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MAPPING THE GENETIC RESOURCES OF AUTOCHTHONOUS FARM ANIMALS IN ALBANIA

Report prepared by Prof. Ass. Dr. Fatmira LEKA (SULAJ) in the framework of the UNDP-GEF Project “Strengthening human resources, legal frameworks, and institutional capacities to implement the Nagoya Protocol” (Global ABS Project).

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ALBANIA, NOVEMBER 2019

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LIST OF ABBREVIATIONS

GDP	Gross Domestic Product
AnGR	Animal Genetic Resources
MARD	The Ministry of Agriculture and Rural Development
ATTC	Agricultural Technology Transfer Centres
IFSV	Institute of Food Security and Veterinary
LEAA	Livestock Entrepreneurs Association of Albania
BZHR	Livestock and Rural Development Centre
RASP	Rural Association Support Programme
RAEA	Regional Agricultural Extension Agencies
MTE	Ministry of Tourism and Environment
ARI's	Agricultural Research Institutes
GDAP	General Directory Agriculture, Policies Food Save and Development Rural
DBPA	Directorate of Biodiversity and Protected Areas
UNDP	United Nations Development Programme
CABRA	Conservation of Agrobiodiversity in Rural Albania
NAPA	National Agency of Protected Areas in Albania
CBD	Convention on Biological Diversity
TK	Traditional Knowledge
ABS	Access and Benefit Sharing
SRS	Small Ruminant Station
NASR	National Association for Small Ruminant
MADA	Mountain Areas Development Agency
GEF	Global Environmental Facility
FRCFP	National Federation of Regional Communal Forests and Pastures of Albania
AUT	Agricultural University of Tirana
LRDC	Livestock and Rural Development Centre

1 Livestock production, the methodology of national management of animal genetic resources

1.1. LIVESTOCK PRODUCTION

Albania is a small European country located in the southeastern part of the continent, covering an area of 28,748 square kilometres. The population of Albania as of 1 January 2018, was 2,870,324 (INSTAT 2019). The total land size of Albania is 2,875,000 ha, from which 699,000 ha or 24% is agriculture land, 36% forestry, 15% pastures and meadows, and 25% is classed as "others" (INSTAT 2019).

24% agriculture land

36% forestry

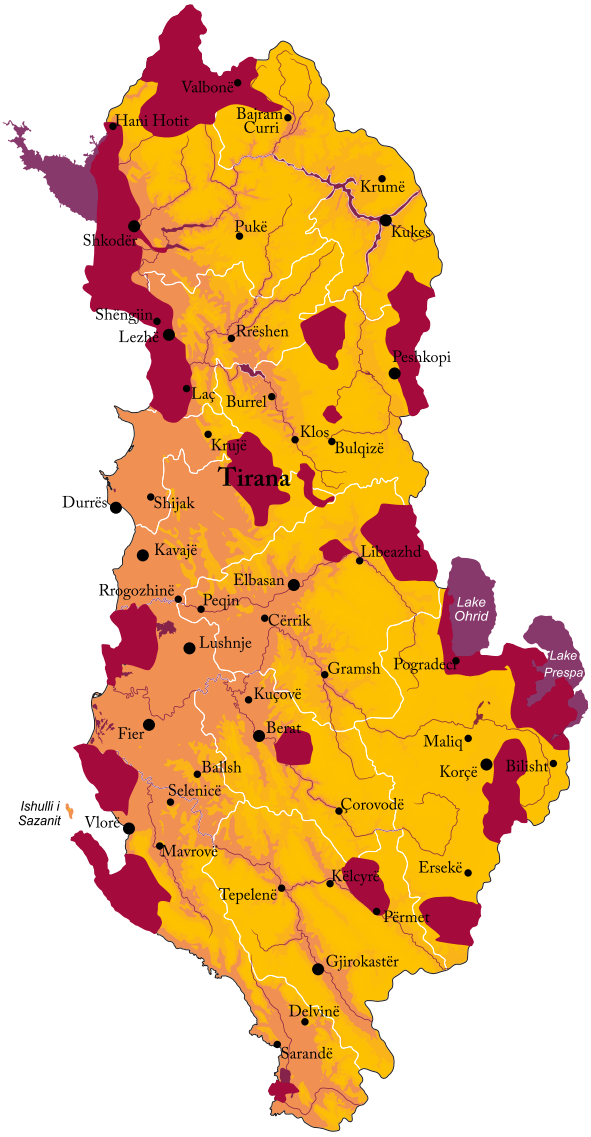
15% pastures & meadows

25% others

The country is predominantly mountainous (nearly two-thirds of its territory is located in mountainous areas) sitting between the continental and Mediterranean climate zones. It is narrow compared to the length of its north-south coastline, meaning the Adriatic and Ionian Seas have a great impact on the climate, flora and fauna.

Albania is distinguishable by its great richness in the biological diversity of its landscape. It is regarded as one of the richest for species and breeds of animals, and variety of plants, and is considered valuable for the development of agricultural and livestock production.

Fig.1. Map of EMERALD areas in Albania



Map 1. A map of Albania, indicating the sites with the richest biodiversity, which are proposed Emerald sites

Agriculture contributed around 22% to the national GDP in 2017. In 2018, imports of agricultural products totalled approximately $980 million. Exports have continued to rise, reaching about $300 million in 2018, a 6.5% increase from 2017. (INSTAT 2018)

Table 1 Number of livestock, per 1,000 heads

	Indicators	2014	2015	2016	2017	2018
1.	Cattle	499.6	504.2	492.4	475	467
	Cows	358	357.1	354.9	349	349
	Sheep/goats	2,804	2,850	2,913	2,858	2,781
2.	Sheep	1,869	1,918	1,972	1,925	1,864
	Milket sheep	1,419	1,417	1,428	1,407	1,366
3.	Goat	904	932	941	933	917
	Milket goats	695	700	716	717	894
4.	Pigs	172	171.4	181	180	184
	Sows	12	11	13	12	12
5.	Equidae	91	91	71	89	88
	Horses	32	31	34	32	32
6.	Poultry	9,493	8,558	8,326	7,835	8,362
	Chickens	6,645	5,323	4,790	4,820	4,963
7.	Beehives	261	271	303	290	285

Source: MARD (June, 2019)

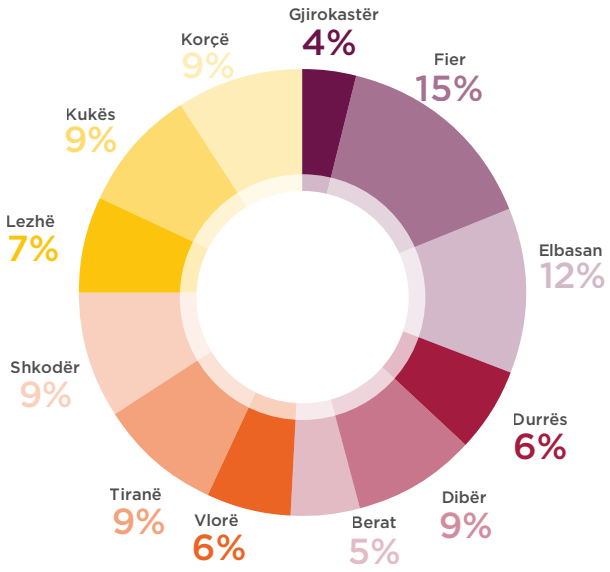
Table 2 Livestock production, in 1,000 Tones

	Indicators	2014	2015	2016	2017	2018
1.	Milk	1,133	1,131	1,145	1,156	1,144
	Cow milk	965	964	975		
	Sheep milk	89	87	85		
	Goat milk	79	80	85		
2.	Meat live weight	155	158	160	161	161
	Cattle	71	71	72		
	Sheep and goats	50	53	51		
	Pork	18	17	17		
	Poultry	17	17	20		
3.	Wool (tons)	3,100	3,332	3,431		
4.	Eggs (million)	835	830	830	811	828
5.	Honey (tons)	3,000	3,200	3,923		

Source: MARD (June, 2019)

Livestock remains one of the most important sectors of Albania's agriculture economy, contributing 45% of the overall value of agriculture and livestock products.

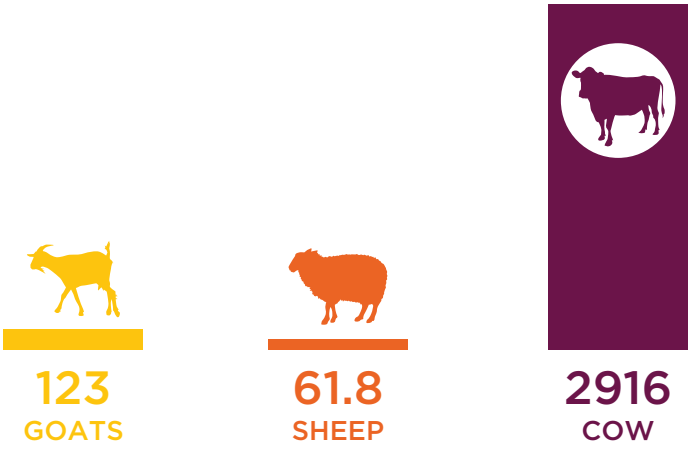
Graph. 1 Cattle structure by prefectures, 2018, INSTAT



- The total number of cattle in 2018 was 467,318, a decrease of 1.7% compared to 2017.
- In 2018, the number of sheep was 1,863,837, marking a decrease of 3.2% compared to 2017. The main category was milked sheep which represented about 73.3 % of the total herd.
- The total number of goats in 2018 was 917,155, a decrease of 1.7 %, compared to 2017. The main category was milked goats, with 97.5 % of the total herd.
- In 2018, the number of pigs was 184,133, representing an increase of 2.2 % in annual terms, compared to 2017. The largest concentration of the number of pigs was in: Lezhë with 35.9% and Shkodër with 27% of the total number.
- Pig breeding is mainly concentrated in areas with largely Catholic and Orthodox populations.
- Milk production in 2018 was about 1.14 million tons, a decrease of 1% compared to 2017. The milk production structure in 2018 was: cow's milk 85.1%, sheep's milk 7.4% and goat's milk at 7.5%.

Graph. 2 Milk Production Structure, 2018

Graph. 3 Average annual yield milk production in country level



- In 2018, milk production from cows was 973,526 tons, a decrease of 0.9% compared to 2017. The annual yield of cow's milk production in the country for 2018 was 2,916 kg/head, an increase of 2.4% compared to 2017. Sheep's milk production, for the year 2018, decreased by 2.5% compared to 2017. The annual yield of sheep milk in the country is 61.8 kg/head, an increase of 0.6% compared to 2017. Milk production from goats in 2018 was 0.9% less than during the previous year. The annual yield of goat's milk production in the country was about 123 kg/head, an increase of 2% compared to 2017.
- Meat production was 161 thousand tons, an increase of 0.1% compared to the year 2017.

It is estimated that the agricultural economy will continue to be one of the main pillars where we must focus our energies for a better future. In this context, biodiversity is an important resource for development. Biodiversity, including livestock biodiversity, is an indication of the genetic and economical wealth of a country (O. Yilmaz et al 2012). In autochthonous genetic resources, fragmented and restricted interferences have been employed.

Albania has a genetic potential that relies largely on autochthonous breeds of small ruminants which, compared to cultivated breeds, possess productive quality, resistance to environmental conditions, and to different diseases. The trends observed, in the context of free trade with countries in the region and beyond, based on these resources on the one hand and the development of agritourism on the other, will support the development of a production system for autochthonous breeds and ecotypes and consequently farm sustainability.

Economically this wealth of autochthonous germoplasm requires the discovery, evaluation, preservation, enhancement, and utilization of values for the development of agro-tourism in mountainous areas and others. Additionally, the demand for local food specialties that reflect regional identity has increased, related to the problem of cultural heritage and the potential nutritional value of human health.

The role of staff, institutions, or projects is to come up with a strategy based on the development of a traditional farm that, with its specific and safe products, is introduced into the global market, valorizing our resources. As for the agricultural impact on biodiversity, habitats, and landscape, the understanding and measurement of these impacts is still at a preliminary research stage, partly because of the high costs associated with monitoring programmers.

Albania has not yet established the necessary measures in accordance with the Nagoya Protocol, related to the monitoring of genetic resources and user-compliance measures. Therefore, one of the future challenges for the developing of agrobiodiversity policy in Albania is to meet the objectives of providing information on the current status of AnGR and using indicators for policy monitoring, evaluation, and forecasting.

1.2. DEVELOP A METHODOLOGY BASED ON:

- Desk-based literature review of existing data from sources and statistical data from previous studies, and
- Discussions held during the meetings with public, academic, and non-governmental stakeholders.

The first part presents a brief overview of the importance of livestock, the status of animal genetic resources, the reasons for their loss, and objectives and options for their conservation, perspectives and recommendations for further actions.

The Ministry of Agriculture and Rural Development (MARD) is the national authority for the conservation and sustainable use of plant and animal genetic resources for agriculture and food. Agricultural Technology Transfer Centres (ATTCs) of Fushë Krujë, Korça, and the Institute of Food Security and Veterinary (IFSV) are public institutions that have the responsibility of cooperating with the national network for the conservation and sustainable use of AnGR.

Non-governmental and non-profit associations in livestock include the Livestock Entrepreneurs Association of Albania (LEAA), ALBAGENE, the National Association of AI Operators, BLEKALB Foundation – Science, Technology, and Extension Service for Farms Development, the Small Ruminants Breeders Association (SHFBI), the Livestock and Rural Development Centre (BZHR) and the Rural Association Support Programme (RASP), etc. They are active players in the treatment of issues for AnGR conservation and sustainable use.

These groups play an important role in the conservation and sustainable use of autochthonous breed/ecotype animals in the country. Priorities and studies will be identified for this issue through visits and meetings in these centres according to a programme as follows:

Table 3 Interview programme of governmental institutions and non-governmental organizations October - November 2019

Nu.	Institution	Functions related to AnGR	Interview dates	Person in charge
1.	The Ministry of Agriculture and Rural Development-MARD	- Functions related to agrobiodiversity protection - Capacity assessment - Important activities carried out by the MARD - Needs for further enhancement of capacities	4 Nov.	Pjerin SHOSHI Director of Programmes in MARD
2.	Agricultural Technology Transfer Centres (ATTCs) of Fushë Krujë	- Functions related to agrobiodiversity protection - Capacity assessment - Important activities carried out by the centre - Needs for further enhancement of capacities - Conducted studies	15 Nov.	Ilir SALILLARI Director
3	Regional Agricultural Extension Agency, Lushnje.	- Functions related to agrobiodiversity protection, - Capacity assessment - Important activities carried out by the agency - Needs for further enhancement of capacities	12 Nov.	Dhimitraq QORRI Director
4	Agricultural Extension Sector – Fier	- Functions related to agrobiodiversity protection - Capacity assessment - Important activities carried out by the sector - Needs for further enhancement of capacities	12 Nov.	Muhamet BABOÇI
5.	Regional Veterinary Agency Plant Protection Service, Vlore	- Functions related to agrobiodiversity protection - Capacity assessment, - Important activities carried out by the agency - Needs for further enhancement of capacities	12 Nov.	Adila KOJDHELI
6.	Agricultural Technology Transfer Centres (ATTCs) of Korça.	- Functions related to agrobiodiversity protection - Capacity assessment - Important activities carried out by the centre - Needs for further enhancement of capacities - Conducted studies	25-26 Nov.	Director Roland MEÇAJ

7	Regional Extension Agency, Korçë	- Functions related to agrobiodiversity protection - Capacity assessment - Important activities carried out by the agency	26 Nov.	Director Vullnet Gjolla
8	Regional Extension Agency, Tiranë	- Functions related to agrobiodiversity protection - Capacity assessment - Important activities carried out by the agency.		Halim Lahukaj
9	Regional Extension Agency, Shkodër	- Functions related to agrobiodiversity protection - Capacity assessment - Important activities carried out by the agency.	13 Nov	Director
10	Livestock Entrepreneurs Association of Albania (LEAA)	- Functions related to agrobiodiversity protection - Capacity assessment - Important activities carried out by the association - Conducted studies	8 Oct.	Valbona YLLI Executive Director
11	Livestock and Rural Development Centre (BZHR)	- Functions related to agrobiodiversity protection - Capacity assessment - Important activities carried out by the centre - Conducted studies	. 10 Oct.	Fejzo BEGA Executive Director
12	Regional Extension Agency, Tiranë	- Functions related to agrobiodiversity protection - Capacity assessment - Important activities carried out by the agency	19 Nov.	Halim LAHUKAJ

1.3. GENETIC DIVERSITY

Livestock resources are vital to Albania's well-being and prosperity. The country has a rich stock of livestock resources, with an estimated cattle population of 467,318, and sheep and goat populations estimated at 2,780,992 (INSTAT 2018).

Populations of endemic ruminant livestock in Albania represent a highly diverse "genetic treasure trove", which is under increasing threat of genetic dilution and

extinction. In the Republic of Albania, native and autochthonous animal breeds make up an important part of the farm animal population. According to The Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture(2013), Albania contains 39 native, autochthonous, or locally-adapted breeds and 13 exotic breeds. A large part of the animal farm population in Albania consists of crosses native and exotic breeds. The National Biodiversity Strategy and Action Plan provides a comprehensive framework for sustainable biodiversity conservation and management, including an emphasis on in-situ conservation of Animal Genetic Resources (AnGR) as one of the means of conserving biological diversity in the country.

A large part of the animal farm population in Albania consists of **crosses native and exotic breeds.**

Table 4 Number of native/local and exotic breeds

Species	Native/locally-adapted breeds	Exotic breeds
Cattle (specialized dairy)	5	3
Cattle (multipurpose)		1
Sheep	6	3
Goats	10	2
Pigs	3	1
Chickens	5	3
Horse	3	
Asses	2	
Buffaloes	1	
Rabbits	1	
Turkeys	2	
Bees	1	

Livestock genetic resources will be expected to play increasingly important roles in the agricultural and social economies of the country due to increasing demand for livestock products. The main production objectives of small-scale livestock farmers, who are the vast majority of livestock producers, are income generation and savings, meat and milk production for home consumption, manure, etc. Because of the variety of critical functions for which livestock are used, and the widespread participation in livestock production, livestock play a major role in the alleviation of poverty throughout marginal rural areas.

Investment in livestock is a priority for many rural inhabitants, who view it as income generating. Livestock are also of traditional and cultural importance. Autochthonous breeds and traditional varieties constitute an important and valuable genetic inheritance. They possess qualities such as high fertility and resistance to diseases and parasites, which could prove very important in a changing economic and natural environment. Autochthonous genetic resources remain the best option for utilizing the environmental conditions of the areas.

Albania's agricultural products are destined for the local market. Exports are strictly limited to a limited number of agricultural products such as vegetables, fruits and eggs manufactured in industrial complexes. Domestic production fails to meet the food needs of the population. Even where domestic production is sufficient, imported products are competitive.

In response to actions stemming from global economic and market conditions, trends in agricultural development have begun to appear in agricultural production traditions that rely mainly on the use of local plant and animal genetic resources and in agro-tradition production systems.

Breeds and autochthonous ecotypes maintain their level of biodiversity and are a source of sustainable livestock production for farmers in rural areas, they also attract tourists, and make for special quality, traditional products.

