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Agricultural Sector Development Study Of Khulo municipality (Draft Report)

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(ENPARD II)

Pilot Rural Development measures (phase II)

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Introduction

The present paper presents the research of the agricultural development potential in Khulo municipality for 2019-2025. The research was conducted under the project “Promotion of Rural Development and Diversification in Khulo Municipality” supported by the European Commission in the frame of European Neighborhood Program for Agriculture and Rural Development (ENPARD) implemented by Caritas Check Republic in Georgia.

Within the project methodology of the research was developed, survey instruments were elaborated and fieldwork conducted. Afterwards the final draft report was presented to the main stakeholders in Khulo municipality. Feedback of validation workshop was integrated into the final report.

The research report includes the following main subchapters: Methodology, Agricultural land analyses, one year crops analyses, Perennial Crops, livestock, pasture management, conclusions and recommendations.

The complex approach of the research enabled to synthesize the findings from different sectors of agriculture. Hence, the report gives possibility to plan further steps of agricultural development in Khulo municipality.

1. METHODOLOGY

The methodology of the research included: Desk research and Key Informant interviews (KII). The desk research conducted at the starting phase of the study and the information was used as a benchmark in the further research process.

According to the evaluation needs, two types of desk research techniques conducted: internal and external desk research.

In frame of ***Internal Desk Research*** a set of project related documents reviewed and analyzed.

External Desk Research was done outside the organizational boundaries and encompassed country specific rural development related policies and materials, that is government strategies at national, regional and local levels, national and international reports, surveys, statistics, policies, etc. For example:

- Rural Development Strategy of Georgia (2017-2020)
- Agricultural Development Strategy of Georgia (2015-2020)
- Agricultural statistic data on Khulo Municipality and Adjara Autonomous Republic

Desk research results additionally contributed to elaboration of the guides for KII's.

Field research was conducted 12-15 April 2018 with the key stakeholders in the sector in Khulo Municipality and Adjara Autonomous Republic. The KII respondents were selected from the "Promotion of rural development and diversification in Khulo Municipality" project team, Khulo Municipality, regional and local stakeholders and partners identified during the desk research and in consultation with the project team.

The particular respondents were identified together with the project management team. In total KIIs were conducted.

A semi-structured KII Guide was elaborated to collect the information. KII Guide (draft) will be prepared during the project preparatory stage.

Information collected through KIIs was one of the main of the research report. The main findings of the survey are presented in the subchapter provided below.

2. SURVEY FINDINGS

2.1. Agricultural Land

In Khulo municipality number of households totals to 8 753, and the area of agricultural land located within the administrative borders of the municipality is 21 696 hectares.

Information on households and lands according to communities is presented in Table 1.¹

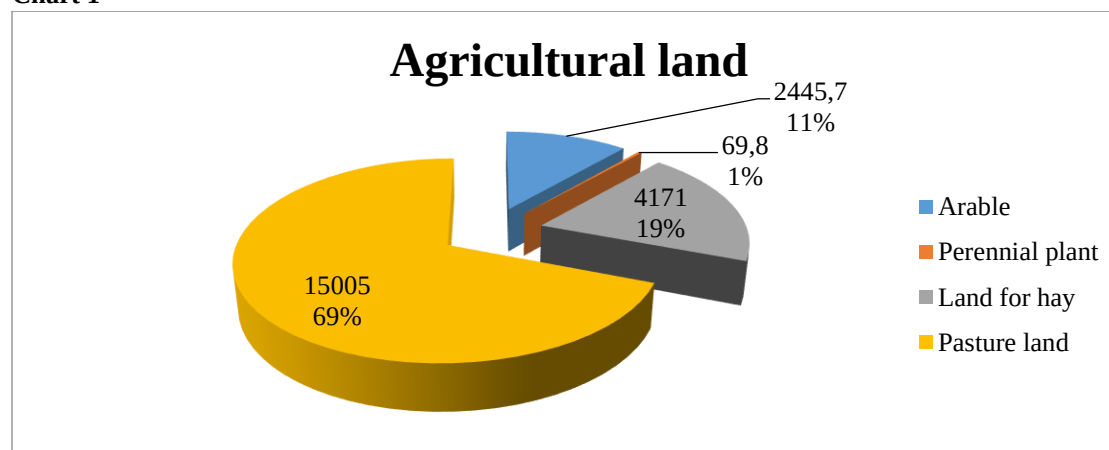
Table 1

№	Administrative Unit	Number of Households	Population	Agricultural Land				
				Total	Among them			
					Arable Land (ha)	Perennial Plants (ha)	Mowing Land (ha)	Pasture Land (ha)
1	Borough Khulo	401	1250	7	6,8	0,2	0	0
2	Pushrukauli	290	1454	805	107	2	213	483
3	Agara	232	962	874	78,5	0,5	219	576
4	Satsikhuri	331	1397	953	101	1	224	627
5	Skhalta	627	3265	1042	255,5	4,5	118	664
6	Vashlovani	946	3143	1206	218	16	144	828
7	Khikhadziri	462	1754	1217	141,5	5,5	311	759
8	Riketi	567	2462	1439	231,2	5,8	239	963
9	Tkhilvana	439	1873	1527	116,5	0,5	213	1198
10	Didachara	605	2528	2061	180	3	406	1471
11	Dioknisi	1229	4255	2267	375	12	621	1259
12	Dekanashvilebi	1797	6458	2879	340,2	13,3	571,5	1954
13	Ghorjomi	827	3714	5414	294,5	5,5	891	4223
Total		8753	34515	21691	2445,7	69,8	4171	15005

Distribution of agricultural land of various purposes is shown in the chart 1.

¹ Ministry of Agricultural development, Adjara Autonomic Republic, 2018.

Chart 1²



The given data should be considered according to the purpose of agricultural land, which will allow us to analyze the main activities of households, namely:

1. Arable agricultural land is the main means for cultivating one-year agricultural crops. Area of arable agricultural land in Khulo municipality is 2 445.7 hectares;
2. Area of agricultural land where perennial crops are cultivated comprises 69.8 hectares;
3. Mowing and pasture land are the main means for livestock production in Georgia; this area is 19 176 hectares.

Let us consider each of the listed purposes of agricultural land.

2.2. Production of One-Year Crops

Production of one-year crops is a common practice in the communities of Khulo municipality. However, there are different types of products produced in each community depending on area of arable land and number of households available. Information on average area of arable land per household in each community is presented in Table 2.³

Table 2

№	Community	Number of households	Population	Arable land (ha)	Average per household (ha)
1	2	3	4	5	6
1	Borough Khulo	401	1250	6,8	0,02
2	Dekanashvilebi	1797	6458	340,2	0,19
3	Vashlovani	946	3143	218	0,23
4	Tkhilvana	439	1873	116,5	0,27

² Here and Below all statistic analyses were done by research's based on the row data provided by different agencies of Ministry of Agriculture of Adjara Autonomic Republic.

³ Development and Information Service, Department Khulo Branch Ministry of Agricultural development, Adjara Autonomic Republic, 2018.

№	Community	Number of households	Population	Arable land (ha)	Average per household (ha)
5	Didachara	605	2528	180	0,30
6	Dioknisi	1229	4255	375	0,31
7	Satsikhuri	331	1397	101	0,31
8	Khikhadziri	462	1754	141,5	0,31
9	Agara	232	962	78,5	0,34
10	Ghorjomi	827	3714	294,5	0,36
11	Pushrukauli	290	1454	107	0,37
12	Skhalta	627	3265	255,5	0,41
13	Riketi	567	2462	231,2	0,41
Total		8753	34515	2445,7	0,29

Column 6 of the Table 2 indicates, corresponding to each community, the ratio of the arable land area of each community to the number of households in the community. Accordingly, the data show the area of arable land in use or in ownership of a single household in each community.

In terms of households, in order to determine the area of arable land per household, the methods of arithmetic average and median were used. In particular:

- Average arithmetic - in Khulo municipality, according to each community, the average area per household varies from 0.02 ha to 0.41 ha. The average arithmetic of which is 0.29 ha;
- Median – according to this method, the average area of arable land per household in the municipality is 0.31 ha;
- Mode - according to this method, the average area of arable land per household in the municipality is also 0.31 ha.

Thus, as the analysis show, the arable agricultural land area per household in the municipality of Khulo is on average 0.29-0.31 hectares. According to the data, there is no statistically significant difference between the results of the average arithmetic, median, and mode methods. This fact indicates that on municipal level it is rare to find exceptions when households own a large area of arable land. Consequently, we can conclude that there are no households owning relatively large areas (more than 5 hectares) of arable land in the municipality.

In order to better analyze data, we divided the communities into 3 different groups:

a) Communities with smallest area of arable land

Table 3

№	Administrative unit	Number of households	Population	Arable land (ha)	Average per household (ha)
1	2	3	4	5	6
1	Borough Khulo	401	1250	6,8	0,02
2	Dekanashvilebi	1797	6458	340,2	0,19
3	Vashlovani	946	3143	218	0,23
Total		3144	10851	565	0,15

b) Communities with medium area of arable land

Table 4

№	Administrative unit	Number of households	Population	Arable land (ha)	Average per household (ha)
1	2	3	4	5	6
4	Tkhilvana	439	1873	116,5	0,27
5	Didachara	605	2528	180	0,3
6	Dioknisi	1229	4255	375	0,31
7	Satsikhuri	331	1397	101	0,31
8	Khikhadziri	462	1754	141,5	0,31
9	Agara	232	962	78,5	0,34
Total		3298	12769	992,5	0,31

c) Communities with relatively large area of arable land

Table 5

№	Administrative unit	Number of households	Population	Arable land (ha)	Average per household (ha)
1	2	3	4	5	6
1	Ghorjomi	827	3714	294,5	0,36
2	Pushrukauli	290	1454	107	0,37
3	Skhalta	627	3265	255,5	0,41
4	Riketi	567	2462	231,2	0,41
Total		2311	10895	888,2	0,39

Summed up numbers for each group are presented in Table 6.

Table 6

№	Conditional group	Number of households	Population	Arable land (ha)	Average per household (ha)
1	2	3	4	5	6
1	I Group	3144	10851	565	0,15
2	II Group	3298	12769	992,5	0,31
3	III Group	2311	10895	888,2	0,39
Total		8753	34515	2445,7	0,28

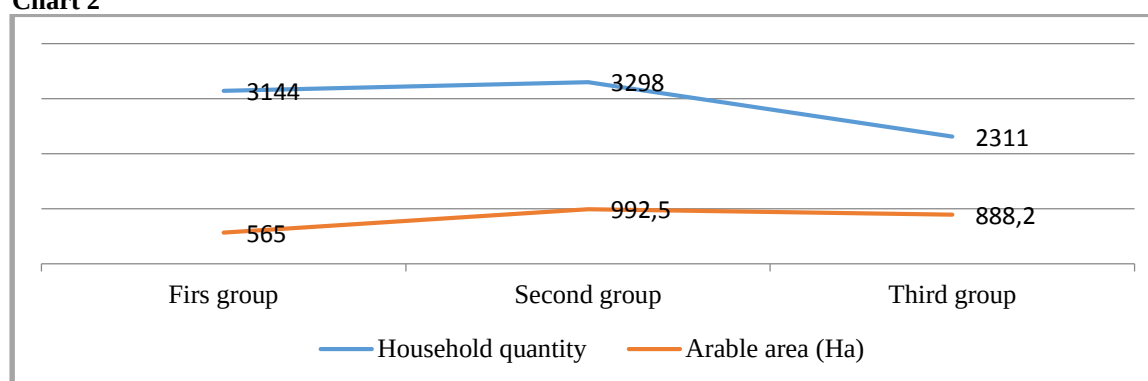
According to the data analyzed, number of households and areas of arable land in corresponding communities in the municipality is increasing, but it is not substantially proportionate growth. 3 communities belonging to the first group, which are located in one geographical area covering borough Khulo and its adjacent villages, are represented by 3 144 households and own only 565 hectares of arable land. Meanwhile, the communities of the second group, which are located in three different geographical areas (the valley) are represented by 3 298 households (by 154 households more than in the first group), and own 9 925.5 hectares of arable land, exceeding by 427.5 hectares the area of arable land owned by the households in the first group. According to the average arithmetic method, average area of the arable land per household in the first group is 0.15 hectares, whereas for the second group the number is 0.31 hectares per household, which is 2.1 times more than the first indicator.

Difference between the number of households and arable land areas in the communities of the first and the third groups (the communities are located in different valleys) is even more contrasting and characterized by inverse proportionality. In particular, here we observe a decrease by 833 households comprising to 2 311 households, while the arable land area rises by 323.2 hectares and is 888.2 hectares. On average, in the first group the area of arable land per household is 0.15 hectares, while in the third group it is - 0.39 hectares, thus 2.6 times bigger.

As for comparing data of the 2nd and 3rd groups, the following is outlined: number of households in the 3rd group is by 987 units less than of the 2nd group, and the arable land area per household is less by 104.3 hectares. The average calculation method shows, that arable land area per household in the second group is 0.31 hectares, while it is 0.39 hectares for the third group – thus, 1.26 times bigger.

For better visualization, number of households and arable land areas per each group is presented as a diagram in Chart 2.

