreme imbalance between the supply and the demand of cultivated feed and concentrates for dairy and beef cows. First, demand for all-year, winter and fall-spring pastures is much too high and the demand for cultivated fodders and concentrates far outstrips supply.

In the Oblast there are 36 750 cows, 332 739 sheep and goats and 21 271 yaks. The main reasons for low productivity are unscientific breeding and poor feeding. There is 80 percent deficit of concentrates. In the eastern Pamirs the feeding of yaks, sheep and goats is on natural pastures (degraded) and only during lambing and calving they are offered a small quantity of roughage.

The major feedstuffs for feeding domesticated livestock includes dry forage (perennial grasses, haylage from alfalfa and straw), lucerne, annual grasses, corn and silage, succulents without silage (feed roots and melons, sugar beets for feed), coarse grains such as corn, barley and oats, bran, cotton seed meal and mixed feed, feed additives and other concentrated feed mixtures.

Between 1991 and 2000 the total cultivated feed available to livestock in Tajikistan fell by 79 percent. Imported concentrates was nearly completely eliminated between 1991 and 2000 (Table 2). The current availability of domestic concentrates is a mere 44 percent of what it was in 1991. This demand-supply mismatch is the

Table 2. The collapse of available cultivated feed and concentrates in Tajikistan (in tonnes of standard feed units), 1991–2007

No.	Feed source	1991	2000	2007	Percent change, 1991–2000	Percent change, 1991–2007
1	Total from cultivated feeds and concentrates	2 196 062	458 131	738 744	–79	–66
a	Total cultivated feed crops	1 500 404	274 858	386 748	–82	–74
b	Domestic concentrates	368 658	182 954	344 439	–50	–7
c	Imported concentrates	327 000	319	7 557	–100	–98
2	Feed availability per animal (feed units/head)					
a	Feed per standard animal head	13	4	5	–69	–73
b	Feed per cow	38	8	9	–78	–77

Source: FAO (2009)

predominant cause of the poor nutrition of livestock and low milk and meat yields. Tajikistan has a significant deficit of cultivated feed. Sustainable development of the livestock sector in Tajikistan would require adequate and accessible supplies of feed. The strategy may include raising pasture yields for fall-spring, winter and all-year pastures and also area under cultivated fodders. In addition to the limitations on fodder crops imposed through the wheat self-sufficiency policy, the absence of crop rotation on soils used for cotton cultivation also limits the area available for fodder.

SYNTHESIS OF INFORMATION OBTAINED THROUGH THE QUESTIONNAIRE ON RESEARCH AND DEVELOPMENT STATUS IN RESEARCH AND DEVELOPMENT ORGANIZATIONS

Number of questionnaires received

Five filled questionnaires were received namely from the Sugd Branch of the Livestock Institute established in 1978, the Livestock Institute of Tajik Academy of Agricultural Science established in 1930, the Institute of Agriculture of the Tajik Academy of Agricultural Science established in 1932 and engaged in the cultivation of fodder crops for animals and has developed more than 20 varieties of different species of forage crops, the Tajik Agrarian University Shirinsho Shotemur established in 1931 and the Experiment Station Pamir established in 2003. General information about these institutions is given in Annex I

All institutions are public institutions and are engaged in R & D, extension and outreach activities in animal nutrition.

Vision of the institutions

There is no industrial production of compound, granulated or briquette feed in the country. The Sugd Branch of the Livestock Institute aims to improve the feed situation in the region. An issue of high importance to the institution is development of complete feeds for different species and pasture management for sheep and goats. The Livestock Institute of Tajik Academy of Agricultural Science works on pasture management, fodder conservation and feed evaluation and envisages to improve the feeding of farm animals. The Institute of Agriculture of the Tajik Academy of Agricultural Science wishes to work on pasture and grazing management and forage production. The Tajik Agrarian University Shirinsho Shotemur has a vision to initiate research on feed evaluation for different animal species. The Experiment Station Pamir would like to solve the animal nutrition related problems of the region by setting up of a modern laboratory with all modern equipment. The laboratory would also help raise the level of research and production work to international level.

Animal nutrition related priorities of the institutions

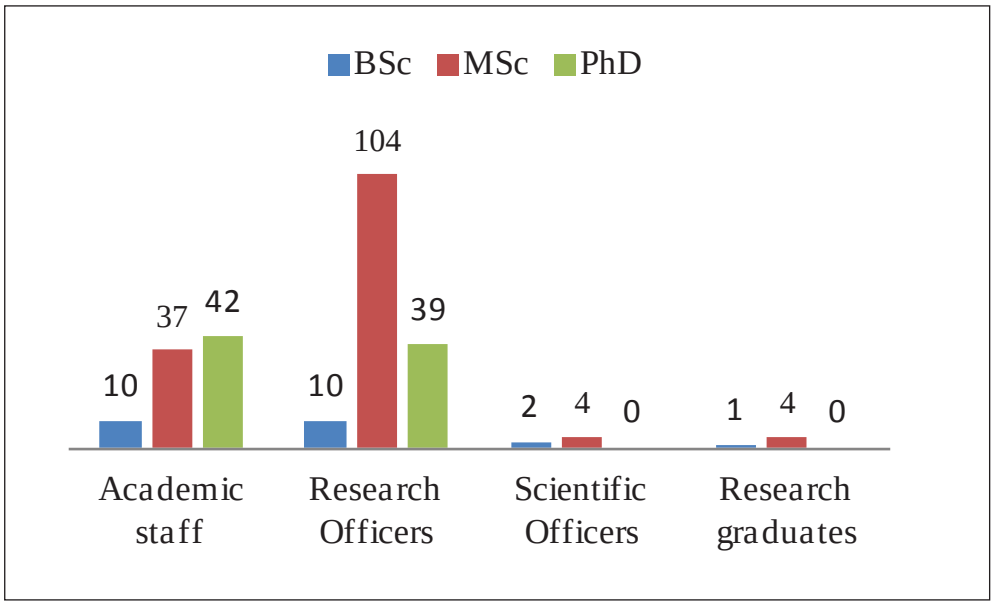
The Sugd Branch of the Livestock Institute has listed improvement in knowledge and skills for feed evaluation, improvement in feed base and optimum use of locally available feed resources as three main priorities of the institution. The Livestock Institute of Tajik Academy of Agricultural Science has similar priorities namely rational use of local feed resources for feeding different types of animals and birds,

improvement of fodder technology and rational fodder conservation methods. The Institute of Agriculture of the Tajik Academy of Agricultural Science has listed production of elite seeds of fodder crops, development of effective technologies for cultivation of fodder crops and round-the-year use of irrigated land under fodder production as the main areas of work. Nutritional evaluation of forages, formulation of balanced rations for high yielding cows and sheep and supplementation strategies for livestock are the three main priority areas for the Tajik Agrarian University Shirinsho Shotemur. Nutrient requirement and balanced feeding of yaks, farm animals and birds and improving yield and nutritive value of pastures and irrigated forage crops are the main nutritional strategies on which the Experiment Station Pamir is working.

Number of staff

The total number of staff at these five institutions is 583. The number of academic staff, research officers, scientific officers and research graduates engaged in animal nutrition activities is shown in Figure 1. There is no clear distinction between Scientific Officers and Research Officers in the questionnaire. The total number of staff engaged in animal nutrition activities is 20, 126, 353, 66 and 18 at the Sugd Branch of the Livestock Institute, the Livestock Institute of Tajik Academy of Agricultural Science, the Institute of Agriculture of the Tajik Academy of Agricultural Science, the Tajik Agrarian University Shirinsho Shotemur and at the Experiment Station Pamir respectively. The number of male academic staff, research officers, technical assistants and extension staff engaged in animal nutrition activities is almost 80 percent of the total staff (Figure 2). No work is being carried out on pig nutrition. The emphasis is on ruminant nutrition and to a lesser extent on poultry. Figure 3 shows the number of staff engaged in animal nutrition activities related to large and

Figure 1. Number of academic staff, research officers, scientific officers and research graduates engaged in animal nutrition activities



small ruminants and poultry while the number of technical staff engaged in animal nutrition activities of large and small ruminants and poultry is shown in Figure 4. The number of extension staff engaged as trainers for cattle, calves and poultry production is shown in Figure 5. The details of staff at these five institution are given in Annexes II and III.

Figure 2. Number of academic staff, research officers, technical assistants and extension workers engaged in animal nutrition activities as males and females

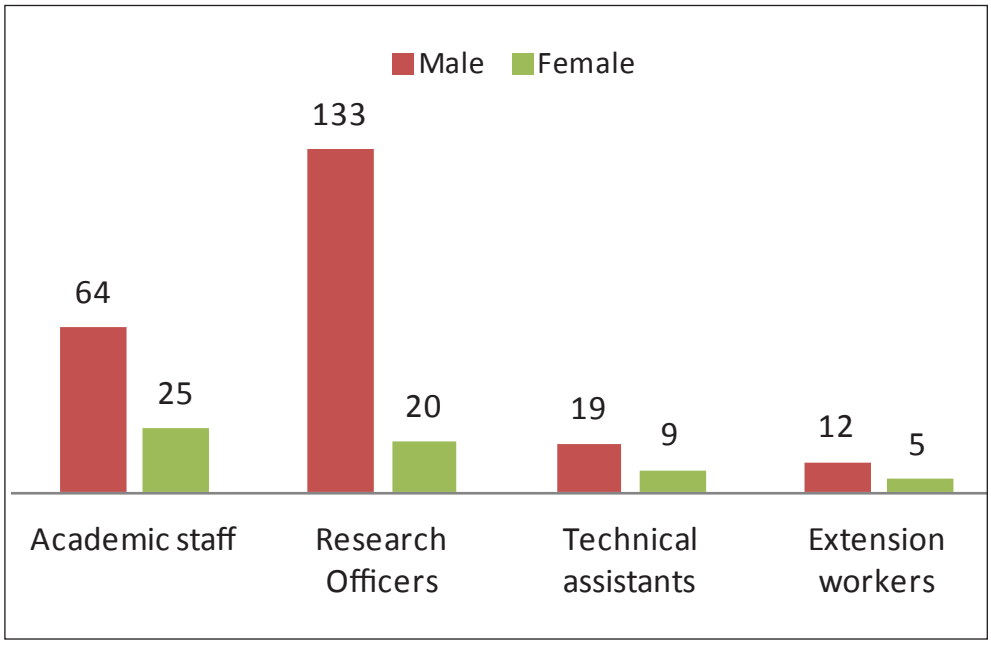


Figure 3. Number of staff engaged in animal nutrition activities related to large and small ruminants and poultry

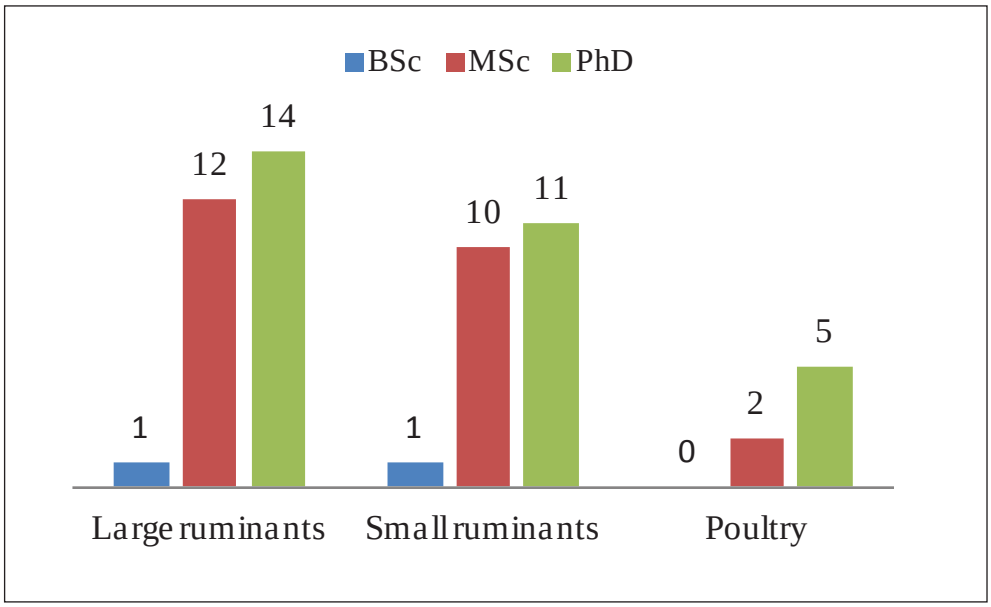


Figure 4. Number of technical staff engaged in animal nutrition activities related to large and small ruminants and poultry

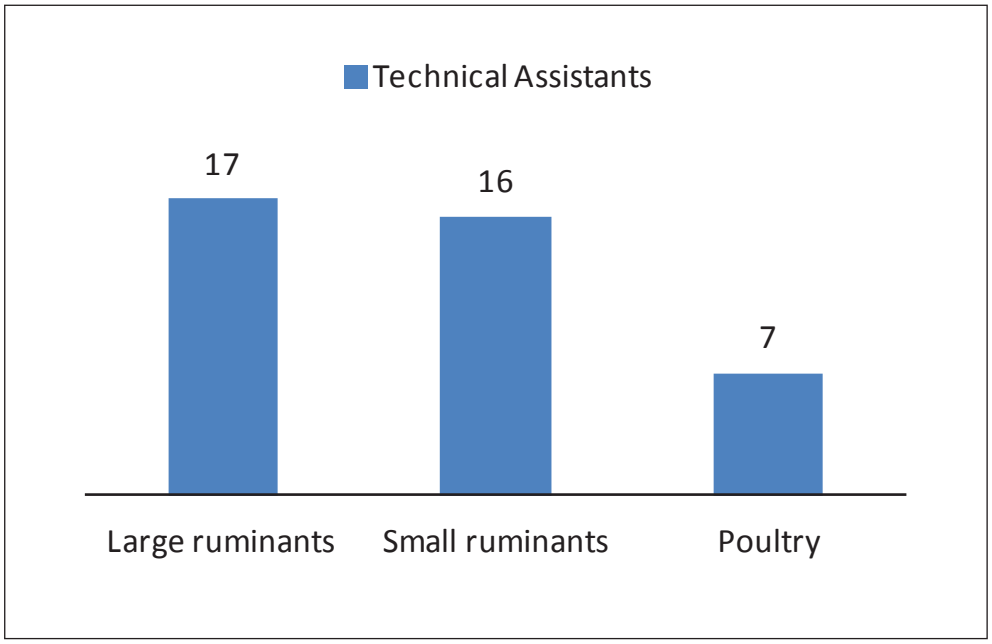
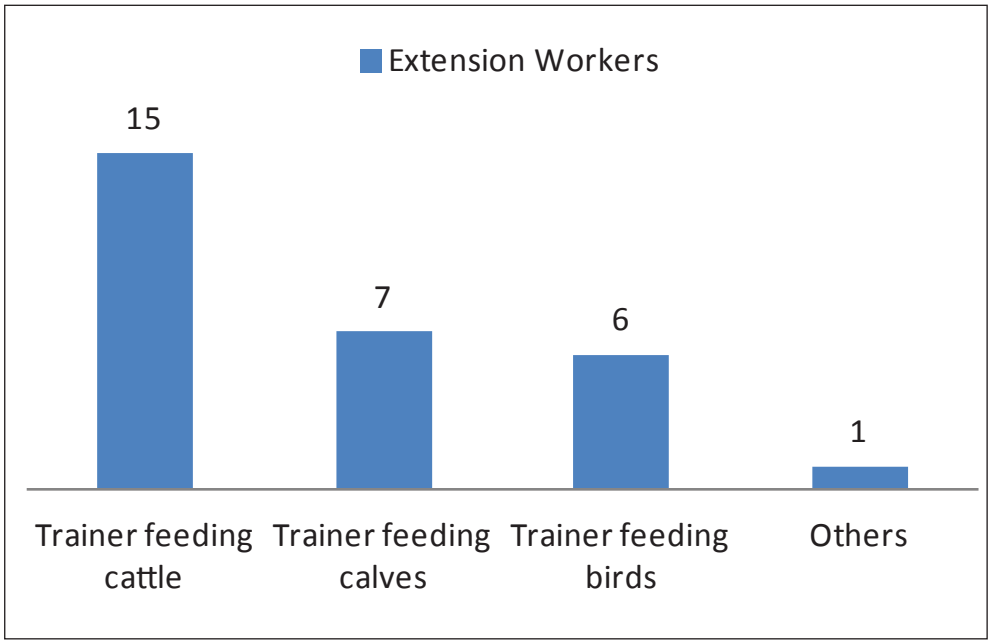


Figure 5. Number of extension staff engaged as trainers for cattle, calves and poultry production



Ongoing R & D activities and extension activities in the area of Animal Nutrition

There is no ongoing R & D project in animal nutrition in any of the five institutions. A number of projects are listed but all have already been completed. The details are given in Annex IV.

Similarly there is no ongoing extension project in animal nutrition. A number of projects are listed but all have been completed (see Annex V).

Trainings undertaken

No staff member from any of the five institutions has undergone training for a period greater than six months. The staff at the Livestock Institute of Tajik Academy of Agricultural Science and the Experiment Station Pamir has no exposure to any training. At the Sugd Branch of the Livestock Institute, only one staff member has undergone training for 5 days on feed production and another for 20 days on animal feeding in USA. Three staff members from the Institution of Agriculture of the Tajik Academy of Agricultural Science took training on fodder production for 20 days. Four persons from the Tajik Agrarian Univeristy Shirinsho Shotemur had training (< six months) on fodder production and conservation.

Mechanisms of sharing information

The Sugd Branch of the Livestock Institute and the Tajik Agrarian University Shirinsho Shotemur conduct training courses for specialists and farmers' agro-industrial complexes; organise meetings, training, seminars and conferences and produce leaflets, brochures, advice and books. The institution has collaboration with neighboring scientific research establishment and foreign scientists. The Livestock Institute of Tajik Academy of Agricultural Science and the Institute of Agriculture of the Tajik Academy of Agricultural Science share information through exchange of research reports, conducting meetings, field days, trainings, seminars and conferences and get information from books, booklets and meeting recommendations.

The Experiment Station Pamir disseminates information and knowledge by conducting training for farmers, distributing leaflets, reporting on achievements of the station and through the media.

All the institutions depend on personal contacts with producers for obtaining feedback in addition to surveys.

Identification of priority areas

The Sugd Branch of the Livestock Institute sets priority areas of work through identification of problems of farmers, producers and different associations and through the data and information available from the international and government organizations. The Livestock Institute of Tajik Academy of Agricultural Science has contact with almost all farms in the region. The scientists have direct contacts with the farmers. The Institute of Agriculture of the Tajik Academy of Agricultural Science identifies priority areas on the basis of government data, the needs of farms and personal opinions of scholars of the country. The Tajik Agrarian University Shirinsho Shotemur has contacts with feed producers of the entire country. In addition, research priorities are formulated on the basis of the needs of farmers. The Experiment Station Pamir identifies areas of work through personal contacts with the farmers and feed industry.

Means to monitor and evaluate R & D activities

The institutions except the Sugd Branch of the Livestock Institute have mechanisms to monitor and evaluate R & D activities in animal nutrition. The Livestock Institute of Tajik Academy of Agricultural Science has a special approbation commission which inspects the scientific results and has funds and facilities for conducting such investigations. The institution has completed the reports of the work on organization of demonstration plots of fodder crops in Vahdat and Dangara Pandzhskom areas of Tajikistan (2007–2009). Similarly, the Institute of Agriculture of the Tajik Academy of Agricultural Science also has a approbation commission together with specialists of the Ministry of Agriculture of the country to monitor forage production. The Tajik Agrarian University Shirinsho Shotemur monitors and evaluates R & D activities in animal nutrition through the scientific department of the University. The Experiment Station Pamir has a mechanism (nature not given) to monitor and evaluate R & D activities in animal nutrition.