The implementation of policies for the development of a centralized agricultural economy in the second half of the last century had a direct effect on the upset of the established genetic equilibrium, in an autochthonous genetic fund. Substantial transformations went through the genetic fund in all species of cattle, pigs, sheep, poultry and horses.

- During this period, almost 100% of the population of local cattle was subjected to crossbreeding with imported breeds
- About 80-85% of the sheep population was subjected to genetic improvement programmes that supported cross-population autochthonous breeds of improved sheep breeds, such as Cigaja and Merinos etc.

In Albania the genetic fund of farm animals **is characterized by a high level of mixing of autochthonous, local, and native genes** with exotic, imported breeds.

- Local pork was replaced with imported pigs such as Landras, Durok, Hepshir and Great White breeds.

Crossbreeding or substitution with imported breeds only survived the local populations of small ruminants and, perhaps, of cattle, pigs and poultry, which bred in deep mountain areas.

Among the species that did not undergo this genetic transformation process was goats. Giving even in terms of centralized economy, almost never became the object of the breeding programmes that consist on breeding, through crossbreeding, with genetically improved breeds. Consequently, even today populations of this species, in terms of genetics can be considered as autochthonous, developing at the primary level.

Currently in Albania the genetic fund of farm animals is characterized by a high level of mixing of autochthonous, local, and native genes with exotic, imported breeds. After all, the efforts made to inventory this fund and evaluations carried out in accordance with the procedures recommended by FAO, established the opportunity to present a general picture of the status of this fund. Autochthonous breeds are important for the Albanian livestock breeding sector.

In 2008, the Catalogue of Albanian Farm Animal Genetic Resources was published by the Ministry of Agriculture, Food and Consumer Protection. It includes a detailed description of 34 local autochthonous breeds/populations (20 goat breeds, seven sheep breeds, three cattle breeds, three pig breeds and a buffalo breed).

Table 5 Genetic and demographic consequences associated with risk categories

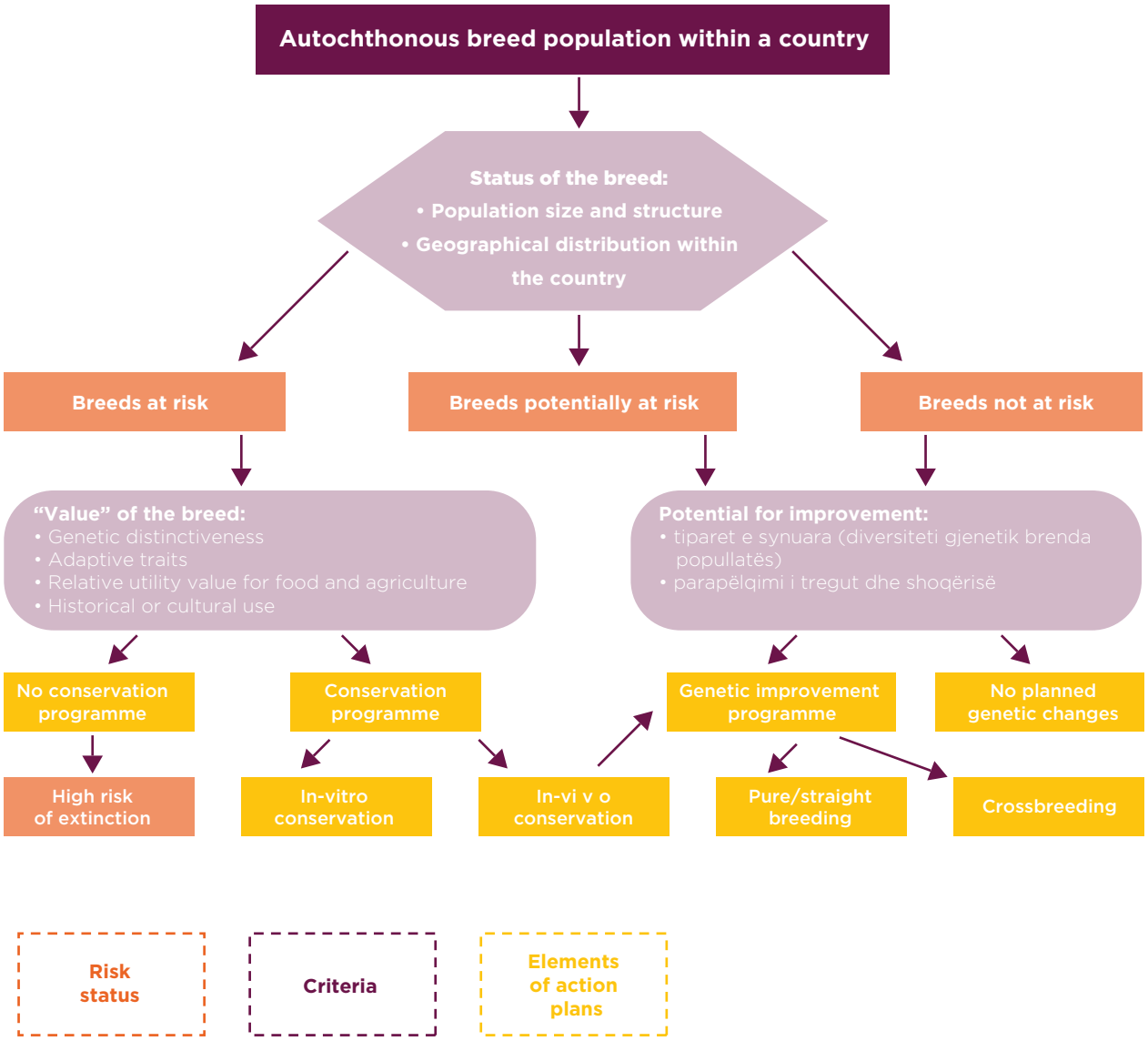
	Genetic consequences		Demographic consequences
Risk category	Loss of diversity	Genetic defects	Susceptibility to random events
Critical	++++	++++	+++
Endangered	+++	++	+
Vulnerable	++	+	
Not at risk	+	+	

Note: the number of plus signs corresponds to the severity of the negative consequence. FAO. 2013

Information is provided for the main morphological characteristics – conformation, production, size of population, numbers of reproducers, the production system, needs to undertake actions for conservation and sustainable use. On this basis, several risk categories are defined according to the FAO.

The genetic and demographic consequences associated with the different risk categories are shown in Table 5. The higher the risk category, the more unfavourable the genetic and demographic consequences and the more urgent the need for action. If the risk category is high, the breed suffers greater loss of diversity due to inbreeding depression and loss of alleles. It also faces greater risk of extinction due to random events such as disease outbreaks, natural disasters and even low fertility rates or unequal sex ratios among the offspring.

Fig.1 Flow chart for the National Management of Animal Genetic Resources



Note: Originally published in FAO. 2007. The State of the World's Animal Genetic Resources for Food and Agriculture, edited by B. Rischkowsky & D. Pilling. Rome (available at http://www.fao.org/docrep/010/a1250e/a1250e00.htm).
Figure 1 presents methods for identifying breeds that are at risk and are therefore candidates for conservation, including assignment of breeds to categories based on their risk status.

2 Institutional and legislative framework

2.1. THE GOVERNMENTAL INSTITUTIONS RELATED TO THE MANAGEMENT OF AUTOCHTHONOUS GENETIC RESOURCES IN FARM ANIMALS

2.1.1. The ministry of agriculture and rural development (MARD)

is national authority responsible for the conservation and sustainable use of plant and animal genetic resources for agriculture and food. The General Directory of Agriculture, Food Security and Rural Development Policies prepares regulations focusing on conservation and management of agrobiodiversity, that legally encourages support for autochthonous animal.

The Sector of Livestock and Rural Development Policies and Strategies is responsible for the sustainable development of livestock production in the country through the drafting of legislation, sector strategies and development policies, as well as programmes for the protection, improvement and preservation of animal genetic resources. Its aim is to promote the growth of livestock production, the creation and propagation of breed values and the preservation of the genetic variability of farm animals.

To help the Ministry fulfil its responsibility there was a national network of Agricultural Research Institutions, which in 2006 were reorganized as the Agricultural Technologies and Transfer Centres (ATTC). The Ministry of Agriculture, 11 years ago, with the technical support of the FAO, established the National Network for AnGR. After this,

The restructuring of extension services in regional agencies was accompanied by **a reduction in the number of zootechnical specialists in these structures, whose role is important** in the conservation and sustainable use of autochthonous animal breeds/ecotypes in the country.

conservation, management and sustainable use was led by the National Coordinator of AnGR. The network became responsible for the whole country. Each of 12 regional coordinators has operated in the field by activating subnetworks at a regional level. These consist of specialists of animal production, agricultural extension service, veterinarians, AI technicians and farmers. At the regional level there are:

- Four regional agricultural extension agencies and
- Four regional veterinary service agencies.

The restructuring of extension services in regional agencies was accompanied by a reduction in the number of zootechnical specialists in these structures, whose role is important in the conservation and sustainable use of autochthonous animal breeds / ecotypes in the country.

In Albania, MARD is tasked with the management of livestock resources (including endemic livestock), with three primary goals: to promote livestock raising activities within the context of agricultural development, to promote the improvement of animal production, and to maintain and improve animal health. MARD takes the lead role in livestock programmes.

2.1.2. Ministry of tourism and environment (MTE)

The MTE is responsible for drafting biodiversity-related legislation and its implementation. It is the national authority for the conservation and sustainable use

of biodiversity, protected areas, protection of nature, sustainable development and the management of forestry and pastures, etc. It establishes the main goals for biodiversity protection, prepares programmes and strategies for their implementation, establishes new regulations in this field and coordinates the implementation of the National Strategy. MTE is cooperating with MARD regarding agrobiodiversity. All activities must be directed through the Directorate of Biodiversity and Protected Areas (DBPA).

2.1.3. Research institutions

During 2005 – 2006, MARD restructured the Agricultural Research Institutes under its administration with the implementation of Government Decision No. 515, dated 19 July 2006 "To restructure research institutes under MAF & CP." According to the decision, five ATTCs and the Institute of Food Safety and Veterinary (FSVI)-Tirana were established.

Institute of Food Security and Veterinary (IFSV) and Agricultural Technology Transfer Centres (ATTC's) of Fushë Krujë, Korça, are public institutions that play an important role through cooperation with the national network for the conservation and sustainable use of AnGR. These are the public institutions with the responsibility of supporting and collaborating with other stakeholders for the implementation of the programmes and projects in the field of conservation and sustainable use of AnGR. Priorities and studies will be identified for this issue through visits and meetings in these centres.

2.1.4. High agriculture universities

The Agricultural University of Tirana and the Agricultural University of Korça are public universities with specialist animal production curricula. Also, these universities are important scientific centres and conduct scientific research in the field of animal genetic resources.

2.1.5. The national agency of protected areas in albania (NAPA)

is part of the Ministry of Tourism and Environment (MTE) It is responsible for the management, protection, development, expansion and operation of Albania's protected areas, which today account for about 16% of the Territory of Albania.

NAPA manages the network of protected areas and other natural networks as Natura 2000 under management plans. In order to carry out their duties and responsibilities these institutions cooperate with different institutions, agencies and various international organizations.

2.2. NON-GOVERNMENTAL ORGANIZATIONS RELATED TO THE MANAGEMENTOF AUTOCHTHONOUS GENETIC RESOURCES IN FARM ANIMALS

This part of the report will list non-governmental organizations that operate in the development of livestock in Albania in general and the conservation and sustainable use of autochthonous breeds / ecotypes in farm animals.

Non-governmental and non-profit associations in livestock include the Livestock Entrepreneurs Association of Albania (LEAA), ALBAGENE, the National Association of AI Operators, BLEKALB Foundation – Science, Technology and Extension Service for Farms Development, Small Ruminants' Breeders' Association (SHFBI) and Rural Association Support Programme (RASP), among others, are active in the treatment of issues for AnGR conservation and sustainable use.

The main financial sources for these organizations are grants awarded by various international institutions such as GEF / UNDP, the World Bank, etc. and in the framework of bilateral cooperation through various agencies such as GIZ. LEA, ALBAGENE, BLEKLAB Foundation, and RASP.

Some of the projects carried out by international organizations have enabled the creation and cooperation of livestock farmers in the associations, but after the completion of the project there was no sustainability. MARD has not applied support schemes to farmers or animal breeding associations of autochthonous animal breeds / ecotypes.

2.3. LEGAL FRAMEWORK

Albania developed an intensive legislative process between 1992-2018 periods for the protection, use and development of biodiversity.

2.3.1. The Legal Acts Related To ANGR

The framework law on livestock is Law No. 9426, dated 20 January 2008 "On Livestock Breeding" is one of the most important regarding animal genetic resources. This law has been subject to several amendments over the years. Its purpose is to encourage improvement and protection through breeding and conservation programmes (in-situ, ex-situ in vivo, ex-situ cry- conservation) and sustainable use.

The Act regulates the following matters:

- Livestock conditions and practices for a good breeding, methods and technologies for animal breeding and feeding;
- Criteria for the preparation and approval of breeding programmes;
- Gene funds and native breeds;
- Professional services in the area of animal breeding;
- Establishment and administration of gene banks;
- Establishment of breeders' associations; and
- Trade of breed materials;

The law provides for the provision of genetic resources and the funds for conservation and maintenance of genetic resources through the state budget and/or private donors, as well as the modalities and procedures of conservation and maintenance of genetic recourses as defined by the Council of Ministers. The articles in the law provide the necessary scope for drafting regulations on certain issues related to the conservation of farm animal genetic resources.

The "Livestock Breeding Act" treats issues related to in-situ and ex-situ conservation of AnGR only in general terms. The legislation and/or the regulatory framework does not contain any statement regarding the in-situ, ex-situ in vitro or in vivo conservation as different complementary alternatives for the conservation of local animal breeds at risk of extinction. In the current legislation the subsidy issues are treated, but the

procedures to be carried out make it difficult to implement them. It forces the Council of Ministers to decide, case by case, on the methodology and procedures used to implement the subsidies. This legislative practice has been followed until today in the case of buffaloes and native small ruminant breeds that are declare at risk.

The analysis of these decisions shows, that in both cases, the subsidies are effective instruments, but not enough to solve the problems. For the in situ conservation programmes to be regarded as successful, the effective way is the combination of the in situ conservation programme with the sustainable use of animals that enables the realization of the economic added value.

This is because this legislation does not give concrete details on mechanisms and legal instruments that should be used for implementing the conservation programmes. The legislative development and implementation needs to take into account the strong linkages between technical aspects of farm animal genetic resources management (e.g. breeding programmes and conservation of breeds at risk) and other factors that may influence the general implementation of the legislation (e.g. influencing decisions relating to breeding programmes or the keeping of traditional breeds). Albanian legislation in the field of livestock must be in line with EU legislation, although some efforts have been made by MARD staff. Cooperation with international organizations in this field is indispensable.

LAW NO. 9587, DATED 20 JULY 2006 "ON THE PROTECTION OF BIODIVERSITY"

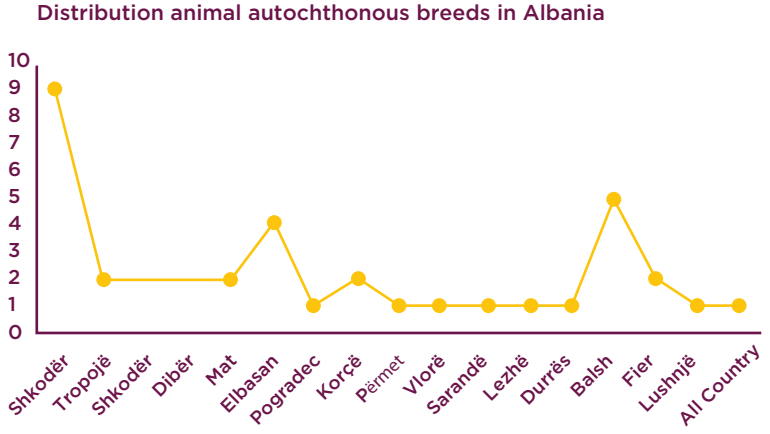
Chapter six deals with animal autochthonous breeds / ecotypes in farm animal that are important for food and agriculture. Articles 29, 30, 31 legislate for the conservation and use of autochthonous breeds / ecotypes of farm animals, ex-situ / in situ conservation methods, and identification etc. Article 30 says that the Ministry of Agriculture, Food and Consumer Protection, through MARD, must maintain a register of the breeds and indigenous species that are important for food and agriculture. This provision provided by law has not been implemented to date. Additionally, the Ministry of Agriculture, Food and Consumer Protection, through MARD and its biodiversity inventory and monitoring network, coordinates research, inventory and monitoring work to support the conservation and sustainable use of indigenous breeds and varieties important for food and agriculture.

3 Animal genetic resources (autochthonous animal breeds/ecotypes)

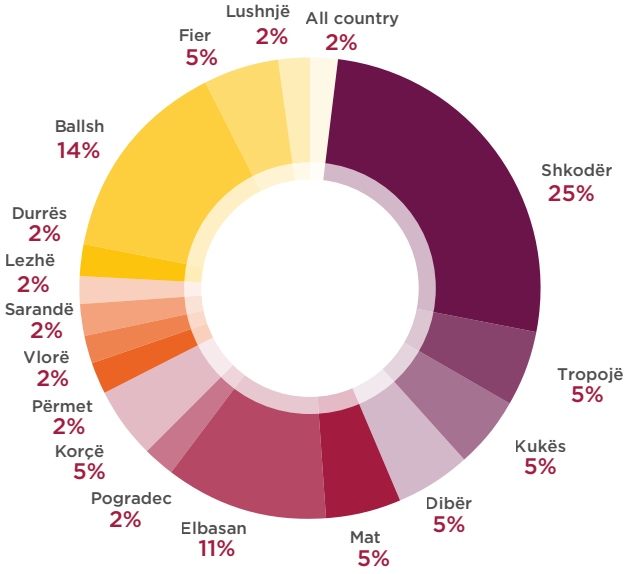
3.1. POPULATION SIZE AND STRUCTURE

Population size of autochthonous breeds and ecotypes and structures

Graph.4 Geographical distribution of autochthonous animal breeds / ecotypes

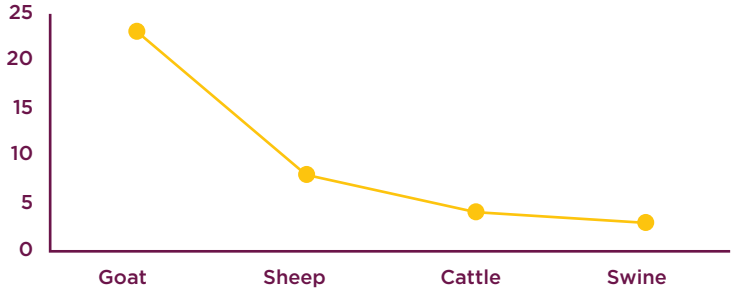


Graph.5 Number species /breeds/ecotypes by %



The geographical distribution of autochthonous animal breeds / ecotypes in the country indicates a significant dispersal.

Graph.6 Structure/species



Species structure predominates autochthonous goat breeds / ecotypes followed by sheep breeds / ecotypes. The Shkodra region is rich in autochthonous farm animal genetic resources, with about 25%.