Chart 2



Thus, according to the analysis, Khulo municipality is generally characterized by scarcity of land; and the areas of arable land are even less. In this respect, situation regarding the arable land resources in the administrative borders of Pushrukauli, Ghorjomi, Riketi and Skhalta communities is better (geographically three different areas - the valley).

Arable land areas are usually used for cultivation of one-year crops. From the information provided by the Ministry of Agriculture of the Autonomous Republic of Adjara about the production of one-year crops, several agricultural products were selected to study. This is presented in Table 7.

Table 7⁴

№	Administrative unit	Number of household	Total area	Potato		Corn		Tomato		Cucumber		Pepper		Carrot		Beet		Onion		Garlic		Cabbage	
				Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)
1	Borough Khulo	401	5,5	2,5	62,5	1	2,1	0,5	6	0,6	7,8	0,2	0,4	0,2	0,9	0,1	0,9	0,1	0,6	0,1	0,2	0,2	2,2
2	Dekanashvilebi	1797	349,5	176,8	4420	153	321,3	6,7	80,4	5,8	75,4	3,2	6,4	0,8	4,8	0,9	8,1	1,1	5,5	0,5	1,8	0,7	8,4
3	Vashlovani	946	217	50,3	1257,5	146	306,6	5,3	63,6	6,1	79,3	5,2	10,4	1,1	6,6	0,9	8,1	1	5	0,8	3,2	0,3	3,1
4	Tkhilvana	439	92,4	48,1	1202,5	35	73,5	2,9	34,8	3,2	41,6	0,4	0,8	0,4	2,4	0,6	5,4	0,2	1	0,5	2	1,1	12,7
5	Didachara	605	158,6	68,4	1710	79	165,9	3,5	42	2,9	37,7	2,5	5	0,5	3	0,6	5,4	0,4	2	0,3	1,2	0,5	6
6	Dioknisi	1229	422,1	290,6	7265	111	233,1	7,1	85,2	5,8	75,4	3,2	6,4	0,8	4,8	0,8	7,2	1,1	5,5	0,8	3,2	0,9	10,8
7	Satsikhuri	331	112,8	44,6	1115	56	117,6	3,8	45,6	3,8	49,4	2,3	4,6	0,4	2,4	0,5	4,5	0,5	2,5	0,3	1,2	0,6	7,2
8	Khikhadziri	462	125,4	67,5	1687,5	54	113,4	1	12	1,3	16,9	0,4	0,8	0,2	1,2	0,3	2,7	0,1	0,5	0,2	0,8	0,4	4,8
9	Agara	232	86,1	48,9	1222,5	35	73,5	0,7	8,4	0,9	11,7	0,1	0,2	0,1	0,4	0,1	0,9	0,1	0,3	0,1	0,4	0,1	0,8
10	Ghorjomi	827	238,3	119,2	2980	113	237,3	2,7	32,4	2,3	29,9	0,1	0,2	0,2	1	0,2	1,8	0,2	0,8	0,2	0,8	0,2	2,8
11	Pushrukauli	290	188,7	32,5	812,5	154	323,4	0,7	8,4	0,8	10,4	0,2	0,4	0,1	0,7	0,1	0,9	0,1	0,5	0,1	0,4	0,1	1,6
12	Skhalta	627	119,7	61,1	1527,5	45	94,5	7,4	88,8	4,4	57,2	0,6	1,2	0,2	1,2	0,3	2,7	0,1	0,5	0,3	1,2	0,3	3,2
13	Riketi	567	256,5	179,5	4487,5	65	136,5	3,7	44,4	3,1	40,3	2,6	5,2	0,7	4,2	0,6	5,4	0,4	2	0,4	1,6	0,5	6
	Total	8753	2372,6	1190	29750	1047	2198,7	46	552	41	533	21	42	5,6	33,6	6	54	5,3	27	4,5	18	5,8	69,6

⁴ Development and Information Service, Department Khulo Branch Ministry of Agricultural development, Adjara Autonomic Republic, 2018.

Table 8 shows data on production of agricultural crops according to the arable land areas for each group.

Table 8

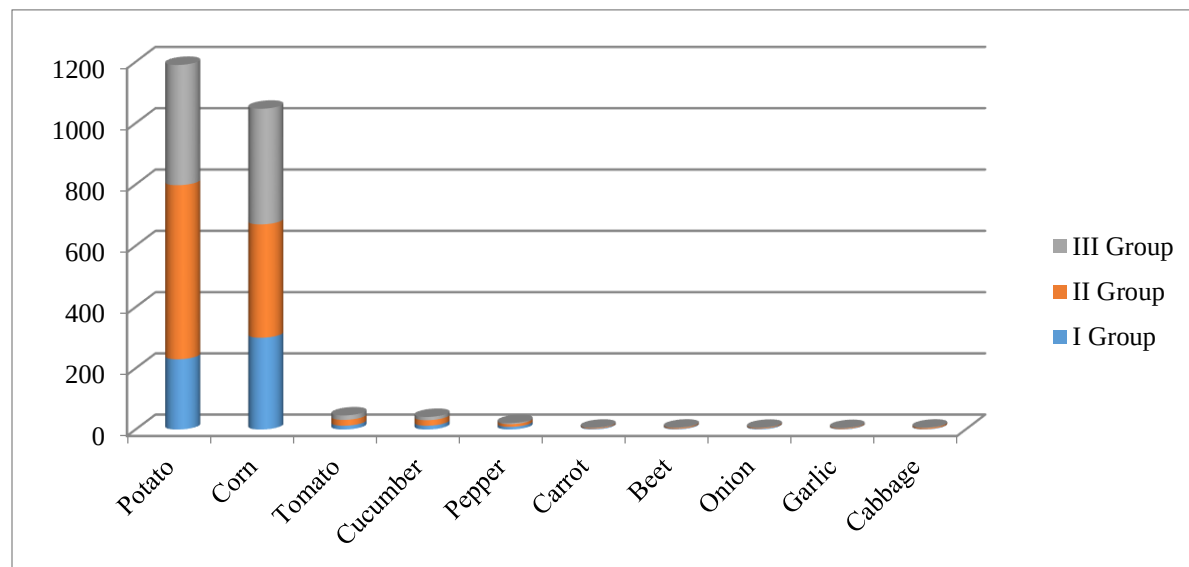
Group	Number of households	Total area	Potato		Corn		Tomato		Cucumber		Pepper		Carrot		Beet		Onion		Garlic		Cabbage	
			Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)
I	3144	572	229,6	5740	300	630	12,5	150	12,5	162,5	8,6	17,2	2,1	12,3	1,9	17,1	2,2	11,1	1,4	5,2	1,2	13,7
II	3298	997,4	568,1	14202,5	370	777	19	228	17,9	232,7	8,9	17,8	2,4	14,2	2,9	26,1	2,4	11,8	2,2	8,8	3,6	42,3
III	2311	803,2	392,3	9807,5	377	791,7	14,5	174	10,6	137,8	3,5	7	1,2	7,1	1,2	10,8	0,8	3,8	1	4	1,1	13,6
Total	8753	2372,6	1190	29750	1047	2198,7	46	552	41	533	21	42	5,7	33,6	6	54	5,4	26,7	4,6	18	5,9	69,6

Data show that from the total of 2 445.7 hectares of arable land in the municipality, in 2017 an area of 1 326 hectares (54.3%) was processed.

According to the figures given in the table, the largest share of production considering all crops (except corn) goes to the 2nd group. This is due to the fact that the second group unites the highest number of households (3 298) as well as arable land area (627.4 ha).

Distribution of areas cultivated with one-year crops for each group is presented by the following diagram in Chart 3.

Chart 3



According to the analysis, in all three groups the potato and corn production is superior (in the first group the corn production is 70.4 tons higher than the potato production). This is due to several factors: the traditions in villages located on territories close to Khulo community; relatively low location of villages from sea level; and the old tradition of producing corn. Besides, in these villages the households are engaged in various agricultural activities and are not focused on any specific crop production, therefore level of market production is low. With quite a high interval, mentioned agricultural crops are followed by tomatoes, cucumbers, peppers, and other one-year agricultural crops (with a variety of crops).

In order to see an overall picture and study efficiency and results of the one-year agricultural crops production, it is important to compare the economic results of the two main agricultural crops - potato and corn – produced in the households of each group.

Data for economic calculation is based on following:

1. According to the information provided by the Division of the Ministry of Agriculture of the Autonomous Republic of Adjara for Development of the Agroproducts and Information Services in Khulo Municipality:

- Average yield of potatoe production per 1 ha in 2017 was 25 tons;
- Average selling price (wholesale) for a farmer for 1 kg of potato amounted to 0.60 Gel in 2017;
- Production yield of corn per 1 ha was 2.1 tons, and of straw - 1000 bales;

- In the municipality, corn products are mainly sold in for of cornflour. The cost of grinding 1 kg corn is - 0.1 Gel, while the price (wholesale) of corn flour is 1.2 Gel (2017). When calculating profit, the selling price of 1.1 Gel (cost of grinding is deducted) is considered.
- Grinding 1 kg of corn grains produces 1 kg cornflour.

2. Standards established by “Economic Guidelines of the Technological Process of Producing Plant and Breeding Products” (R. Margalitadze, V. Goliadze, Batumi 2014) – considered and recommended for publishing by the Ministry of Agriculture of the Autonomous Republic of Adjara.

Calculated based on above-mentioned norms and standards, the potato and corn production per household, its average profit and comparative analysis of average indicators for each group is shown in Table 9.

Table 9

Group	Average arable land per Household (ha)	Produced potato/corn/straw per 1 hectare (tons)	Production per household (tons/bales)	Wholesale price tons/Gel	Revenue after sale	Costs for production				Average profit per household
						Per 1 hectare			Per household	
						Total	Among others			
							Technical process	Transportation		
Potato										
I	0,15	25	3,75	600	2250	5075,4	5040	35,4	761,31	1488,69
II	0,31	25	7,75	600	4650	5075,4	5040	35,4	1573,37	3076,63
III	0,39	25	9,75	600	5850	5075,4	5040	35,4	1979,41	3870,59
Corn										
I	0,15	2,1	0,315	1100	346,5	1242,8	1207,4	35,4	186,42	197,58
		1000	150	0,25	37,5					
Total I					384					
II	0,31	2,1	0,651	1100	716,1	1242,8	1207,4	35,4	385,268	408,332
		1000	310	0,25	77,5					
Total II					793,6					
III	0,39	2,1	0,819	1100	900,9	1242,8	1207,4	35,4	484,692	513,708
		1000	390	0,25	97,5					
Total III					998,4					
Comparative data ⁵ („Potato“ – „Corn“)										
I	0,15			1680	1866	3832,6	3832,6	0	574,89	1291,11
II	0,31				3856,4	3832,6	3832,6	0	1188,11	2668,29
III	0,39				4851,6	3832,6	3832,6	0	1494,71	3356,89

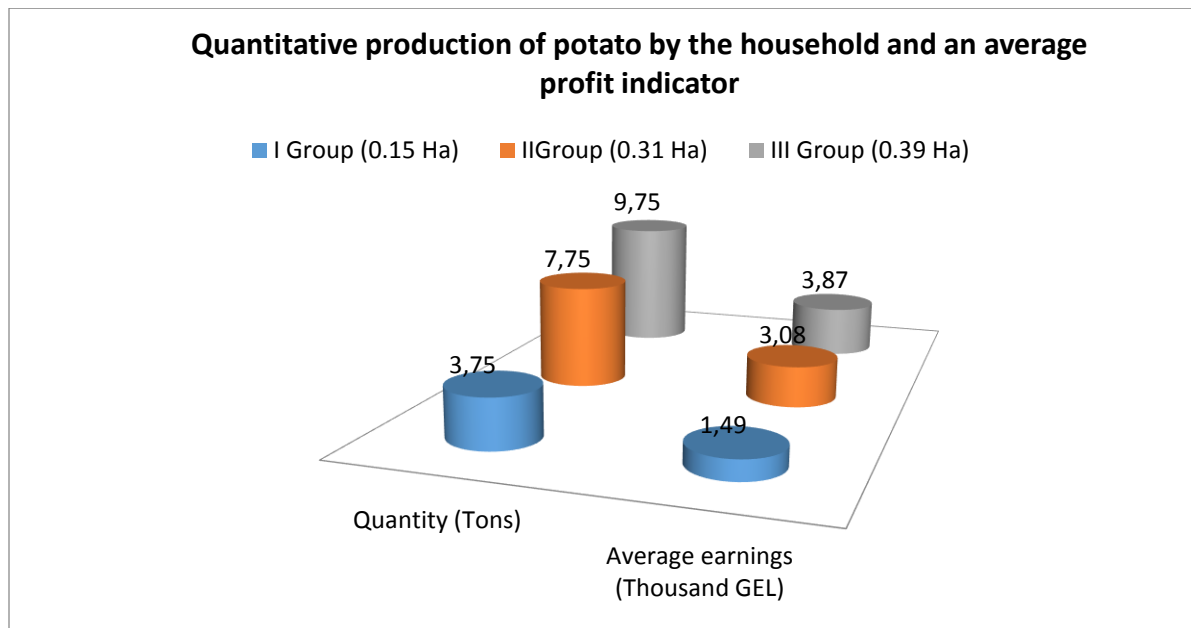
⁵ Presented data considers difference between profits of typical households producing potato and corn.