Nutritional strategies

The main nutritional strategies on which the institutions are working are:

The Sugd Branch of the Livestock Institute

- Nutritional evaluation of feeds;
- Improvement in quality and yield of feeds; and
- Rational use of locally available feed resourses

The Livestock Institute of Tajik Academy of Agricultural Science

- Rational use of locally available feed resources for livestock;
- Improvement in storage and conservation of fodder; and
- Use of unconventional feeds and fodders supplements for commercial feed preparation.

The Institute of Agriculture of the Tajik Academy of Agricultural Science

- Production of elite fodder crop seeds;
- Development of effective technologies for cultivation of fodder crops; and
- Year-round use of irrigated land under fodder production.

The Tajik Agrarian University Shirinsho Shotemur

- Nutritional evaluation of forage plants in Tajikistan;
- Nutrient requirement and balanced rations for high yielding animals; and
- Fodder based feed formulations for cattle, sheep and poultry.

The Experiment Station Pamir

- Recommendations on feeding of yaks;
- Improvement in yield and nutritive value of pastures and irrigated forage crops; and
- Recommendations on feeding farm animals and birds.

Status of laboratory infrastructure and technical skills

All the five institutions have facilities for analysis of nitrogen, ether extract, crude fiber and minerals. The Livestock Institute of Tajik Academy of Agricultural Science, the

Tajik Agrarian University Shirinsho Shotemur and the Experiment Station Pamir also carry out fiber composition analysis and digestibility determination using Tilley & Terry and *in sacco* methods. In addition, the Tajik Agrarian University Shirinsho Shotemur has facilities for determination of digestibility using mobile bag, as well. The average number of samples analysed each month for research and industry respectively at the Sugd Branch of the Livestock Institute is ten and four; at the Livestock Institute of Tajik Academy of Agricultural Science is 130 and 45; at the Institute of Agriculture of the Tajik Academy of Agricultural Science is 50 and 15; at the Tajik Agrarian University Shirinsho Shotemur is 90 and 40 and 10 at the Experiment Station Pamir.

Feed resources commonly analysed. The commonly analysed feeds include lucerne, hay, pasture forages, compound feed, straws of wheat, oats and triticale, grains of maize, wheat, triticale, rye and oats and industrial by-products: grapes press, silage, soybeans, sorghum, sugar beet, peas, vetch, sainfoin and cottonseed cake.

Exposure of the staff to animal nutrition techniques and information. The staff at all the institutions in Tajikistan has access to professional journals, books, technical pamphlets, conference and workshop proceedings for updating their knowledge in animal nutrition. Almost all of them prefer the literature in Russian language. The staff would prefer videos, brochures, leaflets, posters in Tajik and Russian languages. The Sugd Branch of the Livestock Institute and the Experiment Station Pamir have access to Internet facility while this facility is lacking at other three institutions. Most of the institutions do not have any access to information from CDs.

The institutions would like to have short term courses on English language.

The main areas where training is required are feed evaluation techniques including NIRS technique, pasture management and upgradation of feed quality.

Techniques not known and training required. The staff at most of these institutions is familiar with routine proximate analysis and mineral analysis. The training is required in almost all other routinely followed techniques in animal nutrition for example digestibility estimation, the *in vitro* gas production technique, Tilley & Terry and nylon bag techniques, amino acid analysis, PCR techniques and microbial protein estimation. Most of the staff is interested in learning the use of latest laboratory equipment. Specific training has also been suggested in poultry nutrition. The staff at Sugd Branch of the Livestock Institute would like to undergo training in the modern methods for the determination of chemical constituents in fodder and nutritive quality of fodder, feeding of yaks and physiological requirement of the animals at high altitudes.

Training to students on laboratory techniques. Only the Sugd Branch of the Livestock Institute has given information on imparting training to students. The demonstrations on laboratory techniques for analysis of protein, fat, fiber, dry matter, ash, carotene, calcium and phosphorus are given.

Existing equipment. The Sugd Branch of the Livestock Institute has hot air oven, analytical balance, lanometer, muffle furnace, distillation apparatus, Soxhlet apparatus and Kjeldahl apparatus. The maintenance is available through private agencies. The institution has facilities for conducting animal experiments on sheep/goats and cattle. The Livestock Institute of Tajik Academy of Agricultural Science is best equipped and has amino acid analyzer, apparatus for determining proximate composition and feed quality, Suhozharennye cabinets, laboratory thermostat cryothermostat, muffle furnace, gas liquid chromatography and all-glass distillation unit. The maintenance is available through private agencies. The institution has the necessary facilities for conducting animal experiments on rabbits, sheep and cattle.

The Institute of Agriculture of the Tajik Academy of Agricultural Science has a set up for proximate analysis. Equipment such as muffle furnace, distillation unit, refrigerators, analytical balance, pH meters, grinding mill, centrifuges and necessary glassware are available. Animal cages are available for conducting animal experiments on sheep/goats and cattle. Equipment maintenance services are available. The Tajik Agrarian University Shirinsho Shotemur has amino acid analyzer, spectrophotometer, racks, apparatus for determination of feed quality and muffle furnace. However, most equipment are more than 20 years old. Equipment service facilities are available within and outside institution. The institution has the necessary facilities for conducting animal experiments on rats, guinea pigs, rabbits, sheep and cattle.

The Experiment Station Pamir too is well equipped. It possesses pH meter, spectrophotometer, analytical balance, apparatus for determination of fat content in milk, muffle furnace, equipment for silage making, forage shredders and equipment for proximate composition of feed. The institution has facilities for conducting animal experiments on sheep/goats and cattle.

Slaughter house facilities do not exist in any of the institution.

The basic equipment for proximate analysis is available with all the institutions but most of these institutions do not have many modern equipment including those for estimation of feed quality or nutritive evaluation.

Equipment not available but required. The Sugd Branch of the Livestock Institute would like to procure laboratory thermostat, cryothermostat, muffle furnace, amino acid analyser, gas liquid chromatography, all-glass distillation apparatus and complete set up for chemical analysis of feeds.

The Livestock Institute of Tajik Academy of Agricultural Science would wish to acquire amino acid analyser, portable apparatus for feed quality estimation, oven, equipment for nutritive evaluation of feeds, laboratory thermostat, cryothermostat, muffle furnace, gas liquid chromatography, distillation unit and set up for chemical analysis of feeds.

The Institute of Agriculture of the Tajik Academy of Agricultural Science would like to obtain Kjeldahl apparatus, Soxhlet apparatus, laboratory thermostat, cryothermostat, muffle furnace, amino acid analyser, gas liquid chromatography, all-glass distillation unit and set up for chemical analysis of feeds.

The Tajik Agrarian Univeristy Shirinsho Shotemur has the requirement for amino acid analyser, spectrophotometer, biochemical laboratory, milk testing laboratory, muffle furnace, Soxhlet apparatus, distillation equipment, analytical balance, pH meter, grinding mill and centrifuge. The Experiment Station Pamir would wish

to procure Kjeldahl apparatus, Soxhlet apparatus, laboratory thermostat, cryothermostat, muffle furnace, amino acid analyser, gas liquid chromatography, distillation unit and equipment for chemical analysis of feeds.

Amino acid analyser, gas liquid chromatography, muffle furnace, all-glass distillation unit and equipment for chemical analysis of feeds is required at each of these institutions.

Financial resources for animal nutrition activities

The financial resources for animal nutrition activities of these institutions are shown in Figure 6. All the five institutions receive funds from national government while four of these also obtain funds from competitive and international grants. Three institutions also receive financial assistance from private sources and only one institution raises funds from commercial activities (feed testing).

Linkages and types of collaborations in the area of Animal Nutrition

Four institutions have moderate and one (The Livestock Institute of Tajik Academy of Agricultural Science) weak linkages with feed industry, farmers' association and individual farmers. All of these institutions have national collaboration mainly for establishing links between local farmers and producers, getting information on scientific investigations on animal feeding and also exchange of consultants. The regional collaboration is for improving fodder production. The Experiment Station Pamir has private and also international collaborations, for example with Mountain Society Development Support Programme (MSDSP), FAO, German Agro Action and GIZ.

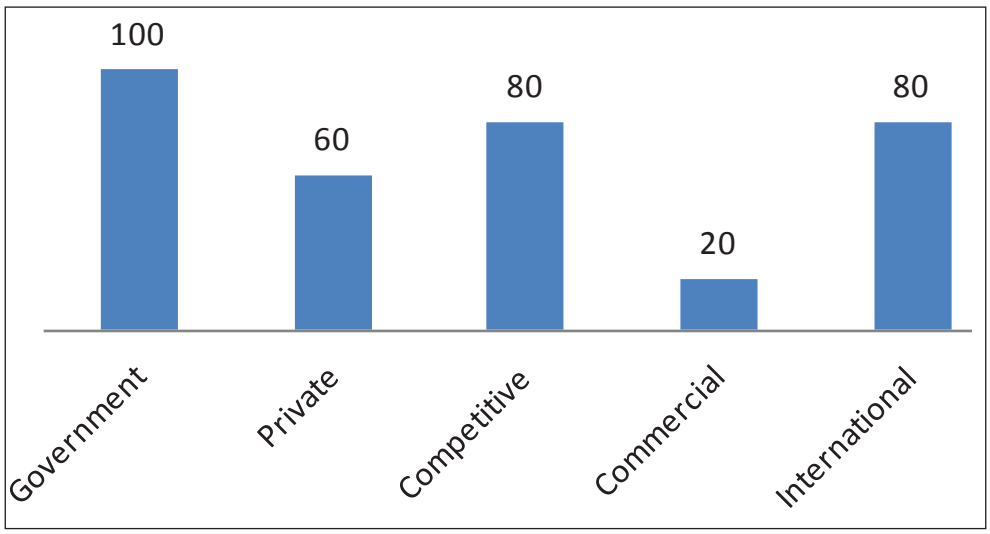
Suggestions for improvement in R & D activities in Animal Nutrition

The suggestions given by these institutions are:

The Sugd Branch of the Livestock Institute

- Improvement in funding for the laboratories;
- Training of young professionals in latest techniques for feed evaluation;

Figure 6. Sources of financial grant (percent) of the institutions for animal nutrition related activities



- Development of fodder resources; and
- Setting up of a laboratory with qualified and trained staff for feed analysis and feed formulations for cattle, sheep and poultry.

The Livestock Institute of Tajik Academy of Agricultural Science
- Adoption of latest methodologies in animal nutrition;
- Training courses on modern methods in animal nutrition; and
- Working contracts with feed industries and livestock breeders.

The Institute of Agriculture of the Tajik Academy of Agricultural Science
- Modernization of laboratory equipment;
- Training courses on modern methods in animal nutrition; and
- Setting up of demonstration plots for fodder crops.

The Tajik Agrarian University Shirinsho Shotemur
- Modernization of laboratory equipment;
- Sharing knowledge base on feed quality and forage production; and
- Upgradation of technology for feed formulation.

The Experiment Station Pamir
- Need for highly qualified staff;
- Modernization of laboratory equipment; and
- Commercial feed and mineral mixture production.

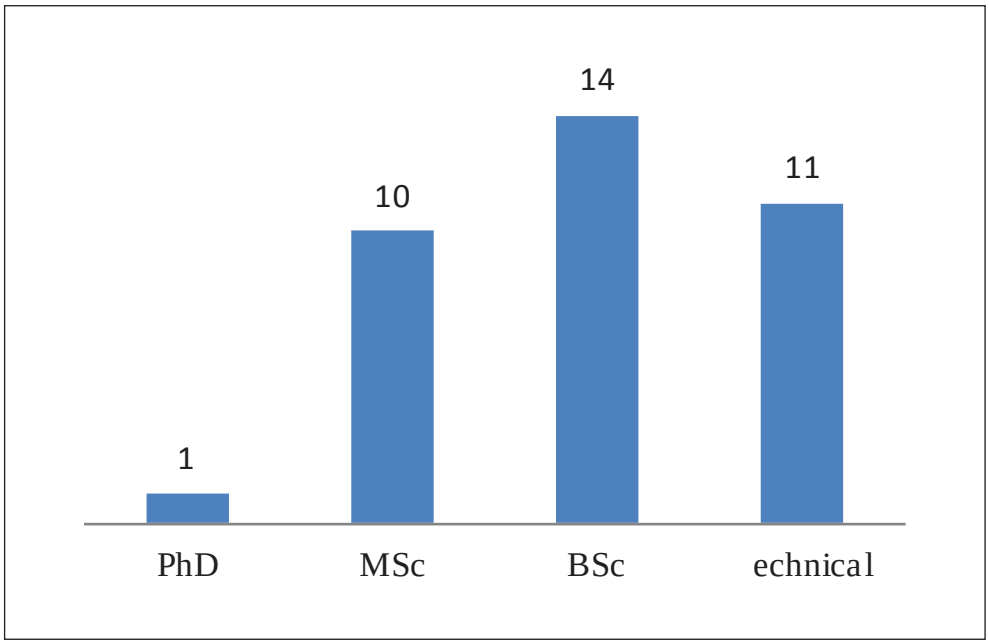
It is apparent from these suggestions that improvement of laboratory infrastructure and in funding and training on modern methods in animal nutrition are of utmost importance for these institutions.

SYNTHESIS OF INFORMATION OBTAINED THROUGH THE QUESTIONNAIRE ON RESEARCH AND DEVELOPMENT STATUS IN FEED INDUSTRIES

Number of questionnaires received

Three filled questionnaires were received from feed industries in Tajikistan namely Zahirai Gala Gift Khatlon (grain stocks in Khatlon), Grain Company and 'Aviculture Khujand' Bobojon Gaffurov Area Sugd region. The Zahirai Gala Gift Khatlon (grain stocks in Khatlon) was established in 2008 and has a staff strength of 104. The company is structured on the basis of the former major mills organized in 1985. The annual production capacity is 2.2 million tonnes but it runs only at 25 percent of its capacity. The second feed industry, the Grain Company was founded in 2007 and has a staff strength of 190. The annual production capacity is 40 320 tonnes and the actual production is almost 88 percent of the capacity. The third feed industry, 'Aviculture Khujand' Bobojon Gaffurov Area Sugd region is the oldest and was founded in 2000 and has a staff strength of 90. The annual production capacity of this industry is 100 000 tonnes and the actual production is 50 000 tonnes. The scientific and technical staff position in these feed industries is shown in Figure 7. The number of staff involved in feed related activities is 10, 35 and 7 in Zahirai Gala Gift

Figure 7. Number of scientific and technical staff engaged in feed industries



Khatlon, Grain Company and 'Aviculture Khujand' Bobojon Gaffurov Area Sugd region respectively.

Linkages and collaborations in the area of feed analysis and feed formulation

All the three feed industries have moderate linkages with research institutions. In addition, the Zahirai Gala Gift Khatlon feed industry has moderate linkages with farmers' association and individual farmers while the Grain Company has weak linkages with farmers' associations and moderate linkages with individual farmers.

Laboratory infrastructure

The feed ingredients that are generally analysed for chemical composition at Zahirai Gala Gift Khatlon include fodder, compound feed, wheat, corn, cotton seed meal, grass meal, rye and oats. The feed ingredients analysed at the Grain Company include wheat for toxic elements (mycotoxins, residual pesticides, radionuclides), corn, birth, soybeans and oats for chemical analysis; and at 'Aviculture Khujand' Bobojon Gaffurov Area Sugd region are barley, wheat, corn, soybean and sunflower meal, limestone, vitamin–herbal flour, sunflower meal, fish meal, beans and wheat bran.

The number of samples analysed each month at the Zahirai gala gift Khatlon is only three for nitrogen, ether extract, crude fibre, neutral detergent fibre, acid detergent fibre, minerals and vitamins. Two samples each month are analysed for mycotoxins and pesticide residues. The number at the Grain Company is five each month. The *in vitro* gas production technique and enzymatic method for estimation of digestibility are used at this industry. The number of samples analysed at the 'Aviculture Khujand' Bobojon Gaffurov Area Sugd region is higher, being 15 for nitrogen, 30 for minerals and 12 for pesticide residues.

Equipment situation. Oven, muffle furnace, Kjeldahl apparatus and Soxhlet apparatus are available with the Zahirai Gala Gift Khatlon feed industry. All equipment are over 20 years old and the maintenance is through private agencies. The Grain Company has hot air oven, muffle furnace, equipment for determination of gluten and a distillation unit. Maintenance services are available within the industry. Kjeldahl apparatus, Soxhlet apparatus, oven, analytical balance, vacuum pump, muffle furnace, autoclave, distillation unit, ELISA system are available with the Aviculture Khujand' Bobojon Gaffurov Area Sugd region. Most equipment are over 20 years old. Maintenance services are available.

Zahirai Gala Gift Khatlon wishes to procure atomic absorption spectrophotometer, laboratory thermostat, cryothermostat, muffle furnace, amino acid analyzer, gas liquid chromatography, distilation unit and a set of equipment for chemical analysis of feeds. The Grain Company would like to procure NIRS, analyzer 'Mikrofoss', spectrophotometer, amino acid analyser, atomic absorption spectrophotometer, Kjeldahl apparatus, Soxhlet apparatus, laboratory thermostat, cryothermostat, muffle furnace, gas liquid chromatography, distillation unit, all-glass distillation assembly and set of equipment for chemical analysis of feeds. Similarly, the 'Aviculture Khujand' Bobojon Gaffurov Area Sugd region wishes to procure amino acid analyser, analyzer 'Mikrofoss', NIRS, autoclave, Kjeldhal apparatus, analytical balance and muffle furnace.

Amino acid analyser is required by all the three feed industries.

Collaboration

All the three industries have collaboration with research institutions for research and consultancy. The Zahirai Gala Gift Khatlon has collaboration with the Trust 'Ptitseprom', Institute of Animal Science for consultancy. The Grain Company has collaboration with Regional Agrohimlaboratoriya, a branch of the Institute of Animal Husbandry, laboratory Ispitatelnaya Akmalinskogo LLP 'Kazgraininspektion' both for research and sharing of information. The feed unit is working together to develop and produce different types of feeds with industries in Israel. The feed ingredients are shipped to Israel for chemical analysis and assessment of nutritional value. The 'Aviculture Khujand' Bobojon Gaffurov Area Sugd region has collaboration with the Institute of Animal TASHN, Dushanbe Giprozem; National Veterinary Diagnostic Center, Dushanbe, A. Donish; and LLC Vetfarm Russia, Volgograd, St. Crystal for research and consultancy.

The sources of information for these feed industries include professional journals, books, websites, conferences, CDs and technical pamphlets. These industries would like to have detailed information but mostly in Russian language. The industries are interested to obtain more information and training on the latest methods of feed evaluation and feed formulations and on manufacture of compound feeds for cattle and poultry. English is not a preferred language. Translation of relevant literature into Russian language has been suggested. The staff would like to take English language lessons.

The suggestions for improving feed analysis and feed formulation activities in feed industry as suggested by these industries are:

- Provision of professional training;
- Provision of modern equipment;
- Improvement in the feed production process;
- Collaboration with specialists in foreign enterprises; and
- Improvement in marketing.