Table 6 Distribution of native breeds/ecotypes in the Shkoder region

No	Native Breeds/Ecotypes	Shkoder Area
1	Goat of Velipojes	Velipoje
2	Goat "Capore e Dragobisë"	Reç
3	Goat of Hasi	Reç
4	Goat "Spotedd of Kallmetit"	Postribe
5	Sheep breed "Shkodrane"	Shirokë, Oblike, Velipoje
6	Sheep breed "Bardhoka"	Mjedë, Theth
7	Swine "White"	Velipoje
8	Swine "Spotted of Shkodra"	Velipoje
9	Swine "Pig with wattle"	Velipoje

The Shkodra region is distinguished for its great richness in the biological diversity of the landscape. It is regarded as one of the richest regions for species and breeds of animals and plant varieties valuable for the development of agricultural and livestock production. Increased tourist capacities in this region where these animals breed, is a factor that affects the increasing of size of the populations of these native ecotypes or breeds.

In the region of Shkodra, several projects have been implemented by governmental and non-governmental organizations in the field of tourism development, having a significant impact on the breeding of breeds/ecotypes of farm animals.

Photo: "Capore e Dragobisë"/Dragobi -Tropojë goat

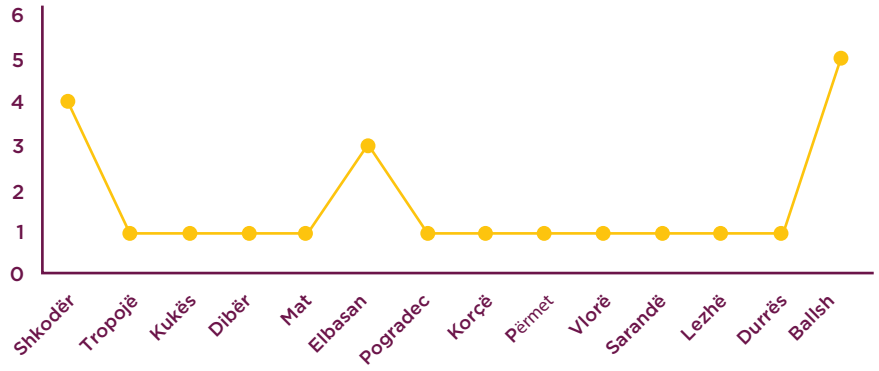
3.1.1. GOAT

The goat species occupies an important place in the domestic breeding, thanks to its valuable products such as milk, meat and other byproducts.

In Albania, goats occupy an important place for livestock. There are currently about 1 million goats in the country. They are widespread in mountainous and hilly areas, in areas where there is more natural grassland. About 97% of goats are native breeds or ecotypes and 3% are crossbreeding with the “Alpine” and “Sana” breeds. Goats are the only species that have not been subjected to mass crossbreeding.

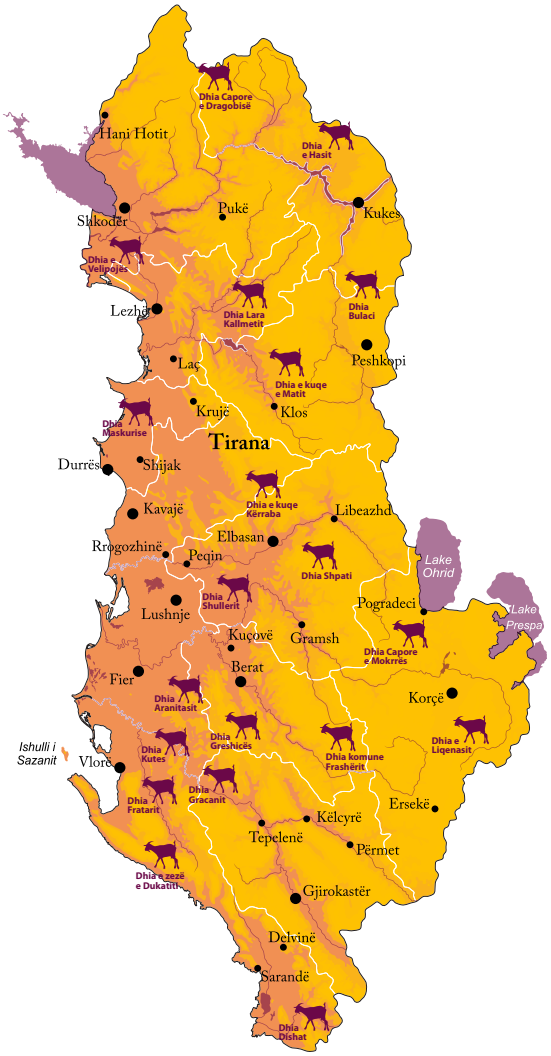
Native goat ecotypes have been created for centuries with the passionate work of farmers. Through continuous selection of generations, they have inherited native ecotypes that for Albanians are a great genetic, traditional asset. The story of the creation of these ecotypes is a living story full of passion and numerous sacrifices for survival. Natural selection has favoured balanced genotype development. They are preserved in their area, taking their name from the geographical region where they are reared as “Goat of “Velipojes”, Goat “Capore e Dragobisë”, Goat of” Hasi”, Goat of ”Skuqe Mati”, Goat of “Shpati”, Goat “Red of Krraba” Goat “Capore of Mokrra”, Goat “Black of Dukatit”, and Goat “Spotedd of Kallmetit”.

Graph. 7 Distribution of autochthonous goat breeds in Albania



In Albania, goats are generally similar to the goats of the Balkan region and from the chronological point of view, originated from Capra Priska. In general, Balkan goats have hair and no wool. Between 70-90% of Albanian goats flocking in the northern part of Albania are red coloured, whereas in the south, there are spotted, chestnut, black and red coloured. According to the Catalogue of Albanian Farm Animal Genetic Resources/2008, there are 20 goat breeds / ecotypes in the country's farms.

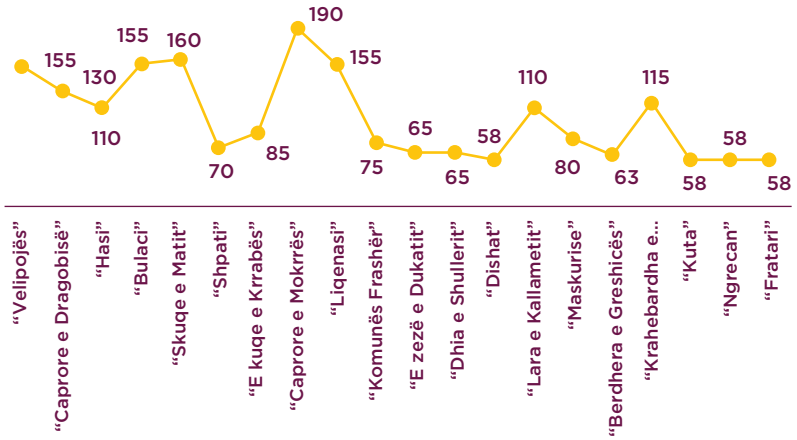
2. Map of breed / ecotype of indigenous goats in Albania



Thanks to the adaptation of the environments, the quality of the natural pastures, the native goat ecotypes are much more suitable for adapting to the grazing environment, to produce more quality livestock (milk, meat) products and lower cost, bioproducts etc. The development of culinary in tourist areas requires natively bred kids and their milk products and byproducts.

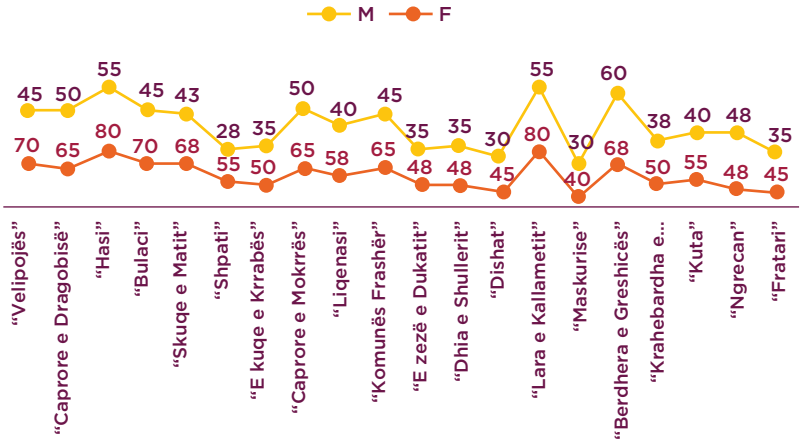
The origin of Albania's goats and their morph-physiological characteristics are included in the group of fur-goats with the combined direction of milk - meat and meat - milk (Goat of Has) taken from them and a small amount of wool.
Studies have been carried out by state institutions and non-governmental organizations on the existing animal autochthonous genetic fund, their distribution and localization, morphological and phenotypic traits, and some breed economic traits.

Graph 8 Average goat milk production / Lact.1



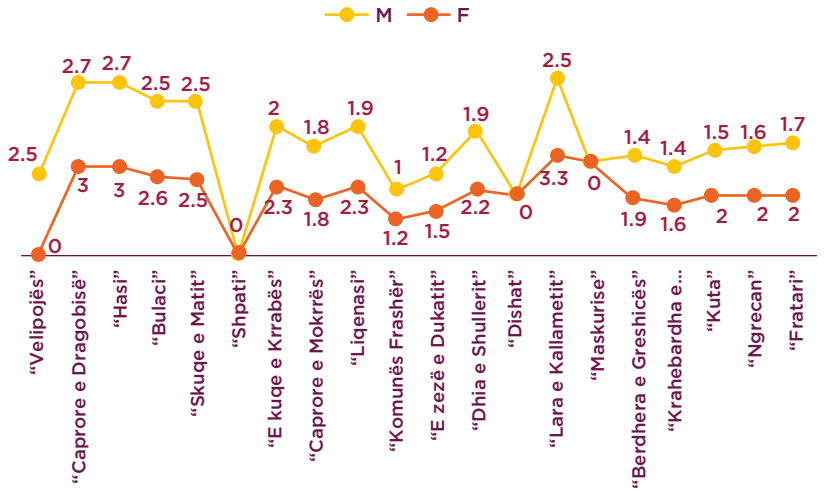
Graph No. 8 shows the average milk yield in lactation one per goat of local breeds / ecotypes. The average milk production for goat ecotypes ranges from 190 kg to 58 kg.

Graph 9 Average goat live weight (kg)



Graph No. 9 shows the average goat live weight (kg) per male and female goat of local breeds / ecotypes. The average live weight for goat ecotypes ranges from 80 kg/ for males to 60 kg/ for females.

Graph 10 Average goat birth live weight



The average weight at birth of the kids is given in graph No. 10. Birth live weight varies from 3 kg in males to 2.7 kg in females. Whereas the average weaning per kid is from 21 kg for males to 18 kg for female kids.

Graph 11 Average goat weaning live weight

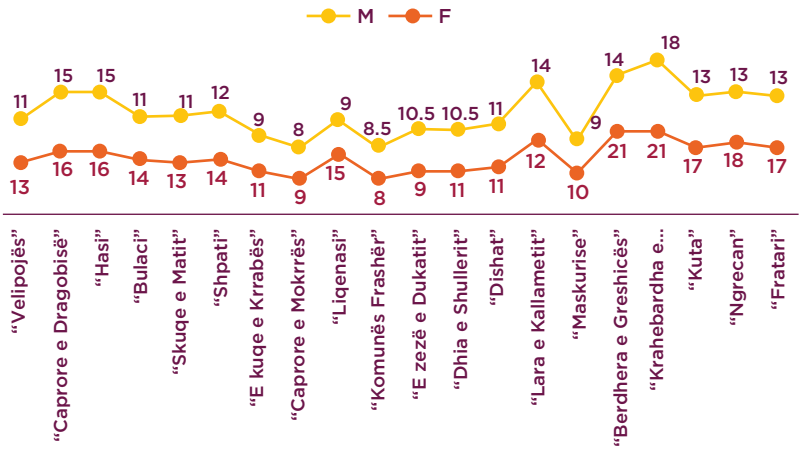
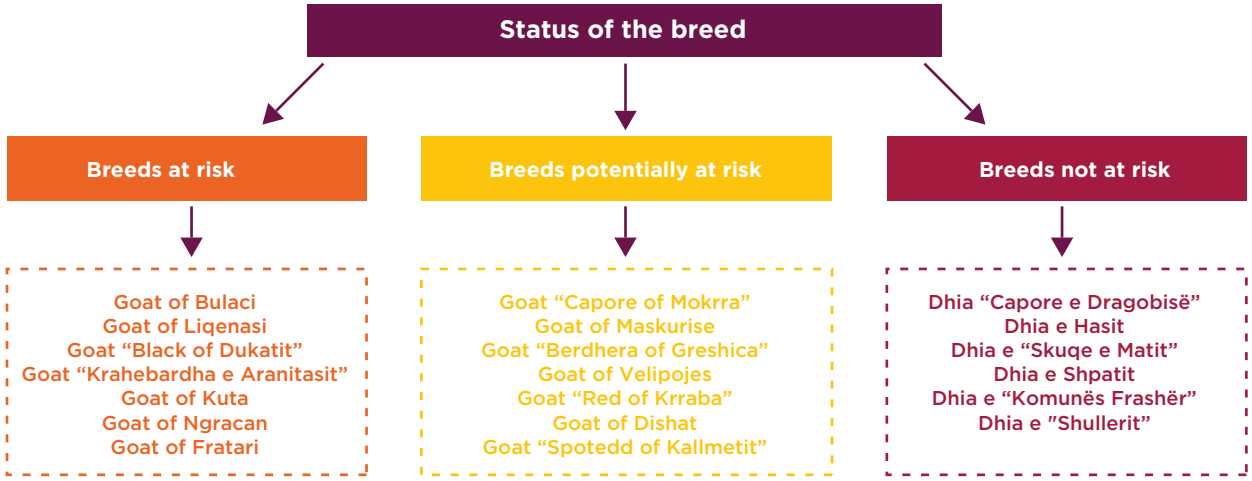


Fig.2 Risk status for native/local goat breeds population



- Conservation programmes should be undertaken for the group of breeds / ecotypes of local goats that are in the "at risk" status.
- For the group of local goat breeds / ecotypes that are "potentially at risk" or "not at risk", programmes should be undertaken for improving the target traits (genetic diversity within population), taking into consideration the market and society.

Table 7 The population of native /local goat breeds

No.	Ecotype/ Breed	Number 2008 **	Number / 2013	Number / 2019	Trend
1.	Capore of Dragobia	3,500 – 3,800	10,200	5.442	▼Decreasing
2.	Hasi	11,000 – 12,000	43,500		▲Increasing
3.	Velipoja	900 - 950	2,200		▲Increasing
4.	Red of Mati	14,500	47,800		▲Increasing
5.	Lara of Kallmeti	850 - 900	900	*800	▼Decreasing
6.	Capore of Mokrra	350 - 400	5,200	1,089	▼Decreasing
7.	Black of Liqenasi	3,500-4,000	3,150		▼Decreasing
8.	Dukati	1,800-2,200	6,500	15,703	▲Increasing
9.	Muzhake		54,600		— Stable

Source: Statistical evaluation data (MARD, 2013, 2019)
** Source: CABRA Project, 2018*
***Source: MAFCP, 2008, Catalogue of Albanian Farm Animal Genetic Resources*

The main characteristic of the genetic stock management process in the population of native and local goat breeds is implemented through the breeding programmes by the farmers themselves. With such programmes, the selection of bucks should be understood, using the empiric information and organization and implementation of their turnover scheme in village farms only. This also has negative consequences. From the phonotypical point of view, the species dominated heterogeneity which shows significant deficiencies in the selection of potential animals of local breeds;

- In a lot of cases missing matriculation is the initial link of breed work, which hampers in-situ conservation of development within the herd of phenotypic traits;
- The reproducers do not circulate the same way between different farms, worsening the inbreeding coefficient with the consequence of decreasing the production of milk, meat etc.
- Uncontrolled crossbreed bucks with different local breeds, low fertility in herds.
- Poor knowledge of the breeding programme among farmers, a lack of information and poor cooperation among farmers to exchanging knowledge etc.

Table 8 Current status of native / local goat breeds

No.	Racat/Ekotipet Vendase të Dhive	Statusi aktual	Arsyet e statusit aktual
1.	Ecotype "Goat of Velipoja"	Vulnerable	Low production and low income for family farms.
2.	Ecotype "Capore of Dragobia"	Not endangered	Interest of farmers to produce meat and milk for family consumption and difficulties to process and market. High demand for kid meat and cheese in developed tourist area (Valbona).
3.	Ecotype "Goat of Hasi"	Not endangered	Interest of farmers to produce meat and milk for family consumption and difficulties to farming the cattle and sheep in the harsh conditions of mountainous areas.
4.	Ecotype Goat "Red of Mati"	Not endangered	Interest of farmers to produce meat and milk for family consumption and difficulties in farming the cattle and sheep in the harsh conditions of mountainous areas.
5.	Ecotype "Red of Krraba"	At risk of extinction	Increasing interest of farmers to farming one or two cows in their family farm over goat "Red of Krraba".
6.	Ecotype "Capore of Mokrra"	Critical	Lack of infrastructure for processing and marketing of cheese.
7.	Ecotype " Black of Liqenasi"	At risk of extinction	Low production and increasing the interest of farmers for farming the cows in their family farm.
8.	Ecotype "Black of Dukati"	At risk of extinction	High demand for kid meat and cheese in developed tourist area.
9.	Ecotype "Spotted of Kallmeti"	Vulnerable	Interest of farmers to produce milk and meat productions for local market and tourists.

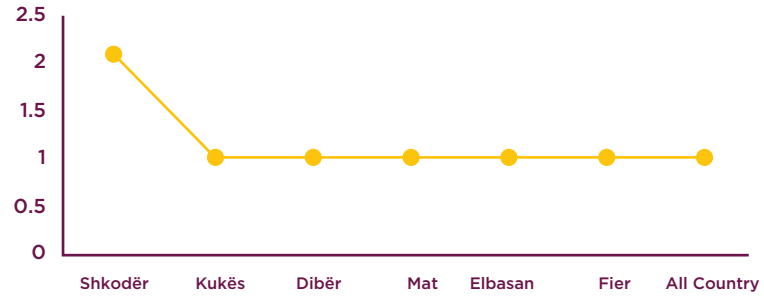
- In recent years, the interest of farmers mainly in hilly areas to cross native breeds / ecotypes of goats with exotic breeds has increased.
- Consequently, the level of the genetic erosion increases and the urgent need for implementation the in situ conservation programme is evident.

3.1.2. SHEEP

The Albanian local sheep breeds (autochthonous) are approximately 40% of the sheep population. They hold a dual purpose for milk and meat and have a very good adaptation to the environment and the hard conditions of their breeding. Sheep breeding is a long-held tradition in Albania.