As calculation shows – the production output and economic results per household for each group is as follows:

1. Potato Production
 - First group (communities with least area of arable land) – 3.75 tons; the average profit - 1488.7 Gel;
 - Second group (communities with average area of arable land) – 7.75 tons; average profit – 3 076.6 Gel;
 - Third group (communities with relatively large area of arable land) – 9.75 tons; average profit – 3 870.6 Gel.
2. Corn production
 - First group (communities with least area of arable land) – 0.315 tons of grain and 150 bales of straw; average profit – 197.58 Gel;
 - Second group (communities with average area of arable land) – 0.651 tons of grain and 310 bales of straw; average profit – 408.332 Gel;
 - Third group (communities with average area of arable land) – 0.819 tons of grain and 390 bales of straw; average profit - 513,708 Gel.

Chart 4 presents the graphical image of data on potato production and average profit indicators per household.

Chart 4



Data on corn production and average profit per household in graphical representation gives the following picture:

Chart 5

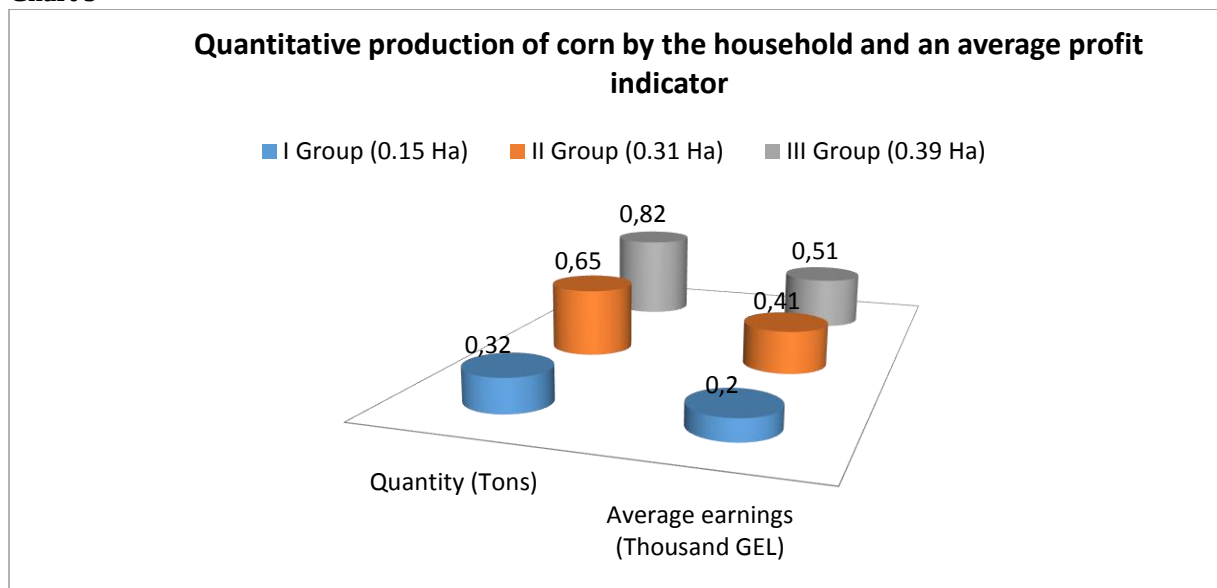
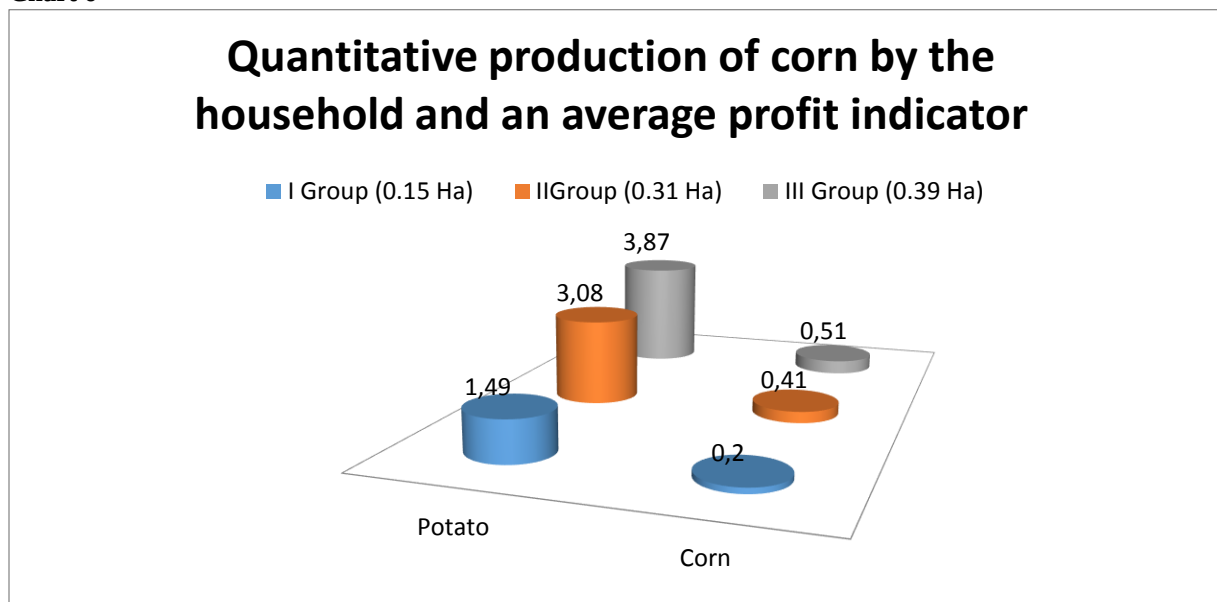


Chart 6 presents the comparative data on average profit from the potato and corn production per household for each group.

Chart 6



According to analysis, the production of potatoes in financial terms is much more interesting and attractive than corn production. Consequently, population mainly concentrates on the potato production. However, this comparative analysis allows only to identify the product of predominant profit in the given conditions and does not find the best way to identify high-profit agricultural products. Moreover, in the municipality the production of potatoes is linked with some of the following hindering factors:

- Diseases (potato cancer);
- Low-productivity of plants;
- Seed production and delivery;

- Poor soil;
- Farmers low level of knowledge about modern agro-technical activities.

In years 2015-2016 in Khulo municipality potato cancer has been detected. Therefore, in 2016 the Scientific Research Center of the Ministry of Agriculture of Georgia has conducted a test to find resistance of certain potato breeds against cancer causing pathogen (*Synchytrium endobioticum*). 15 potato breeds were tested.

According to the information of the Scientific Research Center, as a result of the research of the plots of different potato breeds, (in the process of monitoring the potato seed testing the specialist of the Plant Quarantine Division and the Plant Phytosanitary Monitoring Division of the National Food Agency have participated. The result has been shared to the Ministries of Agriculture of Georgia and Autonomous Republic of Adjara - №04 / 1446, №04 / 1447) potato cancer symptoms were not detected in 6 breeds: "Farida", "Silvna", "Panamera", "Barcelona", "Javakheturi" and "Meskhetian Red". As the Research Center has explained, one year research data does not provide evidence of a high accuracy on plant resistance to diseases. Consequently, at this stage the convincing conclusions and direct recommendations cannot be drawn. However, the Center states that it is desirable to replace old, unknown or uncertain reproduction seeds of potatoes, at least with those that according to the first year research results are elite or high productivity seed potatoes.

Taking into consideration the above mentioned circumstances, the seeds replacing (replacement of low-productive planting material with elite or high productivity seed potatoes) process was planned and started with sub-programs of the Ministry of Agriculture of the Autonomous Republic of Adjara. In 2017 in the frameworks of the sub-program 101.5 tons of "Silvana" - the "A" grade potato seed was purchased; the purchased seeds were delivered to the farmers and agricultural entrepreneurs with concrete condition: they were obliged to transfer 30% (1 kg – 0.84 Gel) of the contracted price of the purchased goods (1 kg - 2.79 Gel) to the state treasury account. 96 984.8 kg (95.5%) of the totally purchased amount was transferred to the Khulo municipality farmers. With the same terms of co-payment the sub-program also provided farmers with mineral and organic (bio) fertilizers.

Information on potato seed distribution according to the communities is given in Table 10.

Table 10⁶

№	Communities in Khulo Municipality	Number or Beneficiaries	Planted Area (ha)	Volume of Potato Seeds (tons)
1	Dekanashvilebi	25	2.77	9 905
2	Vashlovani	2	0,13	455
3	Tkhilvana	1	0,1	350
4	Didachara	6	0,84	3 150
5	Dioknisi	129	19,72	68 584,8
6	Satsikhuri	4	1,1	3 955
7	Khikhadziri	2	1	350
8	Ghorjomi	15	1,224	4 285
9	Pushrukauli	1	0,03	105

⁶ Development and Information Service, Department Khulo Branch Ministry of Agricultural development, Adjara Autonomic Republic, 2018, Analyses done by researchers.

10	Skhalta	6	0,44	1 540
11	Riketi	11	1,22	4 305
Total		202	28,56	96 984,8

Groups according to the document:

The data indicate that the highest demand is from Dioknisi, Dekanashvilebi, Ghorjomi and Riketi communities, which confirms the data given in Table 7 that the highest number of potato production is in these groups.

It is noteworthy that according to the indicators of the total agricultural production (Table 6), the same communities are characterized with high level of potato production (Dioknisi - 290.6 ha, 7 265 tons; Riketi - 179.5 ha, 4 487.5 tons; Dekanashvilebi - 176.8 ha, 4 420 tons; and Ghorjomi – 119.2 ha, 2 980 tons).

Thus, the data given above gives possibility to argue that from 13 communities of Khulo municipality the main followers of potato production are communities of Dioknisi, Riketi, Dekanashvilebi and Ghorjomi, which is 65% of total potato production in the municipality.

According to the information provided by the Ministry, as a result of monitoring the products produced with distributed potato seeds and relevant fertilizers in the framework of the mentioned sub-program, the average yield is 30 tons per 1 hectare. Result is 5 tons higher than in case of the production without the program support.

In such conditions, the profit received from the sales of the products per 1 hectare, with the same selling price (1 ton - 600 Gel), increases by 3 000 Gel. However, the costs related to procurement of seed material increases as well. In addition, the products produced in accordance with the mentioned seed material and relevant agro-technical standards are characterized by higher competitiveness in terms of trademark characteristics, taste, and productiveness; accordingly, the selling price on average becomes 1 Gel.

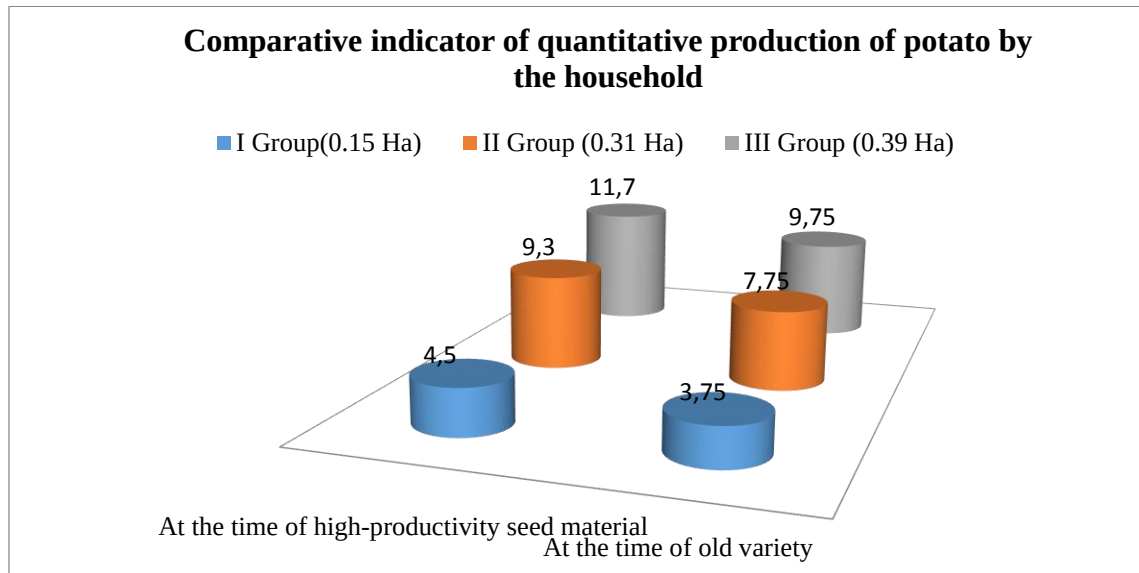
Data on the economic results of the potato production in such conditions is given in Table 11.

Table 11

Group	Average arable land per Household (ha)	Produced potato/corn/straw per 1 hectare (tons)	Production per household (tons/bales)	Wholesale price tons/Gel	Revenue after sale	Cost of production				Average profit per household
						Per 1 hectare			Per household	
						Total	Among them			
							Technical process	Transportation		
I	0,15	30	4,5	1000	4500	11375,4	11340	35,4	1706,31	2793,69
II	0,31	30	9,3	1000	9300	11375,4	11340	35,4	3526,374	5773,626
III	0,39	30	11,7	1000	11700	11375,4	11340	35,4	4436,406	7263,594

Following chart represents: the comparative analysis of data on economic and quantitative results of the potatoes produced with use of high productivity seeds and the potatoes produced with use of old and unknown, or uncertain reproductively seeds; indicators are per household for each group.

