

Czech University of Life Sciences Prague

**Faculty of Economics and
Management**

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Bachelor Thesis

Agricultural business in Kyrgyzstan

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BACHELOR THESIS ASSIGNMENT

Mirsamat Mukhamedziev

Business Administration

Thesis title

Agricultural business in Kyrgyzstan

Objectives of thesis

The main purpose of this study is to assess the development of agriculture in Kyrgyzstan.

Specific goals:

- By interviewing agricultural entrepreneurs, examine the main difficulties in starting a business in this industry.
- to review the development programs offered by third countries aiming to promote and develop agriculture in the country.

Methodology

In order to accomplish the goals set in the objectives of the thesis, the author uses a deep analysis of fundamental microeconomic and macroeconomic indicators, analysis of self-sufficiency, statistical development of the sector.

In addition, a series of interviews with local producers will be conducted in order to understand the main difficulties farmers are facing.

The proposed extent of the thesis

40 –50pages

Keywords

Agriculture, political instability ,corruption ,business, crisis

Recommended information sources

Djalalov,S.;Babu,S.C.(2006).PolicyreformsandagriculturedevelopmentinCentralAsia(Vol.28).

SpringerScience&BusinessMedia.

Dzhalilov,Ch.M.,TheDevelopmentofAgricultureoftheCentralAsiaRepublics,CentralAsiaScientific
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Declaration

I declare that I have worked on my bachelor thesis titled "Agricultural business in Kyrgyzstan" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break any copyrights.

In Prague on 15th of March 2022

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Agricultural business in Kyrgyzstan

Abstract

After a long controlled and central planning as part of the Soviet Republic and then suddenly becoming independent nations, the countries of the Commonwealth of Independent States (CIS) are currently experiencing consecutive years of growth. Yet, in the wake of economic reforms, increasing poverty, food insecurity and malnutrition present a major development challenge to the governments of the Central Asian republics. Agriculture in Kyrgyzstan is one of the leading sectors of the economy. In the total volume of the country's gross domestic product, the share of agriculture is a significant part - about 24.0%. This thesis serves for a complete introduction to agriculture in the Kyrgyz Republic. The main purpose of this research is to study agriculture and its impact on the economy of the Kyrgyz Republic. The theoretical part of this research work will mainly be based on relevant literature reviews, which are in form of journals, scientific articles, books, surveys, and web sources. The research of similar studies, using methods such as abstraction, deduction, and inductive reasoning will equally be used to achieve the research goals. The practical part of this research work shall include descriptive statistical and qualitative thematic synthesis of some economic indicators and selected for the analysis variables.

Keywords: GDP, Agriculture, Industry, Economy, Agricultural business, Kyrgyzstan

Zemědělské podnikání v Kyrgyzstánu

Abstrakt

Země Společenství nezávislých států (SNS), které byly dlouho řízeny a centrálně plánovány jako součást Sovětského svazu a poté se náhle staly nezávislými státy, zažívají v současné době několik let po sobě růst. V důsledku hospodářských reforem však rostoucí chudoba, nedostatek potravin a podvýživa představují pro vlády středoasijských republik velkou výzvu v oblasti rozvoje. Zemědělství v Kyrgyzstánu je jedním z hlavních hospodářských odvětví. Na celkovém objemu hrubého domácího produktu země se zemědělství podílí významnou částí - přibližně 24,0 %. Tato práce slouží k úplnému seznámení se zemědělstvím v Kyrgyzské republice. Jejím hlavním cílem je studium zemědělství a jeho vlivu na ekonomiku Kyrgyzské republiky. Teoretická část této výzkumné práce bude vycházet především z rešerší relevantní literatury, která má podobu časopisů, vědeckých článků, knih, průzkumů a internetových zdrojů. K dosažení výzkumných cílů bude stejně tak využita rešerše obdobných studií s využitím metod, jako je abstrakce, dedukce a induktivní uvažování. Praktická část této výzkumné práce bude zahrnovat deskriptivní statistickou a kvalitativní tematickou syntézu některých ekonomických ukazatelů a pro analýzu vybraných proměnných.

Klíčová slova: HDP, zemědělství, průmysl, ekonomika, zemědělství, Kyrgyzstán

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List of abbreviations

CIS - Commonwealth of Independent States
FAO - Food and Agriculture Organization

GIZ - Gesellschaft für International Zusammenarbeit

GDP - Gross Domestic Product

USSR - Union of Soviet Socialist Republics

UN - United Nations

CU - Credit Union

UNDP - United Nations Development Program

IGW - International Green Week

COVID - Corona Virus Disease

EAEU - Eurasian Economic Union

WTO - World Trade Organization

GMO - Genetically Modified Organism

UNDP - United Nations Development Program

1. Introduction

In the modern world, agriculture not only ensures food security, but also plays a key role in the economic development of a country. In Kyrgyzstan, as in many other countries, the development of agriculture is a priority to ensure sustainable economic growth and social well-being of the population.

An analysis of the agricultural sector in Kyrgyzstan reveals several key areas for its development. In particular, the transition to intensive methods of land cultivation, introduction of new technologies, expansion of the range of crops grown and development of specialized branches of agriculture represent important challenges.

Rising food prices, as a global trend, also stimulates the search for new approaches to agriculture. In this regard, various innovative production methods such as greenhouse farming, fish farming, floriculture, as well as poultry and small livestock breeding are relevant.

Despite the significant potential of agriculture in Kyrgyzstan, its full development requires a systematic approach and a set of measures aimed at increasing productivity, improving product quality and creating favorable conditions for agricultural producers.

This text will examine a number of promising directions for agricultural development in Kyrgyzstan, including the introduction of innovative technologies, the development of specialized industries, and the improvement of infrastructure and support for agricultural producers.

In addition, in light of the challenges facing the Commonwealth of Independent States (CIS) countries, such as growing poverty, food insecurity and malnutrition, a number of fundamental issues need to be analyzed and strategies developed to address them.

2. Objectives and Methodology

2.1 Goal

This thesis serves as a complete introduction to agriculture in the Kyrgyz Republic. The main purpose of this study is to study agriculture and its impact on the economy of the Kyrgyz Republic. The main objectives of this work are:

Conducting interviews with entrepreneurs and employees of organizations actively involved in agricultural activities in Kyrgyzstan.

Analysis of the obtained data in order to identify key trends and problems faced by entrepreneurs in this area.

Assessing the potential of greenhouse farming as a promising area for the development of agriculture in the country.

Development of recommendations for entrepreneurs and government agencies to optimize conditions for the development of agricultural business in Kyrgyzstan.

Formulation of conclusions and proposals based on the obtained research results in order to improve the efficiency and sustainability of the agricultural sector in the country.

2.2 Methodology

The theoretical part of this research work will mainly be based on relevant literature reviews, which are in the form of journals, scientific articles, books, surveys, and web sources. The research of similar studies, using methods such as abstraction, deduction, and inductive reasoning will equally be used to achieve the research goals.

The practical part of this research work shall include descriptive statistical and qualitative thematic synthesis of some economic indicators and selected for the analysis variables.

The achieved results from the analysis will be duly discussed and include the researcher's recommendations.

3. Literature Review

3.1 GDP

The Kyrgyz Republic in November 2023 has overcome the mark of 1 trillion soms in terms of gross domestic product (GDP), as evidenced by official data displayed on a special counter on the website of

the Ministry of Economy and Trade. The indicator is 1 trillion 21 billion soms, and this value continues to grow.

It is noteworthy that on November 23, at a meeting of the Jogorku Kenesh, the unicameral parliament, the Prime Minister announced a historic moment for the country's independence, saying that the GDP of the Kyrgyz Republic will reach 1 trillion soms for the first time.

3.2 Main characteristics of agriculture in Kyrgyzstan

Agriculture is important for any country, contributing to the economy, employment and food security. In Kyrgyzstan, it is not only an economic sphere, but also a way of life for many. However, agriculture has not delivered the expected results in recent decades due to ineffective reforms and underdevelopment. Qualitative changes are needed to improve competitiveness and ensure food security.

Agriculture in Kyrgyzstan is traditionally the leading sector of the economy of the Kyrgyz Republic, both in terms of the amount of added value created and in terms of the number of people employed in the industry. Employed in agriculture make up about one third or about 750 thousand people of the total number of people employed in the country. About 1/5 of the republic's GDP is produced in this sector of the economy, which makes it possible to ensure processing enterprises with raw materials, and the population - food products (Djalalov, 2006).

The presence of vast mountainous territories predetermined the direction of development of agricultural sectors in our republic, which employ more than 60% of the population living in rural areas. However, only a small part of the territory of the republic (about 7%) can be used for the cultivation of cultivated plants and these are mainly flat and foothill parts (Akramov, a další, 2009).

The land fund of the republic is about 20 million hectares, and more than half is agricultural land. More than 85% of agricultural land is occupied by pastures, 15% - arable land and hayfields. In Kyrgyzstan, land has been transferred to private ownership. At present, 382 thousand peasant and farm enterprises and 357 agricultural cooperatives. In the structure of agriculture, there are two main branches - crop production and animal husbandry.

The basis of cultural agriculture is rain-fed and irrigated lands of foothill and plain territories, where a wide network of irrigation facilities has been created (reservoirs, irrigation canals, collector-drainage

network, hydraulic structures, pumping stations, and wells of the on-farm irrigation network). More than 70% of arable land is irrigated (National Statistical Committee of the Kyrgyz Republic).

The sown areas are occupied by grain, leguminous, fodder, technical, oilseed, vegetable and melon and fruit and berry crops. The mountainous and high-mountainous regions of the republic are characterized by a limited set of cultivated crops, the main ones are wheat and barley, potatoes, and perennial grasses.

Animal husbandry in the Kyrgyz Republic is one of the leading branches of agriculture and a key component of the agro-industrial complex. The natural and climatic conditions of the republic contribute to the development of all branches of animal husbandry (cattle breeding, sheep breeding, horse breeding, poultry farming and beekeeping) and the production of cheap, environmentally friendly products (Chia, a další, 2020).