Photo: Sheep breed "Bardhoka" – Mjedë, Shkodër

Graph.12 Distribution of autochthonous sheep breeds in Albania

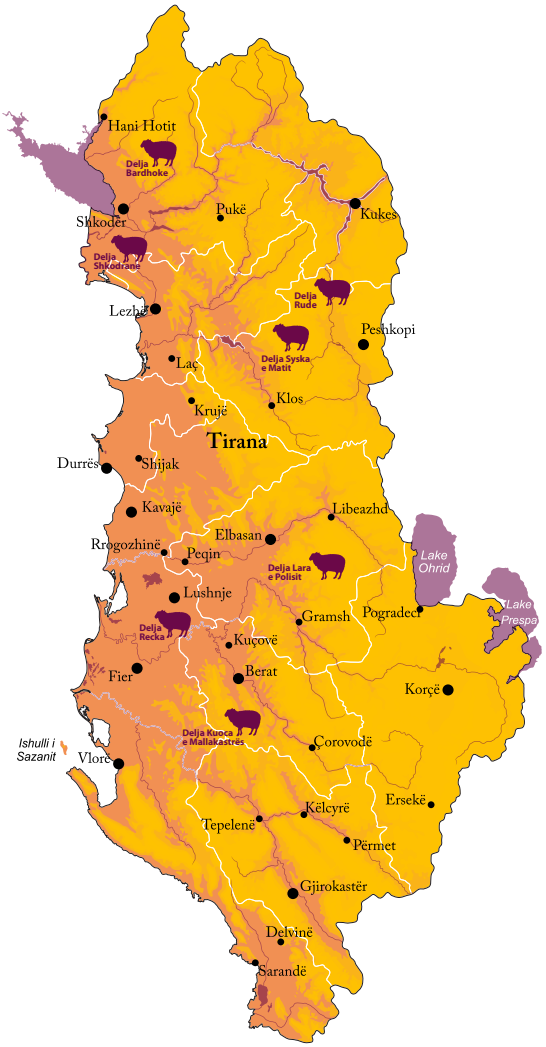


The breed structures of northern sheep (Alps) and those in the northeast region stands out for its great racial richness in the richest biological diversity in the development of livestock product. This wealth of indigenous germoplasm requires passion, appreciation, preservation and utilization of values for the development of agro-tourism in the alpine areas of Albania. The current status of the four most important native sheep breeds "Bardhoka", "Ruda", "Syska Matit" and "Recka" are not at risk. Farmers use these native breeds for commercial production. Between them, these four sheep breeds produce about 45% of total sheep milk and about 35% of the total production of small ruminant meat.

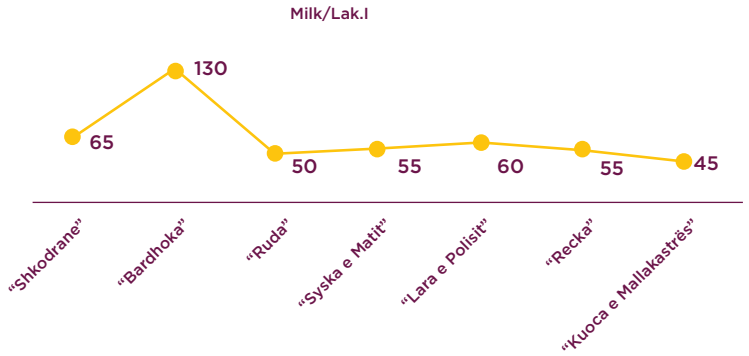
One of the most prominent breeds of sheep breeding in Albania: milk - meat - fur running sheep is the autochthonous breed sheep “Bardhoke” which is widespread mainly in the northwestern part of the country and specifically in the Alps, in the Tropoja, Has, Puka, Malesia e Madhe, Shkodra, Mirdita, Lezha etc. regions.

According to the Catalogue of Albanian Farm Animal Genetic Resources/2008, there are seven sheep breeds throughout the country’s farms.

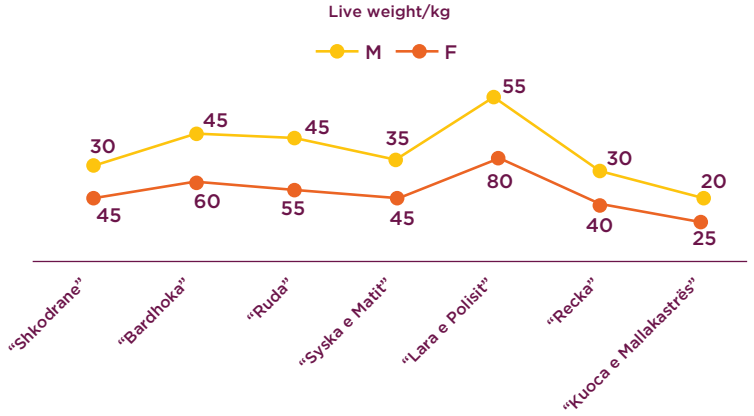
3. Map of breeds of indigenous sheep in Albania



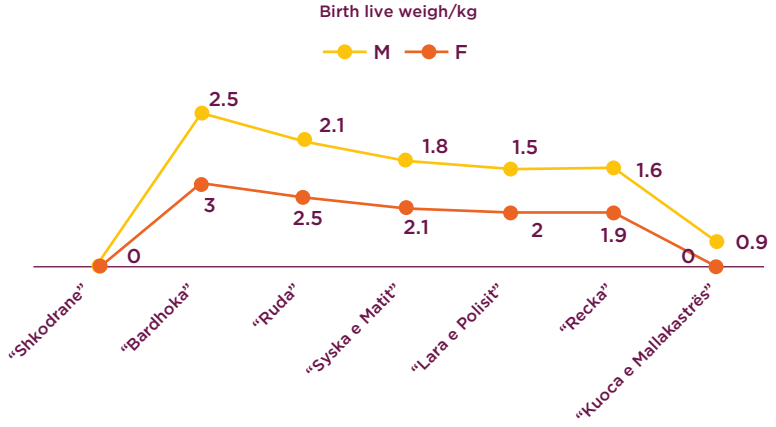
Graph. 13 Average sheep milk production / lact. 1



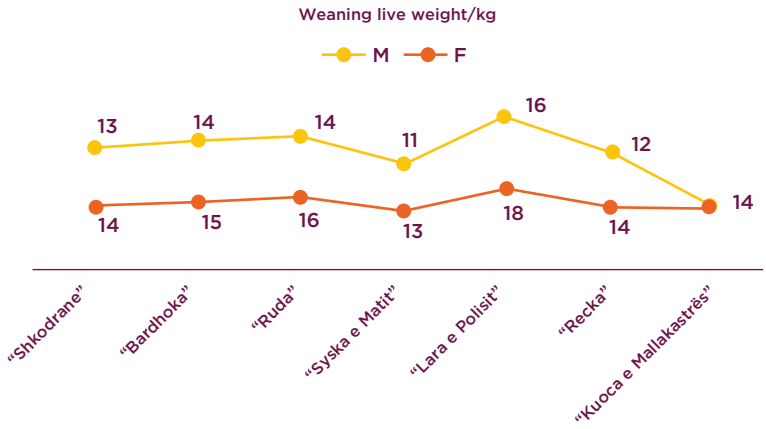
Graph.14 Average sheep live weight (kg)



Graph. 15 Average lamb birth live weight



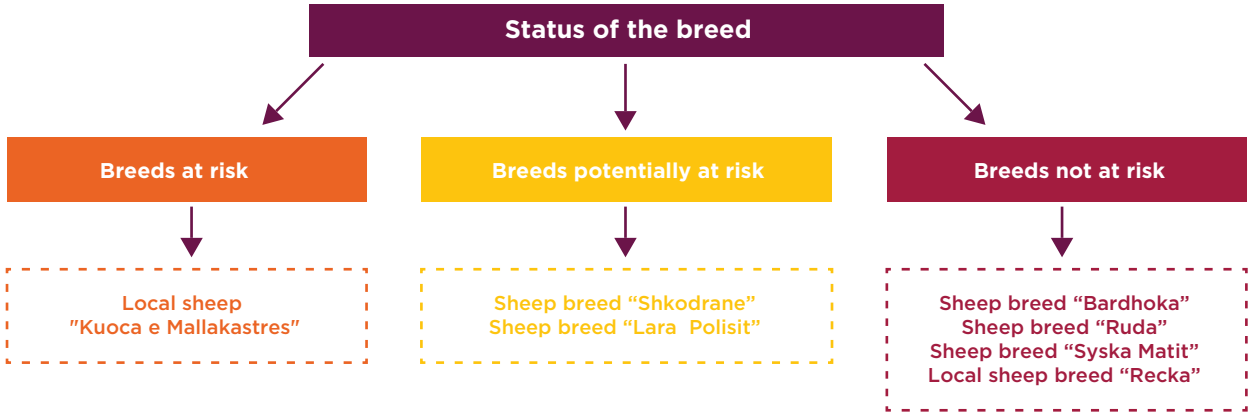
Graph. 16 Average lamb weaning live weight



Graph No. 13 shows the average milk yield in lactation one per sheep of local breeds. The average milk production for sheep ranges from 130L to 45 L. Graph No.14 shows the average sheep live weight (kg) per male and female sheep of local breeds. The average live weight for sheep ranges from 45- 80 kg/ per male to 20 - 55 kg/ to female.

The average weight at birth of a lamb is given in graph no.15. The birth live weight varies from 1.1 kg to 3 kg in males, to 0.9 kg to 2.7 kg in females. Whereas the average weaning live per lamb is from 18 kg for males to 12 kg for female lamb.

Fig. 3 Risk status for native/local populations of sheep breeds



- Conservation programmes should be undertaken for the group of breeds / ecotypes of local sheep that are "at risk".
- For the group of local sheep breeds / ecotypes that are in the status of "potentially at risk" and "not at risk", programmes should be undertaken for their improvement to hit the target traits (genetic diversity within population), taking into consideration the market and society.

Table 9 The population of local sheep breeds

No.	Sheep Breed	Number 2008 *	Number / 2013	Number / 2019	Trend
1.	"Rrecka"	275,000 – 300,000	675,000		▲Increasing
2.	"Ruda"	82,000 – 89,000	87,500		▬ Stable
3.	"Bardhoke"	40,000 - 45,000	45,600		▲Increasing
4.	"Shkodrane"	450 – 500	468	668	▲Increasing
5.	"Syska Matit"	2,900 - 3,200	11,200	689	▼Decreasing
6.	"Lara of Polisit"	320	720	427	▼Decreasing

Source: Statistical evaluation data (MARD, 2013, 2019)

**Source: MAFCP, 2008, Catalogue of Albanian Farm Animal Genetic Resources*

Table 10 Current status of local sheep breeds

No.	Local Sheep Breeds	Current Status	Reasons for Current Status
1.	Native breed "Shkodrane"	Critical	Small animal with low milk and meat production. Experiencing decreasing interest from farmers for wool.
2.	Native breed "Bardhoka"	Not endangered	Increasing interest of farmers producing milk and meat. Animal with good production performance.
3.	Native breed "Ruda"	Not endangered	Increasing interest from farmers producing meat. Animal with good production performances
4.	Local sheep Native "Syska Matit"	Not endangered	Increasing interest from farmers producing meat. Animal with good production performance.
5.	Native breed "Spotted of Polisi"	Critical	Migration of population to urban areas. Lack of infrastructure for marketing the production.
6.	Common breed 'Rrecka"	Not endangered	Alternative to producing milk and meat in most rural areas production is traditionally low.

The following breeding systems for small ruminants are implemented in Albania:

- **Extensive system** – mainly based on pasture during the year as well as in some periods a limited amount of concentrated and dry foods, used for the last stage of pregnancy.
- **Semi-intensive system** – based on the combination of grazing and feeding in the crib.
- **Intensive system** – based on keeping in stable condition (feeding in the crib), and applied to improvement of breeds of sheep and goats and their crossbreeds.

Farms that breed small ruminants are predominant in Albania. In these dominant farms is an extensive system, with small inputs. Depending on the size of the herd, farms that breed small ruminants apply different variants of this system:

Immigration system – This system has traditionally been practised and will continue to play an important role in the future on farms with herds of more than 50 to 100 small ruminants. It is the predominant system for breeding the sheep populations of the northeast and southern areas of Albania (Prefectures - Kukës, Dibër, M. Madhe, Gjirokastra, Saranda,) etc.

The breeds used are mainly autochthonous. Herds of livestock move from villages in the direction of mountain pastures and vice versa. Small family flocks are organized in early summer with big herds. The herds are run by village shepherds and move short distances for grazing in summer, alpine areas. The herds return to the village at the end of autumn and are kept throughout winter season. During the calving period they are fed grass and a little concentrate. During the spring season the herd pastures around the village. This system also has positive effects on the maintenance and development of cultural traditions, agro-ecosystem and agro-tourism development.
It is not only the genetic improvement programme which is implemented on Bardhoka and Ruda nucleus farms. The selection of reproducers is made by the farmers themselves, empirically. To increase the milk and meat productions, during last 20 years the interest of the farmers has focused on the crosses as their native sheep breed with exotic breeds. Albania has a good number of indigenous sheep farm animals. Among these breeds are Shkodra sheep and Polis sheep at risk of extinction.

The Small Ruminant Station (ATTC – Korça – Public Institution) has the responsibilities to organize and implement the conservation programmes and breeding improvement through crossbreed schemes. Department of Livestock has implemented a breeding programme, with the objectives of:

- Preserving the genome of the two at-risk breeds Shkodra sheep and Polis sheep without affecting their genetic variability. Ex-situ, in vivo conservation of the two breeds with a population of 50 sheep.
- Developing themselves for a relatively long time (30 years) in order to homogenize the genetic constitution without an inbreeding decline. Implement breeding and genetic programmes for their sustainable in vivo preservation. Implement the network of breeding scheme, mating, (collection and production herds) with these populations.
- Increasing the number of heads in the area of origin to get out of the critical phase. The programme aims to provide technical and economic support to farmers.

3.1.3. CATTLE

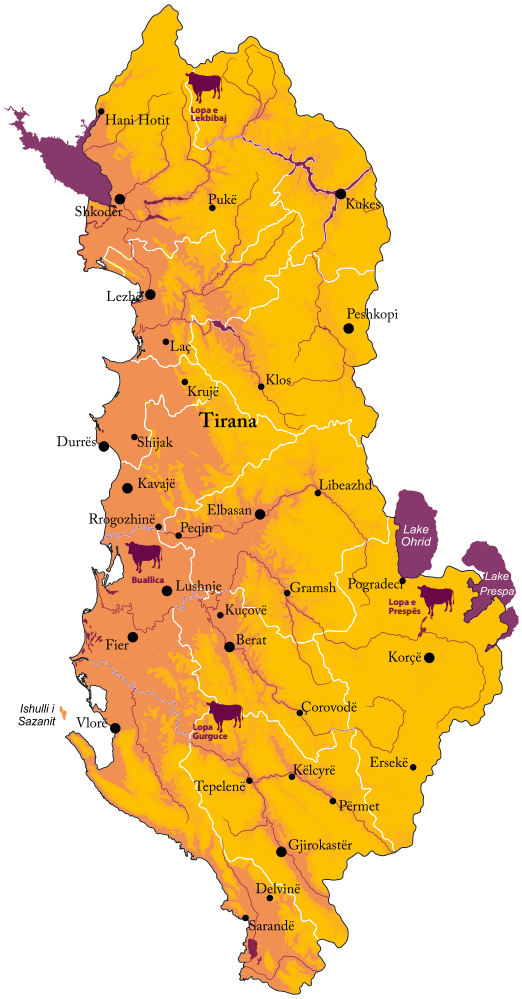
Photo: Ilyric Dwarf Cattle "Lopa e Lekbibajt" – Tropojë

Albanians have dealt heavily with livestock since ancient times. This is because of its climatic conditions offering land for regional animal breeding. Until the beginning of the twentieth century in Albania, only the local breed of cattle existed. Animals with

special phenotypic values and traits were kept and bred in Albanian territories. In various reports these cattle are referred to as Illyric Dwarf Cattle. It was classified in the group of Bos Taurus Brachyecerous. Only in marginal mountainous areas, were the projects for genetic improvement of local cattle by using exotic breed bulls not carried out. The relationship between human and bovine stretches back to a very early time. Today, cultivated cattle provides milk and meat to serve the nutritional diet of the human population.

For centuries, cattle was considered as an indicator of health. Even today some nations and cultures, cattle owners remain as a symbol of health and wealth wherever sold

4. Map of breeds of local cattle in Albania



or purchased in the market. Cultivated bovine widely entered the human food diet in early time. It provides protein through milk and meat.

Cattle breeding helps meet the daily needs for food. This and the ease of feeding them makes them popular. Additionally, thanks to their unique digestive system cattle can digest insoluble plant, and in pasture, cattle can easily turn the grass and plants into a food source that humans can easily use.

The first investigating expeditions to be methodically prepared, were carried out between 2003 – 2006. (K. Kume et al). According to the Catalogue of Albanian Farm Animal Genetic Resources/2008, three local cattle breeds exist in the country's farms.

Local cattle "Cow of Prespa" – Various publications show that in the region of Prespa's Lakes, which lies in south-east of Albania, in the border with North Macedonia and Greece, a "Dwarf Cattle" is present. According to Dr. Th. Schultze – Westrum "at mountain zones of this region, cows have been seen grazing that looked like goats".

In remote mountain areas of Albania, the opportunities for the existence of local cattle are reported by different observers, Dr. Berthold Traxler in SAVE Foundation Magazine, wrote in 2001 "it is important to be studied if the Busha cattle breed – Kosovo, has genetic similarities to Illyric Dwarf Cattle that are situated in the border zone of Albania. The differences as a consequence of crossbreeding with exotic breeds are not observed because these zones of Albania have always been isolated.

Local cattle population – Illyrian Dwarf Cattle – Lekbibaj Zone – Tropojë. Lekbibaj Zone is one the most isolated of Tropoja District. There is no motorway to travel to the villages of Salce, Palc, Brise, Curraj and Betash. Therefore, the possibilities for entering exotic breeds and crossing them with local breeds have been and are very limited. The expedition for the identification of local cattle population in this zone, isolated on the north of the Albania, proved the hypothesis for its existence. Morphology shows a short body, strong skeleton, narrow buttock and undeveloped udder. It has a large head, developed mandibles, and an eye orbit. It has a mantle colour of reddish or light brown, with grey shade. Slightly pointing back horns are high, thin and pointed. It possesses bleached white lips and black vulva.

According to the data collected so far, the size of the cattle population is 550 - 650. Trends to increase the number of cattle and in situ conservation of this cow are on the rise, but the movement of the population from these areas to the cities has played a negative role. This supports the statistical data obtained in the Nikaj - Mërtur area, where in 1990 the cattle population from this race was 2,350 and at the end of 2011 was only about 650 (according to data Municipality Lekbibaj), (Leka (Sulaj) F. et al. 2013).

Local cattle population – Illyrian Dwarf Cattle – Sinanaj –Zone Tepelene. In the Sinanaj's and Dhemblan's villages, in the mountain area of Kendrevices, local cattle breeds have been identified. Their phenotypic profiles and body sizes are indicators that support the hypothesis that this population may be classified in local cattle – Illyric Dwarf Cattle. This population is referred to locally as Gurgucke (Flintstone). That expresses that it is an animal grazing on rough ground with a lot of pebble. The local cattle population of Illyric Dwarf Cattle is known by the name.

"Lopa Gurgucke" is one of the rarest relics of this native breed that in the past populated the south-western Balkans.

Currently, four populations are identified, which, based on the estimates of phenotypic and morph metric traits and molecular characterization are classified as native cattle breeds (Table No. 11).