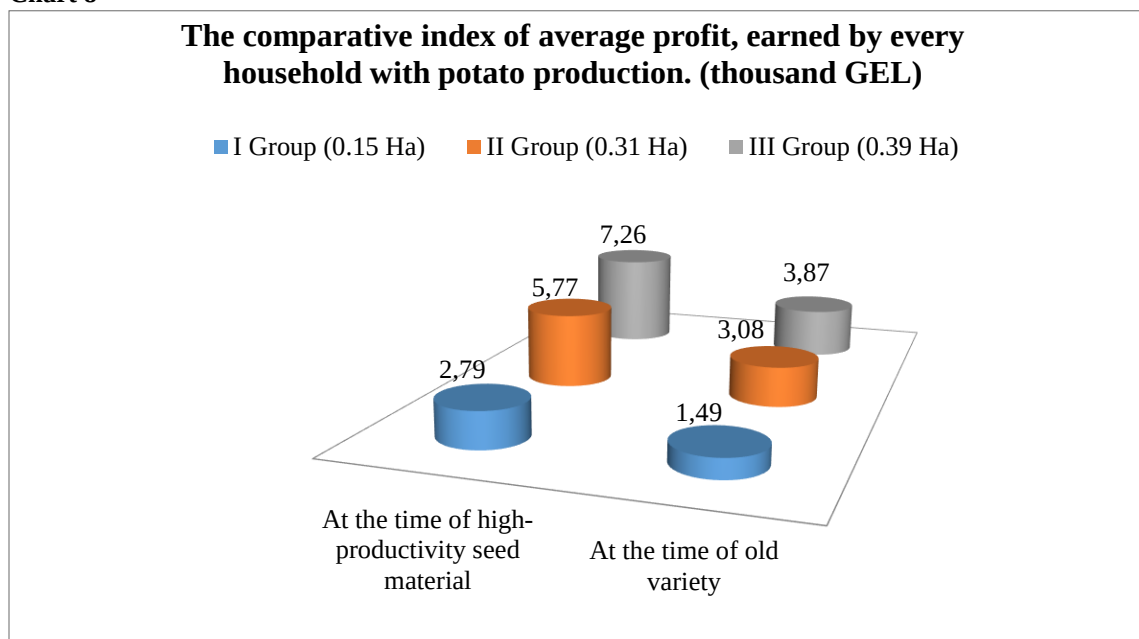
Chart 7



As data indicates, in case of using high-productivity seed material the volume of the potato production increases to 0.75 tons per household in the communities of the first group; increase in the communities of the second group is 1.55 tons; and in the communities of the third group the production increases by 1.95 tons.

In the same conditions, the economic outcome (average profit) is shown in the following chart.

Chart 8



As data indicates, in case of using high-productivity seeds the economic outcome (average profit) of potato production increases by 1.3 thousand Gel per household in the communities belonging to the first group; in the communities of the second group – by 2.69 thousand Gel (87.34%); and in the communities of the third group profit increases by 3.39 thousand Gel (87.60%).

Thus, on the basis of comparative analysis of given data, it is clear that in the production process of one-year agricultural crops (on the example of potatoes) use of high-fertility planting/seeding material and full compliance with agro technical standards has a significant impact on economic outcome. In particular, in this case compared to current results, the financial revenue increases by 87%, even though the costs for procurement of high productivity seeds increases by almost 4 times. In addition, taking into consideration that these seeds may be used by the farmers for further reproduction for next 2-3 years, which will reduce procurement costs, it will further improve financial situation of the households.

Provision of the households with high productivity seeds and plants still remains as one of the main hindering factors. In the region there is no farmland producing planting/ seeding material for one-year crops; even more to that, there is no place where the farmers could purchase high-quality, certified seeding / planting material without viruses, resistant to different diseases.

As for the full and timely implementation of agro technical activities, which include Spring work (planting, rooting, seeding, etc.), plant protection activities (pests, diseases, weeds), and combination of harvesting, storage, saving and selling - in the period of 2008-2018 the progress was noticeable in regard with provision of agricultural sector with basic technical equipment; however in the end, this issue still remains as one of the main hindering factors in this regard.

Use of modern technologies in agro-technical activities directly affects the efficiency of production. This includes implementation of work with use of basic agricultural equipment. The municipality of Khulo is characterized by small households, mountainous and hard-to-reach relief of agricultural lands, therefore, it is recommended to use only small agricultural equipment, which will significantly reduce human work load, increase effectiveness of certain activities, and as an overall result – increase efficiency.

In the municipality, in the process of agricultural production the farmers mainly worked on land manually with a plow. According to the information of the Ministry of Agriculture of the Autonomous Republic of Adjara, in 2013 within the framework of the program, on the basis of co-payment, 350 units of plow and 1000 units of its iron shares (blades) were procured and delivered to farmers.

In the frameworks of the programs of the Ministry of Agriculture of the Autonomous Republic of Adjara, in the region, including the municipality of Khulo, in years 2013-2017 the sub-program financed by the budget of the Autonomous Republic - "Supporting provision of farmers and agricultural entrepreneurs with equipment for mechanization of the agriculture" was implemented. The program is in process of implementation currently as well. Within the frameworks of the program, 409 units of basic agricultural equipment of various type were purchased and delivered to the Khulo municipality farmers on the basis of co-payment of 30% of purchasing price. Types and quantities of basic agricultural equipment is listed in Table 12.

Table 12⁷

№	Community/Borough	Basic Agricultural Equipment			
		Motorized Cultivator	Motorized Cultivator with Hay Cutting Implement	Cart	Total
1	3	4	5	6	7
1	Agara	1	7	2	10
2	Borough Khulo	2	1	0	3
3	Dekanashvilebi	42	28	11	81
4	Didachara	6	13	2	21
5	Diognisi	39	29	13	81
6	Vashlovani	12	10	1	23
7	Tkhilvana	4	11	1	16
8	Riketi	10	20	6	36
9	Satsikhuri	6	2		8
10	Skhalta	15	9	2	26
11	Pushrukauli	1	0	1	2
12	Ghorjomi	32	41	4	77
13	Khikhadziri	15	8	2	25
Total		185	179	45	409

According to the data, at least 4% of the households in the municipality have a motorized cultivators, with the assumption that the households have not given out them to other municipalities.



According to the Ministry's information, within the frameworks of the same sub-program, more than 100 units of spraying machines and more than 70 units of motorized cultivators (with hay cutting implement) are planned to be delivered to the farmers and entrepreneurs in Khulo in 2018 (subprogram is in the process of implementation).

⁷ Agribusiness development department, Ministry of Agricultural development, Adjara Autonomic Republic, 2018.

In addition to fact that farmers were provided with basic agricultural equipment through preferential terms, one more positive side of the sub-program is increasing awareness and higher level of demand, which was observed during the meetings with farmers within the frames of a research. Clearly, the basic agricultural equipment distributed by the sub-program is not sufficient to fully meet existing needs, but increased awareness on its effectiveness and efficiency as well as increased demand in the municipality is the indicator of persistence of introducing modern technologies in agricultural production.

According to the information obtained from the farmers, the municipality does not operate a repair center for agricultural equipment, which could enable the farmers to repair motorized cultivators and/or purchase the spare parts when needed.

Municipality does not operate dry warehousing and refrigerating farms for agricultural products, which could enable the farmers to keep their products in line with the technological requirements and give them advantage to sell products considering favorable conditions on market in regard with seasonal demand and supply. However, this issue was not mentioned by farmers among other problems; though it can be explained by lack of awareness on the advantages of storage spaces.

2.3. Production of Perennial Crops

In municipality of Khulo the level of production of perennial crops, that are cultivated in forms of gardens, is the lowest and comprises 69.8 hectares; this is 1% of whole production. (Table 1)

Considering that households due to owning small lands were mainly focused on the production of agricultural products necessary for personal consumption, their purpose was to designate farmland crops for the production of one-year agricultural crops. Meanwhile, the perennial crops are mainly represented in a scattered form as the mixed farms. In most cases, perennials are planted on mowing lands and within the perimeter of the homestead. Accordingly, the area of land with perennial crops particularly in the form of gardens is 69.8 hectares – data is presented in Table 1 and Box 1. However, the land area with perennial crops is so small that it should be measured as a sum of the perennial crop gardens and crops planted in a scattered form, as it is given in Table 13.

Table 13

№	Administrative unit	Number of households	Total area	Perennial Stoun Fruits		Perennial Stone and pom fruits		Perennial Berries		Average per household (ha)
				Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	Area (ha)	Harvest (tons)	
1	2	3	4	5	6	7	8	9	10	11
1	Borough Khulo	401	7,45	2,5	2,2	4,9	32,65	0,05	0	0,02
2	Tkhilvana	439	9,6	1,47	1,276	8,1	54,2	0,03	0	0,02
3	Pushrukauli	290	11,48	2,95	1,8	8,5	59	0,03	0	0,04
4	Ghorjomi	827	35,21	3,9	3,42	31,1	220,15	0,21	0	0,04
5	Khikhadziri	462	20,84	7,81	6,948	13	114,5	0,03	0	0,05
6	Agara	232	11,44	1,4	0,9	10	70,5	0,04	0	0,05
7	Dioknisi	1229	69,86	22,85	20,08	45,9	312,9	1,11	0	0,06
8	Dekanashvilebi	1797	105,19	35,79	31,132	68,9	475,25	0,5	0	0,06

9	Skhalta	627	41,95	8,1	7,18	33,7	232,95	0,15	0	0,07
10	Didachara	605	41,18	14,31	12,748	26,8	183,3	0,07	0	0,07
11	Satsikhuri	331	22,97	3,92	3,436	19	128,5	0,05	0	0,07
12	Riketi	567	41,6	14,03	12,424	27,5	190	0,08	0	0,07
13	Vashlovani	946	70,52	24,77	21,916	45,6	322,35	0,15	0	0,07
Total		8753	489,29	143,8	125,46	343	2396,25	2,5	0	0,05

Data in column 11 of the Table 13 indicates the ratio of the land area to perennial plants and the number of households in each community. Accordingly, data indicates the average area of land of perennial crops in use or in ownership of a single household in each community.

The average arithmetic, median and mode methods were used to determine the area of land occupied by perennial crops per household. Namely:

- Average arithmetic - in Khulo municipality, according to each community, the average area per household varies from 0.02 ha to 0.07 ha. The average arithmetic of which is 0.05 ha. Accordingly, the average area of land with perennial crops per household is 0.05 ha;
- Median – according to this method, the average area of land with perennial crops per household in the municipality is 0.06 ha;
- Mode - according to this method, the average area of arable land per household in the municipality is 0.07 ha.

Thus, based on analysis, in Khulo municipality the area planted with perennial crops is about 0.05-0.07 ha on average per household. According to the data, there is no statistically significant difference between the results of the average arithmetic, median, and mode methods. This fact indicates that on municipal level it is rare to find exceptions when households own a relatively large area of land cultivated with perennial crops. Consequently, we can conclude that there are no households owning relatively large areas (more than 1000 sq.m) of land with perennial crops in the municipality. Moreover, it is rare to find gardens cultivated on area of 1000 sq.m.

Consequently, for the purpose of further analysis and calculations, 0.06 ha was determined as the average area of land with perennial crops per household.

Taking into account the abovementioned, consideration of the perennial crops production in terms of general community households is not recommended. This is due to the fact that perennial crops in Khulo municipality are mainly represented in a scattered manner in form of mixed households. To be more specific, the perennial crops are planted on the perimeter of the homestead land and only few examples are available when such land is developed into a garden. Accordingly, the economic profitability of perennial crop production is minimal.

In the municipality in period of 2013-2018 there has been a growing tendency in the cultivation of gardens of perennial agricultural crops. Gardens have been cultivated mainly in the frameworks of programs of the Ministry of Agriculture of the Autonomous Republic of Adjara.

In order to better analyze and visualize the growing trend of the perennial crop production (Table 13), it is recommended to separately analyze on one hand, supplying the Khulo municipality farmers with hazelnuts, walnuts (breed „Chandler“), cranberries and actinidia (kiwi) plants, and on the other hand, cultivation of gardens by these farmers. The mentioned plants were delivered to the farmers within the frameworks of the program of the Ministry of Agriculture of the Autonomous Republic of Adjara in years 2013-2017.

Information on distributed plants and the cultivated areas is given in Table 14.