Unfortunately, agriculture in the country is slowly modernizing, and the growth rate is insufficient to reduce poverty and ensure food security in rural areas. Mishandling and inefficient practices have led to the degradation of agricultural land. In addition, water mismanagement, long a problem in the country, continues to hamper production. This contributes to high unemployment in rural areas and mass labor migration to Russia, Kazakhstan, and various other countries.

The UN World Food Program estimates that 16 percent of the poorest quintile of households in Kyrgyzstan lack food. In some regions, almost a quarter of families have low or worse food consumption rates. Nutrition indicators are also of concern, with stunting due to malnutrition among children in the south of the country exceeding 20 percent.

All this shows the level of agricultural policy in the country. This thesis includes a detailed description of this problem and possible solutions, as well as examples of the development of agriculture in various "developed countries" (FAOSTAT).

3.3 Economy of the Kyrgyz Republic

The economy of Kyrgyzstan cannot be called highly developed and prosperous since the country is poor. However, it is developing dynamically, therefore it is very promising and attractive for foreign capital and business. The industry is represented by the energy and mining industries.

There are light and food industry enterprises (Lerman, a další, 2009). A significant part of agricultural products is exported. The gas station market is partially controlled by Gazprom Neft Corporation, which owns up to 63% of gas stations in the north of the country.

Tourism is an important source of income for Kyrgyzstan. The share of small businesses is insignificant — in 2013, the staff of small and medium-sized enterprises (without individual entrepreneurs and farm workers) amounted to only 87.7 thousand people (3.9% of the total number of people employed in the economy). There are also 329.7 thousand individual entrepreneurs (individuals) in the country in 2013.

A serious problem is the state external debt, which as of April 30, 2021, was 4 billion 182.95 million dollars.

The gross domestic product (GDP), according to preliminary estimates, in January-December 2021 amounted to 723 billion, an increase of 3.6 percent compared to January-December last year. Excluding the enterprises developing the Kumtor field, the volume of GDP amounted to about 668 billion. in comparison with the corresponding period of last year, it increased by 3.9% (Lerman, a další, 2009).

GDP growth compared to January-December 2020 is mainly provided by the service and industrial sectors. At the same time, if in January-December 2020, compared with January-December 2019, the growth rates of industries providing services decreased by 9.8%, then in January-December 2021, compared with January-December 2020, on the contrary, they increased by 6.5%. A similar trend was observed in industries, where in 2020 their growth rates decreased by 7.0%, and in 2021 they increased by 7.2%.

Figure 1 GDP growth (annual %) - Kyrgyz Republic



(World Bank national accounts data, and OECD National Accounts data files.)

3.4 Development of Agriculture in Kyrgyz Republic.

Prior to their independence, the Central Asian republics were economically interdependent on each other and on the Soviet republics in general. In terms of grain, certain countries were net exporters (for example, Kazakhstan) and certain countries were net importers (for example, Tajikistan). Following independence and the dissolution of their existing trading arrangements, the Central Asian countries faced a choice between self-sufficiency in food production and food security through a combination of own production and regional trade (Akramov, a další, 2009).

Unable to benefit from comparative advantage through regional trade arrangements, each country chose to address the problem of food self-sufficiency through increased grain production to meet internal needs. For countries that were previously net importers, that has meant increased domestic grain production accompanied by increased market prices and farming of marginal lands. For countries that were previously net exporters, that has meant reductions in grain production and net decreases in prices and national export revenues. The former has hurt consumers, and the latter has been to the detriment of farmers and national accounts. Both categories of countries have suffered in terms of food security.

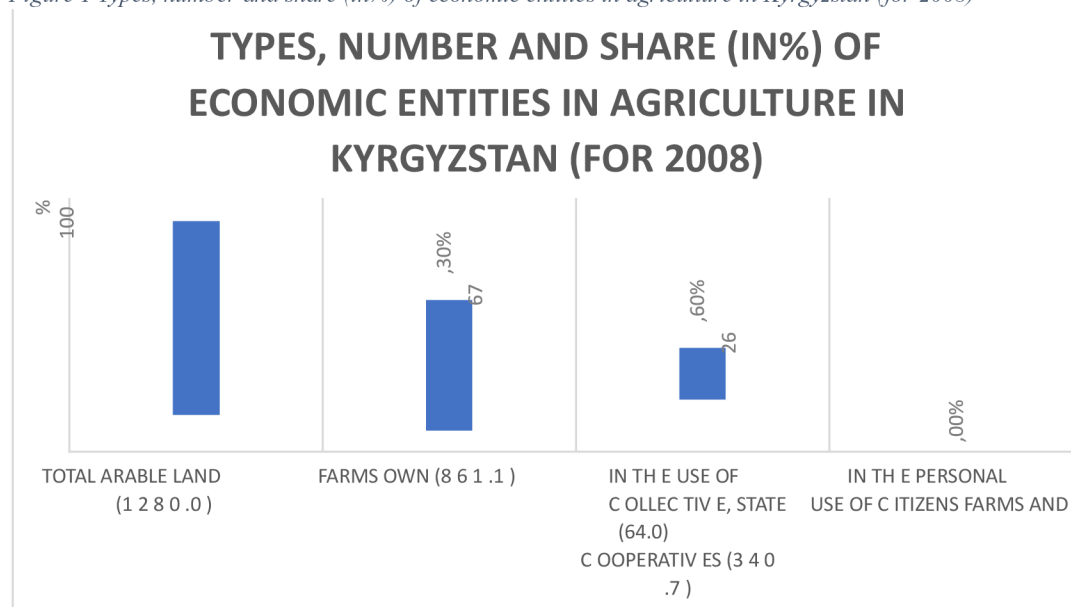
Reforms to dismantle the planned economy and transition to market relations in Kyrgyzstan were launched, in the long-suffering agriculture, in the early 1990s. Then 576 collective farms and state farms

were abolished, and farms were created instead of them - as the basis of the Institute of private property in agriculture. Despite the prevailing number of farms, in the agriculture of Kyrgyzstan today there is a large variety (forms) of economic entities, some of which, being the rudiments of the former planned economic system (state and collective farms), function according to the stereotype to this day.

In 2008, there were 326.7 thousand economic entities in the agriculture of Kyrgyzstan, including 135 state farms (these are seed-growing, breeding farms, experimental stations, and others), 4211 collective farms, 3454 agricultural cooperatives and 321.8 thousand farms. In addition, there are 726.6 thousand personal subsidiary plots of citizens (Chia, a další, 2020).

The pivotal part of the ongoing reform was the transfer of land to private ownership by farmers and its Constitutional consolidation (1998). Of the total arable land (1280.0 thousand hectares), 861.1 thousand hectares (67.3%) are owned by farms, 340.7 thousand hectares (26.6%) are owned by collective, state farms and cooperatives and 64.0 thousand hectares (5.0%) in the personal use of citizens, as household plots (Lerman, a další, 2009).

Figure 1 Types, number and share (in%) of economic entities in agriculture in Kyrgyzstan (for 2008)



(National Statistical Committee of the Kyrgyz Republic)

However, here one most important point should be emphasized. With the current system of land distribution (861.1 thousand hectares of land for 312.8 thousand farmers), 2.7 hectares of land fall on one farm. This suggests that natural production has developed in the classical form in the agriculture of Kyrgyzstan. The most deplorable thing is that the state (due to the incompetence of people related to this

process), instead of creating and developing a secondary land market and forming a layer of farmers-commodity producers, in order to create a highly profitable commodity production in the country's agriculture, advocates a mechanical and total association of farmers into cooperatives, referring (as an argument, innovation, panacea) to the experience of organizing "cooperatives" in Germany, without delving into the essence of German farmers' associations, which is nonsense.

As a result, recently, under the dictates of state bodies, the number of agricultural cooperatives has been increasing, people, having given their tiny plots of land into the hands of the newly-minted latifundios (often not though, many cooperatives have broken up and continue to disintegrate before they have been created) receive in the form of "rent" for them pennies, or most often in kind - products and continue to be in poverty. This is a rollback from the reform, so the land and agrarian reform has ended up in a dead end and has been stalling for 20 years! there are no serious shifts to improve the situation in the agricultural - city-forming sector of the country.

Ultimately, such an "agrarian policy" can lead to segregation and permanent poverty of the bulk of the inhabitants of local communities. If we make a simple calculation, if 1% of the population of the country is employed in agricultural production, in Kyrgyzstan the number of farmers will be 50,000, in this case, one farm will have an average of 25-30 hectares of land, which makes it possible to engage in commercial agricultural production. Consequently, the state agrarian policy in Kyrgyzstan should be aimed at the creation and development of a secondary land market and the formation of a farmer-commodity producer and should be dealt with without delay, and it should become the cornerstone of all the reforms being carried out in Kyrgyzstan, otherwise no social support and declarative slogans can raise agriculture and population of the country (Lerman, a další, 2009).

Pasture resources and natural hayfields are the national wealth of Kyrgyzstan. They occupy about 50% of the total territory of the country or about 90% of all agricultural land and allow the production of cheap and environmentally friendly products. Pastures and hayfields by economic entities are distributed as follows.

The main part (more than 66%) of pastures and hayfields is owned by the state, one third (33%) is used by state farms, *ayil okmotu* and only about 1% is owned by farms (0.23 ha of pastures per farm, just paradoxically, logically, they should have been used by farmers), which does not allow the development of livestock farmers and shows serious distortions in the use of pasture resources. Pasture resources have

been exploited for a long time in pursuit of cheap products very intensively (one might say barbarically) without elementary efforts to improve and rationally use them, as a result, today they are highly degraded and require serious capital investments (World Bank national accounts data, and OECD National Accounts data files.).

The main indicators of crop production

The structure of sown areas. The structure of sown areas is one of the important indicators of the efficiency of agricultural production.

A cursory analysis of the structure of sown areas shows that it is far from perfect, market priorities are not considered, market analysis and forecast are not carried out. These data clearly demonstrate that the Ministry of Agriculture of the Kyrgyz Republic does not conduct marketing and does not offer farmers any recommendations on growing one or another crop that is economically profitable at the moment. Farmers are in the dark and sow this or that crop at their own peril and risk. More than half of the cultivated areas are occupied by grain crops, the profitability of which is not only low, but most often unprofitable due to unsystematic grain imports and humanitarian aid. Farmers who have grown grain cannot sell even for 5-7 soms per 1 kg and suffer serious losses.