Table 11 Population size of Albania native cattle breeds

No.	Native cattle breeds	Population size			Trend
		Total	Bull	Cows	
1	Illyrian Dwarf cattle named "Albanian Prespa Cattle"	750-800	18	500-550	▲Increasing
2	"Busha" cattle	600-650	14	400-450	— Stable
3	Busha strain "Lekbibaj cow"	650-700	20	500- 550	▲Increasing
4	Busha strain "Gurgucka"	250-300	8	150-180	▲Increasing
5	Illyric cattle "Red of Scutary"	45-50	4	25-30	▲Increasing

Table 12 Current status of native cattle breeds

Species	Local Breeds/ Ecotypes	Current Status	Reasons for Current Status
Buffalo	Buffaloes	Critical	Low economic interest for farmers.
Cattle	Ilyric Dwarf cattle "Albanian Prespa cattle"	Endangered	Low production and low income for family farms. Replaced by imported breeds and intensive crossbreed with them.
	Ilyric Dwarf cattle "Gurgucka cattle"	Critical	Low production and low income for family farms.
	Busha type "Lekbibaj Cattle"	Critical	Low production and low income for family farms.
	"Busha" cattle	Critical	Crossbreed with Jersey and Simmental cattle breed. Low production and low income for family farms.
	Illyric cattle "Red of Scutary"	Critical	Crossbreed with Jersey cattle. Low production and low income for family farms.

The native cattle breeds breed in small family farms in hilly and mountainous regions of the country, especially in isolated areas, under the conditions of the traditional production system.Family traditions for cattle keeping are preserved until today. They are kept for nine months in stables built near homes and for three months they graze in the meadows and alpine (mountains). Mountain pastures are used from the beginning of June until early September.

Mountain grasses are used for ruminants (goats and sheep) by mowing the meadow, where grass is prepared for food in winter. Each area has its mountain village set. Every family builds a barn near their home for breeding animals. Stables are generally simple. A dry place is used to build the stable, to protect cows from moisture and winds, as to be as isolated as possible from the strong currents of wind during the winter period. There are no pipes to supply drinking water for the animals, but tubs and buckets are prepared for water provision. A positive fact concerning the animal water supply is that there is sufficient water (spring or water) for every family to meet the physiological requirements. Selected bulls are used for natural matching, avoiding close inbreeding.

The cooperation between small-scale family farms consists in exchange of bulls for natural matching only. Regardless of the size of the farm, the identification of animals (ear tags) was established but not used for the aims of breeding programmes. The

breeding programmes in the cattle population are not implemented. Breed associations not are effective.

- Ministry of Agriculture, Food and Protect of Consumers, in 2007 (through MARD), funded a pilot project for local cattle identification in the Lekbibaj Zone and establishing the conditions for beginning an in situ conservation programme and sustainable economic use of this local cattle.
- With the financial and technical support of different donors and international agencies and NGOs, in situ conservation programmes were implemented for all native cattle breeds at risk of extinction. For the purposes of conservation and sustainable use, the farmers that breed Illyrian draft cattle "Albanian Prespa cattle" and "Busha" cattle were supported for building necessary capacity to implement the conservation programmes, as well as programmes for management and sustainable use of their animals, and enhancing the capacities to develop the traditional system of production and/or traditional processing methods.

3.1.4. BUFFALO

In 1938, the total buffalo population was about 25,000. Most buffaloes were situated in the coastal lowlands of Albania. During the years 1950-1990, the buffalo population was considerably reduced as a result of draining swamps, the mechanization of the agriculture, development of transport in agriculture and the high rhythm increase

of dairy cattle population. Recently, because of the political, social and economic transformations that brought about the disintegration of state farms and agricultural cooperatives, the buffalo population reduced drastically.

The causes that led to this situation were:

- the lack of a market or access to it for the sale of products
- the difficulty in providing sufficient income;
- the competitiveness of improved breeds;
- limited grazing capacity for this species, etc. The size of the population is 350 animals, including 38 bulls and 210 cows (MoAF, 2013).

In Albania, buffaloes are generally used as draught power. Meat production is chiefly provided by slaughtering young males. Milk is freshly consumed. There is no tradition for Mocarela cheese production. The management system of buffaloes is extensive. The main feed sources of buffaloes are: grazing, the cultivated forages, alpha-alpha and hay. A small intake of concentrated feed like maize or bran is used during the wintertime. Milk yield is low, about 380-480 kg. Albanian buffalo is classified into the group of Mediterranean Buffaloes. The buffalo population is classified in the group of populations at the risk of extinction.

The buffalo population is one of the species that should be given special attention as this species is at risk of extinction and concrete actions for its conservation, development and sustainable economic use are required to be taken.

3.1.5. PIG

The pig population in 2018 was evaluated at about 184,000, out of which 12,000 were sows and first farrow sows (Statistical yearbook, 2014-2018, INSTAT). The majority of this population breed under a low-input system of production, in small-scale family farms. Usually family farms breed 1-2 sows that are crossed with different exotic breeds. During the day animals are kept around the farm.

The breeding programme implemented into the commercial pig farms and in industrial complex farming for fattening pigs, is based on imported breeds. During the last 10

years three native pig breeds have been identified. These breeds are farmed in isolated areas, such as Back Rrjoll village, near the popular tourist area of Velipoja. Referring to their population size (Kume, K. 2014) wrote that all three native pig breeds are at critical risk of extinction:

Table 13 Native pig breeds – The size population and trend

No.	Breed	Number			Trend
		Total	Boars	Sows	
1	Swine "White"	225-250	6 – 8	31	▲Increasing
2	Swine "Spotted of Shkodra"	350- 40	18-20	42	▲Increasing
3	Swine "Pig with wattle"	200-250	10-12	24	▲Increasing

Table 14 Current status of native pig breeds

Species	Local Breeds/ Ecotypes	Current Status	Reasons for Current Status
Pig	Native pig "Pig with wattle"	Critical	Low production and low income for family farms. Replaced by imported breeds and crossbreed with them.
	Native pig "Spotted of Scutari"	Critical	
	Native pig "Siska White of Scutari"	Critical	

3.1.6. POULTRY

Poultry breed in just two types of farm: family farms for self-consumption, and medium-commercial farms and industrial complexes that produce eggs, broilers or poultry meat. The breed of poultry growing on family farms is undetermined. On commercial farms and industrial complexes, only imported genetic material are used. The breeding programmes are not implemented on both the family farms and commercial poultry farms. Evaluation data is lacking on poultry breeding on the relationship between small family farms and the genetic structure of populations. Their populations are a mixture of native breeds and crossbreeds with imported animals. Poultry in the hilly and mountainous regions are predominantly crossbreeds of local and imported breeds, which have been able to adapt to the difficult breeding conditions. Native ecotypes named "Black Chicken of Tropoja", "Chicken of Tirana" and "Commune Chickens" are estimated to occupy about 6-7% of the population. Industrial complexes rear the import lines and hybrids of chicken.

Table 15 Current status of native chickens

Species	Local Breeds/ Ecotypes	Current Status	Reasons for Current Status
Chicken	Local "Tirana chicken"	Critical	Crossbreed with imported breeds.
	Local Black Tropoja Lekbibaj	Not endangered	Increasing the interest of farmers to produce the eggs and meat for family consumption.
	Local Black Devolli	Not endangered	
	Albanian Patridge colour chicken	Not endangered	
	Speckled Albanian chicken Speckled Albanian chicken	Not endangered	
	Bronze and Copper Turkey – Zadrima	Not endangered	Increasing the interest of farmers to farming the turkey for local market – Albanian tradition for the consumption of turkey meat during the holiday season.

About 75-80% of the population of ducks, geese and turkeys is estimated to be crossbreed between local and import breeds. Farms that breed turkeys are growing. In these, the farm breeds a breed called "Zadrima", which is an advanced turkey

crossbred with local breeds. These crossbreeds have been breeding in these regions for about 20-25 years.

Extensive production systems for breeding cattle, pigs and poultry under conditions of small family farms apply almost equally, regardless of the region in which the farm is located. This system has distinct features in the case of small ruminants. These features are, in large part, influenced by the size of the herd.

Higher percentage of equidae populations consists of crossbreeds between exotic and local breeds. Existing data for this species is only through assessments and statements by farmers. In horses, about 70% of the population is considered a local population. Crossbreeds with the "Haflinger" "Nonius" "Sardo-Arab" breeds occupy about 30% of the population, with a tendency to decline due to the lack of male pure breeds. The crossbreeding of the "Nonius" and "Haflinger" breeds lie mainly in the western lowland area of the country and in the Korça region. Crossbreeding with the "Sardo-Arab" breed are found mainly on farms located in the hilly area of the country. Locally bred horses populate the mountain area. Most of hilly and mountainous areas contain local populations of mostly ass and male.

Information on the status and risk status of all autochthonous breeds / ecotypes in farm animals shows that 39 breeds / ecotypes of autochthonous farm animals, 12 of them are in critical status and only two are at risk of extension.

The importation of genetically improved breeds and the application of genetic improvement programmes of local breeds through crossing with exotic breeds, declining the interest of farmers to manage local breeds due to their low production capacities are factors that have strongly affected and continue to affect the decline of the biodiversity of AnGR.

On the other hand, this biodiversity under risk by acting factors related to the increased urbanization of land. Negative consequences of this urbanization in the agricultural ecosystems directly affect the reduction of the biological diversity of farm animals.

4 Genetic improvement programmes for the conservation and development of autochthonous animal breeds/ecotypes

4.1. RELEVANT STUDIES ON ACCESS, BENEFIT SHARING AND GENETIC RESOURCES

STUDY: Capacity development iniciative with four farmers groups in three different regions. (RASP)

Capacity development initiative on small ruminants VC: Dried goat meat –
This initiative is being implemented in the Hasi region. In this initiative RASP is working with a farmers group in Cahan and another in Gjinaj, both in the Hasi municipality. The purpose of this initiative is to develop new products (dried goat meat), based on local traditions. The current situation was analysed, and helped inform the main objectives of the initiative, which are:

- To build the capacity of farmers necessary to improve the drying process and food safety for dried meat.
- Improve processing infrastructure and guarantee the standardization of the product and quality control.
- Develop a promotional campaign for introducing dried goat meat in the market.

This capacity-building initiative will continue for a year and a half, and will include training for farmers on the technological aspects of the drying process, trainings on improving managing techniques, a study visit, support for developing marketing and packaging etc. An important element will be the involvement of women in the efforts to build capacity, with a tailored approach.

STUDY: Hasi goat meat quality label (Geographical Indication) – completed project (RASP)

RASP has completed "Hasi goat meat quality label" in the framework of the Balkans biodiversity project for conservation and valorization of biodiversity for sustainable rural development in the Balkan Mountains.

The goal of the project was the *"Promotion of origin-linked products of Hasi goat kids via quality sign system, in Hasi district, which are expected to generate the sustainable development of agriculture and preservation of the biodiversity"*

Project objectives:

- To establish the Hasi Goat Breed Association, validate a selection scheme and be recognized as legitimate by all breeders on the basis of a participatory diagnosis of existing breeding and selection practices and an assessment of the breed performances (milk – meat - breeders); to establish a herd book to conform with national standards and requirements.
- To build a GI process around the Hasi Goat kid Meat through delimitation of the territory, specification of the product (Hasi Goat Kid Meat), selection of the most appropriate label and registration of the product (as GI or Red Label), and establishment of a producer group, dissemination and publicity of the product.

The project started in May, 2014 and was completed in December, 2016 – the project aims to develop and promote sustainable tourism through the establishment of pilot agro-tourism activities in the border areas of northern Albania and eastern Montenegro, based on the usage of natural and cultural resources and also on a large involvement of the local government in this process. All the communes mentioned above will be involved as main partners in the project. A network of 20 pilot farms will

be established on both sides of the border, in Albania and Montenegro that will serve as a model for agro-tourism, which stands on local tradition and cultural inheritance of each region in order to offer the visitors a unique tourism experience.

PROJECT: Preservation, improvement and development of the autochthonous breed "Shkodrane" sheep in its geographic area.(CABRA GIZ, 2018) (Leka(Sulaj) F. Dema A.)

The "Shkodrane" sheep breed is a unique autochthonous breed that exists only in the Albanian territories (Shkodra – Montenegro).

- The "Shkodrane" breed sheep belongs to the group of autochthonous breeds of sheep of Albania. It is also the breed that has the highest coefficient of archaism (coefficient 11), among all the other autochthonous breeds. (Kume K. 1996).
- The current population of "Shkodrane" sheep can be considered as the genetically-well conserved direct descendant of the populations of that period. "In this breed there has been no influence on the improvement, crossing or mixing blood, even from outside the romantic age – the Byzantine, Venetian, or Ottoman times, the breed of the old Illyrian capital is that of Pelasgians." (Samimi, 1937).
- "A breed that needs to be considered to improve the Italian sheep for mattress wool is the breed of Shkodra that produces a large amount of milk that gives 2-4 kg of unwashed wool." (Allamani, 1938).
- The Shkodra sheep breed is a typical breed for its long wool that is highly valued for its qualities that can be compared to the world's best sleeping mattress. (Maymone 1937)
- In the 1937s, in the magazine "Drita" Dr. V. Samimi wrote: "The Shkodra breed has been located in the northern prefecture, on Shtoi surrounded by mountains.
- This breed from the south is spread up to the river Mat, from where it begins to mix with communal breeds. From the north it has spread to the highlands of Shkodra and goes up to Tuz, Podgorica and Tivar."
- In the 1970s, the autochthonous breed sheep "Shkodrane" was planned to be crossed with imported breeds ("Cigaja", "Merinos"). The results of 10-years of work were not satisfactory. Various researchers expressed their opposition to this action:

Such an extent of the crosses is risky because a genotype that is highly productive in its extending area does not always retain this advantage in indigenous breeds when they are moved to less suitable environments"(Bleta, 1987).

During a considerable period the breed sheep of Shkodra, was crossed with the Bardhoke breed – autochthonous breed. However, the crossbreed processes developed during the second half of the last century did not lead to the complete disappearance of the sheep populations – pure breed "Shkodrane".

- Current population size and breeding area

Table 16 Population Size of "Shkodrane"Sheep

Catalogue of autochthonous breeds / populations in farm animals / Year 2008		CABRA Project / May 2017	
Population size	450 – 500 heads	Population size	700 heads
Rams	14 heads	Rams	25 heads
Ewes	380 - 420 heads	Ewes	Shkodrane/ Crossbreed 621 heads / 320 heads – pure breed
Trend of the population	Increasing	Trend of the population	Increasing
Need for action	Economic use	Need for action	Economic use

There is an increase of the pure breed sheep population and crossbreed of "Shkodrane" sheep in its breeding area by about 28%. The flocks of the sheep are subjected to biometric measurements (exterior and body conformation) of about 60 from these 51 sheep, and nine rams. By comparing the biometric measurements, it results in a slight increase in height withers and other biometric performances. This has been the result of the use of rams of unknown origin or of native Bardhoke breed on one side and placement in good treatment conditions in some of the monitored farms.

Reproduction: The "Shkodrane" sheep in normal breeding conditions gives a yearly calving. The breeding period begins in July and ends in August. The calving season

Table 17 Productive performances in sheep farms "Shkodrane"

Farmers	Sheep/ heads	The breeding season day	Weaning weight /kg		Age day	Milk production / liters/day total	Milk production / liters/day / head
			M	F			
11	601	40	18,6	17,3	78,3	445	0,716

coincides with the winter period, from January to February. From monitoring carried out on the farms that breed the "Shkodra" sheep resulting in:

The breeding season: On average it is 40 days which is almost normal but by monitoring the farms one by one it turns out that the breeding season is quite prolonged. This has come about because of inadequate treatment of sheep herds and rams with feed rations supplemented to induced heat and synchronizing it.

The weaning season: on average is 78.3 days with marked variations from one farm to the other. The lengthening of the weaning period depends on several factors:

Table 18 Comparative results for the phenotypic indicators of the "Shkodra" sheep

Phenotypic indicators	National Catalogue		ATTC Korçë		CABRA Project	
	Male	Female	Male	Female	Male	Female
Birth weight	2,9	2,7	3,16	2,99		
Weaning weight, kg	14	13	10,39	12,64	18,6	17,3
Body weight – adult animal, kg	45-50	25-30	50-55	33-35		
Wither height, cm	60		62	59	64	61
Length Body, cm			69	67	75	70
Chest circumference, cm			88	81	109	104
Shin girth, cm	8,6	7,5				
Wool production, kg	4,3	2,6	3,2	2,3		
Milk production	Lakt. I 65 kg Lakt III 85 kg		61 109			
% of fat	7-7,3		7,2			
% of milk protein	5,5-5,8		5,63			
% of fertility	95		103			
% of reproduction	100-103		94			
Frequency of twinning	8-10 %					

- Difficulty (distance or lack) for delivery of milk to dairies or dairy factories;
- High demand for mutton on the market motivates farmers to produce dairy lamb converted from drinking milk.

From the monitoring of weaning weight lambs, we found that the average for male lamb is 18.6 kg and for females is 17.3 kg with some fluctuations depending on the days of drinking sheep milk.

Based on the information gathered, it is estimated that currently the population of the "Shkodra" sheep can be classified in the population group as "Risk of extinction". This breed is being strongly affected by genetic erosion that is the result of its action on the "Bardhoke" breed. The level of inbreeding is due to the lack of breeding control and very small number of male lines is high. The conservation programme should aim to increase the genetic variability within this population, increase the number of heads, and reduce the level of inbreeding in nucleus herds.

From the monitoring of 12 farms in the cited areas that breed the autochthonous "Shkodrane" sheep, it turns out that there is a possibility that this breed exceeds the risk situation: very critical, not degenerate and go to extinction by rigorously applying some technical measures:

- Implementation of controlled natural breeding in a barn near their homes for breeding animals during the breeding season (not pasture) as currently practised in all autochthonous "Shkodrane" sheep farms. This method will bring about a shortening of the breeding period and, consequently, the shortening of the calving period and the prolongation of the lactation period.
- Treatment of rams and lambs who are six years old, one month before the breeding season with protein supplements in the crib.
- The rams and the reproductive lambs over six years old used for breeding must be pure-breed of the "Shkodrane" sheep ecotype from other herds so that there is no deterioration of the inbreeding coefficient in the herd.
- Sheep farming leaving the best grazing during the breeding season.
- The possibility of cyclical exchange of farmers' male lambs
- About the supply or exchange opportunities of male lambs over six months of

age from the flocks of “Shkodrane” sheep from Montenegro, during this year or until May 2018.

- Provide technical assistance starting with the breeding season until the calving season and lactation by the CABRA project team.
- Sensibilization of responsible structures and support to the conservation and development of the autochthonous sheep breed “Shkodrane”.

Albania has a considerable number of autochthonous farm animal breeds. Among these breeds is the “Shkodrane” sheep at risk of extinction.

The implementation of this breed programme has the following objectives: Preservation of the in-situ (12) of Shkodrane sheep heard, in the areas with historical breeding traditions: Zagora, Kastrat (M. Madhe), Reç - (M. Madhe), Muriqan, Oblike, Shirokë, Dobraç, Kolari Mountain - Shkodër Region , Torovica, Lezha;

Photo: Sheep breed “Shkodrane” Shkodër




- Conservation of genofond of this breed at risk of extinction without affecting genetic variation by preserving the genetic and racial indicators of these herds.
- Implementation of the zootechnical and racial genetic programmes for their sustainable in vivo conservation, including: the implementation of the breed scheme, breeding technologies, the production of male and female reproducers from the sheep breeds' herds (nucleus racial) they breed.
- Development in themselves for a relatively long time to homogenize the genetic constitution without falling into inbreeding. The conservation programme should aim to increase the genetic variability within this population, increase the number of heads and reduce the level of inbreeding.