Annex I

General information about the institution in which animal nutrition activities are undertaken

Sr. No.	Name of Institution	Website of the Institution	Address (Tel. No., Fax and e–mail)	Affiliation of the institution		Status of Organization		Year in which the Institution was founded	Total staff of the Institution
				Ministry	Other	Public	Private		
1	Sugd Branch of the Livestock Institute	–	735700 Republic Tajikistan, Sugd region, Khujand, St. kamoli Khujandi, 51 +992 927707624 +992 342261663 matazim@rambler.ru	–	The Livestock Institute of Tajik Academy of Agricultural Sciences	+	–	1978	20
2	The Livestock Institute of Tajik Academy of Agricultural Science	www.taas.tj	Dushanbe, Giprozem17 +992 372734067 Fazliddin66@mail.ru, chorvodor.@mail.ru	–	Tajik Academy of Agricultural Sciences	+	–	1930	126
3	Institute of Agriculture of the Tajik Academy of Agricultural Science	www.zemledelie-tj.usor.ru	Dushanbe, Giprozem17 +992 372735022 ziroatkor@mail.ru	–	Tajik Academy of Agricultural Sciences	+	–	1932	353
4	Tajik Agrarian Univeristy Shirinsho Shotemur	www.tajaqroun.tj	Dushanbe, Rudaki, –146 +992 372734017 Rectortau31@mail	Ministry of Agriculture of the Republic of Tajikistan	–	+	–	1931	66
5	Experiment Station Pamir	–	73600, Tajikistan, Badakhshan, Khorog, St. Lenin 157	–	Tajik Academy of Agricultural Sciences	+	–	2003	18

Annex II

Scientific staff currently involved in animal nutrition activities

Sr. No.	Academic Staff			Research Officers			Scientific Officers			Research Graduates			Other Staff currently involved in Animal Nutrition		
	PhD	MSc	BSc	PhD	MSc	BSc	PhD	MSc	BSc	PhD	MSc	BSc	Technical Assistant	Extension workers	Other (specify)
1.	4	5	8	4	5	8	0	4	0	0	0	0	2	0	0
2.	8	4	0	7	5	0	0	0	0	0	0	0	3	3	0
3.	17	2	0	17	2	0	0	0	0	0	0	0	15	8	0
4.	12	24	0	7	90	0	0	0	0	0	0	0	7	3	0
5.	1	2	2	4	2	2	0	0	2	0	0	1	2	2	0

1. Sugd Branch of the Livestock Institute
2. Livestock Institute of Tajik Academy of Agricultural Science
3. Institute of Agriculture of the Tajik Academy of Agricultural Science
4. Tajik Agrarian University Shirinsho Shotemur
5. Experiment Station Pamir

Annex III

Staff currently engaged in ruminant and monogastric nutrition activities

Sr. No.	Field of Specialization																			
	Ruminant nutrition (large ruminants)				Ruminant nutrition (small ruminants)				Monogastric nutrition (pigs)				Monogastric nutrition (poultry)				Others (specify)			
	No.	PhD	MPhil/MSc	BSc	No.	PhD	MPhil/MSc	BSc	No.	PhD	MPhil/MSc	BSc	No.	PhD	MPhil/MSc	BSc.	No.	PhD	MPhil/MSc	BSc
1	3	1	1	1	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
2	5	6	2	0	5	3	2	0	0	0	0	0	4	3	1	0	0	0	0	0
3	4	2	2	0	4	2	2	0	0	0	0	0	1	1	0	0	0	0	0	0
4	9	4	5	0	8	4	4	0	0	0	0	0	2	1	1	0	0	0	0	0
5	3	1	2	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

1. Sugd Branch of the Livestock Institute
2. Livestock Institute of Tajik Academy of Agricultural Science
3. Institute of Agriculture of the Tajik Academy of Agricultural Science
4. Tajik Agrarian University Shirinsho Shotemur
5. Experiment Station Pamir

Annex IV

Ongoing Research and Development projects in the area of Animal Nutrition

Title	On research station/ on farmers' fields	Start and completion year	Funding source
Joint community action in the field of market oriented feed production and livestock in central and South Asia	On farmers' fields	July 2007–April 2008	ICARDA/IFAD
Developing rations for high productive cows and their adoption to milk cattle raising	In livestock farms	Jan 2000–Dec 2010	National budget
Intensive method of sheep fattening for meat production	Research station and farmers' fields	1990–1995	Government budget
Study on different systems of growing lamb, using sheep milk replacers	Research station and farmers' fields	1990–1995	Government budget
Using local non-traditional fodder for feeding of birds (types of corny-sorghum and triticale on feeding hens)	Research station and farmers' fields	1995–2000	Government budget
Using local non-traditional mineral feeding (neck clay, polygorkscit, coquina and others) for feeding of animals and birds	Research station and farmers' fields	1995–2000	Government budget
Definition of food value of feed, using at aviculture	Research station and farmers' fields	1995–2000	Government budget
Using bentonic clay for feeding laying hens	Research station and farmers' fields	2008 upto present	Government budget; agreement with farming
Developing detailed norms and feeding rations for lactating cows	Research station and farmers' fields	2006–2010	Government budget
Study of productivity and nutritional value of pasture feeds in condition of mountain zones of Tajikistan	Different mountain zones of the country	2000–2010	Government budget
Intensive methods of cultivation technology of fodder crops	Research station and farmers' fields	1981–2010	State Budget
Year-round use of land for fodder production, oproshaemyh	Research station and farmers' fields	1985–1990	State Budget
Determination of chemical composition and nutritional value of forage crops	Laboratory of chemical analysis	1985–2010	Private sector State Budget
Improving the organization and pasture forage production	Research station and farmers' fields	1985–2000	State Budget
Improving the summer feeding of lactating cows	Experimental farm	1990–1993	
The development of tables of energy nutrient feeds	Research station	1994–1998	
Improving standards and feed rations for dairy cows in the valley areas of Tajikistan	Research station and farmers' fields	1995–2005	
Improving standards of feeding and growing technology of Hissar sheep breeds	Research station and farmers' fields	2001–till date	
Improving the system of feeding the cows and young stock for maximizing productivity	Research station and farmers' fields	2001–till date	
Develop ways to improve the meat and milk production from Pamir yak	Research station	2006–2010	State Budget
Development of scientific-based system for Pamir yak breeding and finding additional reserves to increase their meat and milk production	Research station	2003–2010	State Budget
Develop ways to improve the yield of fodder crops	Research station	2005–2005	State Budget

Annex V

Ongoing extension projects in the area of Animal Nutrition

Title	Tools and technologies being used	Start and completion year	Funding source
Practical guide for cattle raising	Booklet for farmers	Oct–Nov 2009	TASIS/SENAS
Balanced rations for raising productively of cattle and wool goats	Low cost training technologies	Jul 2007–Apr 2008	ICARDA/ IFAD
Management of feeding system and the maintenance of sheep and goats in household conditions	Farmer days, seminars and trainings with cattle breeders, release of recommendations	2007–2009	ICARDA
Improvement in technologies of preparation, enrichment and use of the concentrated feeds/forages in animal industries and poultry farming	Seminars and trainings	2008–2010	FAO
Use of local mineral additives in feeding of dairy and meat cattle breeds	Seminars and trainings	2006–2010	Government budget, agreement with farming
Application of local forages in feeding of hens–layers	Seminars and trainings	2009–2010	Government budget
Definitions of nutritional value of forages grown in different conditions of Tajikistan	Laboratory investigations	2006–2010	Government budget
Technologies for intensive feeding and fattening of sheep	Seminars and trainings, release of recommendations	2006–2010	ICARDA
Methods of cultivation of young sheep, early weaned lambs, use of mixed fodders for lambs	Seminars and trainings, release of recommendations	1990–1993 2007–2009	Government budget, ICARDA
Use of local non-conventional forages (triticale and sorghum) in diets of feeding of hen layers	Seminars and trainings, release of recommendations	2006–2008	Government budget, USAID
Production of elite varieties of fodder seeds	Seminars and trainings, release of recommendations	1990–2010	ICARDA, State budget
Improving cultivation of fodder crops	Seminars and trainings, release of recommendations	1995–2010	State budget
Evaluation of crop land in households Dehkan farms and their development prospects	Training, seminars, publications	2008–2010	FAO, State budget
An integrated system of protection of forage crops from pests and diseases	Training, seminars, publications	2009–2010	Project Management Unit of the Ministry of Agriculture
Studying the chemical composition of feeds and determination of their nutritional value	Laboratory studies	1994–1998	State budget
Management system of feeding and keeping of animals and birds in farms and private farms	Farmers' days, trainings, seminars, release of recommendations	2003–2008	Mercy crops
Improving standards of feeding and growing technology for Hissar sheep breeds	Farmers' days, trainings, seminars, release of recommendations	2000–2010	State budget
Improving the system of feeding the cows and young stock for maximizing their productivity	Farmers' days, trainings, seminars, release of recommendations	2000–2010	State budget

Title	Tools and technologies being used	Start and completion year	Funding source
Conduct trainings on the rational use of food resources of the Pamir, the development of poultry farming and artificial insemination of animals	Video clips, posters, flip charts	2005–2010	State budget, FAO
Ways to enhance the productivity of pasture forage and animal productivity	Trainings, demonstrations	2003–2010	State budget

Annex VI

Key persons (R & D institutions)

Sr. No.	Contact Name	Contact Details	Address	Tel. No., Fax No. and e-mail
1	Dr. Kasimov Matazim Askarovich	Director of Sugd Branch of Institute of livestock TACXH	Republic of Tajikistan, Sugd Region, Khujand City, St. Kamoli Khujandi, 51	+992 927707624 +992 342261663 matazim@rambler.ru
2	Fazliddin Mahmadzohidovich	Director of Institute	Republic of Tajikistan, Dushanbe city St. Borbad – 165 / 16	+992 2310667 Fazliddin66@mail.ru
3	Narzuloev Tosh Saduloevich	Deputy Director of Institute	Republic of Tajikistan, Hissar district, pos. Uzbekistan	+992 951827826 +992 7016094 ziroatkor@mail.ru
4			Dushanbe, Rudaki –146, 734017	+992 2247207 Rectortau31@mail.ru
5	Safaraliev Guljm	736002 Horog, Str. Fedorov, 1A		+992 935079778 Esaid_bio@mail.ru

Key persons (Feed industries)

Sr. No.	Contact Name	Contact Details Address	Tel. No., Fax No. and e-mail
1	Engineer – Technology	Dushanbe, St. Firdausi 60 apt. 14	+992 934445403
2	Dr. Rakhimov Sergei Abdufatoeevich	7375690, Tajikistan, p.g.t. Gafurov Str.K. Hobilova 64	+992 344234103 +992 34423410 zerno_tj@mail.ru
3	Dr. Salimov Tojiddin	Borbad st. 105/1 apt. 73 Dushanbe	+992 985830014 bajtorctm@mail.ru

Kyrgyzstan

EXECUTIVE SUMMARY

Kyrgyzstan has a surface area of 20 million hectares. Pasture land is approximately 9.3 million hectares. Seventy to eighty percent of Kyrgyzstan is mountainous and because of this animal husbandry is a significant part of the agricultural economy. The country is rural; two-third (64 percent) of Kyrgyzstan's population lives in rural areas. Some 11.9 percent of 10.75 million ha of the agricultural land is classified as arable. The largest crop is assorted types of animal fodder for the livestock. Water from melting snow irrigates crops in the valleys. Between 1993 and 1996, cattle number declined by 25 percent, sheep and goats by 58 percent, pigs by 64 percent and poultry by 80 percent. Large seasonal variations in animal body weights indicate animal feeding is for survival and not for production. Nutritional value of feeds is generally low. Scientific and livestock research has largely ceased because of lack of funds.

Research and development status in research and development organizations

Six filled questionnaires were received from Kyrgyz National Agrarian University, Department of Production of Agricultural Products; State Project Institute 'Kzrgyzgiprozem'; Kyrgyzstan-Turkey-'Manas' University; Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department); Kyrgyz Research Institute of Livestock and Pastures (Livestock Department); and Kyrgyz Veterinary Research Institute. Except the Kyrgyz National Agrarian University, the institutions are involved in research and development (R & D) activities. The major emphasis of the institutions is on pasture management, fodder production and feed improvement. The institutions also would like to improve laboratories. The main nutritional strategies are focused on pasture improvement, feeding for production and fodder conservation. The total scientific staff currently engaged in animal nutrition activities is 21. The number of technical staff is ten and that of extension is four. There is no scientific or technical staff engaged in poultry or pig nutrition activities. The ongoing projects in R & D are mainly on the chemical composition of pasture plants. Practically no ongoing extension activities exist. The staff has not been exposed to training to any significant extent. The relevant literature is accessed through professional journals, books and participation in conferences and the preferred language remains Russian. The staff has desired to undergo training in English language.

Only three institutions (Kyrgyzstan-Turkey-'Manas'-University; Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department); and Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) obtain feedbacks mainly through personal contacts with the farmers or through surveys. No institution in Kyrgyzstan has any means to monitor and evaluate R & D activities in the area of animal nutrition. The laboratory facilities in the country are not satisfactory. No feed analysis activity at Kyrgyz National Agrarian University, Department of Production of Agricultural Products and at Kyrgyz Veterinary Research Institute exists. Only nitrogen, ether extractives and crude fibre estimations

are being conducted at other institutions. Funds are scarce. The number of samples analysed each month is very low. Only the laboratories at Kyrgyzstan-Turkey-'Manas' University are equipped with modern equipment and are following modern feed analysis methods (digestibility and energy estimations, feed analysis using NIRS, mycotoxins, anti-nutritional factors, purine derivatives, mobile bag technique for pig feeds, *in vivo* digestibility, ileal amino acid digestibility).

Since the staff in most of the institutions is not exposed to any training; exposure to almost all the aspects of feed analysis including the use of the *in vitro* gas production technique, PCR techniques and NIRS is required. Likewise training on pasture management is sought. The situation regarding the availability of equipment is not encouraging. Many of these institutions have very few and very old equipment in their laboratories. However, three institutions (Kyrgyz National Agrarian University, Department of Production of Agricultural Products; State Project Institute 'Kzrgyzgiprozem' and Kyrgyz Veterinary Research Institute) have not shown any interest to procure new equipment but the other three (Kyrgyzstan-Turkey-'Manas'-University, Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department) and Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) would like to have all modern equipment for animal nutrition studies. The facilities for conducting animal experiments are also inadequate. Most of the institutions do not have animal cages or slaughter house facilities. A couple of institutions (State Project Institute 'Kzrgyzgiprozem' and Kyrgyzstan-Turkey-'Manas'-University) have collaboration with international agencies and almost all of them have national or regional linkages. The linkages with feed industries and farmers are moderate. The suggestions given by the institutions to improve R & D activities in animal nutrition include: increased funding, increased staff – scientific and technical, implementation of research recommendations and political stability.

Research and development status in feed industries

Three filled questionnaires were received from Government breeding plant, the LLC 'Agro-industrial complex Elda Atalyk' and the State Breeding Farm 'Strelnikov'. The total number of staff engaged in feed industries is 21. Information has not been provided regarding the capacity or annual production by the feed industries or the type of analyses being conducted by these industries. Only the LLC 'Agro-industrial complex Elda Atalyk' has mentioned that nitrogen, ether extract and crude fibre analysis are conducted. No information regarding the number of analysis per month has been given.

No information has been provided regarding the existing equipment or equipment to be procured or the type of maintenance services available. The sources of information for all the three feed industries are professional journals, books, CDs, conferences and technical pamphlets. The detailed information regarding new technologies and methodologies is required and the preferred language is Russian. Translation of literature in native language would be preferred. No information was given by any of the feed industry on the ways to improve feed analysis. The linkages and collaborations with research institutions are strong and with farmers' associations and individual farmers moderate.

After analysis of the questionnaires, the following conclusions emerge:

- Poor animal nutrition research;
- Weak resource base;
- Insufficient and outdated equipment;
- Inadequate financing;
- Inadequate exposure of staff to animal nutrition research methods;
- Insufficient investment in feed manufacturing;
- Inadequate information;
- Poor feedback mechanisms; and
- No means to monitor and evaluate R & D activities.

INTRODUCTION

Located between 70–80° E and 39–43° N, Kyrgyzstan is bordered by Kazakhstan to the north, Uzbekistan to the west, Tajikistan to the southwest and the People's Republic of China to the east. Its capital and largest city is Bishkek. It is the second poorest country in Central Asia. Ninety percent of the country has an average altitude of higher than 1500 m. The climate is dry continental, but variable over the country. Winters are cold (to –28 °C) and the dry summers are hot (to 41 °C).

Kyrgyzstan has a surface area of 20 million hectares. The land area of Kyrgyzstan is composed of 10 million hectares of agricultural land, including 900 000 hectares of irrigated land, 1.4 million hectares of dry arable land and 176 300 hectares of hay fields. There are approximately 9.3 million hectares of pasture land and 55 000 hectares is under permanent crops. Northern Kyrgyzstan is situated at the western end of the Tian Shan mountains, whereas southern Kyrgyzstan forms the western arm of the Pamir range. Seventy to eighty percent of Kyrgyzstan is mountainous. The mountain influence creates large climatic variations. Annual precipitation (375–400 mm) mainly falls as snow on the highlands between October and May.

The Kyrgyz population is approximately 5.2 million, with an ethnic mix of Kyrgyz (64 percent), Uzbeks (14 percent), Russians (13 percent), with the rest composed of many other nationalities and minorities. The average life expectancy is 65 years and 36 percent of the population is in urban areas. Kyrgyzstan residents have a per capita daily calorie intake of 3 110. Currently 3 percent of children are underweight and 14 percent suffer stunting. In 1990–1992 the proportion of undernourished in the total population and the number of people undernourished were 17 percent and 0.8 million, respectively. The corresponding figures for 2005–2007 were 10 percent and 0.6 million.

Kyrgyzstan is still considered as a low-income country with 44 percent of population living below the poverty line in 2005 (ADB, 2007). Poverty headcount ratio at US$ 2 a day at Purchasing Power Parity is 21 percent of the total population.

AGRICULTURE AND TRADE SITUATION

The share of agriculture to total GDP was 40.7 percent in 1995 and decreased to 28.5 percent in 2009. In 1995 the labour force in agriculture as a percentage of total labour force was 28.9 percent. The corresponding figure for 2009 was 21.3 percent. The value of food exports increased from US$ 53 million in 1995 to US$ 158 million in 2008. In 1995–2000 the average growth rate of exports was –19.8 percent. The corresponding figure for 2005–2008 was 29.7 percent. The share of food exports

in total merchandise exports decreased from 13.0 percent in 1995 to 8.5 percent in 2008. The value of food imports increased from US$ 84 million in 1995 to US$ 435 million in 2008. In 1995–2000 the average growth rate of exports was –7.8 percent. The corresponding figure for 2005–2008 was 33 percent. The share of food imports in total merchandise imports decreased from 16.1 percent in 1995 to 10.7 percent in 2008. Water from melting snow irrigates rice, wheat, cotton, corn, sunflower, tobacco, melons, carrots, rasberries, alfalfa and other crops in the valleys. Dryland cereal, vegetable and oilseed crops are also grown. The main agricultural imports are: wheat, flour of wheat, refined sugar, non-alcoholic beverages and chicken meat. The main agricultural exports are: grapes, beans, hides wet salted cattle, cotton lint and apricots. The total meat and cereal productions were 188 000 tonnes and 1.71 million tonnes respectively.