Table 14⁸

№	Administrative unit	Total		Walnuts		Hazelnuts		Cranberry		Kiwi	
		Household	Area	Household	Area	Household	Area	Household	Area	Household	Area
1	Agara	4	0,53	2	0,13	2	0,4	0	0	0	0
2	Borough Khulo	15	1,05	2	0,15	4	0,7	4	0,02	5	0,18
3	Dekanashvilebi	177	20,53	63	7,65	44	11,68	53	0,73	17	0,47
4	Didachara	12	1,37	2	0,20	5	1,11	3	0,04	2	0,02
5	Dioknisi	70	9,88	31	3,67	20	5,41	18	0,78	1	0,02
6	Vashlovani	47	5,23	17	1,57	18	3,52	9	0,07	3	0,07
7	Riketi	24	4,15	10	1,36	10	2,73	4	0,06	0	0
8	Satsikhuri	6	1,13	2	0,23	3	0,9	1	0	0	0
9	Skhalta	25	3,38	16	2,74	3	0,5	6	0,14	0	0
10	Pushrukauli	5	1,05	1	0,10	4	0,95	0	0	0	0
11	Khikhadziri	10	1,42	7	0,77	3	0,65	0	0	0	0
12	Ghorjomi	17	1,11	1	0,12	4	0,8	12	0,19	0	0
13	Tkhilvana	2	0,45	0	0,00	2	0,45	0	0	0	0
Total		414	51,28	154,00	18,69	122,00	29,80	110,00	2,03	28,00	0,76

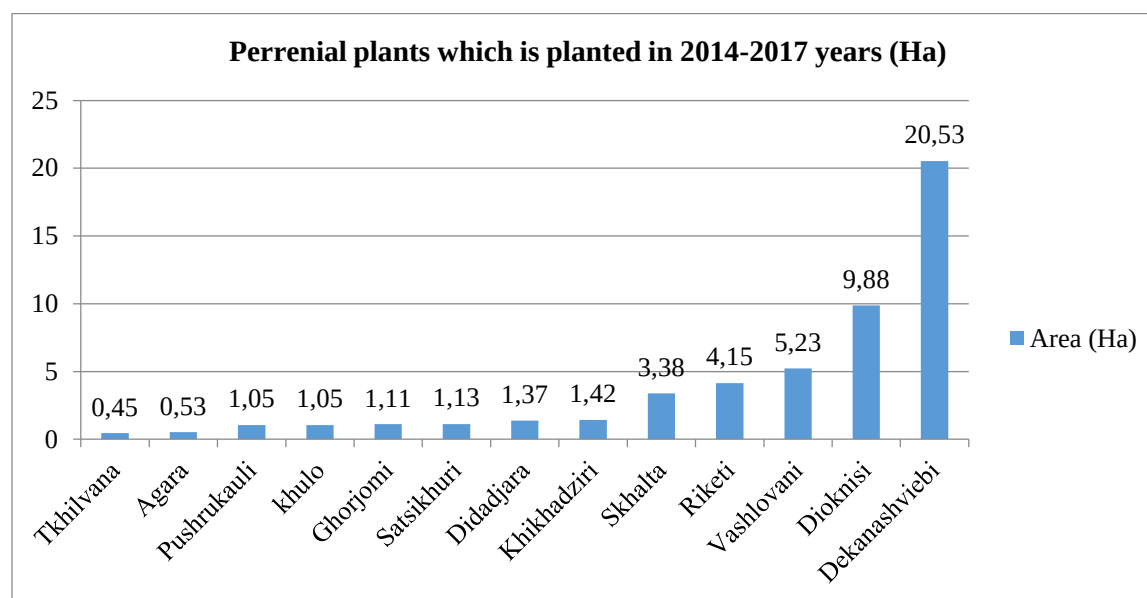
According to the data, in 2014-2017 in the frameworks of the programs of the Ministry, 414 beneficiaries (households) have cultivated gardens of perennial crops, in total on the area of 51.28 ha, which is 10.5% of the total area of perennial crops in the municipality.

The given data also includes demonstration plots cultivated in the framework of the program “ENPARD Adjara” implemented in the municipality from 2014.

Graphical image of the data on perennial crops cultivation in terms of communities gives the following information:

⁸ Agribusiness Development Division, Ministry of Agricultural development, Adjara Autonomic Republic, 2018.

Chart 9



As data indicate, the interest in perennial crops cultivation is most noticeable in Dekanashvilebi, Dioknisi, Vashlovani, Riketi and Skhalta communities. However, the growing trend in the community of Dekanashvilebi shows that area is almost the sum of the indicators of four other communities.

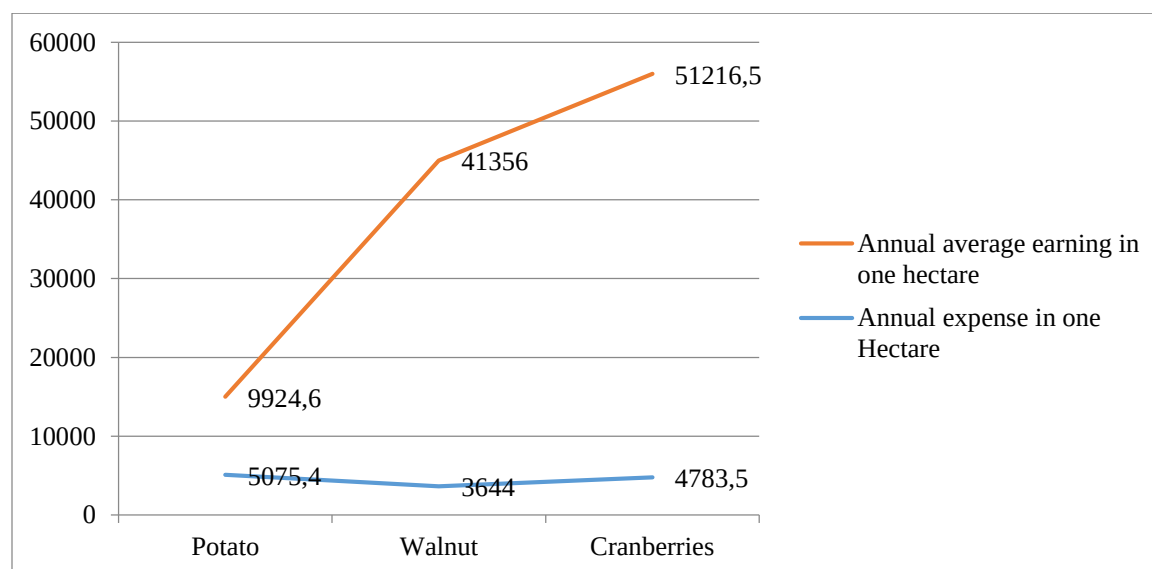
Production of berry crops is the subject to be considered separately. According to the information provided by the representative of the Division for Implementation of Agroprojects and Information Services of the Ministry of Agriculture of the Autonomous Republic of Ajara, the production of berry crops in the municipality has started only in 2013. At present, 110 families have cultivated cranberry and raspberry crops in total on 2.03 hectares of land. Raspberries are cultivated on area of 0.4 hectares, and the cranberries on area of 1.9 hectares. The main producer of raspberries is Guram Dzirkvadze – a resident of the village Dioknisi in the community of Dioknisi; he cultivated the crops on area of 0.1 hectares. Guram Dzirkvadze also cultivates raspberry plants for reselling. The cranberries have not produced fruits yet, but as Guram Dzirkvadze says, in 2017 he produced 700 kg of raspberries, and in 2018 the estimated production output (harvest) will be 2 tons. For the whole community an estimated production of raspberries for 2018 is 4 tons.

For the comparison, data in Table 15 shows an average profit from the production of perennial agricultural crops (walnut, cranberries) and the one-year agricultural crops (potato) per 1 hectare of land.

Table 15

Perennial agricultural crops	Production per 1 ha (tons)	Wholesale price tons/Gel	Revenue from selling	Cost of production per 1 ha	Average profit per 1 ha
Walnut	4,5	10000	45000	3644	41356
Cranberry	8	7000	56000	4783,5	51216,5
Potato	25	600	15000	5075,4	9924,6

Comparison of economic indices of the potato, cranberry and walnut, gives the following picture (see Chart 10).

Chart 10

As numbers show, the average profit earned from the production of perennial crops (walnut, cranberry) is higher than the average profit earned from the potato production. However, this calculation does not include costs as are one-time cost for cultivation of the perennial crops (in case of walnut, the cultivation costs are on average 12 thousand Gel), and costs connected to the agricultural and technical activities, also waiting time before the plants deliver fruits (on average 4 thousand Gel annually). However, it should also be noted that in the long term, when garden is cultivated and plants deliver fruits, if incurring the same costs as in case of potato production, the profits earned from perennial crops is much higher.

Thus, the cultivation of perennial agricultural crops is relatively long term production which requires sufficient financial resources; consequently, it is not very attractive for the households while those highly depend on annual income from the farming activities.

2.4. Livestock

In Adjara, alike in rest of Georgia, the livestock production has been one of the oldest and most traditional agricultural activities. Considering its economic profitability, livestock production has always been a leading occupation in mountainous regions of Adjara, especially for the population of Khulo municipality.

Livestock production is the source of such important products as milk and meat, as well as a large source of raw materials for the light and food industries. Livestock production continues to play a major economic and cultural role in numerous rural communities in the country.

Information on the head of cattle in each community as of 31 December 2017 in Khulo municipality is provided by the specialist of the Division of Agricultural Projects and Information Services of the Ministry of Agriculture of the Autonomous Republic of Adjara. Information is presented in Table 16.

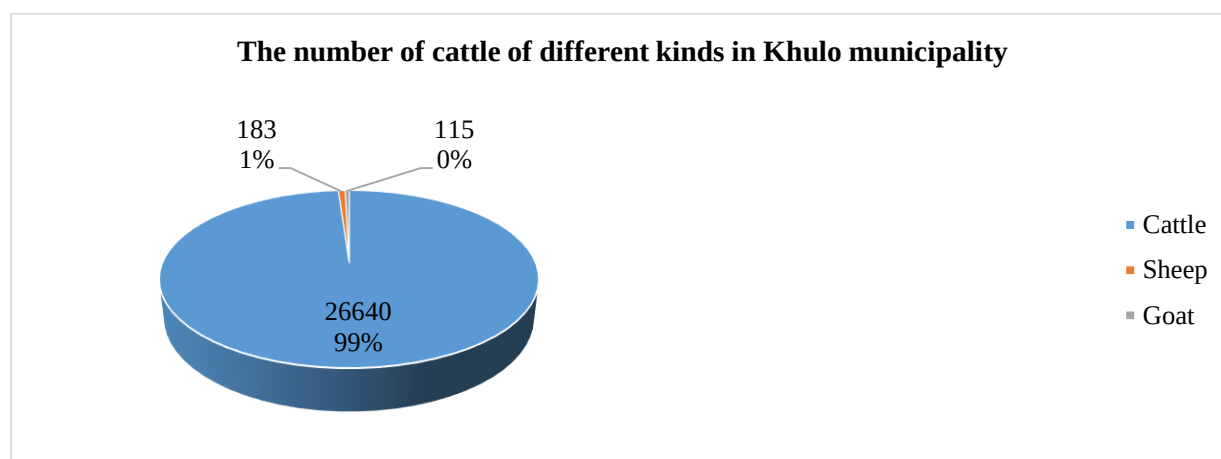
Table 16⁹

#	Administrative unit	Bovine cattle		Sheep	Goat
		Total	Among them heifer		
1	Ghorjomi	4990	2762	5	
2	Dekanashivilebi	2818	1802	5	
3	Vashlovani	1578	761	2	5
4	Dioknisi	3715	1594	17	
5	Skhalta	2816	1361	34	19
6	Riketi	2634	1147	78	45
7	Pushrukauli	1187	555	12	6
8	Khikhadziri	1228	630	30	24
9	Satsikhuri	1039	535		15
10	Tkhilvana	1225	543		1
11	Didachara	2479	1602		
12	Agara	910	347		
13	Borough Khulo	21	12		
	Total	26640	13651	183	115

Following graphical image depicts the share of different livestock species in the municipality.

⁹ Development and Information Service, Department Khulo Branch Ministry of Agricultural development, Adjara Autonomic Republic, 2018, Analyses done by researchers.

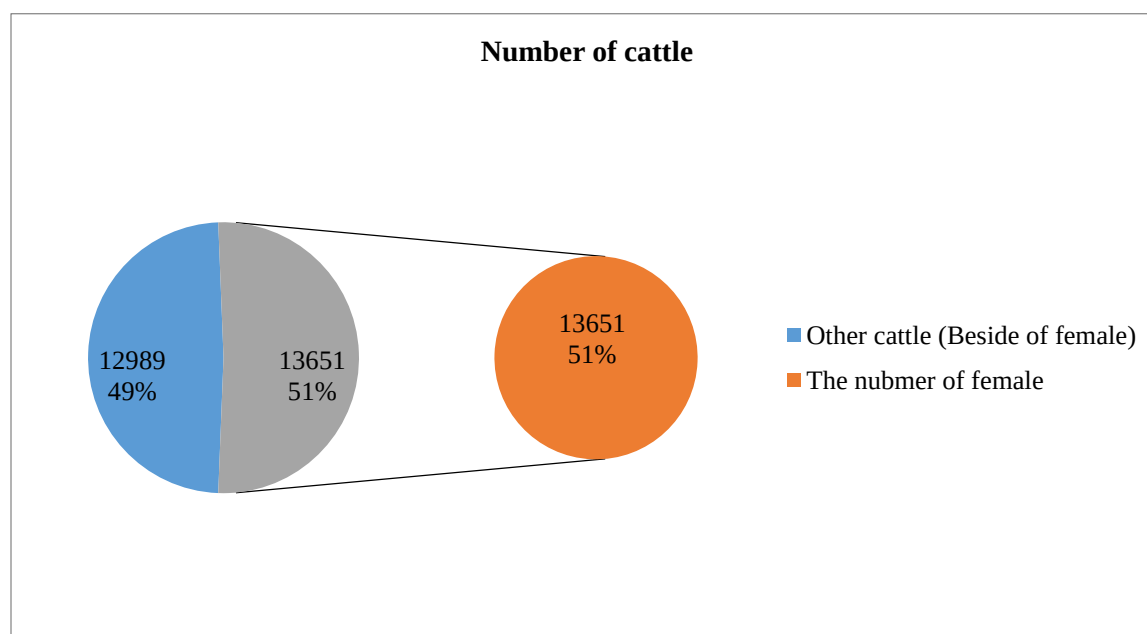
Chart 11



As indicators show, the number of sheep and goats in the municipality is not more than 1% of the total cattle of the municipality (correspondingly, 183 sheep and 115 goats). Thus, for the analysis and examination of economic efficiency, it is interesting to consider indicators of the bovine cattle production, which is one of the most prioritized agricultural activities in the municipality.