Even the state, promising to purchase grain from farmers for support, does not fulfill its promises by purchasing grain for state material reserves from neighboring countries or filling the state's bins with humanitarian grain. Farmers are forced to grow crops as the least expensive, there are no opportunities for high-tech and profitable crops (seeds, fertilizers, equipment for care and cleaning, storage and transportation, and others). Therefore, the most profitable industrial crops, vegetables, melons, occupy a small share in the total share of sown areas, showing extensive farming. It would seem that in the conditions of Kyrgyzstan, the areas under fodder crops should have been the largest, since livestock products always have greater consumption and profitability (therefore, in many countries of the world, the gross income of animal husbandry far exceeds the income of crop production) and there are all conditions for the development of animal husbandry, unfortunately, everything is exactly the opposite.

In addition, if Kyrgyzstan skillfully took advantage of its geographical position (it is located between the largest producers (Kazakhstan, Russia) and consumers of grain (Afghanistan, Pakistan, Bangladesh), then by re-exporting grain, Kyrgyzstan could not only significantly reduce grain production (and instead

to grow more profitable types of crops), but also to get cheap grain, in addition, and profit, as Israel does, for example.

Gross harvest of crop production. The gross harvest of crop production in 2008 was, in thousand tons: grain - 1510.9, incl. wheat - 746.2, cotton - 95.1, tobacco - 13.6, potatoes - 1334.9, vegetables and melons - 822.6. The needs of the population of Kyrgyzstan are not satisfied with grain of its own production, therefore, in 2008, grain was imported in the amount of 557.0 thousand tons, or more than 50% of the need. The produced crop production mainly remains within the republic, only potatoes (26.2%) and vegetables and gourds (18.8%) are exported, which confirms the underdevelopment of commodity production in agriculture in Kyrgyzstan.

3.5 The Current state of agriculture in Kyrgyzstan.

The agricultural sector of the republic has largely lost its former positions (Soviet period). Today it is an industry with a lower-than-average level of development in almost all indicators. We are still far behind the Union level, both in terms of crop yields and livestock productivity. At the same time, it should be borne in mind that the specified union level, in turn, lagged far behind the indicators of developed countries. For example, the average milk yield per cow in 2019 amounted to 2009 kg, while in the Soviet period, it was equal to 3200 kg.

Figure 3 Production/Yield quantities of Milk, whole fresh cow in Kyrgyzstan

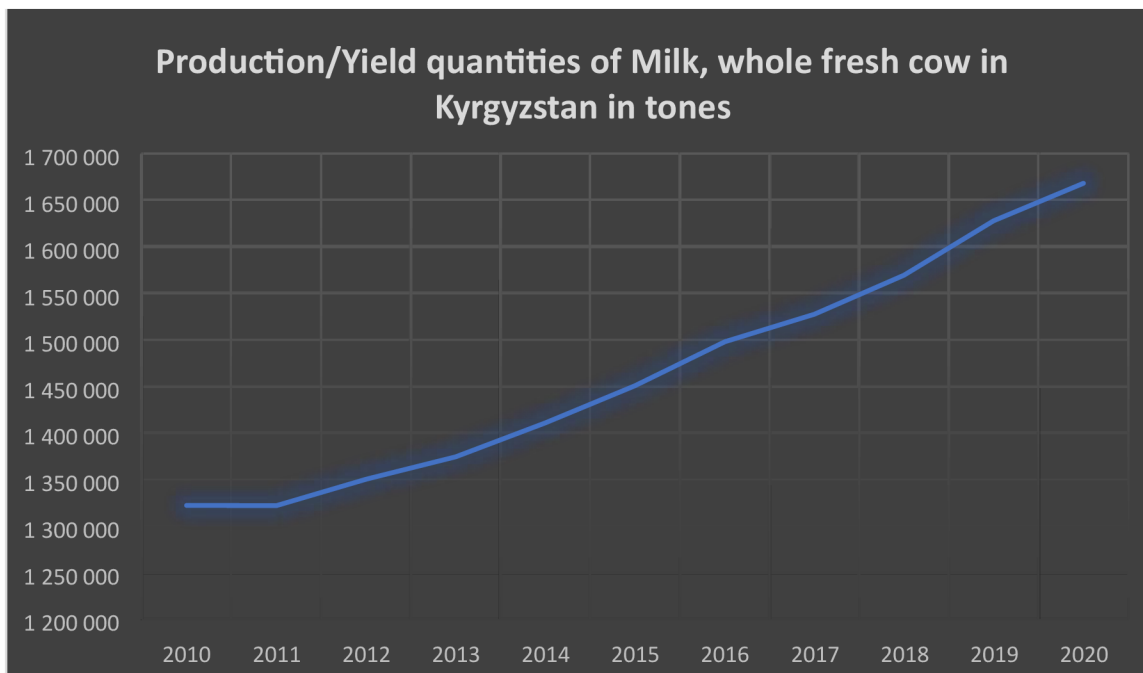


Table 1 Livestock (in farms of all categories, at the beginning of the year, thousands of heads

	2009y.	2010y.	2011y.	2012y.	2013y.	2014y.	2015y.	2016y.	2017y.	2018y.
The EAEU	32970,0	32766,2	32164,7	31998,0	32015,9	31818,2	31807,7	31726,4	31648,6	32014,8
Armenia	584,8	570,6	571,4	599,2	661,0	677,6	688,6	701,5	655,8	650,5
Belarus	4131,0	4151,0	4151,3	4246,8	4367,0	4321,2	4363,7	4356,5	4299,3	4362,5
Kazakhstan	5991,6	6095,2	6175,3	5702,4	5690,0	5851,2	6032,7	6183,9	6413,2	6745,4
Kyrgyzstan	1224,6	1278,1	1298,8	1338,6	1367,5	1404,2	1458,4	1492,5	1527,8	1575,4
Russia	21038,0	20671,3	19967,9	20111,0	19930,4	19564,0	19264,3	18992,0	18752,5	18681,0

(Data of the Eurasian Economic Commission)

Arable lands are being degraded more, there are more animal diseases, work on seed production and breeding of new breeds of livestock has almost been launched. The use of mineral fertilizers is very insignificant (about 10 times less than the union level), the use of herbicides, the irrigation system is worn out. The technical equipment of agriculture is in an extremely unsatisfactory state: the moral and physical deterioration of the equipment available in the equipment of the subjects of the industry has long exceeded 85%.

Deliveries and purchases of new equipment are insignificant on the scale of the republic and do not cover the volume of equipment failure and its write-off due to unsuitability for further operation. Every year, for various reasons, 70-80 thousand hectares remain untreated. A big unsolvable problem is the storage and processing of agricultural products. The main problem is the lack of funds, but other factors also have a negative impact.

Kyrgyzstan's accession to the Customs Union opens up certain opportunities for the export of agricultural products. But we cannot say that we are effectively using these opportunities. It should also be noted such a factor - the small size of allotments of farms and, in general, the low agro-economic literacy of new owners do not contribute to the efficiency of production in the industry.

The lack of an effective system of product procurement, the lack of own and cheap credit resources, despite their slight increase, especially in recent years, also act as factors of negative influence. In terms of the volume of the industry's output in the physical dimension, it has not fallen as catastrophically as in industry. But, as we have noted, the yield of most crops and the productivity of animal husbandry is still below the union level. These indicators are improving, but at a slow pace. This process of fragmentation shows that the mentality of the peasants in our time is not set up for collective work, but for individual work. It should also be said about private farms (personal subsidiary farms). These are, in fact, the gardens of rural residents. Our statistics traditionally show higher indicators for this category. But the bottom line is that these private farms are just part of the farmers' farm.

Of the EAEU countries, the highest beef consumption in Kazakhstan and Armenia is 23.2-19.7 kg. The Republic of Belarus ranks 13th in the ranking of exporting countries (the share in the global ranking is 1.7%). The main livestock of cattle is concentrated: in Armenia – Aragatsotn, Gegharkunik, Lori and Shirak; in Belarus it is evenly distributed - Minsk, Brest, Gomel, Grodno, Vitebsk and Gomel regions; in Kazakhstan, the main part is concentrated in Almaty, South Kazakhstan and East Kazakhstan regions; in the Kyrgyz Republic in the Main Naryn and Chui regions; In the Russian Federation, half of the livestock falls on the Volga and Siberian Federal Districts.

Manual labor and simple reproduction prevail in most farms. According to statistics, per capita availability of arable land in Kyrgyzstan is 0.23 hectares, while, for example, in Russia per capita there is 1 hectare of arable land, in Kazakhstan – 1.6 hectares of arable land. The predominance of small farms in agriculture, in our opinion, at the present stage of market development and the state of the economy of Kyrgyzstan cannot serve as the basis for the rise of the agricultural sector. Practice has shown that most small farms have significant difficulties in running their own business alone.

Farms cannot apply high technologies in production processes, as they do not have the proper qualifications, the ability to incur large costs and maintain high-quality equipment. Significant costs per unit of grown products in small-scale farming and the negatively manifested law of the scale effect of production determine, in the end, the rather low profitability of farms.

According to a survey conducted by the National Statistical Committee of Kyrgyzstan, more than half of farms produce agricultural products for their own consumption, 22.7% of farms and 21.7% of farms supply their products for further processing for sale on the market. Thus, more than half of the products produced by farms are used for their own needs, while forming the basis not of a market, but of a natural

economy. Naturally, this is largely due to the lack of sufficient financial resources, technical problems, appropriate qualifications, etc. However, working exclusively for oneself from this point of view leads to a certain stagnation and a decrease in the positive impact on the economic growth of the state.

As we have noted, the problems of the agricultural sector of the republic that have arisen since independence, despite their partial solution, exist to this day. So, they can be divided into four groups: The first is the problems of organizational order. There are more than 384 thousand farms in the country today. However, more than half of them work for their own consumption. The number of large collective farms is insignificant, and their number is decreasing every year. The number of peasant farms is increasing as a result of the decline. There is no well-organized, effective public procurement of products produced by farmers. The export system is not established.