Case study: Conservation of agrobiodiversity in rural Albania

The protection of agrobiodiversity in the rural areas of Albania is in the focus of the projects implemented by G.I.Z. This is synchronized with the CABRA project which aims to "Improve the protection and sustainable use of natural and agricultural biodiversity in selected mountain areas in Albania". If managed well, mountain tourism can contribute to the conservation of biodiversity and the diversity of farm assets and income generation. The defined areas are the mountainous areas that start from M. Madhe to Vermosh.

OBJECTIVES AND RELATED TASKS:

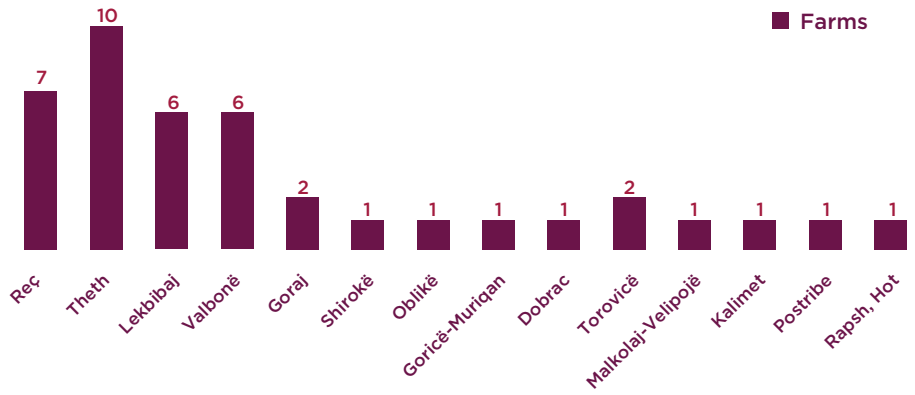
A. Support at least 40 farms to help increase the number of animals of local races and facilitate at least five genetic nucleus farms in order to serve as supplier of genetic resource for the selected group of 40 farmers. The selection of farms in the first phase of the project in the designated areas created the breeding ground for the farmers' breeding group and native autochthonous ecotypes in protected areas. In total, a network has been set up, consisting of about 41 farmers that breed races and autochthonous ecotypes in these areas from 20 farms planned for 2016/2017.

RESULTS

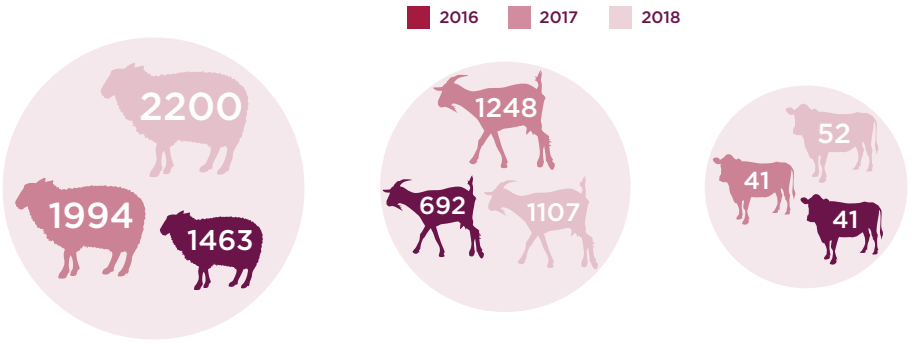
Supporting a group of 41 farmers that breed autochthonous breeds or ecotypes in the CABRA project areas: 12 farmers that breed autochthonous "Bardhoke" sheep, six farmers that breed the "Capore of Dragobia" and "Hasit" Goat, 10 farmers that breed

the most ancient Balkan and European autochthonous sheep “Shkodrane”; 11 farmers that breed Illyrian cows “Busha” which vary greatly from improved bovine breeds, two farmers that breed “Lara e Kallmetit” goat. There are monitoring 41 farms that breed a total of 3,500 – of these 2,200 sheep, 1,248 heads of goats, and 52 cows. Compared to 2017 we have a 10.2%, increase number of animals.

Graf.17 Distribution of farms



Graf.18 The number of animal/heads



The distribution map of the group of farmers breeding autochthonous breeds / ecotypes is within protected areas where the development of tourism has seen progress. In 2018, farmers breeding the autochthonous sheep “Shkodrane” and “Lara Kallmetit” goats in the area of Lezha and Shkodra, for the “very critical” status they are also involved.

At the beginning of project implementation, performance was demonstrated at low levels with negative consequences:

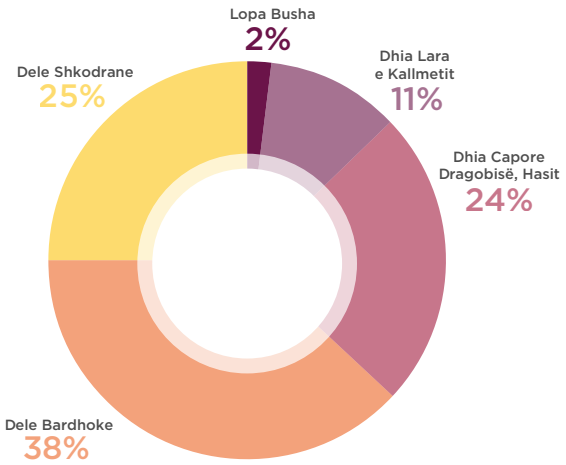
- From the phonotypical point of view (sheep and goat) species dominated heterogeneity which shows significant deficiencies in the selection of potential animals of local breeds;
- Absolutely missing matriculation as the initial link of breed work, which hampered in situ conservation of the development within the herd of phenotypic traits;
- The reproducers do not circulate the same way between the farms of different farms, worsening the inbreeding coefficient with the consequence of decreasing the production of milk and meat etc.
- Uncontrolled crossbreeds with different local breeds, low fertility in herds.
- Young bulls (Busha cattle) do not circulate and are kept in the herd throughout the year. As a result, the females of small ages/weight are breed leading to race degeneration.
- Milk by-product processing facilities are dairies or simple rooms near homes that do not even provide the minimum hygiene conditions.
- Lack of sales market and dairy processing. Reducing farmers' interest, not motivating them and consequently removing them (migration, emigration) to other areas.

All of these resulted in negative consequences for autochthonous breeding by reducing the number of heads in livestock. With this group, several activities were carried out in 2018, such as: Seminars on qualifications, on the effective breeding of native breeds / ecotypes in their breeding ground, demonstration and promotional fair for breeds and economic values of autochthonous races / ecotypes in project areas.

Implementation of breed schemes to improve the productive and reproductive performance of cattle herds. During 2018, this group of farms was monitored and supported in terms of breeding, reducing the inbreeding level by improving the two technical elements, controlled breed of herds in the a barn near their homes for breeding animals during the breeding season (not pasture), circulation of the best reproductive male and well breeders known by the owners of flocks. In the breeding season of 2018, we realized the induction of improving male lines. These breeding

practices require a period of 3-4 years until they become routine for farmers. In small and isolated flocks, it is not easy to keep the inbreeding level lower. Provision of food and feed rations mainly for the winter period and for their supplementation in several critical physiological stages such as: supplementary treatment of the feed rate during the calving period, the breeding season, etc., advice the selected farmers during in situ visits to see the selection and production of lambs and male kids and their circulation between nucleus farms and other selected farms to create male lines that will serve as fathers.
B. Carrying out the activities planned according to the Breeding Work Strategies for each autochthonous breed / ecotype in sheep/ goats/ Busha cattle in order to improve the genetic situation of native breeds and their economic performance.
The methodology applied for the implementation of the CABRA project is divided into four phases. The methods developed in the scheme are summarized by comparing them with the traditional methods used before our interventions.

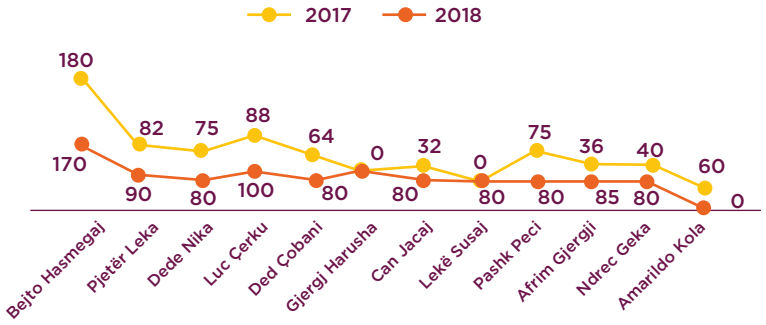
Graph 19 Breed structure



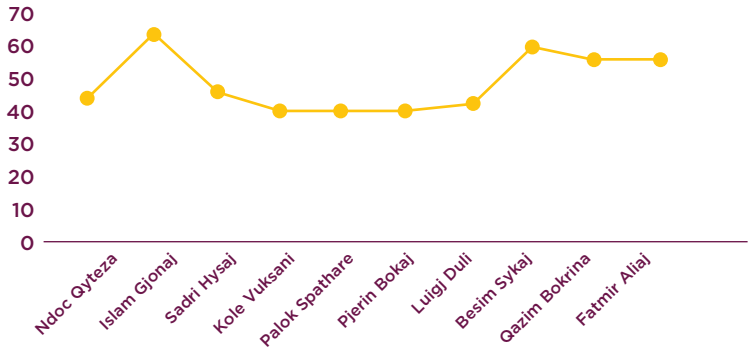
In the breed structure of the farm animals that breed in these areas, the “Bardhoke” sheep breed dominates, followed by the “Shkodrane” sheep, the “Capore of Dragobia” goat and the “Lara Kallmetit” goat. The “Breed Improvement Schemes” implemented for the “Shkodrane” sheep, the “Lara Kallmetit” goat and “Busha” cattle throughout certain farms – the genetic nucleus (“Shkodrane” sheep, “Lara Kallmetit” goat, “Busha” cattle) based on the production performance and biometric measurements typical of a native breed, which will produce reproducers for first and second level farms. There is currently a community of farmers who breed race and autochthonous ecotypes,

who during meetings have exchanged best breeding practices and started to exchange breed living material in the form of live animals.

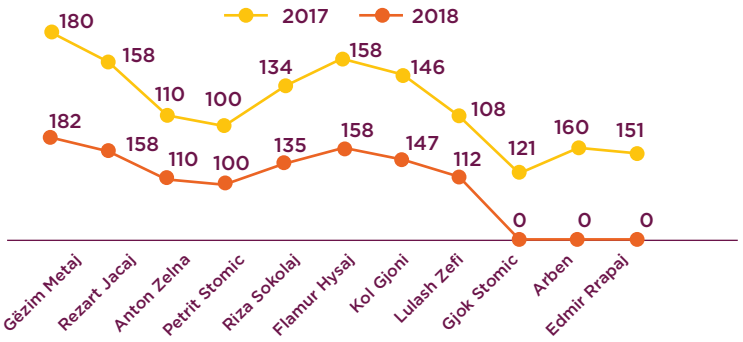
Graph 20 Milk production /lactation / Bardhoke sheep



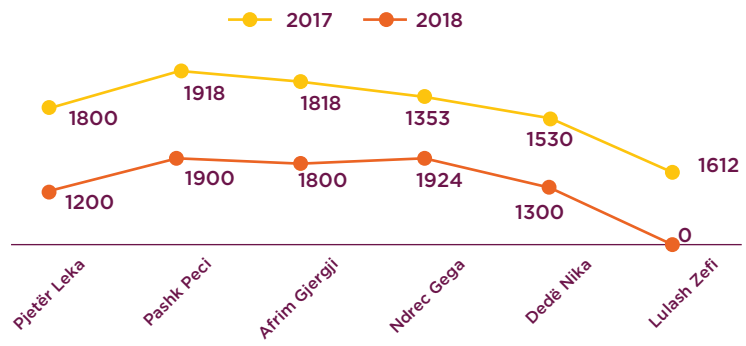
Graph 21 Milk production /lactation / Shkodrane sheep



Graph 22 Milk production /lactation/goat



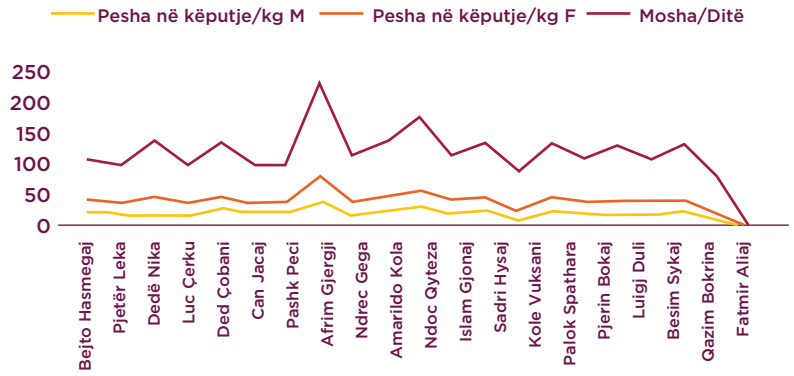
Graph 23 The milk yield of the Busha cow



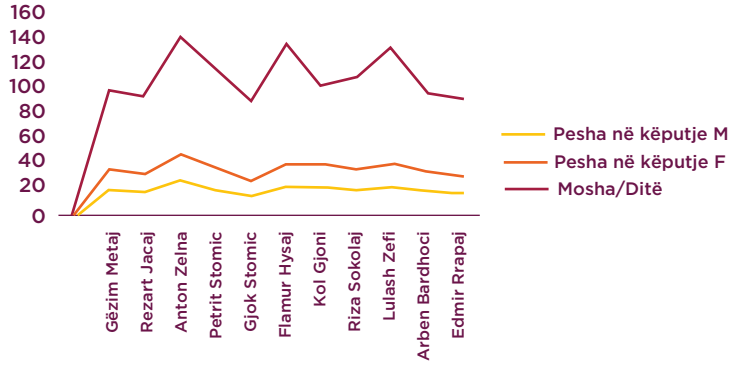
The average milk yield for the "Shkodrane" sheep is 49.5 ± 9 litres, while in the "Bardhoke" sheep it is 73.2 ± 42.3 litres. In the goats' herds for 2018 an average yield of 138.7 ± 25.9 litres of milk per head was achieved. For the year 2018, milk yields at the Busha cattle farms are on average 1,672 ± 212 litres.

- For the year 2018, fertility in sheep flocks has been 100% reproductive performance by technical criteria.
- Implementation of controlled breeding in a barn near their homes (not pasture), for 2018 has brought a significant improvement in the shortening of the breeding season with very positive consequences in the calving season.
- The circulation of the best male and female reproducers between the farms. For 2018, the farmers implemented the treatment with food supplements before and after the breeding season reflecting the advice given by experts.
- Generally, in all the farms that breed the Busha cow, they get a calf per year from the cow, a very effective indicator in reproduction and the use of genetic capacity of this autochthonous breed. The breeding bulls generally breed on other farms by controlling the level of inbreeding. The circulation of reproducers has almost begun to be widely applied in farmers' flocks to each other.
- Farmers have been treated with all issues related to the effective management of "Busha" herds in the breeding season, calving for effective management of the lactation period for Busha cows, effective management of pastures and forests, improvement of vegetation in natural pastures etc.

Graph 24 Weaning weight /lambs, 2018



Graph 25 Weaning weight/ kids, 2018



On selected farms breeding "Bardhoke" and "Shkodrane" sheep, these are the average performances: The weight of the weaning for male lambs is 21.7 ± 6 kg, while for the female lambs is 19.8 ± 5.8kg at 80.7 ± 22.8 days the weaning period. The weight of the weaning for male and female lambs for 2018 has increased by about 2 kg almost maintaining the same period as compared to 2017. On the selected farms that breed goats, mainly "Capore e Dragobisë", "Hasit" and "Lara Kallmetit" goats, the average performances are: The weight of the weaning for male kids is 18±3 kg while in female kids is 16±2.4 kg to 70±13 days the weaning period.

There are several farms that extend this period from the 60-day technical criterion. On average, this period is 70 ± 13 days. This extension depends on several factors, but

often farmers are not affected by the inability to produce goat's cheese and continue to let the kids go to the mother by feeding, turning the milk into meat from the goats.

Study: Sustainable Conservation of the Illyric Dwarf Cattle (Busha Type), Lekbibaj – Tropojë, Albania (ATTC of Fushë-Kruja). (Leka (Sulaj) F. Dedndreaj L. Topi H. Tahiri F.)

This study of bovine population Illyric Dwarf Cattle (Busha Type) Lekbibaj – Tropojë, Albania, Autochthonous Genetic Resources, is an original contribution in accordance with the requirements of international organizations of indigenous genetic resources. This study represents a real contribution to the development of indigenous genetic resources in their historic habitat.

The aim of the study was conservation and implementation of several interventions of elements of farming technologies for the Busha cattle population in the area. Cattle breeding in this area constitutes the main agricultural activity and it is directly related to the livelihood of the population in these areas. Through the monitoring of phenotypic indicators in this population we have created a clear picture of the existence of the population in this area, and we carried out a comparison with the data of other authors carried out 60 years ago.

Table 19 Morphobiometric performances

Characteristics/cm	*Kuhneman A. year 1922	**Tartari T. Year 1965	Livestock Technol. Depart. (Nikaj-Mertur)
Height wither	96,29	98,90	127,7
Length of body	110,37	113,52	
Length of head	40,46	39,54	45,1
Length of the forehead	17,80	17,33	
Width of the forehead	13,53	13,15	21,2
Length of horns	16,70	18,44	28,9
*Comparative data MORFOBIOMETRIKE -Kuheman A.			
** Comparative data MORFOBIOMETRIKE - Tartari T			

For about 90 years, changes in morphological indicators are small. We believe that these changes do not come as a result of an intersection or replacement with exotic breeds, but due to continuous self-selection farmer to increase milk production and the increase of care for breeding and feeding the cows. Therefore, strengthening the idea that today's bovine in this area is a direct descendant population of former local bovine of the Albanian Alps. Through the selection of male and female calves that will be used for parental generation, we consolidate a vital generation, productive heifer and bulls to be used in natural breeding.

The evaluation and processing of all data collected in connection with different feature values morph biometrics, conformations, productive and reproductive performances. Daily milk production was monitored and about four milk samples for each cow were taken. A total of 60 milk samples were analysed with the Lactostar method for determining the constituent milk components. We performed the weighing method with a tape meter, and the data is processed with statistical methods. All-natural services are registered (data), bulls, calving (data) and on this basis reproductive performances were processed. We compiled for food rations for all categories in cattle, depending on the physiological stage according to methodology.

RESULTS

The identification of the population, characterizing the phenotypic population of the "Busha" cattle in the Lekbibaj area, and the monitoring of productive and reproductive performances of their populations were some of the activities carried out. The table below shows the comparative data for the Busha cow in several Balkan countries.

Table 20 Morphobiometric performances

No.	Performance	Unit	Albanian Alps Nikaj-Mërtur	Monte Negro	Kroaci	Bosnje	Rodopi
1	Height wither	cm	127,7	99,3	114	104	97,4
2	Length of body	cm		114	130,4	117,9	111,23
3	Length of head	cm	45,1	41,8	42,1	39,9	39,72
4	Width of the forehead	cm	21,2	19,3	18,4	18,4	18,8
5	Length of horns	cm	28,9	20,2	23,6	23,6	15,5

By comparing some morphological indicators of the Busha cow, in the Balkans, we see no significant changes (III annual meeting of ALBA-SCIENCE Institute, National Conference, Tirana 1 to 3 September 2008).