Only 7.5 percent of the total land area is used for crop cultivation. As far as total production, the largest crop is assorted types of animal fodder to feed the livestock. The second largest crop is winter wheat, followed by barley, corn and rice. Average yields increased substantially between 1995 and 2006 by 22 percent for grains, 41 percent for vegetables and 13 percent for cotton. During the same period, gross output increased by 7 percent for grains, 52 percent for vegetables and 95 percent for cotton. The average productivity of cereals is 3 303 kg per ha (Mirzabaev *et al*., 2009).

Wage-employment in agriculture is still limited and concentrated among large agricultural enterprises. Average wage of an employed worker in the country was US$ 97 per month in 2006. However, agricultural sector is not attractive for foreign investments. Foreign investments into agricultural activities have been fluctuating. It was US$ 0.26 million 1996, reaching US$ 0.62 million in 1999, before decreasing drastically in 2000. The peak of investments was in 2004 with US$ 9.75 million; even then it was only about 6 percent of the total foreign investments.

LIVESTOCK SITUATION

Because of the many mountains in Kyrgyzstan, animal husbandry remains a significant part of the agricultural economy. The country was famous throughout the Soviet Union for dairy production. Major effort was applied to developing the best dairy animal for the environmental conditions. Holstein introduction proved incapable of coping with the environment, but the Brown Swiss made significant contribution to the improvement of local breed. The local Alatoo breed is stated to be able to produce 20–25 litres of milk daily if fed adequately. There is no pure beef industry. Livestock in 2001 included 3.2 million chickens, 3.1 million sheep, 1.9 million cattle, 324 600 horses, 640 000 goats and 87 000 pigs. Yaks are also bred. There are about 20 000 yak in Kyrgyzstan. The Kyrgyz Government wants to increase the national herd to about 50 000. Meat production in 2001 totaled 200 000 tonnes; cow's milk, 1 110 000 tonnes; wool (greasy), 11 000 tonnes; and eggs, 12 700 tonnes.

The livestock sector suffered most after the collapse of the Soviet Union. Domestic prices for livestock dropped to minimal and herders began to barter or eat their livestock, irrespective of the quality of the animals. Many highly selected and bred animals were slaughtered and eaten. Between 1993 and 1996, cattle numbers declined by 25 percent, sheep and goats by 58 percent, pigs by 64 percent and poultry by 80 percent.

Gissar, a fat rumped, black, or dark coloured wool sheep, is capable of producing 2 lambings per year. Goats vary from Cashmere and Angora types, to Saanen milking goats and the Kyrgyz 'local' goat for meat. In Batken Oblast, there are 65 000–70 000 Cashmere type goats. Sheep and goats are normally run together in mixed mobs resulting in reciprocal mating within sheep and goat breeds giving rise to a range of genotypes within each species.

Approximately 70 percent of all domestic livestock (cattle, sheep, goats, horses and donkeys) are owned by town dwellers. A large percentage of Kyrgyz livestock are poorly managed and fed inadequate diets, particularly during winter. Animal production in Kyrgyzstan appears to fall into two categories: livestock owned by people domiciled in towns and villages and livestock owned by the bonafide herders who live outside the town areas. Forty–four percent of the land is used as pastures for livestock but the yield is low. Pastures are state-owned public goods. However, the management, including permission to use pastures, pasture rehabilitation and fee assessment and collection, have been decentralized to the level of the pasture users association.

Crop residues are vital for winter feeding. Large seasonal variations in animal body weights indicate animal feeding is for survival, not production. Nutritional value of feeds is generally low. The water reticulation system of open cement channels for bringing water from the melting snow has fallen into disrepair, thus reducing irrigation capability and forcing potential irrigation areas to dryland use. Scientific and livestock research has largely ceased because of lack of funds. Reliable statistical information is difficult to obtain. Developments in agriculture and livestock industries are occurring mainly from financial contributions by international donor organizations.

In spite of the large number of laws coordinating the agricultural sector, the current arrangements for collaboration among institutions for agricultural research and development are not working effectively (Mirzabaev *et al*., 2009). The national agricultural research system is inadequately funded – barely surviving – and remains quite isolated from the international scientific community. As a result, prospects for professional development for young researchers are lacking. The agricultural research and education systems appear to be largely disconnected from the civil society (the latter including extension organizations, farmer groups, cooperatives, as well as the private sector).

In 1996, all agricultural research institutes were moved into a new organization – the Kyrgyz Agrarian Academy. All agrarian educational and research organizations in the country came under the umbrella of this single organization, made up of the Kyrgyz Agricultural Institute (which is the equivalent of an agricultural university), five agricultural research institutes (soil science and agrochemistry, farming, forage and pastures, animal husbandry and veterinary medicine) and the agricultural colleges, stations and experiment farms (Mirzabaev *et al*., 2009).

SYNTHESIS OF INFORMATION OBTAINED THROUGH THE QUESTIONNAIRE ON RESEARCH AND DEVELOPMENT STATUS IN RESEARCH AND DEVELOPMENT ORGANIZATIONS

Number of questionnaires received

Six filled questionnaires were received from the following institutions in Kyrgyzstan:

- Kyrgyz National Agrarian University, Department of Production of Agricultural Products
- State Project Institute 'Kzrgyzgiprozem'
- Kyrgyzstan-Turkey-'Manas'-University
- Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department)
- Kyrgyz Research Institute of Livestock and Pastures (Livestock Department)
- Kyrgyz Veterinary Research Institute

All these institutions except the State Project Institute 'Kzrgyzgiprozem' are under the Ministry of Education and Science. The Kyrgyz National Agrarian University, Department of Production of Agricultural Products is engaged in education, service, outreach and extension while other five are engaged in research and development activities. The address, type of institution, year of establishment and total staff are given in Annex I.

Vision of the institutions

It is clear from the information provided that the major emphasis of these institutions is on pasture management, fodder production and feed improvement. Kyrgyz National Agrarian University, Department of Production of Agricultural Products has a vision to improve laboratories, feed manufacturing and educational practices while Kyrgyz Veterinary Research Institute would like to have a state-of-the-art laboratories and technical skills to address veterinary issues of importance to the country.

Animal nutrition related priorities of the institutions

Kyrgyz National Agrarian University, Kyrgyzstan-Turkey-'Manas' University, Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department) and Kyrgyz Veterinary Research Institute have not given any comments on the development and use of nutritional strategies. The State Project Institute 'Kzrgyzgiprozem' has listed proper use (seasonal and species wise) of pastures as the main nutritional strategy while the Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) has listed preparation of silages on the farms, preparation of balanced feeds and use of advanced feeding strategies to increase milk production in cows.

Number of staff

The total scientific staff currently engaged in animal nutrition activities is 21. The details are shown in Figure 1. Figure 2 shows distribution of the scientific staff as males and females. The number of technical staff is ten and that of extension worker is four (Figure 3). Kyrgyz Veterinary Research Institute has not given any information regarding the staff position. The emphasis related to animal nutrition activities

is on ruminants. No scientific (Figure 4) or technical staff (Figure 5) is engaged in activities related to poultry or pig nutrition although Kyrgyzstan-Turkey-'Manas' University is conducting ileal digestibility of amino acids in pigs. Two extension workers are engaged for giving demonstrations on proper feeding of ruminants and one for research data analysis and report writing. The details of staff position are given in Annex II.

Figure 1. The number of scientific staff currently involved in animal nutrition activities

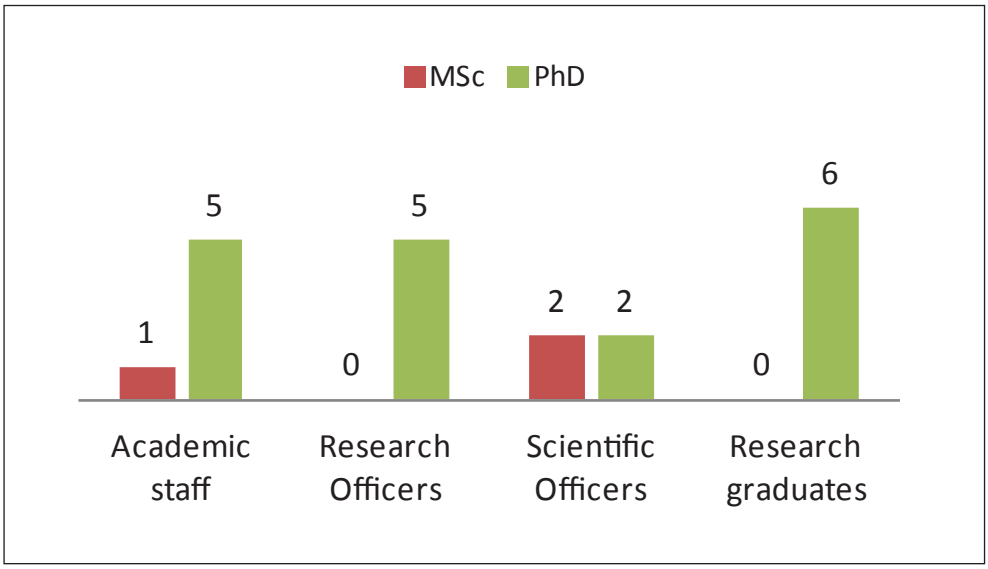


Figure 2. The distribution of scientific staff, as males and females, currently involved in animal nutrition activities

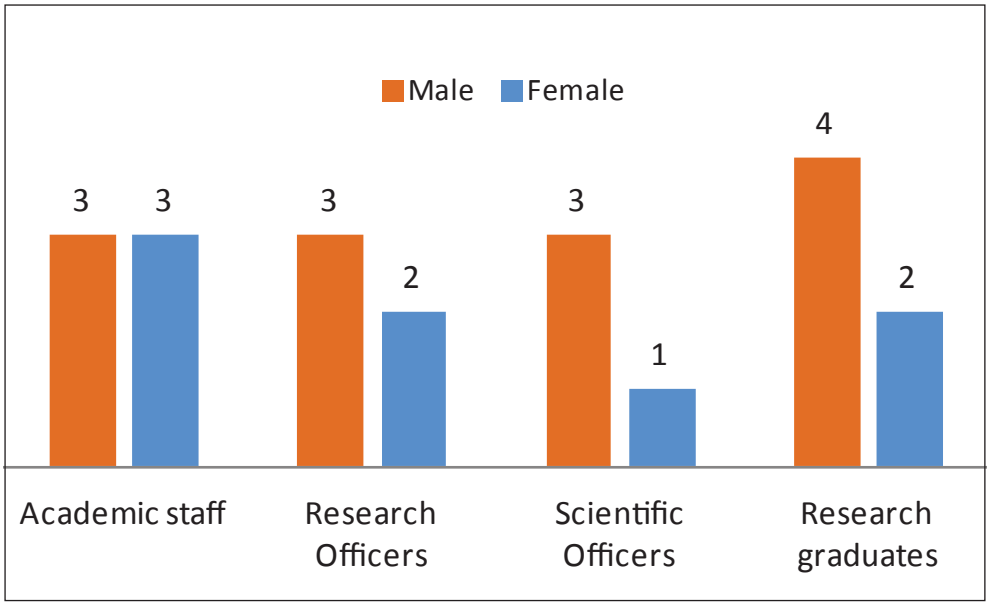


Figure 3. Number of technical and extension staff currently involved in animal nutrition activities

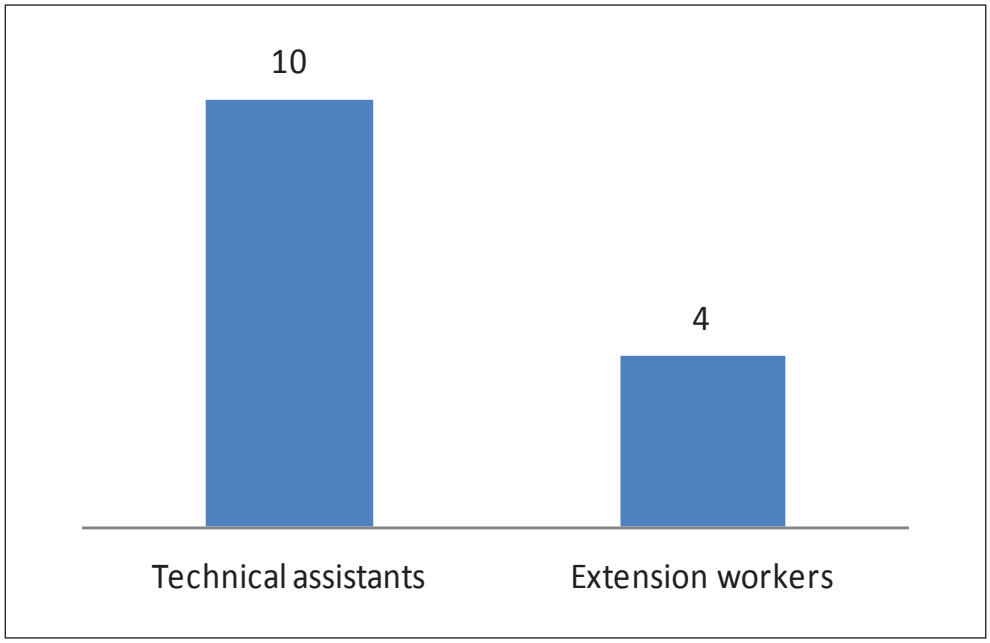


Figure 4. Number of scientific staff currently involved in ruminant nutrition activities

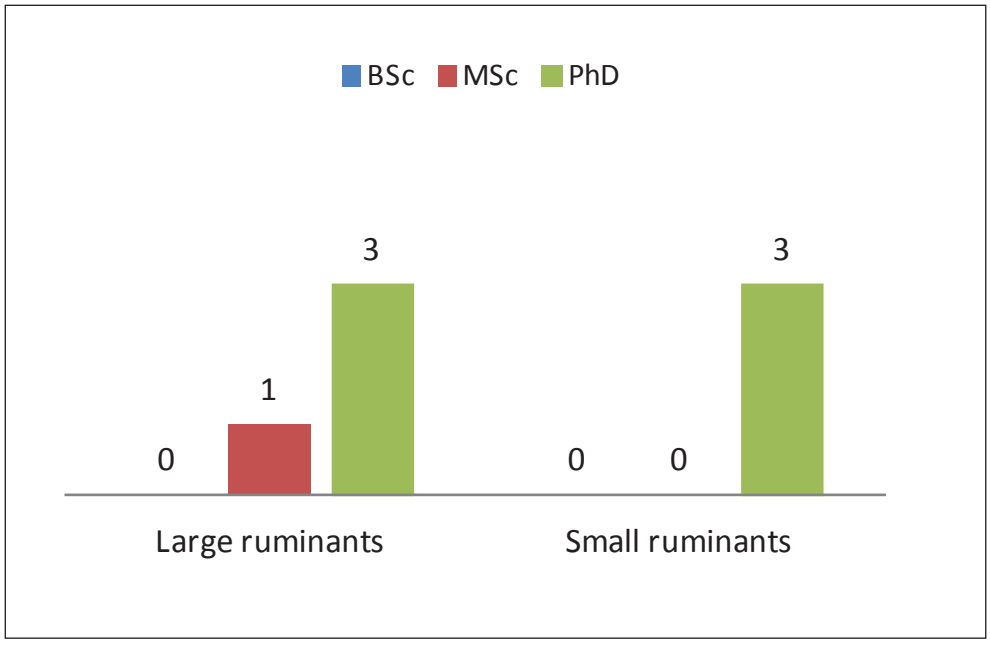
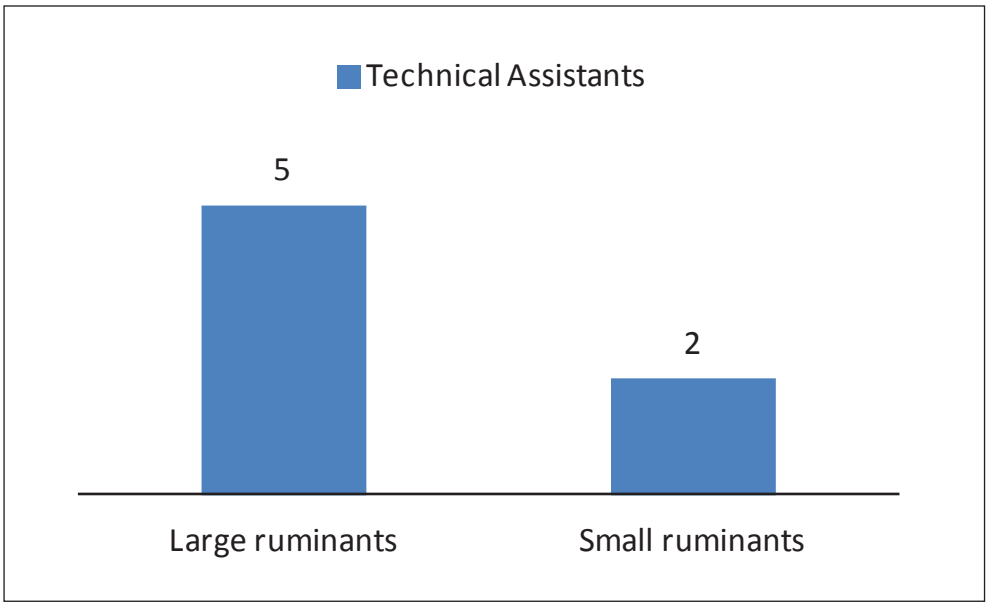


Figure 5. Number of technical assistants currently engaged in ruminant nutrition activities



Ongoing R & D activities in the area of Animal Nutrition

There is no ongoing project in R & D at Kyrgyz National Agrarian University, Department of Production of Agricultural Products. One national funded R & D project on pasture monitoring, spread over 475 areas all over the Kyrgyz Republic on 80 types of vegetation, is running at State Project Institute 'Kzrgyzgiprozem'. Date of start or completion is not given. Kyrgyzstan-Turkey-'Manas' University has an institutional R & D project entitled 'Determination of chemical composition and nutritional value of pasture plants during vegetation in the conditions of high mountains'. The project involves biochemical and microbiological analyses. The project started in 2010 and will conclude in 2013. On this aspect, no information has been provided by Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department).

A state funded project entitled 'Study of the effects of glauconitic as a feed additive in feeding of farm animals' is currently being handled at the Kyrgyz Research Institute of Livestock and Pastures (Livestock Department). The project started this year and will continue till 2015. Chemical composition, quality of forage and livestock production studies are to be undertaken. Kyrgyz Veterinary Research Institute has one international project funded by ICARDA, Aleppo, Syria. The details have not been provided (see Annex III).

Ongoing extension activities in the area of Animal Nutrition

Practically there are no extension activities except in Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) where seminars and conferences are held for extension workers. Kyrgyzstan-Turkey-'Manas' University as well has listed the same R & D project under extension activities of the institution. The remaining four institutions have not provided any information on extension activities.

Training

Only staff from State Project Institute 'Kzrgyzgiprozem' (two; less than six months; on pature management and on ecological problems on pasture usage) and from Kyrgyzstan-Turkey-'Manas' University (one; 6–12 months on rational use of pastures) have undergone training.

Mechanisms of sharing information

The mechanism of sharing information of Kyrgyz National Agrarian University, Department of Production of Agricultural Products is through consultations and recommendations. The State Project Institute 'Kzrgyzgiprozem' shares information through distribution of handbooks. This institution also provides data on payment basis. Kyrgyzstan-Turkey-'Manas' University conducts short term training on pasture use. Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department) and Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) share information through seminars, consultations and conferences while the Kyrgyz Veterinary Research Institute shares information mainly through booklets and pamphlets. The institution also undertakes field trips and hold meetings with farmers.