The second is the lack of resources. State support, increasing from year to year, has not yet reached the required level, the insignificance of state subsidies, the lack of cheap loans, the lack of loans in general. In general, in Kyrgyzstan, the level of subsidies is about 3-5% of the gross output of the industry, whereas in the Soviet period it was, according to various estimates, from 20 to 35%. And as a consequence - the lack of high-quality seeds, breeding cattle, fertilizers, veterinary drugs, equipment, etc. For example, in the developed countries of the West – Belgium, Germany, France – subsidies to agriculture account for up to 50% of the cost of produced products, in Finland this figure reaches 80%.

The third is the low level of agrotechnological and economic (professional) knowledge of the new owners of the agricultural sector. Poor knowledge of farmers is a significant obstacle to the development of the industry. It should be noted that the low level of relevant knowledge required for agricultural production is one of the factors of negative influence.

After all, it is necessary to take into account the fact that when distributing the former collective property and land, rural teachers, doctors, employees of economic services, energy and others became farmers. And if the workers directly involved in agricultural work had some level of necessary knowledge and skills, then these categories encountered agriculture only in their vegetable gardens. The issue of organizing comprehensive training of farmers is still relevant.

Naturally, over all these years, farmers have been engaged in self-education and, in comparison with the first years of independent management, have mastered a certain level of professional knowledge. But

they are still insufficient. The fourth is the state of agricultural infrastructure. This can include the irrigation system, the living conditions of the villagers, broken roads, abandoned pastures, felled forest belts and degraded and degraded lands. Agricultural infrastructure, which we have combined with rural infrastructure for convenience, has a direct impact on the level of agricultural production. All this leads to mass migration of the rural population to the cities of the country and abroad in search of higher earnings.

All these problems are interrelated and have a negative impact on the development of the industry, and they should be solved comprehensively. Effective solutions in each of them automatically lead to an improvement in the state of affairs in other groups of problems. Due to the lack of sufficient funds from the state, it is necessary to apply a mixed method of solving problems. For example, strengthening the integrated agrotechnological and economic training of current farmers should have a certain effect. The organization of such studies is quite capable of the Ministry of Agriculture and other departments. It is clear that a grain farmer, all other things being equal, will manage more efficiently. Much has been said about cooperation in agriculture. As a justification, it is said that large farms have more opportunities to solve many issues of agricultural production. Objectively, they are more productive. Indeed, any economist understands that combining resources and land will make it possible to use them more efficiently. Take the same crop rotation, the acquisition of productive machinery, high-yielding seeds, breeding cattle, fertilizers, the use of new technologies and scientific developments, etc. However, the practice shows that cooperatives in agriculture in Kyrgyzstan are currently, under the current situation, not viable.

Their number is not only not increasing, on the contrary, they are getting smaller every year.

So, if in 2006 there were 1,448 collective farms in Kyrgyzstan, then in 2015 there were 518, for 9 years their number has almost tripled, these farms account for less than 2% of the gross agricultural output. Moreover, their labor productivity is lower than the average in peasant farms. Current cooperatives are less efficient than peasant farms. And at the moment, it is necessary not to artificially create them, but to support peasant farms, the most successful of them in the first place. The question arises: why transfer peasant farms that are slowly but surely increasing their efficiency into cooperatives, especially in their current form, which are less efficient than the peasant farms themselves?

In order for farmers to start uniting, incentives and explanatory work are needed. The question is what legislative and financial benefits the state can provide. How can small owners be attracted? Given the

lack of funds in the state budget, it is not necessary to hope for substantial subsidies to cooperatives. Therefore, at the moment it is not necessary to force the creation of cooperatives in agriculture. On the other hand, it is necessary to support large profitable peasant farms in organizational and managerial terms. It is necessary to turn them into farms with allotments of 100-150 hectares of irrigated arable land due to their purchase of land from less successful farms.

This will be the enlargement.

The process of uniting peasants must be left to chance so that this unification takes place in a natural evolutionary way, without force pressure. The formation of large farms should occur due to the further consolidation of successful peasant farms (their purchase of less successful lands).

Co-operatives often cite the example of the USA - large allotments, up to 500-800 hectares of arable land in one farm. But there it is not a joint ownership of hundreds of approximately equal shareholders, the owner of these hectares is one.

In general, it is necessary to develop a more effective strategy for the further development of the agricultural sector of the republic for 20 years. Some points are not to artificially create cooperatives, to help successful farms, to conduct comprehensive studies, to increase the role of state regulation, the capabilities of the Ministry of Agriculture, to develop new programs, for example, "Second Harvest", "Pond fish farming", "Horticulture", "Industrial forestry", etc., and to determine the course for the production of environmentally friendly products.

We have said above about the agrarian and land reform, its objectivity and shortcomings. It's not finished yet. There are many issues that need to be resolved. There should be a program for further reform. We need a clear analysis of the problems and current trends in the industry. Today, a farmer, a member of a cooperative or an employee of a state farm is practically placed in conditions of independent survival and self-education. Although it is impossible to deny the fact that the state helps the industry to the best of its ability: it attracts grants, implements projects for loans from international financial organizations, writes off and extends debts, tries to reduce credit rates and increase the volume of loans, but these measures are not enough yet.

All assistance in various forms, although it grows annually by a total of 12-13%, does not make up for the volume necessary for agriculture. According to various estimates, it covers only 14-17% of what is needed. But we should be careful about these figures: there is no exact calculation methodology, as well

as full-fledged data on the industry in the republic. According to forecasts, a sharp increase in the volume of this assistance is very problematic, therefore it is necessary to pay more attention to organizational and managerial measures.

The situation is aggravated by the fact that agriculture and related infrastructure are also in a difficult situation. The villagers are getting richer, and the infrastructure of the village has problems. The irrigation system is in a difficult situation. On the verge of extinction, livestock breeds and varieties of cultured plants, the breeding of which at one time took years and huge funds. Due to rapid urbanization, the rural population abandons their places of residence, loses agricultural skills, and equipment is worn out by more than 85%.

Animal diseases have spread, the land is being depleted and degraded due to illiterate use. You can list the troubles of the industry for a long time. Every process has its own tendencies. Trends are an important component of any analysis. Without studying trends, it is impossible to conduct a correct analysis. Without proper analysis, in turn, it is impossible to make a correct diagnosis. Without diagnosis, it is impossible to prescribe treatment. By studying trends, you can direct the process in the right direction. What trends are we seeing in domestic agriculture?

First— there is a process of impoverishment of small farms. Many land owners lease their land to more successful farmers, while they prefer to do other things - mainly in cities, or go to work in neighbouring countries. At the same time, it should be borne in mind that the amount of rent is relatively low, especially in the northern regions. The reason for this is the inefficiency of agricultural production in general. Thus, the rent for the leased land is not essential for the landlord, since it is not high.

Even those farms that we call successful are not distinguished by a high level of production, as is the whole industry. The same farms from the category of non-urgent, which do not lease land, do not sell them, but continue to cultivate them, practically use them as an additional source of income, and not particularly effective. Their main earnings are other activities. In general, in the republic, as mentioned above, more than 50% of farms work only for their own consumption, that is, they are engaged in simple reproduction. This is a very high indicator.

The second is that the expected consolidation of agricultural entities through association into large enterprises in the form of associations, collective farms, cooperatives did not happen. Moreover, over

the past 5 years, there has been a reduction in the number of large farms, and today the basis of agriculture in the republic is peasant farms, the number of which has exceeded 400 thousand. At the same time, their main mass is farms that own an allotment of arable land ranging in size from 1 to 3 hectares.

The solution of the issues of consolidation of farms is seen in the development of a well-thought out strategy, the further development of agrarian reform. There is an example of the USA with large areas of farms. There are also reverse examples – for example, Japan, where the level of agricultural production is very high, the average size of farmers' land is about 1-2 hectares. Which model suits us better? It is necessary to decide and at the same time take into account the mentality of the population.

There is another point, in the same USA, only 3% of the population is employed in agriculture, we have half. That is, even if we provoke a rapid consolidation of farms, where to put the released human reserves? What to do with them? After all, not all of them will go to work outside the country. Here, as we can see, the solution of a purely economic task can cause complex social problems.

Third– as a result of ineffective actions in the industry, it has lost specialization and position in the production of such strategically important crops as sugar beet, tobacco and cotton, and in animal husbandry – fine-wool sheep breeding. The existing capacities for the production of granulated sugar, tobacco fermentation and cigarette production, leather, shoe, textile production, if not completely disappeared, are experiencing a deep crisis. Great changes have taken place in the pride of the republic – sheep breeding. Fine-wooled sheep breeding of merino breeds has practically disappeared.

The economic situation dictates its own laws: farmers have almost completely replaced sheep with meat breeds. The production of high-quality wool is almost reduced to zero. Tactically, it may be beneficial for the farmer – more meat (wool costs nothing), strategically - the republic has certainly lost. However, it is in the perspective of future opportunities in the conditions of membership in the CU that it would be necessary not only to preserve beet farming, tobacco farming, fine-wool sheep farming, but also to develop them.

Fourth– there is a mass exodus of the rural population to the cities and beyond the republic. The reason is objective – the incomes of workers employed in agriculture are among the lowest in the republic. And in the city, even as a handyman, he has the opportunity to earn an order of magnitude more. According

to statistics, currently about two thirds of the population of the republic lives in rural areas, more than half of the working population is employed in agriculture. However, these data are highly questionable.

In reality, these figures are an order of magnitude lower. There is an interesting cycle going on here. Initially, the most able-bodied members of a rural (peasant) family go to work. They usually transfer the earned funds to the remaining family members. It is these transfers that in many ways save many farms from the final collapse.

But there is another side here: the more the notorious guest worker starts earning, the more family members who remain in the village, he pulls into the city. It's no secret that a lot of rural families have completely moved to the city or outside the country. Especially in the last 5 years. Moreover, this process continues. Already today, during the spring and autumn field work season, agricultural producers are experiencing an acute shortage of labor. In recent years, they have been imported by more or less successful farmers from urban labor exchanges (Administration International Trade, 2021).

Fifth– there is a gradual destruction of the entire infrastructure serving both agriculture and the rural population. First of all, the irrigation system should be noted here. The reason is a lack of funds. We have already noted that irrigated agriculture is, without exaggeration, of strategic importance for our republic. The failure of the irrigation system can lead to the collapse of industry.