By comparing the values given above, the corresponding average values of these indices published by different authors, we find that local Albanian beef, according Tartari, T. (1965), is very close to other cranially type brachycerous cattle. The Albanian cattle hypothesis as regards to this type is more likely to be true.

Table 21 Production performances

No.	Name	Nikaj - Mërtur male & female	Sinanaj male & female	Prespa male & female
1.	Weight at birth	18 – 15	14 – 13	18 – 15
2.	Live weight	280 – 210	250 – 200	280 – 230
3.	Height wither	135 – 120	125 – 100	125 – 105
4.	Milk produc. /lactation	Lakt. I 700-800 kg Lakt. III 1300-1400 kg	Lakt. I 800 Lakt.III 1000	Lakt. I 800 Lakt. III 1200
5.	Average day lactation	270 -300 ditë	280 ditë	300 ditë
6.	Age at first calving	21-23 muaj	850 ditë	850 ditë
7.	Weight at first calving	105-115 kg	100 kg.	110 kg.
8.	% Fertility	80-85	85	85

As seen from the table and between regions within Albania there are no significant changes in phenotypic and productive indicators.

Animal nutrition and food

Due to the conditions created by the rain and especially snow and low temperatures that are present from the beginning of November until mid-April, so about six months, the cows are kept in a housing regime. Hay is provided by mountain meadows, and farmers have a great tradition in the preparation of the grass that is cut down in June in the borders and at the end of June and beginning of July in mountain meadows. Hay has a high nutritive value (0.54 NjU kg). The content of hay consists of graminace 48.5%, legumes 23:36% and 28.13% other species.

Table 22 Feed – Ration/Day

No.	Food	Kg	Nj.U	Dry Matter	Prot.
1.	Hay	4	2,16	87	15
2.	Maize (straw, corn)	6	1,26	86	8
3.	Supplemented conc.	1,5	1,65	88	07

In Table 22 the feed rations per cow (November –April) is shown. In mid-April, and during the months of May, September and October the main food in the daily ration for cows comes from grazing near homes which use land plants grass and leaves of plants in areas of oak scrub. During this period, dairy cows are given 0.5 - 0.7 kg of concentrates as a supplement in the morning.

During June and August, the cows are kept in the mountains (alpine meadows) 1,000 – 1,800 m above sea level. The high diversity of habitats in the alpine area, with diversity of vegetation, water resources and mountainous suitable climate creates more favourable conditions for the breeding of Busha cows in this period. The cows adapted well to these conditions with the best performing giving farmers good quality dairy products, meat and byproducts. Pastures in the area being heterogeneous, containing all the necessary food elements for body maintenance and milk production.

Milk production

The conducted study shows that average milk production for lactation (n = 30) is 1,355 litres. Production from first lactation 700-800 kg results in an increase in third lactation to 1,300-1,400 kg. The average duration of lactation is 9.7 months. Fresh milk is consumed and part of it goes to the production of byproducts. This product is intended for self-consumption after missing the sales market. But we can say that these products are “bio” quality as they are produced in completely natural conditions.

The milk quality samples taken according to the methodology were evaluated and its qualitative indicators analysed. Milk samples were taken and analysed by the Lacto Star method for the determination of milk components (lab, ATTC Fushë krujë.). The following indicators were analysed: % of fat, % of protein, % of lactose and % of dry material without fat (L.thY). The quality components of cow milk in Busha Nikaj – Mërtur area, Tropojë are reported in this table:

Table 23 Milk quality ingredients

Indicators	% Fat	% Protein	% Lactose	* % DM F.
X ± DS	3.3±0.6	3.8±0.08	5.5±0.10	10.1 ± 0.20
(*) % Non-fat dry Mater				

With the electrophoresis method, acidic conditions result in the kind of beta / casein that is present in milk. It turns out that the imported breed of cattle is beta casein A1A2 heterozygote for the gene to find the two alleles co-dominant in the sixth chromosome. From tests conducted on milk from Busha cows with type A2 milk, it is found that the relation between the type of milk consumed and mortality from ischaemic diseases.

Meat production

Produced meat has high nutritional value organoleptic and dietary supplements, the pasture of calves used for meat, is both voluminous food, moist and concentrated. In addition to pasture vegetation polifite, an important role is played and the sun, the air and the movement of animals, especially in the digestion of food and weight gain. This makes it possible for animals to be affected less by infectious and parasitic diseases. These features make the production of meat safe for consumption. For meat production, used male and a female calves that are not replacers. Reared calves are combined with a system (milk, pasture) where the base of the food portion is fed with milk straight from the cow. The average weight of calves at birth is about 15-18 kg or almost 12 times less than their mothers. Daily/gain reach 700 gr / day, when placed on pastures suitable for physiological stage. Selling calves at a young age (three to four months) and small weight, negatively affects the household income of farmers. Valorization of this product is one of the challenges to development in this area.

Reproduction

Reproduction is a key factor in determining the efficiency of animal production. The first heat appears around 14 months and natural breeding occurred about 14-15 months weighing 160-180 kg. Bulls are produced within herds for natural mating. On average with calving intervals at 337 days, one calf per year (technical objective) can be born. Calving interval-conception is 47 days. Mating bulls are rotated every year

to avoid inbreeding. Generally, cows are used until the fifth calving. Conservation of tradition on the one hand, and the development of infrastructure on the other hand constitutes future challenges to mountain tourism approach towards development and improving of life quality. Valorization of living must pass by the valorization of biological products is quite acceptable – quality livestock is grown and cultivated in a natural environment. Will natural beauty remain where it is or will it become a surprise with added value, with culinary traditions of hospitality made available to attract visitors, tourists, through a suitable infrastructure, not just roads but also marketing specific livestock product.

Study: The State of Local Cattle of Busha Type in Albania and Kosovo. Their Identification and Morphometric Description. (Agricultural University of Tirana, Albania) (Rexhaj N. Papa L. Hoda A. Kume K.)

The local cattle population of Busha are still found in remote areas of Albania and Kosovo. They have survived until now because of geographic isolation and harsh conditions that are not suitable for exotic breeds. The number of these populations is rapidly declining putting them in danger of extinction.

Conservation of this genetic diversity is challenging for both countries. The identification of local cattle populations of Busha type farmed in different regions of Albania and Kosovo, their phenotypic and genetic characterization, has been and currently is an interesting study subject with the aim of compiling a sustainable breeding strategy that will help to run a national or cross-border conservation programme.

The study was conducted in five regions distributed in the northwest and northeast of Albania and in the east and southwest of Kosovo. For both countries the number of local cattle sampled of Busha type for phenotypic characterization was 94 of which 86 were females and eight were males. The linear body measurement of adult animals was only done according to FAO guidelines 2012. The means of morph metric variables were calculated for animals not divided by sex.

Local Busha type cattle is characterized by different coat colours from intensive red, reddish, dark and light brown. Velipoja local cattle have the lowest mean of wither height, heart girth and body length than other populations (103.07, 137.57 and 113.5 cm). It can be noticed that the populations located at the border between Albania and Kosovo (Kukës and Prizren regions) as well as the population of Gjilan have similar mean values of wither height, heart girth and body length. A higher mean value of wither height is found at Gjakova local cattle (133 cm).

Despite these small differences in body size the milk production is rather different between Albanian and Kosovan populations.

The discriminate analysis model was used to evaluate the level of local differentiation of cattle populations. Three groups are formed: Back Rjoll herd of Albania showing constant differentiation from other groups, the group composed by three herds located in Kukës (Albania), Prizren and Gjilan (Kosovo); the group where we find only Gjakova herd. The results of the discriminate analysis shows that the process of evolution of

Photo: Ilyric Dwarf Cattle "Lopa e Lekbibajt"




morphometric traits and selection have been associated with the presence of isolation in distance. The results need further verifications.

Study: The Integrated Development of Agro - Touristic Farm (Day Farm) with in Situ Conservation and Sustainable Economic Use of Buffalo's Herd in Divjaka Area, District of Lushnja, Albania. (ATTC of Fushë-Kruja) (Tahiri F. Topi H.)

An in situ conservation programme, oriented to sustainable economic use for buffalo population, started at the beginning of 2011. A buffalo herd of 108 composed of animals originated from two ex-nucleus farms was included in the programme. These species, based on the number of breeding animals is categorized at risk of extinction.

Monitoring of animal performances

- An expert system for conservation will be developed and a database will be established. Several components for the expert system will be take into account:
  1. to provide a knowledge–based decision support system for the entire process;
  2. a database of conservation experience classified according to the decision framework;
  3. to provide tools for the active conservation process (i.e. computerized record sheets for sample collection, tools for pedigree recording, evaluation and selection tools. These components may be developed separately, providing the whole system and the need for integrating the components is recognized.)

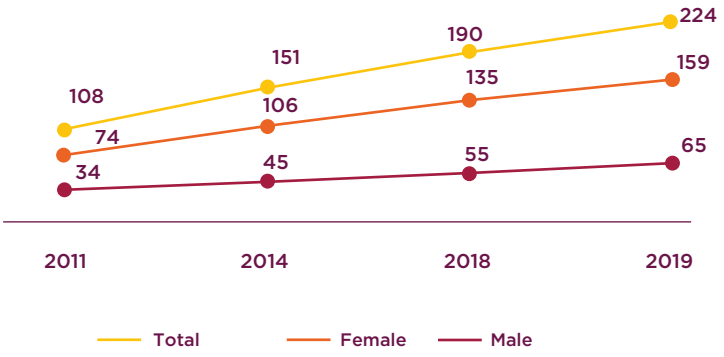
- The grazing behaviours of buffalo population – collecting information on the grazing characteristics of the buffalo population. Special attention will be paid to adaptive traits that enable the animals to perform well in harsh environements and the positive role of buffalo cattle population in the existing habitate.

Results of the in situ conservation programme of buffalo herds

Analysis of the age structure of the class and the number of female and male individuals, especially of the parental generation (male and female reproducers) of the herd as well as population growth, improved breeding and feeding, planning and implementation

of an appropriate breeding scheme and the reduction in mortality rates in newborn animals have been the necessary interventions for the herd of buffaloes.

Graph. 26 Growth of buffalo population size



The data shown in the graph indicates the total size of the buffalo herd for 2019, which reached 224 out of 108 herds, increasing by 207% compared to 2011 which was the year that the the in situ conservation programme was implemented. The total number of individuals of the parental generation (male and female) results in an increase of 172%; effective population size with an increase of 474% and inbred rate with a decrease of 229% compared to 2011.

Table 24 Total number of male (NM) and female (NF) parents, effective population size (Ne), inbreeding rate (Δ F) and generation interval (Ig) by years 2011-2019

Year	2011	2012	2013	2014	2015	2018	2019
NM	4	5	6	8	9	15	18
NF	46	54	60	74	90	99	121
Ne	14,7	18,3	21,8	28,9	32,7	58,4	69,66
Δ F	2,36	1,87	1,61	1,56	1,07	0,65	0,54
Ig	5,78	5,81	5,82	5,84	5,89	6,21	6,13

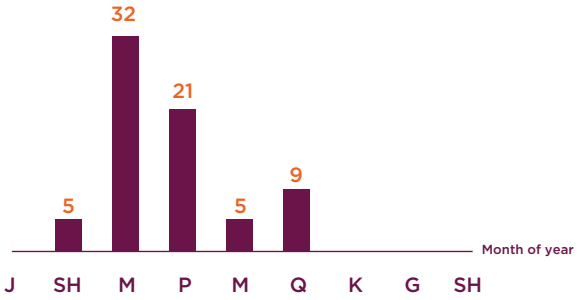
The average age of females is 6.75 years. The average age of males is 1.99 years. For 2019 the effective population size (Ne) is 69.66 animals per generation and Δ F 0.54% and generation interval an increase of 6.1%. Such a dynamic of the indicators achieved

for this population are very promising not only for increasing herd size, preserving genetic variability but also for improving future genetic parameters of the population.

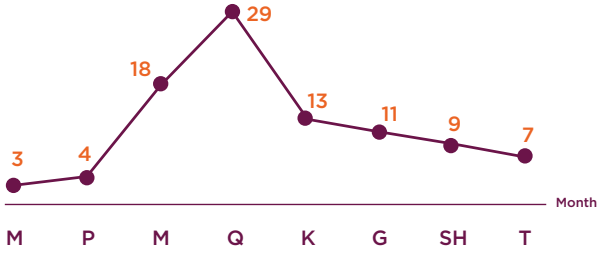
Monitoring reproductive performance of buffalo herds

Graph 27 Buffalo calving distribution

a. Buffalo Calving distribution for v.2019



b. Buffalo's pregnancies(heads) according to months v 2019



Graph 27 shows buffalo calving distribution during the different months of the year. For 2019, 72 buffalo herds were fertilized or 72.7% of fertility was realized. The calving curve indicates an abnormal distribution during different months of the year. Buffalo calving is more concentrated in the months of March and April, where 73.6% of the heads have calves in these two months. Such a calving seasonality curve is related to the abundant vegetation of grazing in spring and summer and consequently to the best nutritional needs which is reflected in an optimal body condition of buffalo herd during spring and summer and the conception of buffalo in this period.

The mean calving interval was 563 ± 188 days. The relatively long interval is related to the limited food resources this species has in the habitat and the presence in the herd of some advanced age buffaloes. This indicator, however, will improve as a result of the removal of highly advanced buffalo herds which are kept in the herd to maintain the highest genetic variability of the herd.

Of the 114 buffaloes, there is a 94 or 82% conception rate. As shown in the graph, the highest concentration of conception results in the period from May to August which is

related to the better fulfilment of nutritional needs due to the abundant vegetation of grazing vegetation and consequently their conception and pregnancy rate.

Monitoring milk yield of buffalo herds

Table 25 Milk production (kg) and lactation length (days)

Traits	Lakt. I n=6	Lakt. II (n=7)	Lakt. III (n=21)	Lakt. IV (n =12)	Lakt.> IV (n=10)
Milk production (kg)	540±72	654±36	697±42	624± 31	608±42
Lactation Length (ditë)	251±27	263±47	271±49	271±52	257±35

Monitoring Growth performance of buffalo herds

Table 26 Body weight (kg),wither height (cm) & chest perimeter of buffalo calves,age 0-6 months

Traits	At Birth		3 Months		6 Months	
	f	m	f	m	f	m
No. of Heads	24	29	24	29	24	29
Body Weight (kg)	23,10±0,38	25,11±0,98	54,5±7,23	57,8±5,84	97,22±5,94	101,86±7,67
Wither height (cm)	68,75±4,76	74,28±1,24	82,94±6,31	85,34±2,76	91,66±4,56	96,7±2,81
Chest Perimeter (cm)	73,24±3,51	76,36±3,15	89,02±4,79	94,15±6,33	97,58±5,22	102,98±7,12

Conclusions

- Optimal management through the implementation of the in-situ conservation programme and genetic improvement programme that support sustainable economic use is the key to the sustainable conservation and development of native species and breeds that are threatened by genetic erosion or extinction.
- Since the buffalo herd in Divjaka is in a tourist area and part of an ecosystem characterized by high biodiversity, this could be seen as an integral part of it which positively impacts this ecosystem and also contributes to the development of agro-tourism by delivering high-quality specific products to the local market and beyond.

This farm fulfils three basic principles of an agro-touristic one (Day Farm):

- Visitors have something to see: farm animals are a special species, providing an attraction to visitors, participating in agricultural and farm operations, animal

feeding/grazing, etc. The farm lies close to a National Park, where visitors could see wild animals and birds, rare birds like pelicans (endemic species) etc. The wonderful nature and landscapes are very attractive for tourists. Divjaka has a beautiful beach, a whole sandy area, which is prolonged to a coastal line of 20 km, is main touristic destination. Lagoon is another of the area's assets, which is very rich with different species of fish. Flora, fauna and local food are in perfect harmony. Apart from these, culture, dress, festivals and fairs could create enough interest among visitors.

- Visitors have something to do: Participating in agricultural operations (hay making, feeding and brushing farm animals, etc,)
- Visitors have something to buy: "Mozzarella" cheese and young buffalo meat (added-value products – niche, very delicious and preferred by foreign visitors).
- Rural crafts, dress materials, farm gate fresh agriculture products, processed foods are the few items which tourist can buy as memento for remembrance.

The important factors that would contribute to the development and success of this agro-touristic farm are:

- There is a long tradition for raising autochthonous buffalo species in this area;
- Farmer Llambi Monçe is of the highest educated and he has 50 years of experience in buffalo raising;
- The farm is located in a touristic area (500 m from the lagoon Natural Park) and 1,500 m from the beach;
- To the farmer, any outsider is a guest and is treated wholeheartedly without any commercial motive. Treating guests is a pleasure for him. The farmer entertains the guest while entertaining himself in the process. Community structure is more homogeneous and treating guests is part of the culture rather than a professional activity leading to the natural environment required for such form of tourism;
- The way of dairy products production (Mozzarella cheese and young buffalo meat) are a great attraction to foreign tourists;
- Natural resources are unique in their own kind creating curiosity and attraction for tourists;
- Traditional culture and knowledge are a treasure of the area and an attraction to tourists;

- Combination of farmer, village and agriculture creates a wonderful situation which provides unlimited satisfaction to the tourist especially from urban areas
- Educational value could create awareness of rural life and knowledge about animal management and feeding among urban school children. It provides the best alternative for schools. It is a means for providing training to future farmers. It would be effectively used as an educational and training tool to train animal farming and line department officers. This provides a unique opportunity for education through recreation where learning is fun, effective and easy.

Photo: Buffalo farm – Divjaka - Lushnje

Study: "In-Situ Conservation of the Native Pig Breeds" (ALBAGENE, ATTC of Fushë-Kruja)(Kume K. Tahiri F.)

The expedites in the Velipoja region during the year 2005 have identified three native pig breeds: Siska white of Scutary, Spotted of Scutary and Pig with wattle. The breeds are in a critical status.

Among the factors affected by this situation were:

- Low economic interest of farmers consequently concerns of farmers to preserve these breeds and increase number of animals have been low.
- Lack of local market;
- Lack of farmer`s organization and programme for conservation and development of local pig breeds. As a result, selection of reproducers, drafting and monitoring mating schemes, prevention of crossbreeding phenomenon (boars come from Monte Negro) was almost impossible.
- Activities and objectives of in-situ conservation programme:
- Implementation of urgent measures, necessary to stop the process of genetic erosion, and decrease of the size population
- Establish a farm where breeding four to five sows and one or two boars for each native breed, that will serve as nucleus heard for in-situ / on-farm conservation and as a rescue centre.
- Support collaboration among farmers, building up and strengthening the capacity of the local network of farmers to support in-situ/on-farm conservation Capacity building to support the marketing meat.

After two years:

The population size quadrupled. Three nucleus farms were established. The price of pig meat rose 80-90% higher than usual. The demands of consumers for this product also increased. The main part of the meat production is dedicated to Velipoja's tourist market. The interest of farmers to breed native pigs, not only in the Velipoja region but farmers from other regions, also increased.