From the total number of the bovine cattle in the municipality – 13 651 are heifers (Table 1). The share of heifers in the bovine cattle is shown by graphical image as follows:

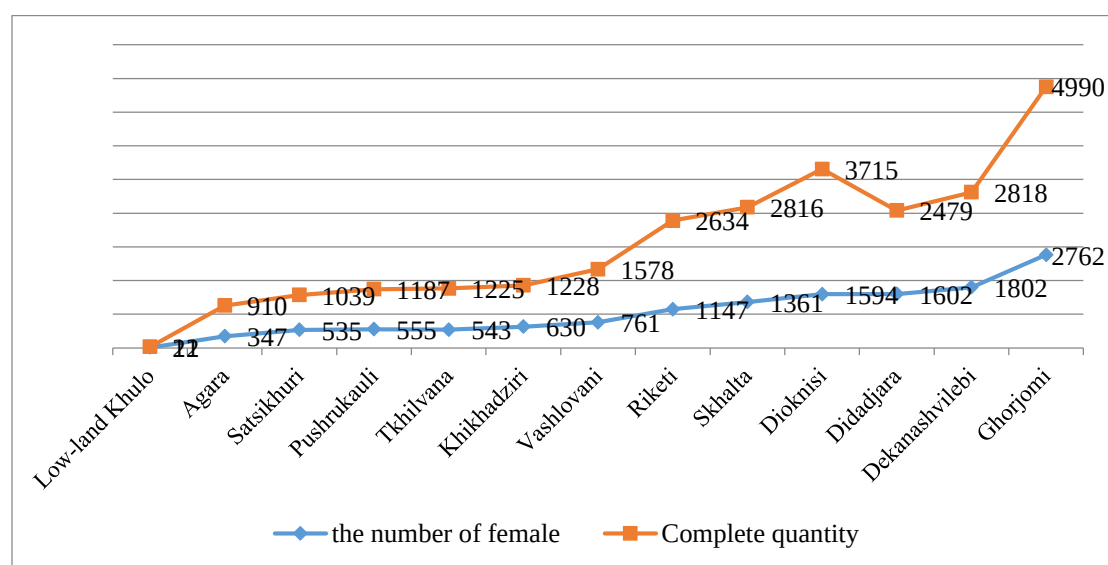
Chart 12



According to the data, share of heifers in the bovine cattle is 51%; this in turn confirms that in Khulo the households of livestock production prefer to concentrate on milk production.

The distribution of bovine cattle according to the communities is depicted in the following graphical image:

Chart 13



For analysis, it is also important to identify the average number of bovine cattle (including heifers) and of mowing and pasture land in regard with households for each community. The analysis is shown in Table 17.

Table 17¹⁰

#	Administrative unit	Number of households	Bovine cattle (total)	Among them		Average number of bovine cattle per household	Average number of heifers per household	Total area of mowing and pasture lands	Among them			Total area of pasture land	Mowing and pasture lands per household (ha)	Average area of mowing-pasture land per household
				Number of bovine cattle except heifers	Heifers				Total area of mowing land	3-4 km distant from house	Near house			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Borough Khulo	401	21	9	12	0	0	1	1	0	1	0	0,0	0,0
2	Dekanashvilebi	1797	2818	1016	1802	2	1	2551	571,5	546	25,5	1954	1,4	0,9
3	Vashlovani	946	1578	817	761	2	1	992	144	124	20	828	1,0	0,6
4	Khikhadziri	462	1228	598	630	3	1	1084	311	297	14	759	2,3	0,9
5	Tkhlivana	439	1225	682	543	3	1	1422	213	202	11	1198	3,2	1,2
6	Dioknisi	1229	3715	2121	1594	3	1	1915	621	586	35	1259	1,6	0,5
7	Satsikhuri	331	1039	504	535	3	2	861	224	214	10	627	2,6	0,8
8	Agara	232	910	563	347	4	1	802	219	212	7	576	3,5	0,9
9	Pushrukauli	290	1187	632	555	4	2	705	213	204	9	483	2,4	0,6
10	Didachara	605	2479	877	1602	4	3	1894	406	389	17	1471	3,1	0,8

¹⁰ Development and Information Service, Department Khulo Branch Ministry of Agricultural development, Adjara Autonomic Republic, 2018, Analyses done by researchers.

11	Skhalta	627	2816	1455	1361	4	2	807	118	93	25	664	1,3	0,3
12	Riketi	567	2634	1487	1147	5	2	1223	239	218	21	963	2,2	0,5
13	Ghorjoni	827	4990	2228	2762	6	3	5143	891	862	29	4223	6,2	1,0
Total		8753	26640	12989	13651	4	2	19400	4171,5	3947	224,5	15005	2,4	0,7

The average arithmetic, median and mode methods were used to determine the average number of bovine cattle per household. Namely:

- Average arithmetic - in Khulo municipality, according to each community, the average number of cattle per household varies from 2 to 6 head. The average arithmetic of which is 4. Accordingly, in the municipality of Khulo the number of bovine cattle per household on average is 4 head;
- Median – according to this method, the average number of bovine cattle per household in the municipality is 3 head;
- Mode - according to this method, the average number of bovine cattle per household in the municipality is 4 head.

Thus, according to the analysis, in Khulo municipality number of bovine cattle per household is on average 3 to 4 head. There is no statistically significant difference between the results of the average arithmetic, median, and mode methods. This fact indicates that on municipal level it is rare to find exceptions when households own large farmlands of bovine cattle. Consequently, we can conclude that there are no households owning relatively large cattle farms (more than 35 head) in the municipality.

Accordingly, for the purpose of further analysis and calculation, as an average number of the bovine cattle per household is considered to be 4 head.

Khulo municipality, as high mountainous zone is characterized by long winter periods. Due to this specificity, cattle farmers need livestock feeding troughs for period of 5 months per year, which requires consequent availability of food supplies. For this purpose, the farmers have to purchase supplies outside the municipality (mainly from Kakheti and Kvemo Kartli regions) – on average 50-55 kg of compressed hay per head, which makes up to 250 units per household. However, most of the time farmers prepare the livestock food using their own resources (mowing farmlands). The combined food for livestock is rarely used in the municipality, which is one of the hindering factors for the productivity growth.

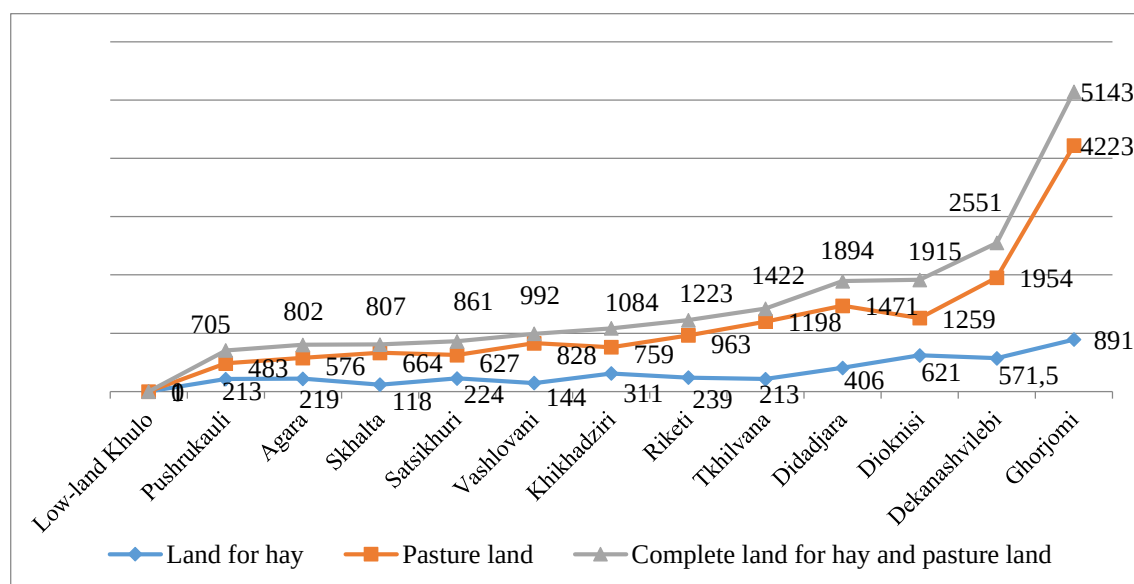
Households in Khulo municipality own relatively small areas of mowing lands nearby their own houses (homestead); relatively big areas of mowing lands are located 3-5 km away from the residential areas. As for the pastures, this land is registered as state property. However, the actual beneficiaries of pastures are the communities traditionally (historical memory) sharing and using these lands.

Nomadic pastoralism is a traditional form of livestock in Khulo municipality. In the summertime the livestock are herded in order to find fresh pastures in mountains, where mainly milk products and winter supplies for personal consumption are produced. For the nomadic pastoralism it is important to have two-generation households (division of labor). This type of household means the following: older generation, the seniors travel to mountains to take care of livestock, and the younger generation stays home for agricultural work.

For the household the mowing and pasture agricultural resources are the main factors in determining livestock production as a main agricultural work, as well as in planning the size (productivity) of the livestock farming.

Thus, it is important to analyze the household resources for livestock farming in regard with mowing and pasture lands. This information is depicted in columns from 9 to 15 of Table 17. For more visibility, the data for each community is given in graphical image in Chart 14.

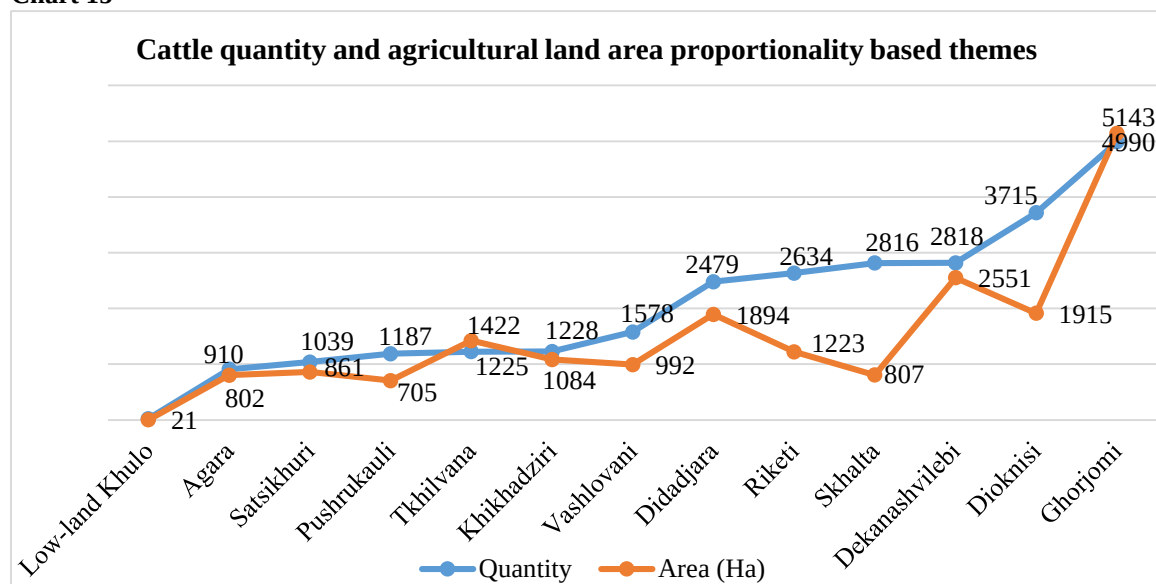
Chart 14



In Khulo municipality, considering each community, the livestock production indicators vary greatly in regard with number of bovine cattle as well as required natural resources for cattle breeding. In this regard, Ghorjomi community is a leader; here indicator of each component is higher or equals indicators of rest of the communities. According to the data, next leading position has Dekanashvilebi, owning 2 552 ha of mowing and pasture land, though it is 50% behind Gorjomi community. Alike Dekanashvilebi, as the owners of relatively sufficient resources for livestock production next in the list are Dioknisi, Didachara, Tkhilvana, Riketi and Khikhadziri municipalities, where the area of mowing and pasture land varies between one thousand and 2 thousand hectares.

In order to identify the factors determining contrasting distribution rates of the bovine cattle (from 20 to 4 990 head) among communities, the presented graphical image depicts the proportional correlation between number of cattle and area of mowing and pasture lands.