Today, half of the villages of the republic do not have drinking water, water pipelines are destroyed. Cultural institutions do not work. Many FAPs and kindergartens are closed. All this strengthens the process of villagers leaving villages and, accordingly, leads to a decrease in the population of entire rural regions. And this, in turn, adds an additional factor of negative impact on agricultural production.

It is a fact that according to a number of socio-economic indicators characterizing the standard of living, residents of villages are inferior to residents of cities and towns. Here is the average life expectancy, infant mortality, the incidence of various diseases, income level, and so on. This situation unequivocally confirms our conclusion that in the possible development of a further scenario of land reform, it is necessary to take into account the social problems of the village widely.

Today, it is not necessary to talk about the development of small and medium-sized processing enterprises in rural areas. There are very few of them. Large-scale production facilities associated with

the processing of agricultural products are practically idle. According to the latest data, domestic agricultural enterprises process only 15% of all industry products (Administration International Trade, 2021). This is a very low indicator. As a consequence of this situation, the few remaining agricultural enterprises continue to be destroyed, repurposed, etc. No new large and modern enterprises with modern technologies have been built.

The sixth is the degradation of agricultural land. The reasons for this are banal lack of funds, small size and overlap of private land holdings, different, inconsistent norms and watering times for various crops of these small allotments, mass felling of forest belts, especially in 1994-95, lack of crop rotations and so on. At present, 145 thousand hectares of arable land are not used in the republic, which is more than 10% of the total arable land (Akramov, a další, 2009).

The pastures of the republic are also not in the best condition, although some territories are self-healing due to a decrease in the number of livestock. And this is despite the general global trend, when the value of land, in particular agricultural land, will increase more and more every year. We have noted only the main trends in the development of agriculture. There are many others, not so significant, but nevertheless important. First of all, it is necessary to start with the search for solutions to these main trends, which, as we see, are negative trends.

There are also positive trends in the industry, this is that the industry is still developing, volumes are growing, farmers are gaining knowledge every year (albeit mainly by trial and error), the volume of loans and grants is growing, etc. The main directions of solving the problems of the agro-industrial complex and, accordingly, creating an effectively functioning complex are as follows: Improving the legislative framework. The legislative framework concerning the agricultural sector requires further improvement. It seems that the current situation and the critical state of the industry require an extraordinary approach here.

In our opinion, agricultural entities should be exempted from both land tax and social fund contributions for several years. With reasonable management of the republican budget, it can quite withstand this. The losses here on the budget scale are small, as well as on the budget scale of the social fund. In addition, it is necessary to stimulate, through deliberate benefits, the production of strategically important crops and crops for which we have experience and traditions but have practically ceased to cultivate. Rational management and organization. It is necessary to change the structure of state bodies responsible for the

development of the agro-industrial complex of the republic. Strengthen the powers of new structures, their financial support, the number of their employees, increase wages and qualifications. It would be reasonable, given the general lack of resources, to create a more powerful agency in charge of agriculture.

It was reasonable for the current ministry to add the structures responsible for the state of the Kyrgyz forests, as well as the State Agency for Material Reserves. In addition, to increase the staff of both the Ministry and its territorial structures. Provision of resources. It is known that almost all over the world agriculture is a subsidized industry. Even in a market economy, the industry needs powerful and comprehensive assistance from the state (Administration International Trade, 2021).

To increase the efficiency of the industry, it is necessary to find additional funds to help agriculture. In order to reduce interest rates, it might be necessary to create another bank specializing in lending to agriculture, in addition to Aiy Bank. Here it is necessary to pay attention to such a moment as the ecological purity of food products of Kyrgyzstan.

But there is no corresponding advertising, as, indeed, there is no corresponding packaging. It is necessary to work more effectively to attract grants and investments. Ensuring the sale of products and their processing. To do this, first of all, it is necessary to provide financial support for the implementation of these measures. Attracting investments for these purposes is very problematic today due to both the economic situation and the financial crisis.

Even if we agree that finding additional resources for these purposes is very problematic, it is regrettable that there is no clear program on this issue. Here, the fact of joining the WTO has the opposite effect. As a WTO member, we do not have any sufficient opportunities to restrict food imports. And as a result, the rural producer suffers (World Bank national accounts data, and OECD National Accounts data files.). The low efficiency of its economy is further aggravated due to the lack of competition with imported goods. Practically, the import of agricultural products in our conditions leads to the ruin of farmers. Application of scientific developments and new technologies. Any industry other than funds needs new developments. And agriculture is no exception here.

All over the world, everything new is widely used in agriculture. We don't have that. However, in terms of GMOs, it would be worthwhile to develop a strategy for the production of environmentally friendly

products. Their popularity is growing all over the world, and the price per unit is disproportionately higher than analogues produced using GMOs. For these purposes, a whole national program is needed. And the initial step could be an initiative to legally prohibit the use of mineral fertilizers.

Apparently, in this block there should also be comprehensive systematic agro-economic training of members of peasant (farm) farms. Their industrial illiteracy is also a significant factor negatively affecting the results of their activities. Development of a set of benefits and measures to keep the rural population on the ground. This measure should be a task of national importance. The rise of the village is vital. This is a task of national importance. And here, not only economic aspects are important, but also social, and to no lesser extent spiritual.

It should be borne in mind that the rural population moves to cities not only because of the low return on agricultural labor (the industry is one of the last places in terms of wages), although this is the main reason, but also because of the lack of agricultural amenities in the countryside. In many villages there is currently no clean drinking water, houses of culture do not work, there is no good level of hospitals, FAPs, convenient roads, shops and catering facilities, which was present in the Soviet period. That is, there are no what we call communal amenities, or it is at a very low level (Chia, a další, 2020).

Again, it would be important to raise wages at least for employees of budgetary institutions in rural areas – but there are no funds. A lot of measures can be developed here if this issue is raised seriously. Over the past few years, society and the state have realized the existence of a threat to food security. The problem of food security of the population has been the subject of active consideration by the world community in connection with socio-economic processes in developing countries since the mid-70s of the twentieth century.

A global contradiction arose when the absolute overproduction of food in developed countries was accompanied by mass starvation and malnutrition of the population in a number of third world countries. This has clearly demonstrated that chronic food instability is often associated not so much with the theory of declining Malthus fertility or the underdevelopment of the agricultural sector, but with the level of economic development and poverty of a significant part of the population of individual states, which makes food inaccessible at market prices. The problem of ensuring food security of our republic is closely linked with the development of agriculture.

3.6 Greenhouse farming

The development of agriculture is food Greenhouse farming. In turn, the development of the agro-industrial complex and especially its component, such as agricultural production, is generally associated with the development of the economy in general. Since in developed countries there is practically a redistribution of income between the sectors of the economy in favor of agriculture due to its peculiarities and objective unprofitability in comparison with other industries. The domestic economy has not yet achieved such a situation.

Taking into account global trends, namely the outstripping growth of food prices in comparison with the growth of prices for the bulk of manufactured goods, it can be assumed that the efficiency of agricultural production will increase. Or else, the prospects of agriculture with its different organization are objectively high. It must be recognized that on the scale of the republic, specialization and priorities are mostly defined, despite some discrepancies. Agriculture is present in these priorities.

But speaking about the industry as a whole, it is worth mentioning points that should be discussed in more detail. The natural and climatic conditions of our country are unique in their own way. They allow you to cultivate a fairly wide range of crops, ranging from heat-loving to frost-resistant. More than 90% of arable land is irrigated – and this is an additional factor in ensuring stable high yields. There are neighbors - countries with a large and rapidly growing population. In these conditions, the determination of development priorities within the rural economy proper, the development of tactics and strategies for the development of the industry would have a great effect.

It is clear that due to objective reasons, such areas of agriculture as the production of grain, potatoes and fodder crops, sheep breeding, cattle breeding and horse breeding will always be present in tactics and strategy. Vegetable growing will continue to occupy a significant share. But at the same time, attention should be paid to such promising areas as drip irrigation, re-sowing, artificial forestry, pond fish farming, greenhouse farming, fur farming, horticulture, floriculture, poultry farming, gardening (medicinal herbs are mentioned in a separate article). Let's try to briefly substantiate their prospects.

- **Repeated crops**

It is known that in many countries of the world with the appropriate climate, 2-3 crops per year are plucked. There is practically no such practice in our country. There are isolated farmers who use repeated

crops. There are practically no publications on repeated crops in our republic. The author has repeatedly considered this issue in various publications. The essence of the proposal is to develop a corresponding program, taking into account the natural and climatic conditions of our country.

There are facts when tenants in the Moscow region receive 2 harvests a year, although the climate there is more severe than in our republic. According to our calculations, up to 120-150 thousand hectares can be used for repeated crops in the republic. A similar program, called the "Second Harvest", was tested in the Osh region in 1999-2000, when approximately 5-6 thousand hectares were used for repeated sowing. Repeated snowing is possible in all southern regions and in separate zones of the northern regions.

- **Artificial (industrial) forestry**

The benefits of artificial forestry are huge, including for agriculture. There are enough areas in Kyrgyzstan that can be occupied by forest plantations. At the same time, it is necessary to restore the previously existing forest belts that separated the arable fields. The benefits of forests, including forest belts, for agriculture are enormous. This is the preservation of moisture, soil, protection of cultivated plants, etc.

- **Pond fish farming**

Israel has achieved impressive success here. In this country, fishponds produced 18 thousand tons of fish in 2014. The catch-to-pond ratio was 20 t/ha – one of the best indicators in the world. Here is an approximate comparison of the efficiency at the prices of the markets of Kyrgyzstan. If 1 ha of a pond yields 20 tons of fish worth 250 som per 1 kg, the result will be 5 million som. Let 1 ha of arable land give 40 c / ha of wheat, the cost of 1 kg is 7 soms. A total of 28 thousand soms. That is, the ratio is 177 to 1. It should be noted that pond fish farming is slowly beginning to develop in Kyrgyzstan. Today there are more than 300 fish-growing ponds in the republic.