The three institutions namely Kyrgyz National Agrarian University, Department of Production of Agricultural Products, State Project Institute 'Kzrgyzgiprozem' and Kyrgyz Veterinary Research Institute have no feedback mechanism. Kyrgyzstan-Turkey-'Manas' University obtains feedback through questionnaires and personal contacts. Both Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department) and Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) rely on personal contacts for obtaining feedback.

Most of the institutions identify priority areas through contact with the farmers. However, no information has been provided by Kyrgyz Veterinary Research Institute for identification of priority areas.

No institution in Kyrgyzstan has any means to monitor and evaluate R & D activities in the area of Animal Nutrition.

Status of laboratory infrastructure and technical skills

Laboratory activities. Kyrgyz National Agrarian University, Department of Production of Agricultural Products and Kyrgyz Veterinary Research Institute have not provided any information on laboratory activities. Nitrogen, ether extractives, crude fibre, cellulose, Ca, Mg and K are analysed at State Project Institute 'Kzrgyzgiprozem'. No information on the number of samples analysed each month or feed resources commonly analysed is given. The laboratory at Kyrgyzstan-Turkey-'Manas'-University possess many modern equipment including NIRS; most of these were procured in 2010 and are in excellent condition. Nitrogen, ether extractives, crude fibre, minerals, vitamins, short chain fatty acids (SCFA), digestibility and energy estimations, analyses using NIRS, mycotoxins, anti-nutritional factors, purine derivatives, mobile bag technique for pig feeds, *in vivo* digestibility and ileal amino acid digestibility determinations are done. However, inspite of having all the equipment the number of samples analysed each month is one or two only. No information on feed resources commonly analysed has been given. NIRS is also available at Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture

Department) but only nitrogen, ether extractives and crude fibre are routinely analysed in grains and leguminous plants. The number of samples analysed each month has not been given. One hundred and twenty samples for nitrogen, ether extractives and crude fibre, 240 samples for macro-minerals, 120 samples for vitamins and 30 for SCFA are analysed each month at Kyrgyz Research Institute of Livestock and Pastures (Livestock Department). The feeds commonly analysed include hay, haylage, silage, grain, straw and beet.

Exposure of the staff to animal nutrition techniques and information. Kyrgyz National Agrarian University, Department of Production of Agricultural Products; Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department); and Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) have not given any information on the techniques not known to the staff, however, the staff at Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) would like to undergo training on rapid analysis of feeds using NIRS. The staff at Kyrgyzstan-Turkey-'Manas' University would like to obtain training on the *in vitro* gas production, PCR techniques and pasture management while the other two institutions namely State Project Institute 'Kzrgyzgiprozem' and Kyrgyz Veterinary Research Institute would like to provide their staff training on almost all the aspects of feed analysis and animal care.

The staff at the State Project Institute 'Kzrgyzgiprozem' and Kyrgyz Veterinary Research Institute do not wish to obtain detailed information in the area of animal nutrition while the other four institution have shown willingness to have more detailed information. It appears that most of the staff has inadequate English language skills and they would like to take English language lessions and many would like to have the literature translated into their native language.

Almost all the institutions have access to professional journals, books and CDs for obtaining information. All the institutions normally arrange conferences for interaction among staff members and for exchange of scientific information. Only one institution has access to the Internet. The literature in Russian or native language is preferred.

Training to students on laboratory techniques. State Project Institute 'Kzrgyzgiprozem' gives demonstration to Agriculture University students and Kyrgyzstan-Turkey-'Manas' University on proximate analysis of feeds, mycotoxins and microbial analysis. The other four institutions have not given any information on this aspect, suggesting that they do not conduct these analyses. Kyrgyz National Agrarian University, Department of Production of Agricultural Products is an educational institution.

Agricultural education institutions should establish closer linkages to the research institutes through facilitating internships of their students in research institutes and encouraging more students to do such internships (Mirzabaev *et al.*, 2009).

Equipment situation. The situation regarding the availability of equipment is not at all encouraging. Many of these institutions have very old and very few equipment in their laboratories. Kyrgyz National Agrarian University, Department of

Production of Agricultural Products has listed only muffle furnace, autoclave and balance as existing equipment. These are more than 40 years old. A plasmatic photometer without any maintenance facilities is listed by the State Project Institute 'Kzrgyzgiprozem'. Kyrgyzstan-Turkey-'Manas' University is the only institution having modern equipment purchased in 2010. These equipment are in excellent condition. The listed equipment include biochemical analyzer, GLC, pH meter, spectrophotometer, electrophoresis system, laminar flow and PCR machines. The equipment available at Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department) are electric thermostat, laboratory microscope, NIRS, analytical balance and pH meter. The equipment with Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) are old and service facilities are also not available. The existing equipment include distillation unit, muffle furnace, analytical balance, dryer, microscope and hood. No information regarding existing equipment is provided by Kyrgyz Veterinary Research Institute .

The Kyrgyz National Agrarian University, Department of Production of Agricultural Products and Kyrgyz Veterinary Research Institute have not given any requirement for acquiring new equipment. On the other hand, the State Project Institute 'Kzrgyzgiprozem' would wish to acquire two vehicles. Kyrgyzstan-Turkey-'Manas' University (already having most of the required equipment) would like to acquire amino acid analyzer, atomic absorption spectrophotometer, DNA sequencing equipment and Real-time PCR machine. Similarly, Kyrgyz Research Institute of Livestock and Pastures (Pasture Department) would like to acquire all modern equipment for animal nutrition work and the Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) wishes to acquire equipment for rapid analysis of feeds (NIRS).

State Project Institute 'Kzrgyzgiprozem'; Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department) and Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) do not have any facilities for animal (large or small) experiments. Kyrgyz National Agrarian University, Department of Production of Agricultural Products has cages for experiments on rabbits (number not given). The Kyrgyzstan-Turkey-'Manas' University and Kyrgyz Veterinary Research Institute have the required facilities for conducting animal experiments including a slaughter house. The institutions have collaboration with the Kyrgyz Agriculture University and Pasture and Animal Institute respectively.

Financial resources for animal nutrition activities

No information has been provided by the Kyrgyz National Agrarian University, Department of Production of Agricultural Products. Other institutions have national and competitive grants. In addition, State Project Institute 'Kzrgyzgiprozem' and Kyrgyz Veterinary Research Institute have international grants as well.

Linkages and types of collaborations in the area of Animal Nutrition

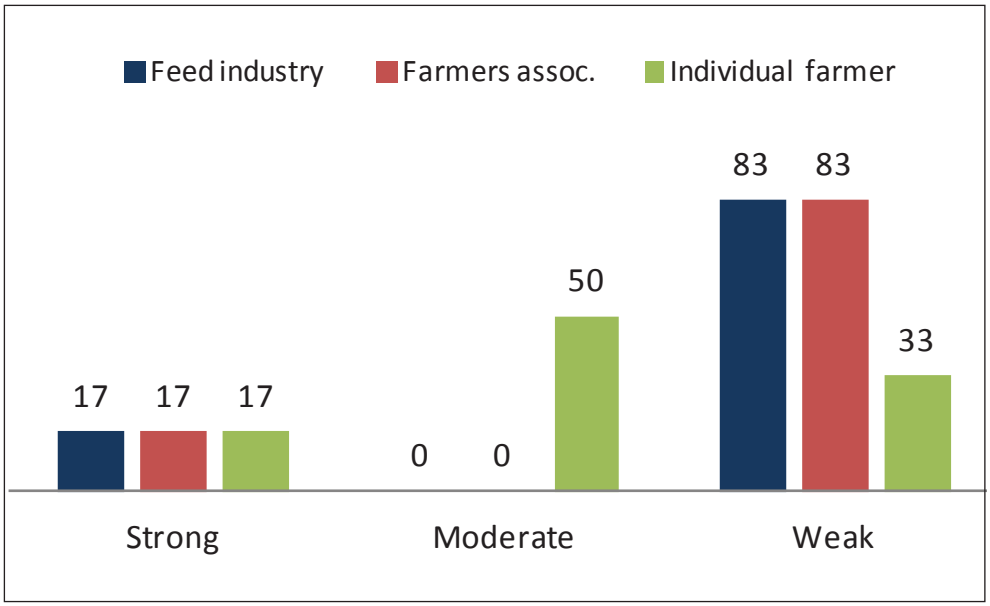
Kyrgyz National Agrarian University, Department of Production of Agricultural Products and Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) do not have any collaboration or linkages with other agencies. The State Project Institute 'Kzrgyzgiprozem' has national linkages with Academy of Sciences, Kyrgyz National University, the Ministry of Agriculture and the Agricultural

University; regional linkages with the Naryn State University, the Naryn Oblast State Administration, the State University, the Talas State University, Rayon village administrations and Camp Ala-Too; and international linkages/collaborations with the World Bank, ADB and UNDP. The Kyrgyzstan-Turkey-'Manas' University has national linkages/collaboration with the Kyrgyz Agriculture University and the Kyrgyz Research Science Institute of Livestock and Pasture; regional linkages with the departments of Jalal-Abad, Osh and Naryn; and international linkage with the Humbolt University, Germany. Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department) has only regional collaboration for introduction of new breeds of fodders. Kyrgyz Veterinary Research Institute has only national collaboration.

Linkages with feed industry, farmers' associations and individual farmer

Kyrgyz National Agrarian University, Department of Production of Agricultural Products has strong linkages with feed industry, farmers' associations and individual farmer; while the State Project Institute 'Kzrgyzgiprozem' and Kyrgyzstan-Turkey-'Manas' University have weak linkages with each other. The other three institutions namely Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department), Kyrgyz Research Institute of Livestock and Pastures (Livestock Department) and Kyrgyz Veterinary Research Institute have weak linkages with feed industries and farmers' associations but moderate linkages with individual farmers. The percent wise share of linkages (all the 6 institutions) with the feed industry (strong 1 out of 6, weak 5 out of 6), farmers' associations (strong 1 out of 6, weak 5 out of 6) and individual farmer (strong 1 out of 6, moderate 3 out of 6, weak 2 out of 6) is shown in Figure 6.

Figure 6. Linkages of the R & D institutions with feed industries, farmers' associations and individual farmers (percent)



Suggestions for improvement of R & D activities in Animal Nutrition

The suggestions given by the institutions include:

- Increase in funding;
- Increase in staff – scientific and technical;
- Implementation of research recommendations; and
- Political stability.

Mirzabaev *et al*. (2009) conducted a pilot study in Kyrgyzstan to identify policy and legal frameworks, institutional set-up in agricultural research, extension/advisory services, education, farmer organizations, their linkages, their information and communication needs in order to serve farmers' and agribusinesses' needs in their re-orientation to markets. According to the study:

There is an urgent need to re-orient agricultural research and education to establish strong linkages between research, academia, extension services, civil society organizations, farmers, processors and markets in order to successfully tackle the issues of agricultural development in the region.

SYNTHESIS OF INFORMATION OBTAINED THROUGH THE QUESTIONNAIRE ON RESEARCH AND DEVELOPMENT STATUS IN FEED INDUSTRIES

Three completed questionnaires were received from Government breeding plant established in 1950; the LLC 'Agro-industrial complex Elda Atalyk' established in 1938 and the State Breeding Farm 'Strelnikov' established in 1930.

Most of the information sought through the questionnaire was not provided.

The number of staff in Government breeding plant is 15. No information is given by the LLC 'Agro-industrial complex Elda Atalyk' and the number of staff in the State Breeding Farm 'Strelnikov' is six.

No information was provided regarding the capacity or annual feed production.

Only the LLC 'Agro-industrial complex Elda Atalyk' analyses feeds for nitrogen, ether extract and crude fibre. No information has been provided regarding the number of analyses conducted per month.

All the three feed industries obtain technical information from professional journals, books, CDs, conferences and pamphlets.

The detailed information regarding new technologies and methodologies is required and the preferred language is Russian. Translation of literature in native language is preferred.

No information has been provided regarding the existing equipment, equipment to be procured or the type of maintenance services available.

The feed industries have linkages with Kyrgyz Research Institute of Livestock and Pasture. No information has been provided by any of the feed industry on the ways to improve feed analysis. The linkages and collaborations with research institutions are strong and with farmers' associations and individual farmers are moderate.

Annex I

General information about the institution in which animal nutrition activities are undertaken

Sr. No.	Name of Institution	Website of the Institution	Address (Tel. No., Fax and e-mail)	Affiliation of the institution		Status of Organization		Year in which the Institution was founded	Total staff of the Institution
				Ministry	Other	Public	Private		
1	Kyrgyz National Agrarian University, Department of Production of Agricultural Products	-	#168, Mederova Street, Bishkek, Kyrgyzstan Fax +996 312548641	Ministry of Education and Science	-	+	-	1933	6
2	State Project Institute 'Kzrgyzgiprozem'	-	Kyrgyzstan, Bishkek city, Orozbekov St. 4/412 +996 312300280, +996 555666699 +996 312300349 penkina_lm@rambler.ru	Ministry of Natural Resourses	-	+	-	1964	126
3	Kyrgyzstan-Turkey-'Manas'-University	www.manas.kg	720044, Bishkek, Kyrgyzstan, Jal Campus +996 312492756 www.@manas.edu	Ministry of Education of the Kyrgyz Republic	-	+	-	1995	800
4	Kyrgyz Research Institute of Animal Breeding and Pastures (Pasture Department)		+996 772070555 +996 313466034	Ministry of Education and Science	-	+	-	1931	8
5	Kyrgyz Research Institute of Livestock and Pastures (Livestock Department)	-	#14, Institutskaya Street, village Frunze, Sokuluk region, Chui oblast, Kyrgyzstan +996 312453509 +996 31566034	Ministry of Education and Science	-	+	-	1930	12
6	Kyrgyz Veterinary Research Institute named after A. Duysheev	-	Bishkek, 60 Togolok Moldo Str., 720033 +996 312325069 +996 312325069 vetmed-kg@rambler.ru, namazbek@gmail.com	Ministry of Education and Science of Kyrgyz Republic	-	+	-	2008 (1927)	98

Annex II

Scientific staff currently involved in animal nutrition activities

Sr. No.	Academic Staff			Research Officers			Scientific Officers			Research Graduates			Other Staff currently involved in Animal Nutrition		
	PhD	MSc	BSc	PhD	MSc	BSc	PhD	MSc	BSc	PhD	MSc	BSc	Technical Assistant	Extension workers	Other (specify)
1	0	0	0	1	0	0	0	1	0	5	0	0	0	0	0
2	2	1	0	0	0	0	0	0	0	0	0	0	3	2	0
3	0	0	0	0	0	0	2	0	0	0	0	0	4	2	0
4	2	0	0	2	0	0	0	0	0	1	0	0	3	0	0
5	1	0	0	2	0	0	0	1	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Annex III

Ongoing Research and Development activities in the area of Animal Nutrition

Title	Techniques being used	On research station/ on farmers' fields	Start and completion year	Funding source
Pastures monitoring in Kyrgyz Republic	Mowing method; Druda's scale; Protective coverage; Burdens and capacity of pastures	475 areas all over the Kyrgyz Republic on 80 types of vegetation	Every year for 3 observations in spring, summer, autumn	National budget
The determination of chemical composition and nutritional value of pasture plants during vegetation in the of high mountains	Biochemical, chromatograph, Microbiological	Experimental fields of the faculty	2010–2013	Kyrgyzstan-Turkey Manas University
Study the effects of glauconitic as a feed additive in feeding of farm animals	Method of zootechnical analysis for chemical composition	Government breeding plants and farms	2011–2015	State budget
International Project (ICARDA): Nutrition and farm management practices	–	On pilot farms	–	ICARDA, IFAD

Annex IV

Key persons (R & D institutions)

Sr. No.	Contact Name	Contact Details	Address	Tel. No., Fax No. and e-mail
1	Prof in Agricultural Baitogoev	Kyrgyz National Agrarian University, Department of Production of Agricultural Products	#168, Mederova Street, Bishkek, Kyrgyzstan	+996 312 548641
2	Prof Penkina Ludmila Mihailovna		Orozbekov St. 4/412	
3	Prof Doolotkeldieva Tinatin		720044, Bishkek, Kyrgyzstan, Jal Campus	tdoolotkeldieva@gmail.com
4	Prof Samsaliev K.A.		Sokuluk district, Komsomol skiy village, Stroitel'naya Str.	+996 772 070555 +996 3134 66034
5	Dr. Ponomarenko I.N.		#1, Institutskaya Street, village Frunze, Sokuluk region, Chui oblast, Kyrgyzstan	+996 312 453509
6	Namaz Abdykerimov		Bishkek, 60 Togolok Moldo Str., 720033 Vetmed-kg@rambler.ru, namazbek@gmail.com	

Key persons (Feed industries)

Sr. No.	Contact Name	Contact Details Address	Tel. No., Fax No. and e-mail
1	Tarycheva G.	Sokuluk region, Chui oblast Kyrgzystan, Government breeding plant	-
2	LLC 'Agro-industrial complex Elda Atalyk'	Alamedin region, Chui oblast Kyrgzystan	-
3	Mr. Turkanbaev N.	Arashan v., Chui oblast Kyrgzystan	-

Azerbaijan

EXECUTIVE SUMMARY

Azerbaijan is the largest country in the Caucasus region of Eurasia. The population of Azerbaijan is 8.4 million and the number of agriculture labour is 2.2 millions. Small-scale livestock farmers with few cattle are the principal source of milk and meat. They are individually responsible for milking operations and for taking care of animal health, nutrition and reproduction.

Research and development status in research and development organizations

Only one filled questionnaire from Research and Development (R & D) organization was received. The animal nutrition vision of the institution is not clearly mentioned. The scientific staff currently involved in animal nutrition is 45 while the technical and extension staff is seven and five respectively. The institution has two ongoing projects, being carried out at farmers' fields. These projects are due to conclude in December, 2011. No details are given regarding the techniques and methodologies used in these projects. There is no ongoing extension project.

The institution does not have any means of obtaining feedback from farmers, farmers associations and feed industries about the effectiveness of the extension/outreach activities.

The priority areas for R & D work in animal nutrition are identified through close contacts with the farmers. There is no input from other stakeholders or the feed industries. The institution does not have a formal means to monitor and evaluate R & D activities. It is not clear what type of specific animal nutrition strategies have been passed on to farmers, farmers' associations or feed industries.

Laboratory activities are practically insignificant. On average only ten samples per month (five from research station and five from feed industry) are analysed for nitrogen, fat, crude fibre and vitamins. The feed ingredients commonly analysed include forages, by-products and concentrate mixtures. The laboratory facilities are inadequate – there is hardly any equipment. The staff is not aware of the recent feed evaluation techniques including those giving information on feed safety. The laboratory equipment available are not listed. The institution would like to procure equipment as listed. The institution has no facilities for animal experiments. The staff is willing to undergo training for improving qualification and skills and also willing to have detailed information in the area of animal nutrition. Lack of knowledge of English language has been identified as a constraint.

The institution has not shown any interest in international collaboration. The linkages of animal nutrition groups with feed industries, farmers' associations and individual farmers are moderate. The main reasons for poor R & D activities in animal nutrition appears to be as follows:

- Lack of laboratory equipment;
- No training for the staff;
- No formal means to monitor and evaluate R & D activities in animal nutrition;

- No means of obtaining feedback from end-users; and
- Weak research-extension-user linkage.