Chart 15



In the graphical image the indicators of bovine cattle per community is sorted by growth. The lowest number of bovine cattle is in borough Khulo, and the highest - in Gorjomi community. It is noteworthy that the diagram also shows a gradual increase in areas of mowing and pastures, however the growth in some cases is not fully proportional. For detailed analysis, the issue is considered based on following principles: 1 head of cattle - 1 hectare of mowing and pasture land.

Based on the data analysis, communities can be divided into 3 groups. Description of each group is following:

- I Group – Fushrukauli, Vashlovani, Didachara, Riketi, Skhalta, Dioknisi** – here the number of bovine cattle is significantly higher than the area of mowing and pasture land available in the community. The biggest discrepancy in this regard is found in Skhalta, Dioknisi and Riketi communities. The figures indicate that the area of mowing and pasture land in use of these communities is significantly incompatible with the number of bovine cattle owned by the households of the same communities. It should be taken into consideration that livestock is one of the main directions of agriculture activities in these communities. Consequently, in order to ensure further development of the livestock production, it is advisable to implement measures for ensuring sufficient food supply for bovine cattle, which can be achieved by introducing and developing modern technologies and gradual transition into intensive livestock farms;
- II Group - Agara, Satsikhuri, Khikhadziri and Dekanashvilebi** – here, in terms of interdependence, the correlation between areas of mowing and pasture lands and number of bovine cattle is relatively proportionate;
- III Group - Gorjomi and Tkhilvana** - here, the resources of mowing and pasture lands exceeds the number of bovine cattle in respective communities, which indicates the potential for livestock growth.

Consequently, taking into consideration the circumstances described above, it is rational to develop livestock production mainly focusing on Gorjomi, Dekanashvebi, Dioknisi and Didachara communities.

One of the most important factors in livestock production is the cattle housing and compliance with sanitary-hygienic conditions.

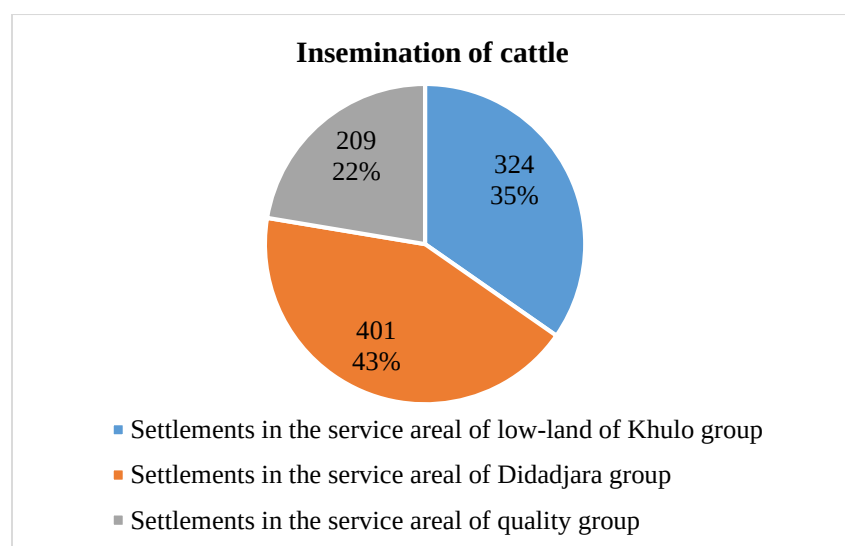
The situation in this regard is critical. Namely:

In the municipalities during the meetings with farmers, inspection of the households showed that cattle housings (exceptions are rare) do not comply with established norms, and the modern technologies and agricultural equipment are less commonly used.

With financial support of the European Neighborhood Program for Agricultural and Rural Development - "ENPARD Adjara", by the non-entrepreneurial (non-commercial) legal entity "Agro Service Center" of the Ministry of Agriculture of the Autonomous Republic of Adjara, since 2012 the artificial insemination procedures have been carried out for the purpose of bovine cattle breeding.

For this purpose, in the municipality of Kulo 3 groups of communities were established according to their geographical location. These are: 1. Didachara-Ghorjomi group (station), which serves the households of livestock production in Didachara, Agara, Satsikhuri and Gorjomi communities. 2. Borough Khulo group (station), which serves the households of borough Khulo, Dekanashvilebi, Vashlovani, Dioknisi, Riketi communities 3. Khikhadziri group (station), which serves the households of Khikhadziri, Tkhilvana, Pushrukauli and Skhalta communities. Till 2018 in Khulo municipality, 934 cases of artificial insemination procedures were carried out (only positive results are presented). According to the groups described above, the ratio of indicators is shown as graphical image:

Chart 16



As data verifies, in this case as well, indicator of Didachara-Ghorjomi group (station) communities is the highest, following by borough Khulo group (station) service area. However, it is important to remember that the borough Khulo considered in this particular case is not the same as the community of Khulo; the title of the group is due to its (station) location only. In the second group main activities are carried out in Dekanashvilebi, Dioknisi and Riketi communities.

Thus, once again, the data presented prove that in Khulo municipality the communities - Ghorjomi, Dekanashvilebi, Dioknisi and Didachara have predominant positions in livestock production.

In terms of veterinary services the situation in the municipality of Khulo is quite poor. There have been only minor improvements in this regard during past years, however it cannot be sufficient to

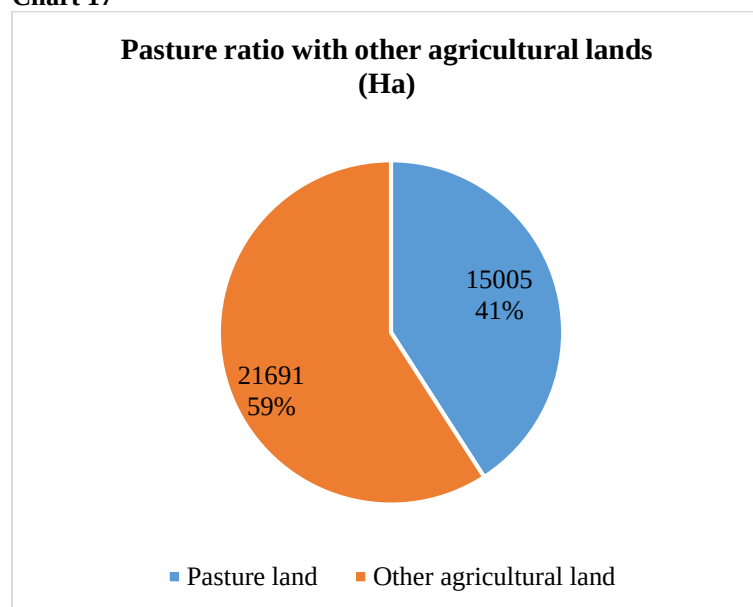
meet existing needs. In particular, only by end of year 2017, within the framework of the "Private Veterinary Development Support" program, implemented by financial aid of the Austrian Development Agency (ADA), a veterinary clinic was constructed and developed with the purpose to give it out to the Union of Veterinarians. Considering the geographical area of Khulo municipality, its natural and climate as well as environmental features, the veterinary clinic located on administrative territory of borough Khulo cannot provide sufficient access to veterinary services.

2.5. Pasture Management

From the total area of agricultural land within the administrative borders of Khulo Municipality, the area of 15 005 hectare is the pastures, which is 69% of total agricultural land of 21 691 hectares in the municipality.

The ratio of areas of the pastures to the rest of the agricultural land in the municipality is presented in a chart below.

Chart 17



Absolute majority of the pastures are located in the subalpine and alpine zones, which is covered by snow throughout months of April and May. Therefore, it was impossible to observe the landscape during the research period.

One of the main agricultural activities in Khulo municipality is a livestock production; this is mainly due to the sources of pastures available in the municipality. Households engaged in cattle breeding are practicing nomadic pastoralism. In particular, livestock are herded and taken to mountains in the summertime until the second decade of September.

Consequently, the condition of pastures and its proper exploitation significantly determines the economic efficiency of the cattle breeding.

This analysis is mainly based on the Report of the Division for Environmental Protection and Natural Resources of the Autonomous Republic of Adjara. The report has been developed based on result of

monitoring the biodiversity species in the subalpine and alpine zones, habitat destruction and soil protection within the administrative territory of the Autonomous Republic. The mentioned monitoring was carried out in mountains of **Sarichairi-Bako, Tkhilvana, Ghrmani, Tetrobi, Beshumi, Goderdzi, Riketi, Didachara, and Vashlovani.**

According to the conclusions of the report prepared on the basis of monitoring – as a result of the impacts of natural and anthropogenic factors and climate change, large-scale land degradation cases have been observed. In order to reduce the scale of land degradation, special attention is required for studying the causes of agricultural land degradation in the subalpine and alpine zones. Existing situation clearly shows that no proper attention is paid to ensure the integrity of soil cover, soil fertility growth and sustainability of the agricultural lands in the subalpine and alpine zones. Due to absence of financial resources even the minor measures against the degradation process cannot be carried out. The lands are mainly degraded by excessive settlements, improper agricultural practices, excessive number of herd and flock on pastures, change in grass species, damages due to overgrazing, uncontrolled forest cutting in the past, and the climate change. During last three decades in the subalpine and alpine zones the climate change has already had visible effects on environment. Negative impact of the climate change is observed in temperature change, increased sediments, density and character of the drought, water erosion and other natural and anthropogenic factors.

Thus, as the report shows, pasture management system is not functioning in the municipality and its exploitation continuous in an unsystematic manner, which as a result causes the degradation of agricultural land and hinders the development of the livestock production.

3. CONCLUSION

General Review of Agricultural Potential in Khulo

Khulo municipality is characterized by the lack of agricultural land and land fragmentation. On average 0.31ha of arable land is available per household, which is represented by several small-scale plots. Relatively bigger are the areas of mowing land, which comprises on average 0.5ha per household. All above mentioned indicate that resources of the agricultural lands in the municipality are dramatically limited.

Land distribution according to its agricultural designation is as follows: total arable land area is 2 445.7 (11%) ha, area of perennial crops 69.8 (1%) ha (semi intensive gardens), mowing land – 4 171 (19%) ha, and pastures - 15 005 (69%) ha.

Structural distribution and geographical location of the land with high altitude (400-2050 meters above the sea level) determines the development of relevant traditional agricultural activities in the municipality such as potato production, livestock, and corn production.

Measures for increasing soil fertility are minimal in the municipality. Due to the lack of land, it is problematic to use the method of crop rotation. This significantly reduces the productivity.

In the municipality, the agricultural plant production mainly concentrates on potato and corn production; as for the agricultural cattle breeding – the population prioritizes livestock production. In both case – either plant or livestock production, the households follow a "traditional" type of agriculture.

The modern agricultural practices are developing gradually, at a slow pace in both directions – as in plant production (one-year crops, perennial crops) so in cattle breeding (artificial insemination).

Changes in the social and demographic structures of households – 5.1 person in one household. Decomposition of the traditional type of two-generation families. Relatively high rates of migration (families and/or young generation) influence all types of agricultural production; with high probability, in a longer term (20-30 years) this will trigger changes in prioritized agricultural (livestock, potato production) production processes and/or transform the existing practices (e.g., nomadic pastoralism – “nomad”).

Prioritized Crops According to the Communities

One-year crops

In almost every community of the municipality, the prioritized are the potato and corn production. However, there are differences among the communities in terms of potato production traditions. By production output the leaders are Dioknisi and Dekanashvilebi communities, which is due to the relatively large areas of the land available, as well as existing natural and climate conditions (altitude from the sea level).

As seeds and planting materials the farmers primarily use the old and unknown breeds; these potato seeds are of significantly low productivity having average yield of only 25tons per 1 hectare.

Starting from 2017 the Center of Agro-Projects Management has launched a program for potato breeding. As a result, on an area of 28.56 hectares (2.4% of the total area of potato crops) high-quality

potatoes were sown. As a result, an average yield per 1 hectare amounted to 30 tons of potatoes. Which by 5 tons exceeds the yield from the unknown potato seeds.

In order to increase the productivity, the potato breeding and improvement of farmers' skills in agrotechnical activities (land processing, soil fertilization, etc.) are one of the important priorities, especially in Dioknisi, Riketi, Dekanashvilebi and Gorjomi communities.

Perennial Crops

Traditionally the fruit trees are dispersed on homestead and mowing lands. From the total are of agricultural land in the municipality, the area of 489 (2.25%) ha is cultivated; the semi intensive gardens are cultivated on the area of 69.6 (0.3%) ha.

Semi intensive gardens are being cultivated in small scale, mainly with co-financing of the Agro Projects Management Center. Small scale is due to relatively high investment costs and other relevant factors.

The level of knowledge and skills of farmers in maintenance of semi intensive gardens and storage/sale of production is quiet poor.

Livestock

Livestock is one of the main agricultural activities in Khulo municipality, which is due to natural, climate and geographical conditions and a relatively large areas of mowing and pasture lands. Dairy bovine cattle: there are 26 640 (13 651 heifers) head of cattle in the municipality, which is up to 3-4 head of cattle per household. Part of the population is practicing nomadic pastoralism.

Livestock production processes are mainly of a traditional character and the modern technologies are used seldom in the municipality. However, very rarely there are exceptions found - relatively modernized farms and the use of agricultural machinery, such as tractor, mowing equipment, and motorized cultivator.