Greenhouse farming has a lot of experience and rich traditions in the world. You can grow almost anything in greenhouses. At the same time, receiving several harvests per year. In recent years, greenhouse farming has been developing in our country as well. However, even here it is necessary to speed up this process. With sufficient volumes of products from greenhouses, this would affect first of all the purse of citizens, the usefulness of their nutrition. After all, ideal food security is not only

achieving the required number of calories, it is achieving this through the widest possible range of products.

- **Fur farming.**

Once upon a time in Soviet times, many state farms and collective farms had their own animal farms. They raised nutria, foxes, arctic foxes, etc. Now, of course, there are none. Perhaps there is a need to launch a pilot project on the basis of efficient farms. Although the green movement in the world is gaining strength, nevertheless, the demand for our products is also growing. That is, there are prospects here. Mushroom farming. The production of this useful product is growing all over the world.

Currently, the leading position is occupied by China, which annually produces more than 1 million tons of grits. Poland is in second place – 350 thousand tons. From the countries of the former USSR, Ukraine produces the most - up to 28 thousand tons. Russia annually produces 14 thousand tons, while consuming up to 160 thousand tons, that is, it imports 10 times more than it produces. The yield of mushrooms from 1 square meter varies greatly. This is due to the difference in technology. So, if in Russia, Ukraine they receive up to 12 kg, then in the USA, Australia, Poland,

Holland - up to 30-33 kg.

- **Floriculture.**

Over the past 50 years, floriculture has become a global industry. Suffice it to say that the global turnover of the flower trade is 30 billion euros. This, for example, is more than the volume of the global music industry. Many countries are actively developing floriculture. For example, the African country Kenya annually exports flowers worth 400 million euros. Floriculture in this country is on the 2nd place in terms of exports (Administration International Trade, 2021).

In Kyrgyzstan, there are greenhouses for growing flowers in the suburbs of the capital and other large cities. They satisfy part of the need. But a large number of flowers are imported to the republics, and the volumes of this import are growing. We can say that these are the first sprouts of floriculture, a special program is needed for more serious development. There are prospects here.

- **Poultry farming**

By the end of 2018, 1 trillion 360 billion eggs were produced in the world. The leaders here are China – 436 billion eggs and the USA - 91 billion eggs. For example, Russia has produced 41.3 billion eggs. As an interesting fact, we note that in 1990 the USSR ranked first in the world – 89.6 billion eggs, China at

that time produced 78 billion eggs (3rd place). That is, in less than 25 years, China has become a leader. Considering that the first trillion eggs were produced in 2010, the 36% increase in egg production is impressive.

We can conclude that the pace is high. The most important thing is that they are preserved. For poultry meat. In the world, according to data for 2013, 296 million tons of it were produced. In the structure of meat consumption in the world, poultry meat is in 2nd place (34.7%), only slightly behind pork (1st place, 37.1%). Experts predict that by 2022 poultry meat will occupy the first line. According to FAO forecasts, poultry meat production will increase to 465 million tons by 2050.

4. Practical Part

4.1 Introduction to Kyrgyz agriculture sector development

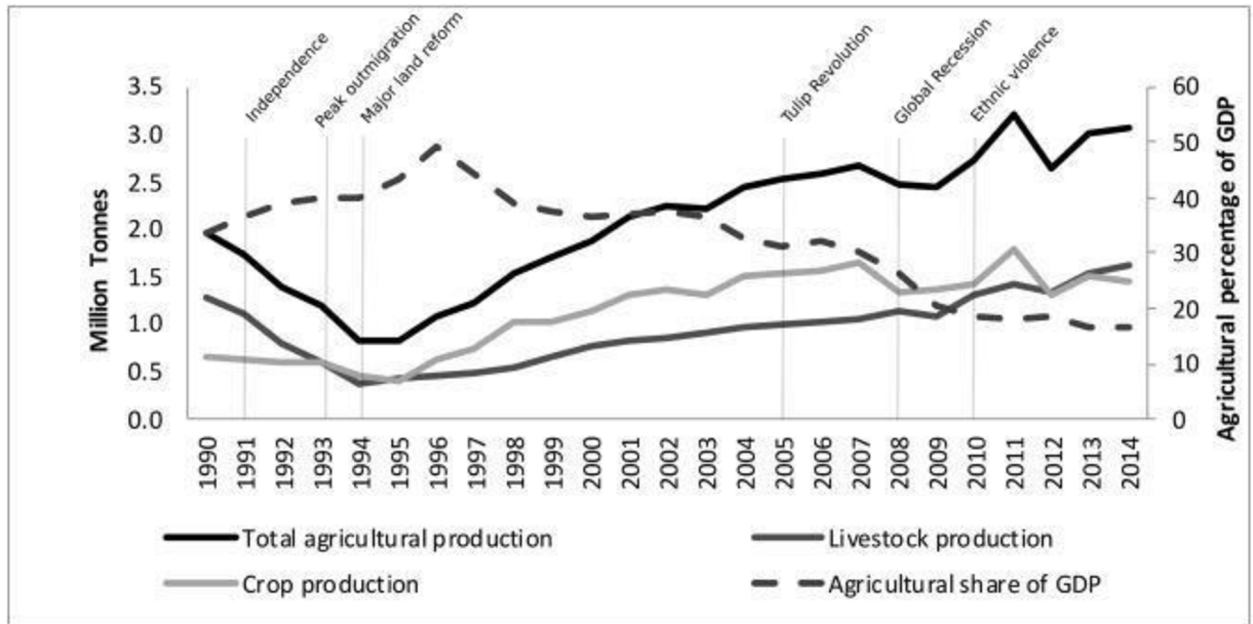
In the practical part of the work, a study of detailed analysis of agricultural business in the Kyrgyz Republic will be conducted. For this work two interviews were conducted:

The first interview with an entrepreneur from Kyrgyzstan who was trying to make money on growing cucumbers and tomatoes in greenhouses.

The second interview was with an employee of the German organization GIZ in Kyrgyzstan, who was engaged in assisting in the establishment of cooperatives, as well as helping with the legal side of business creation. These interviews were conducted in order to fully familiarize ourselves with the workings of agriculture in the Kyrgyz Republic and to identify the difficulties that can be encountered when doing business in the country.

4.2 Greenhouse business in Kyrgyz Republic

Figure 4 Overview of Kyrgyz agriculture sector development



Source: ScienceDirect

A greenhouse is a type of garden greenhouse, differing in size. It is a protective structure. It is used for growing early seedlings (cabbage, tomatoes, cucumbers, flowers of seedlings, rooting cuttings or growing potted plants), for subsequent planting in the open ground. But unlike a greenhouse, the size allows you to organize the entire cycle of growing a particular crop. They are covered with polyethylene film, glass, plastic or cellular polycarbonate. Inside them, infrared radiation emanating from the sun warms plants and soil. The air heated from the inner surface is held inside the structure by the roof and walls.

The material of which the walls are composed plays the role of a selectively transmitting medium for various spectral frequencies, its effect is to capture energy inside the greenhouse, with the help of which both plants and soil are heated. This heats the air near the soil, which does not rise up and does not leak out.

The largest greenhouse complex is located in the Spanish province of Almeria. How does the greenhouse work? After all, you must agree, it is somewhat unreasonable to use any device without having a clue how it works at least at a basic level. Understanding the principle of operation of

the greenhouse, you will be able to use its capabilities to the maximum, with maximum efficiency. The simplest self-made film greenhouses or complex industrial greenhouse complexes of Luxury class - they all function on the basis of the same basic principles.

The operation of the greenhouse is based on simple principles of physics - thermal radiation and heat exchange. The greenhouse collects the heat radiation coming from the outside, turns it into heat and retains this heat. This allows you to keep a certain stable temperature inside the greenhouse, creating the most favorable environment for the growth and vital activity of horticultural crops.

In addition, the greenhouse protects both from environmental influences – for example, weather conditions such as wind, hail or snow, and from pests - beetles, locusts and pets that your crops can simply eat or trample.

The main task of the greenhouse is to utilize the thermal radiation received from the outside from sunlight and/or artificial sources. Inside the walls of the greenhouse, thermal radiation turns into heat, heating the greenhouse from the inside.

You can feel the same effect yourself by closing all the windows inside the car on a summer day. Even if you don't start the engine, after just a few minutes, the temperature inside the cabin will become noticeably higher than outside – it's sunlight that has heated the insides of your cabin, and this heat can't get out anywhere.

The materials from which the greenhouse is made also affect the ability to retain heat and regulate the temperature inside the greenhouse. For example, polycarbonate is excellent as a material for a greenhouse due to its high coefficient of thermal expansion and high thermal stability. A greenhouse is a sealed room, and this makes it impossible for air to circulate between the interior of the greenhouse and the environment.

Air circulation equalizes the temperature difference, which would negate the main function of the greenhouse - maintaining a stable temperature, independent of the temperature outside. Without air circulation, the air inside heats up quickly. This creates ideal conditions for plant growth.

4.3 Temperature regulation in the greenhouse

Thermal radiation quickly heats the air inside the greenhouse and slowly warms the soil. Warm air, in turn, contributes to the production and, most importantly, the preservation of heat by the soil. Due to its organic properties, the soil is able to retain heat for a very long time, even when the source of thermal radiation becomes inactive, for example, in a simple greenhouse without heating, the soil heated by the sun during the day retains the heat received during the night.

But if the greenhouse were only infinitely heated, the temperature inside would soon become unsuitable for plants, right? The fact is that the greenhouse device promotes fully automatic thermoregulation.

According to the laws of physics, the soil heats up during the day due to the fact that the air temperature in the greenhouse is high during the day, and at night, when the air temperature drops without sunlight, the soil begins, on the contrary, to give off stored heat, heating the air. Such a simple cycle creates a constant temperature regime inside the greenhouse. In more advanced greenhouses, additional heating means are also used, which makes it possible to manually control thermoregulation without regard to the weather, but the basic principle of obtaining-preserving heat output remains the same.

Our interlocutor is a citizen of Bishkek, Anara. She and her husband Murat are financiers by education. At the moment, they provide consulting services. In 2014, when accumulating a certain amount of money, they decided to find an additional source of income. At that time, they advised mainly agricultural enterprises, which gave them some experience in this field. And so, they decided to start growing cucumbers and tomatoes in greenhouses. They had free land, which is very important when starting a business like this. Because thanks to this, they have greatly reduced monthly expenses. And so, they began to study greenhouses. We decided to build ourselves without the involvement of specialists in this industry. They studied greenhouses in various districts and cities.