The suggestions given to improve R & D activities include strengthening financial position, sharing information regarding experiments and enhancing staff skills.

Research and development status in feed industries

Three feed industries namely Agil farm enterprise, Private enterprise of Rustambeyli municipality and Gullubulag filled the questionnaire. The total number of staff engaged in feed industries is 44 including 36 technical staff. The feed industries are running at over 70 percent of their capacity. Haylage, silage and grain are analysed for nitrogen and ether extract but surprisingly only one sample is analysed per month. Similar to the situation in research organization, the staff is not aware of the recent feed evaluation techniques and hardly any equipment is available in the laboratories for such analyses. The staff has exposure to professional journals, conferences and books but would like to have detailed recent information, mostly in Russian language. English is not a preferred language and the translation into Russian language has been suggested. The staff would like to take English language courses to improve their language skills. Strengthening of staff position and skills and improvement in the financial situation have been proposed as the ways to improve the feed analysis. All the three industries have collaboration in the area of feed analysis and formulation with Azerbaijan Scientific Research Institute of Cattle-Breeding, Azerbaijan Scientific Research Institute of Forages, Meadows and Pastures.

INTRODUCTION

Azerbaijan is the largest country in the Caucasus region of Eurasia. Located at the crossroads of Western Asia and Eastern Europe, it is bounded by the Caspian Sea to the east, Russia to the north, Georgia to the northwest, Armenia to the west and Iran to the south. Azerbaijan is an economy in transition in which the state continues to play a dominant role. The population of Azerbaijan is 8.4 million and the number of agriculture labour is 2.2 millions. While Azerbaijan's life expectancy rate took a dip from 69 in 1995 to 65 in 2000 the nation's child mortality rate registered a decrease from 98 per thousand live births to 91 in the same span of years. Individuals consume an average of 2 580 calories per day, of which 11 percent are derived from proteins.

AGRICULTURE AND TRADE SITUATION

The share of agriculture to total GDP was 25.2 percent in 1995 and decreased to 7.1 percent in 2009. In 1995 the labour force in agriculture as a percentage of total labour force was 29.1 percent. The corresponding figure for 2009 was 23.2 percent. The value of food exports increased from US$ 14 million in 1995 to US$ 419 million in 2008. For 1995–2000 the average growth rate of exports was 16.8 percent. The corresponding figure for 2005–2008 was 50.2 percent. The share of food exports in total merchandise exports increased from 2.2 percent in 1995 to 9.4 percent in 2008. The value of food imports increased from US$ 253 million in 1995 to US$ 843 million in 2008. For 1995–2000 the average growth rate of exports was –4.6 percent. The corresponding figure for 2005–2008 was 26.6 percent. The share of

food imports in total merchandise imports decreased from 37.9 percent in 1995 to 11.8 percent in 2008.

The main agricultural imports are: wheat, raw sugar, wheat flour, maize, palm oil, cake soybeans, sunflower cake, confectionery sugar and pastry. The main agricultural exports are: refined sugar, apples, fresh fruit, potatoes, wheat bran, tomatoes, fruit juice, hydrogenated oil, wheat flour and sugar beet.

LIVESTOCK SITUATION

The livestock population in 2004 included 16.9 million chickens, 6.7 million sheep, 1.9 million cattle, 604 000 goats, 20 000 pigs and 68 000 horses. Meat production in 2004 amounted to 145 500 tonnes, almost three-fourths of which was beef and mutton. In 2004, about 1.2 million tonnes of cow's milk, 46 500 tonnes of eggs and 12 100 tonnes of wool (greasy)were produced.

Small-scale livestock farmers with few cattle are the principal source of domestic meat and raw milk in Azerbaijan, although there are a handful of large-scale livestock farmers. In the previous planned economy, livestock were raised, milked and slaughtered in collective operations. Small-scale farmers now own between three and ten heads of cattle and are individually responsible for milking operations and for taking care of animal health, nutrition and reproduction. Livestock and poultry produce is expected to experience a 20–50 percent increase in annual sales due to reduced production costs, modified practices and higher sale prices. Government statistics show that the market for animal products has increased over the last three years and promises to continue growing. Eight kinds of taxes have been abolished by the government of Azerbaijan since 1994 in order to stimulate the agricultural sector.

Nearly 70 percent of the raw milk is consumed non-pasteurized, whether at the household level or through products sold at local markets. The remaining milk is pasteurized and processed by other enterprises. Local production satisfies only 45 percent of the national demand for dairy products and the rest is imported, mostly in powdered milk form.

Local meat production cannot satisfy the entire national demand of Azerbaijan, which imports finished and semi-finished meat products. Livestock from small-scale farmers sold for meat are transported and slaughtered in central and local markets. There is strong local preference for fresh local meat over imported products. Despite the local preferences and price advantages for Azeri beef and milk products, respectively, local production faces critical gaps in competing with imported products. The principal gaps concern low volumes and small profit margins as a result of relatively high costs of local production.

The small-scale of operations and low incomes of most livestock farmers complicate access to veterinary assistance and animal health products and services. It is estimated that small-scale farmers are producing at only 40 percent of their efficiency due to poor animal health and subsequent poor yields of milk and low rates of animal growth.

Knowledge of animal nutrition is a key component of an integrated farming system. Feeding animals appropriately improves their ability to produce high quality food products. The composition and nutritional quality of milk, eggs and meat are affected by the diet the animal consumes. When animals are adequately nourished

their resistance to diseases also improves. Feed safety and its regulation are of major international concern. Animal feeds are routinely subject to contamination from diverse sources, which may have serious consequences on the safety of foods of animal origin.

SYNTHESIS OF INFORMATION OBTAINED THROUGH THE QUESTIONNAIRE ON RESEARCH AND DEVELOPMENT STATUS IN RESEARCH AND DEVELOPMENT ORGANIZATIONS

Number of questionnaires received

Only one filled questionnaire from R & D organization was received from the Azerbaijan Scientific Research Institute of Forages, Meadows and Pastures (AZS-RIFMP), a public sector institution. It was founded in 1969 and has staff strength of 109.

Vision of the institute

The animal nutrition vision of the institution is not clearly mentioned. The institution is engaged in R & D, outreach and extension activities in animal nutrition.

Number of staff

Scientific staff currently involved in animal nutrition is 45. The distribution of which is given in Figure 1. The number of males and females in the scientific, technical and the extension staff currently involved in animal nutrition activities is shown in Figure 2. The number of males and females engaged in these activities is almost similar. The major emphasis of the institution is on large and small ruminants and to a lesser extent on pigs (Figure 3). The number of technical workers engaged in large ruminant and small ruminant feeding and care is four each. No activity in poultry nutrition exists. There are four extension workers currently engaged in information provision and ten in scientific research analysis and report writing in animal nutrition (Figure 4).

No staff member of the institution has ever been exposed to training abroad.

Ongoing R & D activities in the area of Animal Nutrition

The institution has two ongoing projects, namely 'Use of microelements (cobalt, selenium) in sheep feeding and determination of an optimal dosage of these elements' and 'Elaboration and application of effective complete feed mixture in granules for agricultural animals (large ruminants) and breeding of forages in Azerbaijan Republic'. Both of these State funded projects are being carried out at farmers' fields and will conclude by December, 2011. No project is being carried out at the research station or the institution. Nothing is mentioned about the techniques being used in these projects. An earlier project (2004–2008) entitled 'Optimization of the large ruminants rations on the basis of factual chemical content and forages in farms' has also been listed (see Annex I). No details are given regarding the techniques and methodologies used in these projects.

Figure 1. Academic, research and scientific staff currently involved in animal nutrition activities

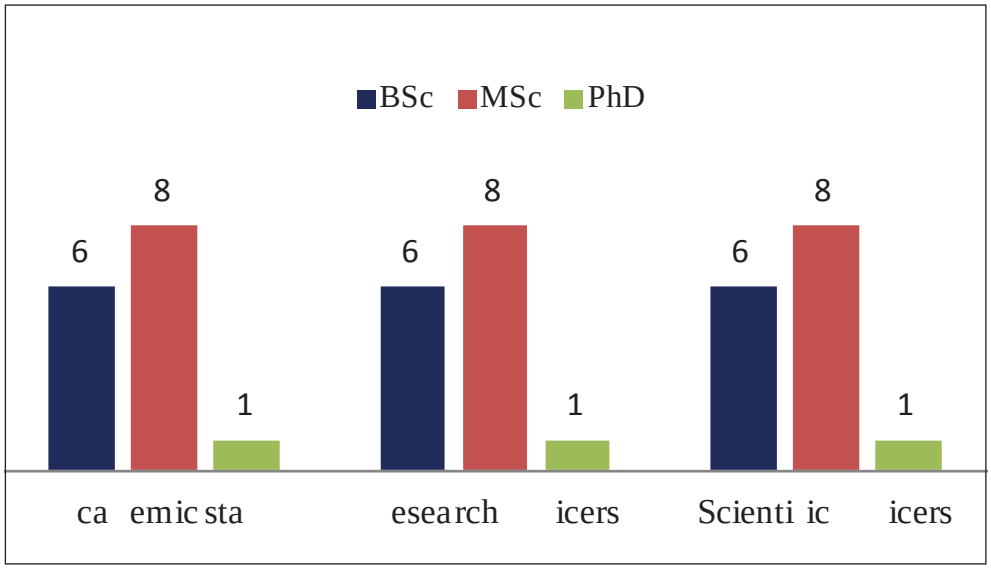


Figure 2. Number of scientific, technical and extension staff, as males and females, currently involved in animal nutrition activities

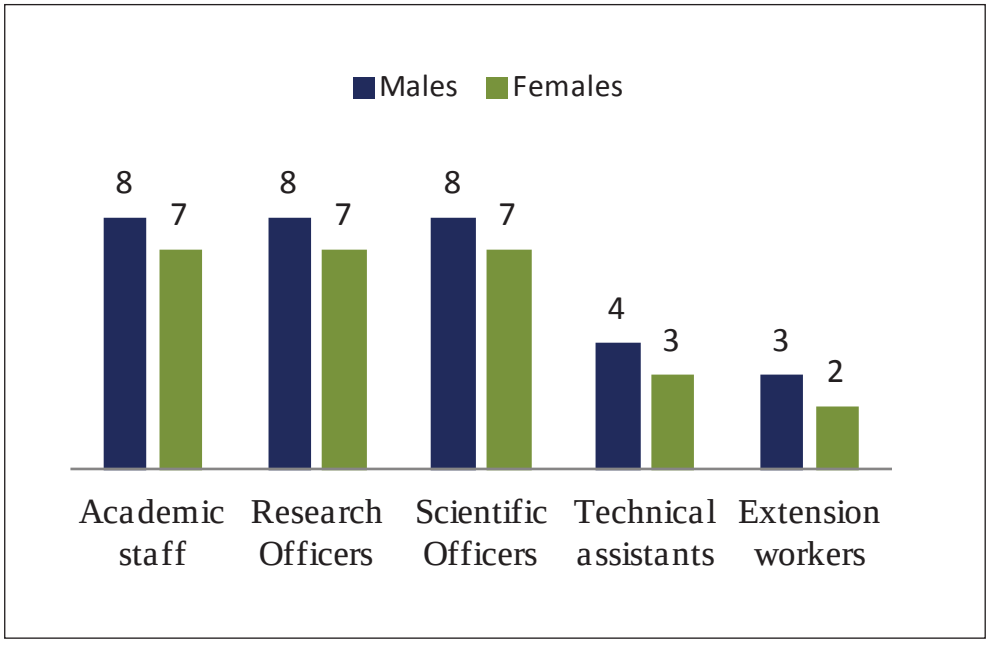


Figure 3. Number of staff engaged in animal nutrition activities related to large and small ruminants and pigs

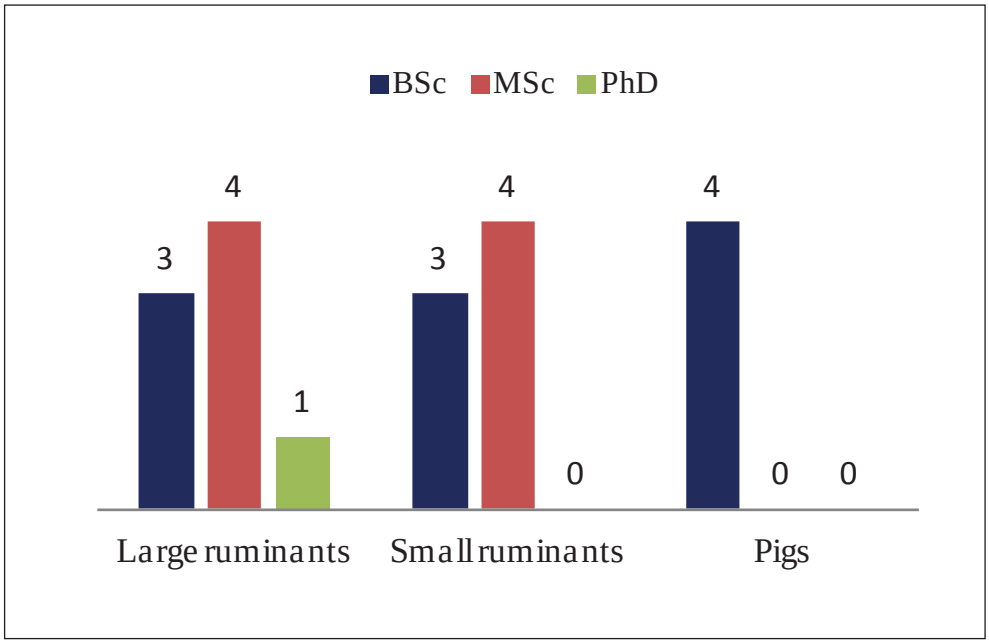
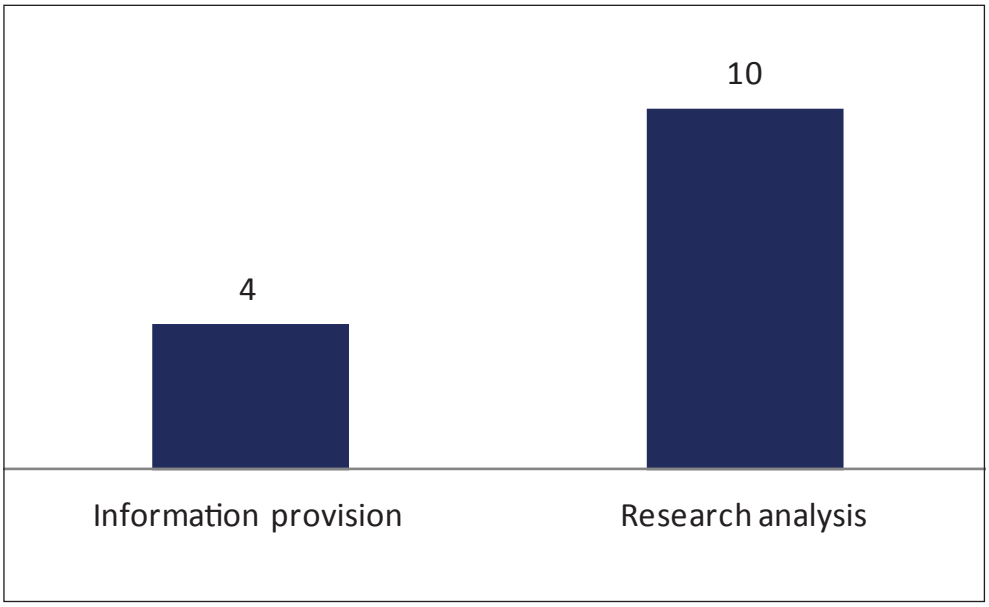


Figure 4. Number of extension workers currently engaged in animal nutrition activities as information providers and research analysts



Ongoing extension activities in the area of Animal Nutrition

At present, there is no ongoing extension activity. Three State funded projects have been listed: optimization of dairy cows rations and breeding of forages on the basis of factual chemical content in farms, complete feeding of young and mature large ruminants and effective norms of protein and vitamin supplements in fattening of large ruminants. All these projects were on the use of appropriate forage technologies. Two projects were completed in 2001 and one in 2008.

Mechanisms of sharing information

The institution shares information and knowledge it produces with farmers, farmers' associations, feed industries and policy makers using brochures and quarterly and annual reports. The institution does not have any means of obtaining feedback from farmers, farmers' associations and feed industries about the effectiveness of the extension/outreach activities.

The priority areas for R & D work in animal nutrition are identified through close contacts with the farmers. There is no input from other stakeholders or the feed industries. The institution does not have a formal means to monitor and evaluate R & D activities in the area of animal nutrition.

The three main strategies that have been passed on to the farmers, farmers' organisations or feed industries are:

- Animal nutrition practices;
- Forages for feeding; and
- Animal registration.

It is not clear what types of specific strategies have been employed under these main strategies.

Status of laboratory infrastructure and technical skills

Laboratory activities in animal nutrition are practically insignificant. On average only ten samples per month (five from research stations and five from feed industries) are analysed for protein (nitrogen), fat, crude fibre and vitamins. The feed ingredients commonly analysed for the chemical composition include forages, by-products and concentrate mixtures.

It is not clear which vitamins are being determined. Other analyses for example VanSoest's fibre analysis (Neutral detergent fibre, Acid detergent fibre, Acid detergent lignin) or minerals are not conducted. The methods for determination of feeding value are not carried out.

The laboratory facilities are inadequate. There is no equipment and the staff is also not aware of the techniques being used routinely in animal nutrition research in other parts of the world. The staff is not familiar with the *in vitro* gas production technique, techniques for estimating digestibility (enzyme, Tilley & Terry, or nylon bag), amino acid analysis, ileal amino acid digestibility in monogastrics, mycotoxin estimation or purine estimation.

Equipment situation. The laboratory equipment available is not listed, but for the analyses conducted it appears that the institution has equipment for determination of only nitrogen and crude fibre. The institution does not have services available

within the institution for maintenance or service of the equipment, however, private sector services are available.

For forage studies, only one hand chopper has been listed. The institution would wish to acquire the following equipment for animal nutrition activities.

Rough-feed chopper
Feed distributor
Fodder chopper
Feed crusher
Grain crusher
Agregate for forage product preparation
Equipment for grass flour granulation

The institution has no facilities for animal experiments, large as well small animals, including rats, guinea pigs, rabbits, sheep/goats or cattle. No facilities for slaughtering of experimental animals exist. The staff has no access to these facilities in another institution.

Exposure of the staff to animal nutrition techniques and information. The staff is willing to undergo training for improving qualification and skills. There are sufficient sources available for information on animal nutrition including professional journals, books, internet, CDs. The staff members also get information through conferences. Inspite of the availability of all these resources, the staff have shown willingness to have more detailed information in the area of animal nutrition especially on latest technologies. The information desired could be in English or Russian. The lack of English knowledge is the main constraint for gathering information and the staff would like to undertake English language courses. The funding for the animal nutrition activities is through national and international grants.

The institution is willing to have collaboration with Azerbaijan Scientific Research Institute of Cattle-Breeding and Azerbaijan Scientific Research Institute of Veterinary Science for conducting joint scientific research activities and to establish contacts with Azerbaijan Agrarian University. The institution has not shown any interest in international collaboration.

The linkages of animal nutrition groups with feed industries, farmers' associations and individual farmers are moderate.

The suggestions from the institution for means to improve R & D activities in the area of animal nutrition are as follows:

- Strengthening financial position;
- Sharing information regarding experiments; and
- Enhancing staff skills.