Dairy products (cheese, sour milk, butter, cream, cottage cheese, “kuruti”, “nadugi”) are produced in households in a non-standardized conditions. Products are sold mainly locally, in Batumi (cheese, butter) and in mountainous resorts (Beshumi, Goderdzi, Bakhmaro). Food safety standards are less considered during the production process. Only one milk processing factory has been functioning in the municipality, which receives milk from Dioknisi, Riketi, Dekanashvilebi, and partially Didacha and Gorjomi communities.

Pasture Management

According to the conclusion of the Ministry of Environmental Protection and Natural Resources of the Autonomous Republic of Ajara, the pastures are massively degraded, which is due to improper agricultural practices. No measures for increasing soil fertility are undertaken. Negative impact of the climate change is observed in temperature change, increased sediments, density and character of the drought, water erosion and other natural and anthropogenic factors, which increases the level of negative effects on the soil fertility.

Other Agricultural Productions

There are few cases of fish farming practices in the municipality, which are represented as fish ponds of alevins and trouts. Establishment of the practice was conditioned by examples of fish farming in neighboring municipality (Keda municipality). Modern technologies are rarely used in fish farming. This type of agricultural production can be evaluated as having a relatively high potential -considering availability of water resources in the municipality. Consequently, it requires support for further development.

Examples of berry plant gardens are rare in the municipality. However, in nine communities the berry crops (blueberries, raspberries) are cultivated on small areas (0.02 hectares). Availability of relevant space is important for developing the berry crop cultivation practices in farmers. In terms of productivity and profitability, the berry crop cultivation practice is prospective, but the risks of perishability and storage issues should be considered.

Among the wildy growing berries in the municipality, the most common are cranberries, which are traditionally collected by population for selling. Annually population collects 50 tons of wildy growing cranberries. Only the small part of population of four communities is involved in this activity.

In the municipality there are neither organizational system nor transportation possibilities, or any possibility of storage in proper conditions, drying and/or shock freezing of the fruits collected, to say nothing about availability of fruit processing factory.

Local Enterprises

In Khulo municipality (Dioknisi community) only one milk processing factory is functioning. The enterprise employs 25 people; it receives and produces 3.5-4 tons of milk. Received milk is produced by 550-600 households. The enterprise is supplied with milk from communities of Dioknisi, Riketi, Dekanashvilebi, and partially from Didachara.

4. RECOMMENDATIONS (Estimated 4 Million EURO)

The recommendations was based on the research findings, conclusions and approximate budget that could be located under Check Caritas Rural Development Project, FAO , Ministry of Agriculture of the Autonomous Republic of Adjara , APMA.

Object of Intervention	Intervention	Responsible Agency	Result of Intervention	Resources	Recommendation Period	Budget for 5 years (EURO)
Documents						
Agricultural statistics	Data collections, data systematization, methodological improvement	Division for Agroprojects Development and Informational Services	Improved agricultural database	-ENPARD III- Rural Development Program (2018-2021) - State Budget	Medium-term	
Registration of agricultural lands	Special programs to promote land registration benefits among farmers	Public registry, Ministry of Justice of Georgia	Increased number of registered agricultural lands	Reform of Land registration/N APR	Short-term	
Institutions						
1. Rural Development Department a) Municipal Development Division b) Agrobusiness Development Division 2. Agroproject Development and Information Service Department 3. Laboratory of Ministry of Agriculture (LEPL) 4. NNLE “Agro Service Center” 5. NNLE “Agroprojects Managing center” 6. Agricultural Development Department 7. Policy and Analysis	Clarification of functions between and within departments and other structural units. Development of job descriptions Consideration of UNDP recommendations provided in 2017	Government of Autonomous Republic of Adjara Ministry of Agriculture of Autonomous Republic of Adjara	More effective and efficient Ministry and improved rational planning and management of human resources.	UNDP	Short-term	

Object of Intervention	Intervention	Responsible Agency	Result of Intervention	Resources	Recommendation Period	Budget for 5 years (EURO)
Department						
Prioritized Sectors for Investments and Politics (1 776 000)						
One-year crops						
1. Potato production						287 000
Trainings						
Beneficiaries	Training in agrotechnical measures in potato production	-Ministry of Agriculture of Adjara -International Organizations (UNDP, Caritas)	Increased productivity of potato production	Experts of relevant fields	Medium term	100 000
Beneficiaries	Directions of business plan and marketing	-International organizations (UNDP, Caritas)	Improvement of marketing and business systems of potato production	Consulting companies	Medium term	100 000
High Quality Seeds Distribution						
1. Potato seeds	1. Distribution/spread of high productivity potato breeds	Ministry of Agriculture of Adjara International organizations (UNDP, FAO, Caritas) National Food Agency Scientific and Research Center of the Ministry of Environment and Agriculture of Georgia	Increased output of potato productivity	Financial resources of relevant international organizations and governmental bodies	Short term	80 000 EURO
2. Center of high productivity potato breeds	Research the possibilities of establishing high quality seeds production	Ministry of Agriculture of Adjara International organizations (UNDP, Caritas Czech Republic) Scientific and Research Center of the Ministry of Environment and Agriculture of Georgia	Possibility determined for producing local high productivity seeds material	Potato production experts Marketing experts Business planning experts	Short-term	7 000 EURO
2. Garlic Production						207 000
Trainings						
Beneficiaries	Training in agrotechnical activities for garlic	- Ministry of Agriculture of Adjara	Increased garlic productivity	Experts of relevant	Medium term	100 000

Object of Intervention	Intervention	Responsible Agency	Result of Intervention	Resources	Recommendation Period	Budget for 5 years (EURO)
	production	- International organizations (UNDP, Caritas, DANIDA/IFAD)		fields		
Beneficiaries	Directions of business plan and marketing	- International organizations (UNDP, Caritas)	Improved marketing and business system of the garlic production	Consulting companies	Medium term	100 000
Research		-				
Marketing of the garlic production	Study value-chain of garlic production	- International organizations (UNDP, Caritas Czech Republic)	Increased access to market	Consulting company/ expert in sectorial analysis	Short-term	7000
3. Perennials						437 000
Equipment						
Semi intensive garden (walnut, hazelnut and other fruit gardens)	Cultivate semi intensive gardens	- Ministry of Agriculture of Adjara	Increased output of walnut, hazelnut and other fruits' production		Long-term	400 000
Semi intensive garden of black plum	Cultivate 20 demonstration gardens of black plum (1 garden – 2000kv.m)	- Ministry of Agriculture of Adjara - International organizations (UNDP, Caritas Czech Republic)	Raised awareness on black plum among the farmers	- International organizations - Black plum producing farmers from other municipalities	Short-term	7 000
Training						
Beneficiaries	Training in agro-technical activities for black plum production	- Ministry of Agriculture of Adjara - International organizations (UNDP, Caritas, DANIDA/IFAD)	Supported black plum production	Experts with relevant field expertise	Medium term	30 000
4. Berry Crops						225 000
Equipment						
Cranberry and raspberry demonstration gardens	82 demonstration gardens of cranberries and raspberries (1500 kv.m)	- Ministry of Agriculture of Adjara - International organizations	Popularization of cranberry and raspberry production	Financing of the international	Medium-term	145 000

Object of Intervention	Intervention	Responsible Agency	Result of Intervention	Resources	Recommendation Period	Budget for 5 years (EURO)
		(UNDP, Caritas, DANIDA/IFAD)		organizations and governmental institutions		
Training						
Beneficiaries	Training in agrotechnical activities for cranberry and raspberry production	- Ministry of Agriculture of Adjara - International organizations (UNDP, Caritas, DANIDA/IFAD)	Supported cranberry and raspberry production	Experts of the relevant fields	Medium-term	80 000
5. Fish Farming						80 000
Equipment						
Fish farms	Develop 5 fish farms (fish ponds of alevins and trouts) in the communities of Dekanashvilebi and Dioknisi	- International organizations (UNDP, Caritas, DANIDA/IFAD)	Demonstration fish pond farmland		Medium-term	60 000
Training						
Farmer	Prepare farmer for managing the trout farmland	- International organizations (UNDP, Caritas, DANIDA/IFAD)	Support for the development of the trout farming	Ichthyologist	Medium-term	20 000
6. Beekeeping						200 000
Beekeepers (+40 hives)	Packaging, marketing	- International organizations (UNDP, Caritas, DANIDA/IFAD)	Improved honey packaging and marketing standards	Trainer/ Machines of packing	Medium-term	
Honey plants	Study existing honey plants; research the potential of introducing new honey plants (especially chestnut tree illness)	UNDP, Caritas Check	Decisions made on new kinds of honey plants based on conducted research	Relevant experts	Short-term	10 000
Beekeeping farmlands	Support development of small-scale beekeeping farmlands	- Ministry of Agriculture of Adjara - International organizations (UNDP, Caritas, DANIDA/IFAD)	Development of medium-scale (50 hives) beekeeping farmlands	Donor organizations	Medium-term	165 000

Object of Intervention	Intervention	Responsible Agency	Result of Intervention	Resources	Recommendation Period	Budget for 5 years (EURO)
Beneficiaries	Training for raising beekeeping skills	- Ministry of Agriculture of Adjara - International organizations (UNDP, Caritas, DANIDA/IFAD)	Developed beekeeping	Relevant experts	Medium term	
7. Cattle Breeding						340 000
Livestock farm (30 head)	Building demonstration farm in Ghorjomi	- International organizations (UNDP, Caritas, DANIDA/IFAD)	Popularization of farms developed with modern standards	Donor organizations	Short-term	100 000
Training						
Veterinarian	Retrain/raise qualification of 5 veterinarians	- International organizations (UNDP, Caritas, DANIDA/IFAD)	Health standard of livestock is improved/ prevention from diseases	Donor organizations	Short-term	40 000
Milk processing and receiving factory	Building milk processing and receiving factory in Dekanashvilebi and other community (minimum 2)	- International organizations (UNDP, Caritas, DANIDA/IFAD)	Support milk selling/processing production	Donor organizations	Medium term	200 000
Basic Agricultural Equipment, Green Houses and Agricultural Education						1 800 000
Secondary School	Developing and Integration of Agricultural Curricula into the secondary schools of Municipality	- International organizations (UNDP, Caritas)	Agricultural education improved	Municipality, Schools, Educational recourse center	Long Term	
Green Houses	Explore potential of development of Green Houses and development of green houses	- International organizations (UNDP, Caritas, DANIDA/IFAD)	Green Houses potential identified	Donor organizations	Medium term	
Multifunctional motorized cultivator with hay-cutting implement (500 units)	Purchase multifunctional motorized cultivator (500 units)	- International organizations (UNDP, Caritas, DANIDA/IFAD)	Technical modernization	Donor organizations	Medium term	550 000
Multifunctional motorized cultivator with soil processing aggregates (400 units)	Purchase of multifunctional motorized cultivator with soil processing aggregates	- International organizations (UNDP, Caritas, DANIDA/IFAD)	Technical modernization	Donor organizations	Medium term	600 000
Milk transportation refrigerator and bidons	Purchase milk transportation refrigerator	- International organizations (UNDP, Caritas,	Develop system of milk processing	Donor organizations	Medium term	200 000

Object of Intervention	Intervention	Responsible Agency	Result of Intervention	Resources	Recommendation Period	Budget for 5 years (EURO)
	and bidons (2 units)	DANIDA/IFAD)				
Agricultural equipment for planting and harvesting garlic	Purchase agricultural equipment for planting and harvesting garlic	- International organizations (UNDP, Caritas, DANIDA/IFAD)	Technical modernization	Donor organizations	Medium term	200 000
Agricultural equipment for planting and harvesting potato	Purchase agricultural equipment for planting and harvesting potato	- International organizations (UNDP, Caritas, DANIDA/IFAD)	Technical modernization	Donor organizations	Medium term	200 000
Service center for agricultural mechanization	Establishing service center for agricultural mechanization	- International organizations (UNDP, Caritas, DANIDA/IFAD)	Technical modernization	Donor organizations	Medium term	50 000

ANNEXES

Annex 1. List of Respondents

1. Tamaz Vashadze – Fish producer, Community Dioknisi
2. Tengiz Shavadze – Potaito Producer, Community Dioknisi
3. Nodar Katamadze – Veterinary, Community Ghorjomi
4. Temur Iremadze –Representative of Mayor, Community Ghorjomi
5. Davit Khozrevanidze – Livestock Owner, Village Mekaaidzebi, Community Ghorjomi
6. Emzar Bolkvadze – Semisubstitutional Farmer, Community Didadjara
7. Gela Shavadze - Livestock Owner, Community Didadjara
8. Gocha Meladze – Mayor of Khulo municipality
9. Resan Chogadze – Rural Development Main Spacialist in Khulo Municipality
10. Jambul abuladze – The main specialist of the Agro Projects Introduction and Information Provisioning Service at the Ministry of Agriculture of Autonomic Republic of Adjara.
11. Zurab varshanidze – Head of Agricultural Extension Department at the department of Agrarian Development
12. Temur Gobadze – Potato grower, farmer.
13. Jumber Mgeladze – Wild growing cranberry Farmer

Annex 2. List of Documents Reviewed

1. Rural Development Strategy of Georgia (2017-2020)
2. Agricultural Development Strategy of Georgia (2015-2020)
3. Agricultural statistic data on Khulo Municipality and Adjara Autonomous Republic
4. Assessment of rural agricultural investment capacities and corresponding extension needs In Georgia (2017)