Due to the climatic conditions of the country, the Russian technology for building a Greenhouse was chosen (Chia, a další, 2020). The greenhouse area occupied 400 sq. m. When planning the construction of a greenhouse, a business plan was written and a budget of \$15,000 was allocated. According to Anara's calculations, the greenhouse had to pay for itself within 2 years. In fact, the amount of the investment

amounted to 24 thousand dollars. This happened due to the fact that there was a crisis in the polycarbonate market. And as a result, it so happened that the amount of investment is up to 24 thousand dollars. The family did not attract any additional investments using only their savings.

They decided to take up this case because they like agriculture and they were ready for the difficulties that they (as they thought) would get. Greenhouses brought in crops 2 times a year and for this they alternated cucumbers with tomatoes. The case is quite profitable. At that time, the price of cucumbers on the market was 90-98 som, and the price of tomatoes was 75-80 som per kilogram. Whereas the cost of production (both tomatoes and cucumbers) was 15 som per kilogram. As a result, the first two years worked well. The family did not hire employees but worked themselves. They promoted the product easily. All they did was drive around the city and offer their goods to cafes and restaurants, small grocery and vegetable stores, as well as gave them for sale to markets.

As a result, within two years they were very exhausted and decided to hire employees. The first time they hired a married couple who were paid 700 som a day to everyone. According to Anara, the employees coped with the work well, but since there were certain fears of theft of products, they had to appear there every day, which greatly affected the employment of the family. But unfortunately, during a certain period, employees migrated to another country and therefore had to look for new ones.

The second family was also with wholesale in this area, but after working with them for a year, Anara and Murat discovered the theft of products. This finding forced them to part with their employees and return to work in the greenhouse again. This situation did not please Anara and Murat very much, as they had to be torn between consulting and a greenhouse. But trouble does not come alone.

At the beginning of 2020, the COVID 19 epidemic began. This situation forced the Government of the Kyrgyz Republic to close all institutions of the country for an indefinite period. This meant only one thing - there was no one to buy Anara and Murat's goods. This situation prompted them to finish with this case. Now they are still engaged in consulting.

According to Anara, one of the main problems of doing this business are risks that are difficult to predict, such as the coronavirus epidemic. The problem is that the state has not compensated for these losses. Well, the second important problem is the personnel. Hired employees are most often, unfortunately, prone to theft as well as to unscrupulous work.

4.4 Who helps farmers?

Now, there are many international, state, and private companies in Kyrgyzstan. These companies help not only with lending, but also with consulting. One of such companies is Agrolead Company. The public Association "AgroLead" is a leading consulting company in the field of agriculture, contributing to the improvement of the economic situation of agribusiness participants through the construction and development of the Value-Added Chain (CDS) according to the approaches of the green economy and adaptation to climate change.

4.5 The mission of "Agrolead"

The aim is to assist in the development of agriculture by increasing the potential of agribusiness participants in Central Asia through the provision of consulting, educational, research and marketing services. AgroLead pursues the following goals in its activities:

Ecological - preservation of ecology through the use of agrotechnical, biological and folk methods of production.

Economic – increasing the farmer's income by increasing crop yields and rational use of resources. Social - mobilization of resources of rural residents to solve community problems (assistance in uniting farmers in self-help groups, creation of savings funds, etc.).

Principles of work of "AgroLead":

Individual approach to the needs of our clients.

Focus on quality results.

This association has already completed more than 80 projects, for example, completed projects for 2021 are listed here:

1. Trainings for representatives of small and medium-sized businesses (SMEs) in the regions on the development of a business plan under the Program of the Russian-Kyrgyz Development Fund "Start-up";
2. Project "Strengthening the potential of participants in the winter tourism sector", HelvetasKyrgyzstan;
3. UNDP project "Capacity building for financing sustainable development in the CIS region";
4. The project "On the assessment and implementation of Fair-Trade standards". Helvetas "BaiAlai";
5. The project "strengthening the potential of beneficiaries of the business planning project". UNDP "Trade Facilitation".

6. The project "Research to identify the most relevant and competitive value chains in the agricultural sector". Branch of the NGO "Good Nabors International" in the Kyrgyz Republic;
7. The project "Development of a feasibility study of the possibility of implementing a support program for the development of agribusiness with the investment of remittances of migrant workers with grant support of the project". UN FAO.

At the moment, Agrolead is engaged in 4 more projects that are planned to be completed this year.



Picture 2 Agrolead logo

4.6 Food and Agriculture Organization

The next organization that was covered in the research work is FAO. FAO is the Food and Agriculture Organization of the United Nations (Food and Agriculture Organization). FAO has maintained partnership relations with Kyrgyzstan since its entry into the Organization in 1993. As an intergovernmental international organization, FAO deals with issues of food resources and agricultural development in the countries of the world community. Founded in 1945. The FAO headquarters is located in Rome.



Picture 1 FAO logo

Food and Agriculture Organization of the United Nations

It operates on the basis of the Charter, which sets out the goals and objectives of the organization, which are to improve nutrition and improve the standard of living of the population. FAO is engaged in: Collecting, studying, processing and disseminating information on the development of agriculture and food, providing technical and methodological assistance to countries in need, studying the situation on the world food and agricultural market, developing agricultural statistics that allow comparing data on agriculture in different countries.

The work of FAO is financed both from its own budget and from the funds of other international organizations and institutions. The current activities of FAO are carried out by a Council headed by the Director General, who is elected by the conference, which is the highest body of the organization.

Well, the last organization is the GIZ company.

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

Extensive know-how in the field of sustainable development

The services provided by the Deutsche Gesellschaft Internationale Zusammenarbeit (GIZ) GmbH (German Society for International Cooperation) are based on its recognized regional know-how, extensive professional knowledge, and proven management approaches. As a German federal company, GIZ supports the Government of the Federal Republic of Germany in the implementation of its tasks in the field of international cooperation in order to promote sustainable development. In addition, they are actively engaged in international educational and educational activities around the world.

Specially designed services

They offer services that promote sustainable development and are demand-driven, specially designed and effective. They form the processes of change and make people able to independently and responsibly manage the processes of further development. They provide partners with support at the local, regional, national and international levels on strategic and conceptual issues, as well as in the implementation of their political goals.

Development of solutions

This company is active in many areas, covering a wide range of issues - from stimulating economic development and employment, state-building and building democracy, ensuring peace, security, and reconstruction, overcoming civil conflicts, ensuring food security and the work of health systems and basic education to environmental and resource protection and climate protection. They also assist their partners by providing them with management and logistics services, and act as intermediaries to coordinate divergent interests in sensitive contexts. In particularly acute situations requiring urgent resolution, they implement emergency assistance programs and programs for refugees.

GIZ Customers

The main customer is the Federal Ministry of Economic Cooperation and Development of the Federal Republic of Germany. However, both in Germany and abroad, GIZ performs the tasks of other federal agencies, primarily the Federal Ministry of Foreign Affairs, the Federal Ministry of the Environment, Nature Protection and Safety of Nuclear Reactors, etc., as well as the lands and municipalities of Germany and other public and private customers. These include, for example, the Governments of other countries, the European Commission, the United Nations and the World Bank.

Summary of the company's activities

GIZ is active in more than 120 countries around the world. The company's executive bodies are located in the cities of Bonn and Eschborn. The number of GIZ employees working around the world is more than 19,000 people, of which about 70 percent are national staff working in the field.

GIZ also employs approximately 1,000 development assistance specialists.

GIZ activities in the Kyrgyz Republic

GIZ has been operating on the territory of the Kyrgyz Republic since 1992. The number of GIZ employees is about 190 people (as of February 2020), 145 of them are local specialists.

The GIZ representative office in Kyrgyzstan is located in Bishkek.

Projects implemented by GIZ:

- Sustainable economic development
- Promoting sustainable economic development in Kyrgyzstan
- Promoting regional economic cooperation in Central Asia
- Integrated development of regions
- Good governance

- Promotion of legal statehood in Central Asian countries
- Natural resources
- Sustainable land use for economic development in Central Asia
- Transboundary water resources management in Central Asia
- Ecosystem approach for climate change adaptation in high-altitude regions of Central Asia
- Biodiversity conservation and poverty reduction with the involvement of local communities in the management of nut forests and pastures
- Healthcare
- Promotion of perinatal healthcare
- Education and the labor market
- Vocational education in Central Asia
- Promotion of employment and vocational training
- Prospects for young people
- National minorities
- Support for the German ethnic minority in Central Asia



Picture 2 GIZ logo

4.7 GIZ and cooperatives

The next interlocutor was an employee of GIZ - Rano. Rano is the manager of cooperatives. So, what is a cooperative? - this is an organization voluntarily created by agricultural producers, including those who lead personal subsidiary farms by citizens on the basis of membership for joint production or other economic activities. In other words, it is a business owned and operated under the control of the owners - members of the cooperative who use its services.

An agricultural cooperative can be created in the form of an agricultural production cooperative or an agricultural consumer cooperative:

A production cooperative is a commercial organization, and a consumer cooperative is not a commercial organization. In order to make it clearer how to distinguish them, citizens (individuals) who are not agricultural producers and work together on the production of any type of products (a collective farm can be attributed to production cooperatives), and in a consumer cooperative, only agricultural producers who participate in the economic activities of the cooperative are united and their goal is to form added value for the products they produce (for example, through processing).

Processing cooperatives include consumer cooperatives engaged in the processing of agricultural products (production of meat, fish and dairy products, bakery products, vegetable and fruit and berry products, and others).

Marketing (trade) cooperatives sell products, as well as their storage, sorting, drying, washing, packaging, packaging and transportation, conclude transactions, conduct market research, organize advertising of these products and more.

Service cooperatives carry out mechanized, agrochemical, reclamation, transport, repair, construction work, as well as insurance services (insurance cooperatives), scientific and production, legal and financial consulting, electrification, telephony, sanatorium and medical services, and more.