SYNTHESIS OF INFORMATION OBTAINED THROUGH THE QUESTIONNAIRE ON RESEARCH AND DEVELOPMENT STATUS IN FEED INDUSTRIES

Number of questionnaire received

Three filled questionnaires have been received from Azerbaijan namely Agil farm enterprise, Private enterprise of Rustambeyli municipality and Gullubulag. Agil farm enterprise was founded in 2005 and has a staff strength of 12. The annual production capacity is 290 tonnes and it runs at 75 percent of the capacity. The second feed industry Private enterprise of Rustambeyli municipality was also founded in 2005 and has a staff strength of eight. The annual production capacity is 324 tonnes and the actual production is 72 percent of the capacity. The third feed industry Gullubulag is the oldest and was founded in 2001. The staff position in these feed industries is shown in Figure 5. The annual production capacity is 648 tonnes and the actual production is 84 percent of the capacity (Figure 6)

Status of laboratory infrastructure and technical skills

Even the basic equipment for proximate analysis of feed samples is not available with the these feed industries. Only one sample each month is analysed for nitrogen and ether extract. Haylage, silage and grain are analysed for protein (nitrogen) and ether extract. The equipment available is same in all the three industries i.e. equipment for granulation of grass meal and roughage chopper. Oven, furnace, balance or other basic equipment are not listed as available.

The equipment the industries would like to procure is the same for these industries which include the following:

- Rough feed chopper;
- Fodder chopper; and
- Agregate for forage product preparation.

The equipment mandatory for feed analysis is not listed as required.

Figure 5. Staff engaged in feed analysis activities in feed industries

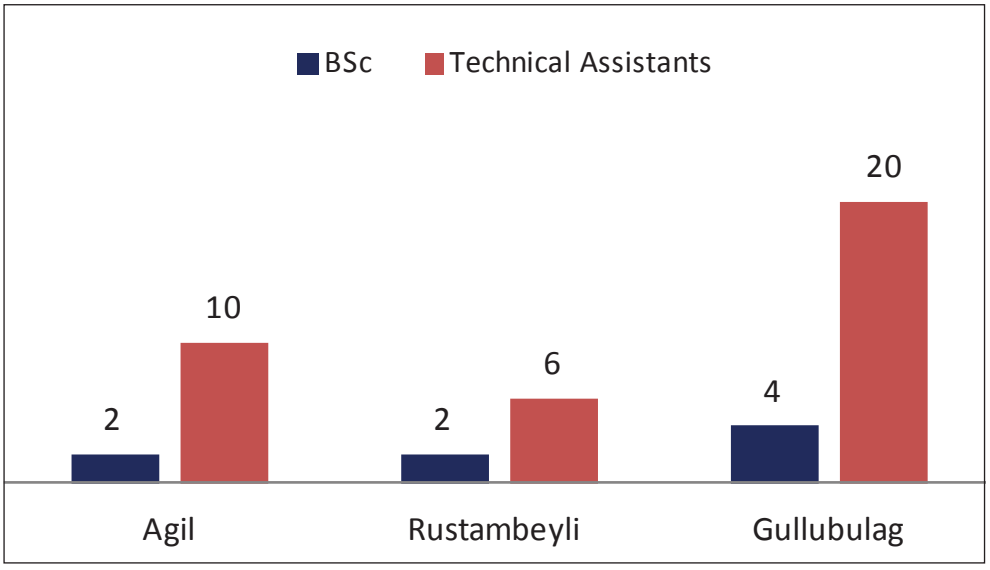
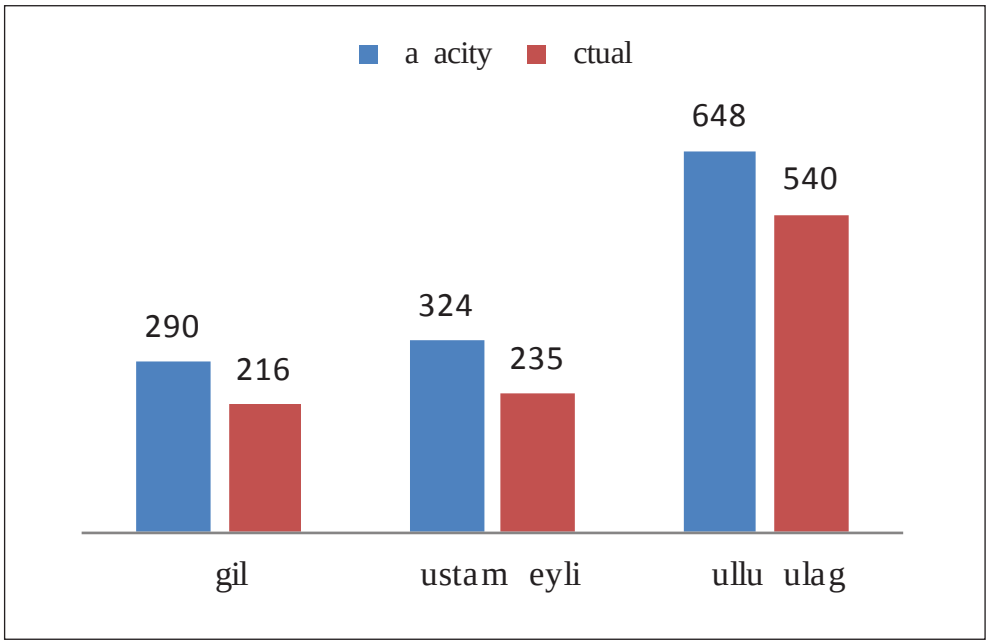


Figure 6. Capacity and actual production (tonnes) of feed mills



Mechanisms of sharing information

The source of information for these feed industries include professional journals, books, conferences, CDs and technical pamphlets.

These industries would like to obtain more detailed information but mostly in Russian language. English is not a preferred language and the translation into Russian language has been suggested. The staff would like to undergo some training in English language.

Strengthening of staff position and improvement in the financial situation have been proposed as the ways to improve the feed analysis.

Linkages and collaboration

All the three industries have collaboration in the area of feed analysis and formulation with Azerbaijan Scientific Research Institute of Cattle-Breeding, Azerbaijan Scientific Research Institute of Forages, Meadows and Pastures.

The linkages with research institutions, farmers associations and individual farmers are moderate for all the three feed industries. Name of the farms with which the collaboration exists is given below:

1. Az. Rep. Gedebey district, private farm 'Rustamaliyev'
2. Az. Rep. Kurdemir district, private farm 'Kar-rar'
3. Az. Rep. Sheki district, private farm 'Zeynalov'
4. Az. Rep. Absheron district, Association 'Gullubulag'
5. Az. Rep. Agstafa district, private farm 'Sudghaet Mamedov'

Annex I

Ongoing Research and Development activities in the area of Animal Nutrition

Title	Techniques being used	On research station/ on farmers' fields	Start and completion year	Funding source
Azerbaijan				
Use of complex microelements (cobalt, selenium) in sheep feeding and determination of an optimal dosage of these elements' salts	Not mentioned	Farmers' fields	01.06.2009–31.12.2011	State budget
Optimization of large ruminants rations on the basis of factual chemical content and on forage availability in farms	Not mentioned	Farmers' fields	2004–2008	State budget
Elaboration and application of effective complete rationed feed mixture in granules for agricultural animals (large ruminants), breeding on industrial basis in Azerbaijan Republic	Not mentioned	Farmers' fields	2009–2011	State budget

Annex II

Key person (R & D institution)

Sr. No.	Contact Name	Contact Details	Address	Tel. No., Fax No. and e-mail
1	Mr hingi liye a ar Settaro	Guzdek village	Azerbaijan Scientific Research Institute of forages, Meadows and Pastures (AZSRIFMP)	+994 123450028 +994 123450028 azforages@box.az

Key person (Feed industries)

Sr. No.	Contact Name	Contact Details Address	Tel. No., Fax No. and e-mail
1	Mr. Kerimov Telman Mehman Oglu	Azerbaijan Republic, Kurdemir district, Gorus Eyribend village	+994 507479087 +994 503972698 +994 505905555 azforages@box.az

References

Asian Development Bank (ADB). 2007. Republic of Kyrgyzstan: Agricultural Strategy Formulation. Technical Assistance Consultant's Report Bonn, June 2007.

CACAARI. 2010. Priorities in Agricultural Research for Development in Central Asia and the Caucasus: Summary Report, Central Asia and the Caucasus Association of Agricultural Research Institutions. Available at http://www.fao.org/docs/eims/upload/272174/SummaryReport_GCARD_in%20CAC.pdf

FAO. 2009. The State of Food and Agriculture, FAO, Rome, Italy. Available at http://www.fao.org/docrep/012/i0680e/i0680e00.htm

Mirzabaev, A., Martius, C., Livinets, S., Nichterlein, K. & Apasov, R. 2009. Kyrgyzstan's National Agricultural Research and Extension system: An assessment of information and communication needs. Sustainable Agriculture in Central Asia and the Caucasus. No. 5. ICARDA-CAC/FAO 2009. 80 pp. Available at http://www.icarda.org/cac/files/sacac/SACAC_05_ICT_in_Kyrgyzstan.pdf

Official Statistics of the Commonwealth of Independent States (CISSTAT). 2008. CD-ROM 2008-13 (Moscow: Statistical Committee of the CIS, 2008).

Sedik, D. 2010. The Feed-Livestock Nexus in Tajikistan: Livestock Development Policy in Transition (revised version), FAO Regional Office for Europe and Central Asia, Policy Studies on Rural Transition No. 2010-1, 32 pp. Available at http://www.fao.org/fileadmin/user_upload/Europe/documents/Publications/Policy_Stdies/Livestock_en.pdf

Questionnaire

Evaluation of status of animal nutrition research and development activities

Исследование современного состояния по исследованиям в области кормления животных и деятельность по развитию на Кавказе и в Центральной Азии

Цель исследования: систематически провести оценку положения в области кормления животных и деятельность по ее развитию

Aim of the survey: To systematically evaluate the status of animal nutrition research and development activities

Результат: составления отчетов по положению в области кормления животных и деятельность по развитию по странам

Output: Country status reports on animal nutrition research and development activities

Польза от проведения настоящего исследования: Отчет о состоянии позволить выявлять вызовы и возможности для усиления деятельности по кормлению животных, включая отрасль кормопроизводства, а также поможет в разработке дальнейшего плана действий. Это является актуальным и важным шагом, который внесет свой вклад в разработке сильных и эффективных национальных и региональных стратегий по развитию животноводческого сектора в целевых странах. Срочная работа после написания отчета о состоянии по исследованиям в области кормления животных будет мобилизация ресурсов от доноров для усиления инфраструктуры лабораторий и возможности штата для проведения анализа кормов и разработки сбалансированных рационов.

Advantages of conducting this survey: A status report would enable identification of challenges and opportunities for strengthening animal nutrition activities including those of the feed manufacturing industry; and assist in the formulation of an action plan. It is a vital first step that would contribute to the development of sound and effective national and regional strategies for development of livestock sector in the targeted countries. An immediate action following the production of the status report would be to mobilize resources from donors for strengthening laboratory infrastructure and human capacity to perform feed analysis and formulate balanced rations.

ЧАСТЬ А. Заполняется каждой организацией по исследованию и развитию

PART A. To be filled out by each Research and Development organisation

Страна /Country.....

Имя человека заполняющего вопросник: г-жа/г-н/Д-р/проф.....

Name of the person filling out the questionnaire: Ms/Mrs/Mr/Dr/Prof .....

Название /Designation: .....……..

Адрес /Address: .....

Эл. Почта /e-mail: .....

ОБЩАЯ ИНФОРМАЦИЯ О ИНСТИТУТЕ, В КОТОРОМ ПРОВОДИТСЯ ДЕЯТЕЛЬНОСТЬ ПО КОРМЛЕНИЮ ЖИВОТНЫХ / GENERAL INFORMATION ABOUT THE INSTITUTION UNDER WHICH ANIMAL NUTRITION ACTIVITIES ARE UNDERTAKEN

Название института / Name of Institution: .....

Вебсайт института / Website of the Institution:.....

Адрес /Address: .....

Номер телефона / Tel. No.: .....

Факс / Fax: .....

Эл. Почта / e-mail: .....

Принадлежность института / Affiliation of the institution:

a) Министерство / Ministry (please specify / пожалуйста укажите).....

b) Другое / Other (please specify / пожалуйста укажите).....

Тип организации / Status of Organisation:
Общественная / Public ( ), Частная / Private ( )

Год создания института / Year in which the Institution was founded:.....

Количество всего штата института / Total staff of the Institution: .....

ИНФОРМАЦИЯ ОТНОСИТЕЛЬНО КОРМЛЕНИЯ ЖИВОТНЫХ / INFORMATION PERTAINING TO ANIMAL NUTRITION

Видение кормления животных институтом /
Animal Nutrition vision of the Institution: .....
.....

Характер работ относительно кормления животных / Nature of work in relation to Animal Nutrition (можно выбрать несколько ответов / more than one answer is possible)

- Исследование и развитие / Research and Development ☐
- Образование / Education ☐
- Услуги / Services ☐
- Распространение и внедрение знаний / Outreach and extension ☐
- Другое / Other (указать / specify) ..... ☐

Научный штат, вовлеченный в исследование по кормлению животных / Scientific staff currently involved in Animal Nutrition
Academic Staff / Штат научных работников

	♂	♀
Кандидаты наук / PhD	☐	☐
Магистры / MSc	☐	☐
Бакалавры / BSc	☐	☐

Исследователи/научные сотрудники / Research Officers / Scientific Officers)

Кандидаты наук PhD	☐	☐
Магистры / MSc	☐	☐
Бакалавры / BSc	☐	☐

Выпускники вузов занятые научно- исследовательской деятельности / Research Graduate

Кандидаты наук / PhD	☐	☐
Магистры / MSc	☐	☐
Бакалавры / BSc	☐	☐

Другое/Others (укажите / specify)

Кандидаты наук / PhD	☐	☐
Магистры / MSc	☐	☐
Бакалавры / BSc	☐	☐

Другие сотрудники, которые сейчас вовлечены в исследовании по кормлению животных / Other Staff currently involved in Animal Nutrition

	♂	♀
Технические ассистенты / Technical Assistant	☐	☐
Сотрудники по распространению и внедрению знаний / Extension workers	☐	☐
Другое / Others (укажите / specify)	☐	☐

Человеческие ресурсы по кормлению животных в настоящее время / Human Resources currently in Animal Nutrition

Научные работники / Scientists Бакалавры Field of Specialization Область специализации	Кол-во Number	Кандидат PhD.	Магистр Mphil/MSc.	 BSc.
Ruminant nutrition (large ruminants) Кормление жвачных животных (КРС)	☐	☐	☐	☐
Ruminant nutrition (small ruminants) Кормление жвачных животных (МРС)	☐	☐	☐	☐
Monogastric nutrition (pigs) Кормление однокамерных животных (свиньи)	☐	☐	☐	☐
Monogastric nutrition (poultry) Кормление однокамерных (птиц)	☐	☐	☐	☐
Другое / Others (укажите / specify).....	☐	☐	☐	☐

Технические ассистенты/ Technical assistants

В области / In the area of	Кол-во / Number
Ruminant nutrition (large animals) Кормление жвачных животных (КРС)	☐
Ruminant nutrition (small animals) Кормление жвачных животных (МРС)	☐
Monogastric nutrition (pigs) Кормление однокамерных животных (свиньи)	☐
Monogastric nutrition (poultry) Кормление однокамерных (птиц)	☐
Others (specify) ..... Другое / Others (укажите / specify)	☐

Сотрудники по распространению и внедрению знаний / Extension workers

Вид деятельности / Type of activity (укажите / please specify)	Кол-во / Number
.....	☐
.....	☐

Количество проходивших обучений за рубежом за последние 5 лет в области кормления животных / Number of overseas training received in the area of Animal Nutrition during the last 5 years

1 до 3 лет 1 to 3 years	Область Area	Кол-во человек No. of people
……	.....	.....
6 до 12 месяцев 6 to 12 months	Область Area	Кол-во человек No. of people
……	.....	.....
< 6 месяцев < 6 months	Область Area	Кол-во человек No. of people
……	.....	.....

роводимыеисследованияидеятельностьпоразвитиюобластикормленияживотных/ Ongoing Research and Development activities in the area of Animal Nutrition

Название/Title	Используемые технологии (методы) / Techniques being used	На исследовательских станциях / на полях фермеров On research station / on farmers' fields	Дата начала и год завершения / Start and completion year	Источник финансирования / Funding Source

Проводимая деятельность по распространению информации в области кормления животных/Ongoing extension activities in the area of Animal Nutrition

Название/Title	Используемые средства и технологии / Tools and technologies being used	На исследовательских станциях / на полях фермеров On research station / on farmers' fields	Дата начала и год завершения / Start and completion year	Источник финансирования / Funding Source

Каким образом ваш институт делится полученной информацией и знанием с фермерами/фермерскими ассоциациями, производством и с вышестоящим руководством
How does your institution share information and knowledge it produces with farmers/farmer association, industry and policy makers?
.....
.....

Имеет ли ваш институт средство получения обратной связи от фермеров, фермерских ассоциаций и производителей кормов об эффективности деятельности по распространению информации в области кормления?
Does your Institution have a means of obtaining feedback from farmers, farmers' organisation and feed industry about the effectiveness of the extension/outreach activities in the area of Animal Nutrition?
Да (Yes) / нет (No).....

Если да то, пожалуйста, укажите вид имеющихся средств (например, личный контакт, вопросник или другие средства)
If yes, please state the type of means (e.g., personal contact, questionnaire or other means)
.....

Как ваш институт определяет приоритетные области для исследования и работ по развитию относительно кормления животных? Например, контактирует ли с фермерами? с производителями кормов? Имеет ли формальный способ в определении приоритетных областей с фермерами и/ или с производителями кормов или с другими заинтересованными сторонами?
How does your Institution identify the priority areas for Research and Development work in Animal Nutrition? For example, are the farmers contacted; are the feed industries contacted? Is there a formal way of identifying the priority areas with farmers and/or feed industries or other stakeholders?
.....
.....

Имеет ли ваш институт официальные средства для проведения мониторинга и оценки деятельности по исследованию и развитию в области кормления животных?
Да/Нет
Does your institution have a formal means to monitor and evaluate Research and Development activities in the area of Animal Nutrition?
Да (Yes) / нет (No) .....

Если да то укажите, что они представляют с собой?
If yes, please state what that is?
.....
.....

Пожалуйста, приложите образец используемых/завершенных отчетов о мониторинге и оценки
Please attach a sample of monitoring or evaluation report used/completed

Назовите 3 основные стратегии по кормлению животных, которые были переданы фермерам, фермерским организациям или предприятиям по производству кормов
What have been the three main animal nutritional strategies that have been passed on to the farmers, farmers' organisations or feed industry?
1. .....
2. .....
3. .....