Supply cooperatives are formed for the purchase and sale of means of production, fertilizers, lime materials, feed, petroleum products, equipment, spare parts, pesticides, herbicides and other chemicals, as well as for the purchase of any other goods necessary for the production of agricultural products.

And so the main task of Rano was the creation and maintenance of agricultural and commodity service cooperatives. Their main task was to create a union of cooperatives, which they successfully coped with. Rano took on responsibilities from the legal part. The latest project for co-creation of cooperatives is the creation of a dairy cooperative "Kok Chui". The company helped this cooperative to purchase equipment for milk transportation. This was necessary in order for the milkmen who collect milk from farmers to dairy producers to deliver milk in good condition.

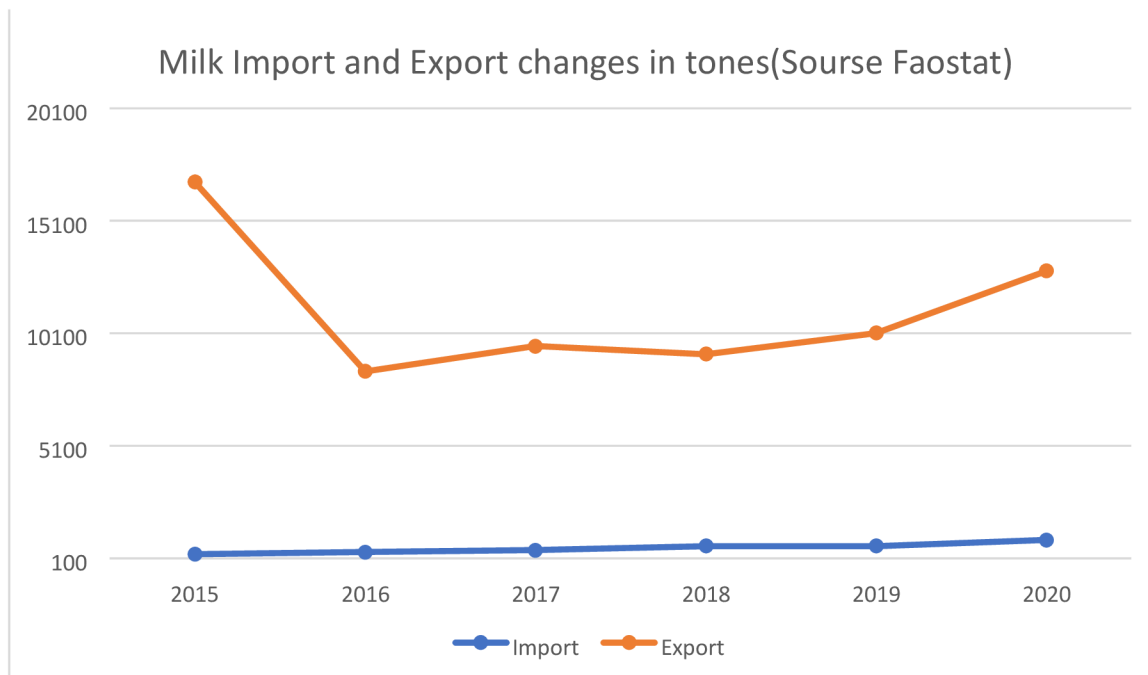
According to Rano, before the equipment was purchased, farmers faced such a problem that milkmen were not always able to do their work in good faith. For example, one of the problems was the transportation and storage of products. If the milk is transported incorrectly, it may spoil and farmers may not receive money for their work. At the moment, the cooperative "Kok Chui".

Milk industry in Kyrgyzstan.

The annual milk production in Kyrgyzstan is about 1.6 million tons, of which only 2.5% goes to industrial processing. Until now, more than 98% of raw materials for processing are produced on private farmsteads of the population, which sells raw materials either through small wholesalers or directly through the plant.

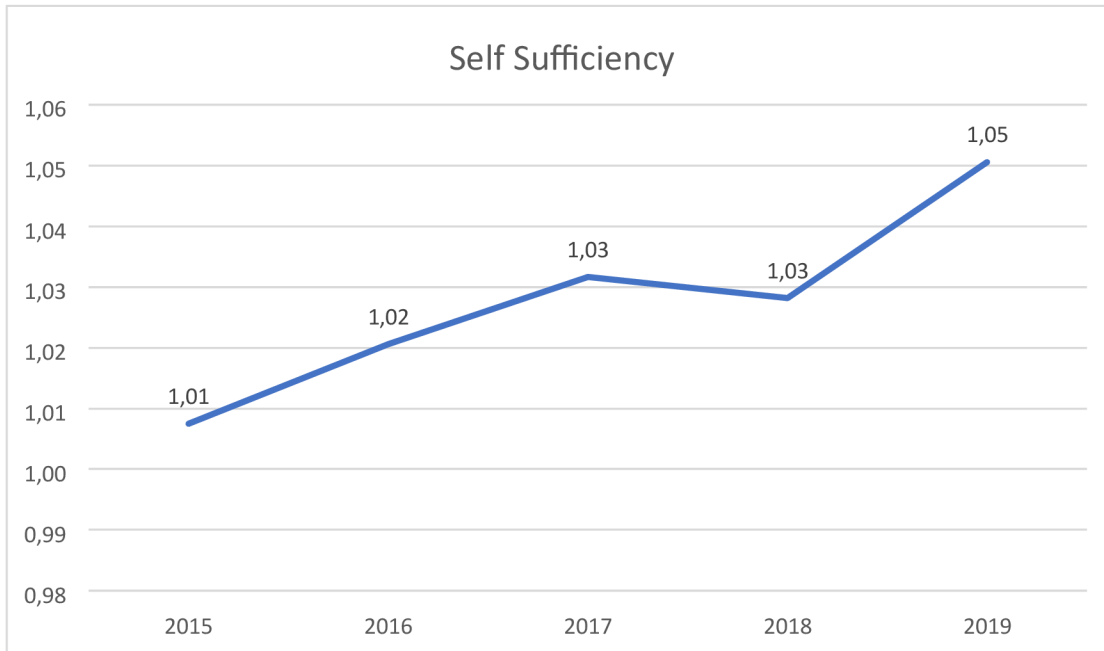
Next, let's look at milk production in Kyrgyzstan using the FAOstat resource and calculate Self-sufficiency.

Figure 5 Milk Import and Export changes in tones



(Source Faostat)

Figure 6 Self-Sufficiency calculation



(Source: Own Calculation from FAOSTAT DATA)

Based on Faostat statistics and calculations using the formula Production divided by domestic supply quantity, we can conclude that Kyrgyzstan is a self-sufficient in milk agricultural products from 2015 to 2019.

Rano was also the manager of the "Green Week". She took Kyrgyz farmers and their products to the exhibition.

International Green Week (IGW) is a unique international exhibition of food, agriculture and horticulture. Food and beverage manufacturers from all over the world use this exhibition as a sales and testing market, as well as to strengthen their image.

Modern services are increasingly being offered to farmers (such as recreation and shopping in rural areas), as well as information about renewable energy sources and renewable resources. In addition to the general public in Germany and neighboring countries, representatives and experts from all fields of agriculture and forestry, horticulture and fisheries from the country and abroad are expected to participate.

The first Green Week (not yet "international" at that time) was held from February 20 to 28, 1926, when an employee of the Berlin Tourism Bureau had the idea to combine the traditional winter meeting of the German Agricultural Society with an agricultural exhibition as a secondary showcase for fair participants. After the reunification of Germany in the 1990s, Green Week has grown significantly and holds special shows on topics such as "German Cheese" and since 2005 a technical program of more than 250 lectures, seminars and symposiums.



Picture 4-3 IGWBerlin

Preparing for the "Green Week" is a difficult and time-consuming process. Because you need to prepare the product for the fair, collect all the documents and pass all the product testing. All this was done jointly with the Ministry of Economy of the Kyrgyz Republic and the Ministry of Agriculture of the Kyrgyz Republic. Farmers take to the exhibition in order to find partners. Thanks to this program, some products from Kyrgyzstan are already on the shelves of countries such as Germany, Turkey, UAE, Bulgaria, etc.

5. Results

The results of the study confirm the significant potential for agricultural development in Kyrgyzstan and offer specific recommendations for potential entrepreneurs wishing to engage in this industry.

Study of agricultural business in Kyrgyzstan

Two interviews were conducted with an entrepreneur from Kyrgyzstan who was engaged in growing cucumbers and tomatoes in greenhouses, as well as with an employee of the German organization GIZ, which provides assistance in establishing cooperatives and business support. The data obtained provided a complete picture of agricultural activity in the republic and revealed the main difficulties faced by entrepreneurs.

Greenhouse Business

The basic principles of greenhouse operation are examined, including heat retention mechanisms, temperature regulation and protection from external influences and pests. Special attention is paid to how greenhouse farming can be a promising business in Kyrgyzstan.

Greenhouse Temperature Regulation

The physical principles of greenhouse operation and its thermoregulation mechanisms are studied. Explained how a greenhouse uses thermal radiation to maintain a stable temperature inside and protect plants from unfavorable weather conditions.

Example of a Successful Agricultural Business

A case study of a successful agricultural entrepreneur from Bishkek who combines consulting activities with greenhouse farming is presented. This example demonstrates the potential of agricultural business in the republic and opportunities for income diversification.

6. Conclusion

In conclusion, it is very important to have a clear scenario for the further development of land reform in the issue of intra-sectoral priorities. If we keep these areas in mind, in the sense of special attention to them in agricultural development programs, then there will definitely be an effect. We noted that after several years of crisis after independence, the industry is gradually getting back on its feet. The question is to accelerate the formation of an effective agricultural sector by all possible methods, based on the current situation and current trends. To do this, it is necessary to use not only financial or other material resources, but also effective organizational and managerial measures.

As the practical part has shown us that the country is self-sufficient in milk products for the examined periods. Then, thanks to an interview with Anara and Murat, it became clear how and how much it costs

to build a greenhouse and what it takes to maintain it. The main problem of this business is, of course, employees. As the practice of this family has shown, there is a problem with personnel in Kyrgyzstan, it seems that it's all about poor-quality equipment and the cost of labor. In order for employees to work more efficiently, they have to devote a lot of time to building trusting relationships between employees and the employer.

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