Лабораторная деятельность по кормлению животных
Laboratory activities in Animal Nutrition

	Кол-во анализов в месяц для / Number of analyses/month for	
	Research Исследование	Industry Производства
Protein analysis Анализ протеина	☐	☐
Fat analysis Анализ жира	☐	☐
Crude fibre analysis Анализ грубых волокон(клетчатка)	☐	☐
Van Soest's Fibre analysis (NDF, ADF, ADL) Анализ волокна (клетчатки) по Ван Соесту	☐	☐
Minerals (macro) Макроэлементы	☐	☐
Minerals (trace) Микроэлементы (Следы)	☐	☐
Vitamins Витамины	☐	☐
Tilley and Terry technique Метод Тиллей и Терри	☐	☐
In sacco/in situ (nylon bag technique) Ин ситу (метод фильтрации)	☐	☐
In vitro gas method Ин витро газовый метод (газоанализатор)	☐	☐
Enzyme techniques for estimating digestibility Метод энзим (ферментов) для оценки усваиваемости	☐	☐
Energy content by Bomb Colorimeter Содержание энергии - колориметрический метод	☐	☐
Analysis using Near Infra Red Spectroscopy (NIRS) Анализ с использованием спектрометра	☐	☐
Microbial protein by determination of urinary purine derivatives Микробные белки через определения производные мочевины (пуринов)	☐	☐

Volatile fatty acids Легкоусвояемые жирные кислоты	☐	☐
Amino acid analysis Анализ аминокислот	☐	☐
Determination of mycotoxins Определение микотоксинов	☐	☐
Determination of pesticide residues Определение остатков пестицидов	☐	☐
Determination of antinutritional factors such as tannins, trypsin inhibitors, lectins, gossypol, alkaloids, etc Определение антипитательных веществ такие как танины, ингибатор трипсин, лектин, госипол, алкалоиды и др	☐	☐
Polymerase based techniques for feed contaminants Технология на основе полимеризации для определении загрязненности кормов	☐	☐
Measurement of in vivo digestibility Измерения усваиваемости ин виво	☐	☐
Determination of ileal digestibility of amino acids in monogastric feed ingredients Определение усваиваемости аминокислот в моногастричных ингридиентах кормов	☐	☐
Mobile bag technique for pig feed evaluation Технология мобильного мешка оценки корма для свиней	☐	☐
Mobile bag technique for ruminant feed evaluation Технология мобильного мешка для оценки корма для жвачных	☐	☐
Другое / Others (укажите / specify).....	☐	☐
.....	☐	☐
.....	☐	☐

Какой из вышеперечисленных анализов не знаком для штата или имеется недостаточный практический опыт?
Which of the above analyses are not known to the staff or practical skills are lacking?
.....
.....

Если ваш институт является образовательным, то какой из вышеперечисленных анализов показывают студентам?
If yours is an education institution, which of the above analyses are demonstrated to students?
.....
.....

Какие кормовые ресурсы, в общем, анализируют на ваших лабораториях для химических составов?
Which feed resources are generally analysed in your laboratory for chemical composition?
.....
.....

Какие оборудования имеются в лаборатории по кормлению животных
Which equipment are present in Animal Nutrition laboratory

Major Основной	Number Ко-во	Year of purchase Год закупки	In working condition (Yes/No) В рабочем состоянии (да/нет)
.....	( )	.....	.....
.....	( )	.....	.....
.....	( )	.....	.....
.....	( )	.....	.....

Minor (costing less than 500 US$) Второстепенные (стоимость которых меньше 500 долларов США)	Number Кол-во
.....	( )
.....	( )
.....	( )
.....	( )

Доступны ли услуги по содержанию и уходу за оборудованием в вашем институте или в частном секторе?
Are services available within the institution or from private sector for maintenance and servicing equipment?

В институте/ Within Institution (Да/Нет) (Yes/No): .....
В частном секторе/Private sector (Да/Нет) (Yes/No): .....

Оборудование, которое не доступно, но требуется для деятельности по кормлению животных
Equipment that are not available but required for Animal Nutrition activities

(Please list) (пожалуйста перечислите)	Number (кол-во)
.....	( )
.....	( )
.....	( )

Имеет ли ваш институт средства для проведения экспериментов с животными?
Does your Institution have facilities for animal experiments?

Animal room for studies on rats or guinea pigs (Yes/No): .....
Помещение для проведения исследования на мышах и морских свинках (да/нет)
If yes, state number of experimental cages: .....
Если да, укажите кол-во экспериментальных клеток

Animal room for studies on rabbits (Yes/No): .....
Помещение для проведения исследования на кроликах (да/нет)
If yes, state number of experimental cages: .....
Если да, укажите кол-во экспериментальных клеток
Animal shed for studies on sheep/goats (Yes/No): .....
Помещение для проведения исследования на овцах/козах (да/нет)
If yes, state number of experimental cages: .....
Если да, укажите кол-во экспериментальных клеток
Animal shed for studies on cattle (Yes/No): .....
Навес для проведения исследования на КРС (да/нет)
If yes, state number of experimental cages: .....
Если да, укажите кол-во экспериментальных клеток
Facilities for slaughtering experimental animals (Yes/No): .....
Помещение для забоя экспериментальных животных (да/нет)
Any other facilities for animal experiments (specify): .....
Другие средства для экспериментов на животных (укажите)
Если ваш институт не имеет средства для проведения экспериментов на животных то имеет ли он доступ к этим средствам в других институтах?

If your institution does not have facilities for animal experiments, does it have access to these facilities in another institution?
Да/нет Yes/No .....;
Если да, то название института / If yes, name the institution .....

Какие тренинги требуются в области кормления животных в вашем институте?
Which trainings are required in the area of Animal Nutrition at your Institute
.....
.....

Какие источники информации вы используете для получения информации по темам в области кормления животных?
Which sources of information do you use for getting informed on topics in the area of Animal Nutrition?

Professional journals	(Yes/No)	If yes: Often	☐	Seldom	☐	Never ☐
Профессиональный журнал	(Да/Нет)	Если да: Часто	☐	Редко	☐	Никогда ☐
Books	(Yes/No)	If yes: Often	☐	Seldom	☐	Never ☐
Книги	(Да/Нет)	Если да: Часто	☐	Редко	☐	Никогда ☐
Websites	(Yes/No)	If yes: Often	☐	Seldom	☐	Never ☐
Вебсайт	(Да/Нет)	Если да: Часто	☐	Редко	☐	Никогда ☐
e-Discussion fora	(Yes/No)	If yes: Often	☐	Seldom	☐	Never ☐
Элек-ный дискуссионные форумы	(Да/Нет)	Если да: Часто	☐	Редко	☐	Никогда ☐
Conferences	(Yes/No)	If yes: Often	☐	Seldom	☐	Never ☐
Конференции	(Да/Нет)	Если да: Часто	☐	Редко	☐	Никогда ☐

Training courses & workshops	(Yes/No)	If yes: Often ☐	Seldom ☐ Never ☐
Обучение и семинары	(Да/Нет)	Если да: Часто ☐	Редко ☐ Никогда ☐
CDs	(Yes/No)	If yes: Often ☐	Seldom ☐ Never ☐
Компакт диски	(Да/Нет)	Если да: Часто ☐	Редко ☐ Никогда ☐
Technical pamphlets	(Yes/No)	If yes: Often ☐	Seldom ☐ Never ☐
Технические брошюры	(Да/Нет)	Если да: Часто ☐	Редко ☐ Никогда ☐
Others, please specify:			
	(Yes/No)	If yes: Often ☐	Seldom ☐ Never ☐
Другое, пожалуйста укажите			
	(Да/Нет)	Если да: Часто ☐	Редко ☐ Никогда ☐

Хотите ли вы получить больше информации в области кормления животных, которая не доступно вам: Да/Нет
Would you like to have more detailed information in the area of Animal Nutrition, which is not accessible to you: Yes/No .....
Если да, то укажите информацию которая не доступна и предпочтительный язык для получения информации
If yes, specify the information that is lacking and the preferred language for obtaining information:
.....
.....
Является ли недостаточное знание английского языка причиной трудности в сборе информации в области кормления животных? Да/Нет
Is insufficient knowledge of English a reason for difficulties in information gathering in the area of Animal Nutrition? Yes/No.....
Если да то, что необходимо сделать, чтобы улучшить положение?
If yes, what could be done to improve the situation?
.....
.....
Финансовые ресурсы для деятельности по кормлению животных (пожалуйста, отметьте; можно выбрать несколько ответов)
Financial resources for Animal Nutrition activities (please tick; more than one answer is possible)

National Government / Национальное Правительство	☐
National private sector / Национальный частный сектор	☐
Competitive grant / Конкурсный грант	☐
Commercial activities (e.g. income from feed analysis) / Коммерческие деятельности (например, доход от анализа кормов)	☐
International grant / Международный грант	☐
Others (specify) / Другое (указать)	☐

Связь и тип сотрудничества в области кормления животных (пожалуйста, укажите тип связей и с кем; также включите частный сектор)
Linkages and types of collaborations in the area of Animal Nutrition (please mention type of linkages and with whom; also include the private sector)

National / Национальный

.....

Regional / Региональный

.....

International / Международный

.....

Как вы оцениваете связь групп по кормлению животных с производством кормов, с фермерскими ассоциациями и индивидуальными фермерами?
How do you evaluate the linkages of the Animal Nutrition groups with feed industry, farmers' associations and individual farmers?

Производство кормов / Feed Industry
- Сильное/ Strong ☐
- Среднее /Moderate ☐
- Слабое/ Weak ☐

Фермерские ассоциации / Farmers' associations
- Сильное/ Strong ☐
- Среднее /Moderate ☐
- Слабое/ Weak ☐

Индивидуальные фермеры / Individual farmers
- Сильное/ Strong ☐
- Среднее /Moderate ☐
- Слабое/ Weak ☐

Что нужно сделать, чтобы улучшить деятельность по исследованию и развитию в области кормления животных в вашем институте?
What could be done to improve Research and Development activities in the area of Animal Nutrition in your Institution?

.....
.....

Название существующих производителей кормов и для каких видов животных и птиц они производят корма?
Name existing animal feed producers and for which animal species do they produce feed?

Название / Name	Корма произведено для / Feed produced for
.....	.....
.....	.....

Название существующих ассоциаций производителей кормов и для каких видов они производят корма?
Name existing animal feed producers' association and type of services they provide?

Название / Name	Корма произведено для / Feed produced for
.....	.....
.....	.....

Другие комментарии/ Any other remarks:
.....
.....
.....

Ключевые лица для контакта / Key person to be contacted

Имя / Contact Name:
г-жа / г-н / Д-р / проф
Ms / Mrs / Mr / Dr / Prof .....
Контактные детали и адрес / Contact Details
Address: .....
Номер телефона / Tel. No: .....
Факс / Fax: .....
Эл. Почта / e-mail: .....

ЧАСТЬ Б. Заполняется каждым предприятием по производству корма для животных

PART B. To be filled out by each Animal Feed Industries

Страна /Country .....

Имя контактного лица: г-жа/г-н/Д-р/проф

Contact Name: Ms/Mrs/Mr/Dr/Prof .....

Название / Designation: .....

ОБЩАЯ ИНФОРМАЦИЯ О КОРМОПРИЗВОДЯЩЕЙ ПРЕДПРИТИИ / GENERAL INFORMATION ABOUT THE FEED FACTORY

Название предприятия / Name of the Factory: .....

Адрес / Address: .....

Вебсайт / Website: .....

Номер телефона / Tel. No.: .....

Факс / Fax: .....

Эл. Почта / e-mail: .....

Год создания предприятия / Year in which the Factory was founded: .....

Количество всего штата предприятия / Total staff of the Factory: .....

Производственная мощность (в год) / Production capacity (per year): .....

Фактическое производство / Actual production (year): .....

ИНФОРМАЦИЯ ОТНОСИТЕЛЬНО АНАЛИЗА КОРМОВ / INFORMATION PERTAINING TO FEED ANALYSIS

Штат вовлеченный в анализе кормов и относящих действий /
Staff involved in feed analysis related activities

Исследователи научные сотрудники / Research or Scientific Officers

	♂	♀
Кандидаты наук / PhD	☐	☐
Магистры / MSc	☐	☐
Бакалавры / BSc	☐	☐
Технические ассистенты / Technical Assistant	☐	☐
Другое/Others (укажите / specify)	☐	☐

Analyses being conducted in Animal Nutrition laboratory
Анализы, которые проводятся в лаборатории по кормлению животных

	Кол-во анализов в месяц / Number of analyses/month
Protein analysis / Анализ протеина	☐
Fat analysis / Анализ жира	☐
Crude fibre analysis / Анализ грубых волокон(клетчатка)	☐
Van Soest's Fibre analysis (NDF, ADF, ADL) / Анализ волокна (клетчатки) по Ван Соесту	☐
Minerals (macro) / Макроэлементы	☐
Minerals (trace) / Микроэлементы (Следы)	☐
Vitamins / Витамины	☐
Tilley and Terry technique / Метод Тиллей и Терри	☐
In sacco/in situ (nylon bag technique) / Ин ситу метод фильтрации (метод нейлонового мешка)	☐
In vitro gas method / Ин витро газовый метод	☐
Enzyme techniques for estimating digestibility / Метод энзим для оценки усваиваемости	☐
Energy content by Bomb Colorimeter / Содержание энергии через бомбовый колориметр	☐
Analysis using Near Infra Red Spectroscopy (NIRS) / Анализ с использованием близко инфракрасного спектроскопии	☐
Determination of mycotoxins / Определение микотоксинов	☐
Determination of pesticide residues / Определение остатков пестицидов	☐
Polymerase based techniques for feed contaminants / Технология на основе полимераза для загрязнений кормов	☐

Какие кормовые ингредиенты в общем анализируется в вашем лаборатории на предмет химических составов? / Which feed ingredients are generally analysed in your laboratory for chemical composition?

.....
.....

Какое оборудование имеется в лаборатории по кормлению животных /
Which equipment are present in your Animal Nutrition laboratory?

Major	Number	Year of purchase	In working condition (Yes/No)
Основной	Ко-во	Год закупки	В рабочем состоянии (да/нет)
.....	( )	.....	.....
.....	( )	.....	.....
.....	( )	.....	.....

Minor (costing less than 500 US$)	Number
Второстепенные (стоимость которых меньше 500 долларов США)	Кол-во
.....	( )
.....	( )
.....	( )

Доступны ли услуги по содержанию и уходу за оборудованием в вашим институте или в частном секторе? / Are services available within the institution or from private sector for maintenance and servicing equipment?

В институте / Within Institution (Да/Нет) (Yes/No): .....
В частном секторе / Private sector (Да/Нет) (Yes/No): .....

Оборудование, которое не доступно, но требуется для деятельности по кормлению животных /
Equipment that are not available but required for Animal Nutrition activities

(Please list) (пожалуйста перечислите)	Number (кол-во)
.....	( )
.....	( )
.....	( )

Какие источники информации вы используете для получения информации по темам в области кормления животных? / Which sources of information do you use for getting informed on topics in the area of Animal Nutrition?

Professional journals (Yes/No) .....; If yes: Often ☐; Seldom ☐; Never ☐
Профессиональный журнал (Да/Нет) .....; Если да: Часто ☐; Редко ☐; Никогда ☐
Books (Yes/No) .....; If yes: Often ☐; Seldom ☐; Never ☐
Книги (Да/Нет) .....; Если да: Часто ☐; Редко ☐; Никогда ☐
Websites (Yes/No).....; If yes: Often ☐; Seldom ☐; Never ☐
Вебсайт (Да/Нет) .....; Если да: Часто ☐; Редко ☐; Никогда ☐

e-Discussion fora (Yes/No).....;	If yes: Often ☐; Seldom ☐; Never ☐
Элек-ный дискуссионные форумы (Да/Нет) .....;	Если да: Часто ☐; Редко ☐; Никогда ☐
Conferences (Yes/No).....;	If yes: Often ☐; Seldom ☐; Never ☐
Конференции (Да/Нет) .....;	Если да: Часто ☐; Редко ☐; Никогда ☐
Training courses & workshops (Yes/No).....;	If yes: Often ☐; Seldom ☐; Never ☐
Обучение и семинары (Да/Нет) .....;	Если да: Часто ☐; Редко ☐; Никогда ☐
CDs (Yes/No).....;	If yes: Often ☐; Seldom ☐; Never ☐
Компакт диски (Да/Нет) .....;	Если да: Часто ☐; Редко ☐; Никогда ☐
Technical pamphlets (Yes/No).....;	If yes: Often ☐; Seldom ☐; Never ☐
Технические брошюры (Да/Нет) .....;	Если да: Часто ☐; Редко ☐; Никогда ☐
Others, please specify	
(Yes/No).....;	If yes: Often ☐; Seldom ☐; Never ☐

Хотите ли вы получить более детальную информацию в области анализа кормов и составления кормов, которая не доступно вам: Да/Нет / Would you like to have more detailed information in the area of feed analysis and feed formulation, which is not accessible to you: Yes/No .....

Если да, то укажите информацию которая не доступна и предпочтительный язык для получения информации / If yes, specify the information that is lacking and the preferred language for obtaining information:

.....

.....

Является ли недостаточное знание английского языка причиной трудности в сборе информации в области кормления животных? Да/Нет / Is insufficient knowledge of English a reason for difficulties in information gathering in the area of Animal Nutrition? Yes/No.....

Если да то, что необходимо сделать, чтобы улучшить положение? If yes, what could be done to improve the situation?

.....

.....

Важные связи и сотрудничество в области анализа корма и приготовления кормов с исследовательскими институтами / Important linkages and collaborations in the area of feed analysis and feed formulation with research institutions

Название и адрес исследовательского института /
Name and address of the research institution:

.....

.....

Вид сотрудничества / Type of collaboration:

.....

Как вы оцениваете связь вашего предприятия по производству корма для животных с исследовательскими институтами, с фермерскими ассоциациями и индивидуальными фермерами?
How do you evaluate the linkages of your feed industry with research institution, farmers' associations and individual farmers?

Исследовательские институты / Research institutions

Сильно / Strong ☐
Среднее / Moderate ☐
Слабо / Weak ☐

If linkages are weak, what could be done for its improvement
Если слабо то, что необходимо сделать чтобы ее улучшить
.....
.....

Фермерские ассоциации / Farmers' associations

Сильно / Strong ☐
Среднее / Moderate ☐
Слабо / Weak ☐

If linkages are weak, what could be done for its improvement
Если слабо то, что необходимо сделать чтобы ее улучшить
.....
.....

Индивидуальные фермеры / Individual farmers

Сильно/ Strong ☐
Среднее /Moderate ☐
Слабо/ Weak ☐

If linkages are weak, what could be done for its improvement
Если слабо то что необходимо сделать чтобы ее улучшить
.....
.....

Что нужно сделать, чтобы улучшить деятельность по анализу корма и приготовления кормов для животных на вашем предприятии? / What could be done to improve feed analysis and feed formulation activities in your feed industry?
.....
.....

Другие комментарии / Any other remarks:
.....
.....

Ключевые лица из института работающих в области кормления животных. Это для дальнейшей информации если необходимо / Key person from the Institution in the area of Animal Nutrition. This is for further information, if needed

Имя контактного лица / Contact Name:
г-жа/г-н/Д-р/проф
Ms/Mrs/Mr/Dr/Prof .....
Контактные детали и адрес/Contact Details
Address: .....
Номер телефона / Tel. No .....
Факс / Fax: .....
Эл. Почта / e-mail: .....

Предложенный подход / Suggested approach

Для одной страны/ For one country:

a Необходимо исследовать по крайней мере 5 исследовательских институтов и институтов по развитию, которые имеют деятельность относящее кормлению животных. Эти институты должны быть основными институтами страны. / At least five Research and Development institutions having Animal Nutrition related activities should be surveyed. These institutions should be the main institutions in that country.

   По крайней мере, пять предприятий по производству кормов должны быть исследованы. Эти предприятия должны быть основными предприятиями страны. / At least three Feed Industries should be surveyed. These industries should be the main feed industries in that country.

ONLINE PUBLICATION SERIES

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