Photo: Native pig breeds

4.2. GENETIC IMPROVEMENT PROGRAMMES FOR THE CONSERVATION AND DEVELOPMENT OF AUTOCHTHONOUS ANIMAL BREEDS / ECOTYPES

Albania has four priorities for livestock management: exclusive utilization of local breeds, rural development linked to improved livestock performance, active participation of rural communities and programme regionalization. Within the strategy for improved livestock performance, in-situ conservation of autochthonous ruminant breeds among small farmers has been identified as a priority. In Albania, Action Plan adopted the optimal improvement of animal production, while preserving the natural environment as a priority. Furthermore, one of its prior objectives was the preservation of local breeds of domestic animals under the threat of extinction. The Global Plan of Action consists of strategic priorities grouped into four strategic priority areas:

- Characterization, inventory and monitoring of trends and associated risks.
- Sustainable use and development.
- Conservation.
- Policies, institutions and capacity-building.

The main responsibility for implementing the Global Plan of Action lies with national governments, but non-governmental and intergovernmental organizations are also expected to play a major role.

Genetic conservation and improvement genetic programmes sanctioned in the Albanian legislation on livestock should be applied to autochthonous animal populations on the farm. In reality, there are many articles of law that have not been implemented. This has happened for several reasons:

- Insufficient capacity of public institutions such as research centres, extension service in insufficient livestock.
- Designing realistic genetic improvement policies and programmes.
- Lack of financial support.
- Low level of knowledge of the community of farmers and their cooperation.
- The implementation of conservation and breeding improvement programmes in autochthonous animal populations requires the development of policies that support:
- Establishment and updating of the “Book of Herd”, the “Book of Bred” for each farm that breeds autochthonous breeds / ecotypes and markets their livestock products and byproducts.
- Strengthening capacities to support the monitoring of natural breeding, selection of male and female reproducers, nutrition and grazing systems, etc.
- Supporting farmers to implement control and record the production and reproductive performance of the herd.
- Support for the establishment of autochthonous breeders’ farm associations.

In autochthonous genetic resources, a fragmented and restricted interference has been employed. During the last decade conservation programmes have been undertaken for the farm animal group of autochthonous breeds / ecotypes while programmes for the improvement of of autochthonous farm animals with the status of “potential at risk” and “not at risk” have been initiated with the target traits (genetic diversity within population) taking into consideration the market and society.

Table No. 27 lists the autochthonous animal species / breeds / ecotypes that have been subjected to their conservation or sustainable development programmes. It

also shows the number of participating farms, the period, the source of funding and the governmental and non-governmental institutions that have implemented these programmes.

Table 27 In-situ/on-farm conservation programmes

No.	Specie	Breed	Number of farms	Years	Financial source	Institution
1.	Buffalo	Buffalo	12	2002-2014	GEF/UNDP MBZHR	Albagene Association
			2	2015-2018	MBZHR	ATTC -Fushë-Kruja
2.	Cattle	Albanian Prespa cattle	21	2005-2015	GEF/UNDP Fondacioni SAVE	ATTC-Fushë-Kruja
		Busha strain "Lekbibajt cows"	8	2005-2014	MBZHR	Albagene Association
			10	2015- 2019	MBZHR	SAVE Foundation
			10	2016-2018	GIZ	ATTC-Fushë-Kruja
		Busha cows"	32	2008-2015	GEF/UNDP MBZHR	Blekalb Foundation
3.	Goat	Ecotype "Capore of Mokrra"	12	2014-2016	GEF/UNDP	ATTC-Fushë-Kruja
		Ecotype "Capore of Dragobia"	31	2013-2015	Bashkëpunimi Francez MBZHR	FRPKK
			10	2010 – 2012	GTZ/GEF	Blekalb Foundation
			7	2016 - 2018	GIZ	ATTC-Fushë-Kruja
		Ecotype "Black of Dukati"	8	2010-1012	GEF/UNDP	AU-Tirana
		"Spoted of Kallmetit"	2	2017-2018	GIZ	Blekalb Foundation
4.	Sheep	"Breed Shkodrane"	14	2005-2006 2010-2012	GEF/UNDP MBZHR	AU-Tirana MADA
			10	2017-2018	GIZ	RASP
		Breed "Lara of Polisit"	10	2013-2016	GEF/UNDP MBZHR	LRDC
		Breed "Bardhoka"	11	2016 – 2018	GIZ	FRCFP
5.	Pig	Native pig "Pig with wattle"	5	2007-2010	GEF/UNDP Fondacioni SAVE	NASR
		Native pig "Spotted of Scutari"	6	2007-2010	GEF/UNDP Fondacioni SAVE	FRCFP
		Native pig "Siska White of Scutari"	8	2007-2010	GEF/UNDP Fondacioni SAVE	Albagene Association

In-situ programmes have been implemented in farm groups that breed autochthonous breeds /ecotypes animals in their area of origin relying heavily on local communities. The farms were selected based on phenotypic indicators and characteristics of the autochthonous breed / ecotype animal. Activities such as monitoring of production, reproduction, nutrition and nutrition indicators, health status, etc. were carried out. Creating a network of farmers through their support where in-situ conservation programmes were implemented, their training support to improving farm infrastructure and improving the production systems were the most important part of the activities. International organizations such as GEF / UNDP, SAVE Foundation, GIZ, FRENCH Cooperation in cooperation with governmental and non-governmental organizations have played a crucial role in the implementation of in-situ conservation programmes.

4.3. FOREIGN DONOR SUPPORT FOR CURRENT AND PREVIOUS ACTIVITIES RELATED TO AGRO BIODIVERSITY

Baseline study on the status and use of native plant and animal landraces in the CABRA project area (North Albanian Alps). Project no: 2014.2199.9. Financed by GIS-Albania, August-October 2015

The focus of the project was on:

- Conservation of natural and agricultural biodiversity, and
- Enhancing rural incomes through sustainable, gender-neutral and equitable use of natural resources. The baseline survey conducted was focused on vegetables, fruits, medicinal and aromatic plants (MAP) and livestock.

Conservation and sustainable use of Agrobiodiversity in the Northern Alps of Albania. CABRA Project, Contract No: 83226204: 2016-2018, Financed by GIZ-Albania
(Dervishej L.)

This project promotes the conservation and sustainable use of agricultural biodiversity in selected mountain areas in the northern Alps (accounting for about 8% of Albanian territory).

Specific objectives:

- Collect and propagate local varieties and landraces from the project area both in-situ (on farms in the northern Alps) and ex-situ (on site of IPGR ground);
- Distribute/ disseminate plant material among local farmers in the project area;
- Train local farmers in animal breeding and cultivating the local cultivars;
- Strengthen the capacity of the IPGR for in-situ conservation.

Agrobiodiversity is recognized as a key asset to improving the livelihoods and productivity of poor smallholder farmers. Agricultural biodiversity provides environmental services and supports the sustainability and resilience of agricultural systems. It can also provide a diverse and nutritious diet, and contribute to health.
The FAO's Commission on Genetic Resources for Food and Agriculture pointed out among the main threats to genetic diversity in agriculture and food production the lack of development and use of "adapted varieties and animal breeds and their important characteristics". Its recommendations included combining ex-situ and in-situ conservation, networking of producers and consumers where the market opportunities for farmers and educational initiatives for consumers can strengthen this network, support diversifying and adapting agriculture and food production to the market needs and therefore "enable locally-adapted varieties and animal breeds to be embedded in tourism, food production, food trade and local cultural activities".

It is considered there is evidence that local farming systems and short chains do have a higher multiplier effect on local economies than long chains (EC- JRC, 2013). Furthermore, the integrated approach of the above-mentioned measures, is the best alternative for conservation and profitability from high-value, low-volume and diverse products in mountain value chains where there is a long distance to the market, a fragile environment and marginality in the community (ICIMOD, 2010).

Recent consumer trends such as the increased demand for vegetarian and vegan food or the slow-food movement also offer options for agrobiodiversity products.

Agrobiodiversity products can also attract potential buyers who are interested in cultural diversity and values, novelty, health foods and environment.

The conservation and sustainable use of natural and agricultural biodiversity in the mountain regions of Albania is a challenge that was identified by experts and institutions and has drawn the attention of international development projects and research expertise such as the Conservation of Agrobiodiversity in rural Albania (targeting the area in the mountain regions bordering Montenegro and Kosovo, i.e. the Albanian Alps communities (Kelmend, Shkrel, Shala, Lekbibaj and Margegaj).

In order to improve framework conditions for the conservation of natural and agricultural biodiversity, the project has set itself the target of assisting representative households to increase the number of native animal species, varieties or races, along the economic benefits which can be obtained from their sales.

The project applied an integrated approach for the sustainable use of agrobiodiverse resources combining the conservation of agriculture and livestock resources through in-situ and ex-situ conservation (via the Albanian IPGR by supporting the capacities of a network of 100 farmers, supplying them with 25 cultivars among 100 local plant varieties regenerated and 15 restored, supporting the capacities for animal breeding and improving productivity of a nucleus of 40 livestock breeders of seven autochthon animal breeds) with nature park and biodiversity management (supporting the management of four protected areas). It valorized those through added-value options, such as employing short value chains, developing agro-ecotourism, supporting the nature and rural tourism product development such as itineraries in nature parks, chestnut trail, supporting short chains through tourist consumption and in-situ selling points such as promotion of fairs, weekend markets, promotion of agrobiodiversity days in nature parks, designing certification schemes (promoting Alps Product Brand as mountain products) and finding niche products etc.

The results of this project with an evident increase of conservation and the use of the agrobiodiversity deriving into economic benefits and the increase in marketing and tourist interest for the Alps area can serve as a model for the conservation and sustainable use of biodiversity and agrobiodiversity in mountain and rural areas.

Capacity building to support in-situ conservation and use of Animal Genetic Resources. TCP/ALB/3001 (A). Financed by FAO, 2005-2006.
The objective of this project was to support the long-term in-situ conservation of AnGR in Albania through the development of a national strategy and a National Action Plan. The development of the necessary technical capacities at national, regional and local levels required to implement the action plan, the creation of a national AnGR network to support the plan's implementation and the provision of recommendations relating to the design of an improved legislative framework to support AnGR conservation.

Development of regional network in function of sustainable breeding programmes for transboundary breeds. Financed by European Regional Focal Point for AnGR, www.rfp-europa.org, 2010-2012. The objectives of the ERFP were to support the in-situ and ex-situ conservation and the sustainable use of AnGR to:

- Identify and evaluate of current status of the AnGR, especially for sheep and cattle breeds.
- Develop and maintain regular contact and exchange of relevant information for conservation and sustainable use of local breeds according to the geo-climatic characteristics in the lowland, hilly and mountainous areas in the Balkan regions.
- Exchange ideas regarding the development and implementation regional cooperation among neighbouring countries, in order to identify the economic and cultural values of management and conservation of indigenous breeds at risk of extinction.
- For scientific aspects, it is supported by the European Association of Animal Production's Working Group on Animal Genetic Resources (EAAP WG-AGR).
- To stimulate and coordinate the maintenance and further development of national and regional AnGR databases and to encourage European information networking on AnGR.

Evaluation of the current status of Busha cattle and develop a regional breeding programme for their conservation and sustainable economic use. Financed by the European Regional Focal Point (ERFP) for AnGR, www.rfp-europa.org, 2010-2013.
The project objective in general terms was the sustainability of ERFP projects and their effects in Balkan region. The project used a model for a sustainable cross-border

conservation programme for trans-boundary breeds as a tool for strengthening the capacity of the ERFP and its role in the Balkan regions. The Busha cattle is in serious danger of extinction. It has existed in the Balkans since Neolithic times. It has adapted to harsh environmental conditions and spread with numerous strains, but in small fragmented relict populations throughout the Balkans.

Building up the role of National Coordinator of FAnGR for strengthening the capacity of Balkan network for the agrobiodiversity of livestock. Financed by European Regional Focal Point for AnGR, www.rfp-europa.org, 2013-2014
The main objectives were: Establishing a regional platform for supporting the management, conservation and sustainable use of animal genetic resource.

Rescue of endangered pig breeds and building up farmers' network in the Velipoja Nature Reserve, Albania. Financed by GEF/UNDP and SAVE – Foundation project, 2009-2013.
The village which farmed with endangered pig breeds has been announced as a rescue station and in-situ conservation programme that was implemented until now. It is regarded as a success story.

The identification and characterization of small ruminant native breeds in the southern region of Albania. ALB/SGP/OP4/Y3/CORE/2009 – GEF/UNDP, 2013-2014.
The current status of the Brachycerous cattle populations in the southeastern European countries and strategies for their sustainable conservation. Financed by European Regional Focal Point for AnGR, www.rfp-europa.org, 2011-2013.

The conservation and valorization of biodiversity for sustainable rural development in the Balkan mountain. Financed by the French Fund for World Environment (FFEM), the Government of Albania and CIHEAM/IAM, the Mediterranean Agronomic Institute of Montpellier, France, 2014-2015, the Albanian Partners Mountain Area Development Agency (MADA) and the Albanian Ministry of Agriculture (Mardwa). The promotion of origin-linked products from Hasi goat kids via a quality sign system, in the Hasi district, which are expected to generate a sustainable development of agriculture and preservation of the biodiversity, the BiodivBalkans project. BiodivBalkans (2012-2016) is a research-action project aiming at crossing the environmental injunction of biodiversity conservation with economic objectives of rural development, in Albanian

mountainous rural areas. The main hypothesis is that implementing an appropriate label to display quality / origin / equity / sustainability (especially geographical indications – GI) information could provide an effective tool for territorial development and conservation of agrobiodiversity. http://www.iamm.fr/recherche_cooperation/projets/BiodivBalkans.

Capacity development initiative on small ruminants VC: Dried goat meat. Financed by SARED-RASP. 2016-http://rasp.org.al/. The RASP has established the "Hasi goat meat quality label" in the framework of the Biodiversity Balkans project for the conservation and valorization of biodiversity for sustainable rural development in the Balkan Mountains. The goal of the project was the "promotion of origin-linked products as Hasi goat kids via a quality sign system, in Hasi district, which are expected to generate a sustainable development of agriculture and preservation of the biodiversity"

4.4. FACTORS RESPONSIBLE FOR THE DECREASE OF THE POPULATION SIZE OF NATIVE AUTOCHTHONOUS ANIMAL BREEDS

The sources of the threats to these populations are varied and complex but three are key:

- Crossbreeding between of local native animal breeds / ecotypes by exotic animal breeds.
- Abandonment of autochthonous livestock raising due to production and market constraints without competing exotic breeds,
- Migrating peoples, especially youths, from rural areas to urban ones.
- Crossbreeding between autochthonous and exotic goat breeds – Autochthonous livestock populations in the country are declining as they crossbreed with others. As a result of this crossbreeding, they are losing certain adaptive characteristics (such as hardiness, disease resistance) essential for survival and production in their environment. In addition, although crossbreeding has short-term benefits

(increased milk and meat production, etc.), in the long run it could result in the elimination of globally significant autochthonous breeds.

Crossbreeding happens for a variety of reasons:

- Most autochthonous livestock are relatively low producers of milk or meat (native sheep and goat), livestock farmers choose to crossbreed with more productive exotic animals, particularly as the market demand for meat and milk products has steadily increased.
- In addition to seeking higher productivity, many farmers feel that market structures are aligned to the higher value of exotic breeds and to distribute them more widely within the region, thereby increasing their value relative to endemic breeds.
- Contributing to the desire among livestock farmers to crossbreed their flocks, there is a lack of awareness of the risks of crossbreeding (most breeders consider crossbreeding as a means of strengthening their flocks and understand poorly the implications of genetic erosion for long-term health of their flocks). Most livestock farmers also have a limited understanding of the advantages of autochthonous ruminant livestock raising, in particular where ecosystems are under pressure and traits such as hardiness and low-input needs will become more and more valuable over time.

Unfortunately, the introduction of exotic germ plasma into Albania has been (and continues to be) seen as the solution to low animal productivity even in areas where the exotic genotypes are ill adapted. In many cases, this trend has been responsible for the extinction or severe erosion of the genetic diversity in these populations. This has, in most part, been due to a lack of (or inappropriate) assessment of the economics of these interventions. In particular, conventional evaluations of the impact of exotic breeds have often not considered subsidies provided by donors or governments, nor have they been based on sound cost-benefit analyses which includes veterinary and other extension support services as well as 'indirect' costs. More specifically, these evaluations have not included an assessment of the increased risk, loss of indigenous farm animal genetic diversity, or disturbances to the ecological balance through impacts on other components of the production system. As a result of these factors,

evidence suggests crossbreeding between exotic breeds and endemic breeds has increased significantly in the past two decades.

Abandonment of autochthonous livestock rising due to production and market constraints

The loss of animal genetic resources is not only linked with the extinction of indigenous breeds but also the loss of best bet genetic diversity within breeds which the genes and gene complexes they carry may be useful to agriculture in the future. “Ref.23”.

A great threat to the long-term survival of autochthonous livestock breeds in Albania is the ongoing trend among livestock farmers to abandon local breeds because of their perceived inferiority to exotic breeds in terms of productivity and marketing. Productivity in terms of animal products (milk, meat) is cited by many livestock farmers as a key reason for switching to exotic breeds and/or crossbreeds. Under some environmental and management conditions, autochthonous livestock are clearly unable to compete with exotic breeds in productivity, but in other conditions autochthonous breeds can in fact produce well, if certain constraints are not present. Among these constraints, specific to autochthonous ruminant livestock production is the decline in their feed, which in most cases is not adequately replaced by crop residues or other feeds. Finally, there is a limited awareness among livestock producers of production and productivity enhancement opportunities with exotic breeds.

In addition to constraints on the production and productivity of autochthonous populations, the effective and efficient marketing of animals is also constrained by several factors. Because of these constraints, market demand and valuation for products is low, in comparison to demand for exotic breeds, and has led many farmers to abandon goat flocks in favour of exotics or other marketable products. Another factor is the weak level of utilization of livestock byproducts, which lessens the overall economic productivity of livestock.

One of the primary constraints to the marketing of animals in Albania is poorly organized distribution channels or poor market information for these breeds. In addition, there are no viable commercial channels among regional and larger districts for the sale of livestock and their products.

Finally, farmers of autochthonous livestock are not organized properly to support their efforts, meaning potential customers remain unaware of livestock products and producers themselves have only limited awareness of marketing enhancement opportunities.

Migrating peoples, especially youths, from rural to urban areas.

Rural people are also abandoning autochthonous breeds of livestock due to constraints on all livestock production (autochthonous and exotic), which causes them to focus on other rural economic activities, or in many cases, to leave rural areas completely and migrate to the city (as seen in the Lekbibaj Zone).

Root causes of the threats to autochthonous animal populations.

The primary immediate threats to these populations are crossbreeding with exotic livestock, and declining interest among local populations in raising autochthonous breeds. Less obvious are the underlying causes for these threats, which are: socio-economic trends, unregulated and inefficient resource management, decision-making based on inadequate information and policy incentives/disincentives, and market distortions.

Socio-economic trends.

Albanians are adapting to buy and sell small ruminants frequently to satisfy their needs for monetary income. On the other hand they, based on the cultural and savings values associated with small ruminants, keep as many animals as possible for as long as possible. This trend is further exacerbated by the breakdown in traditional resource management rules and practices that has accompanied the large-scale human and animal migrations into areas that support endemic ruminant livestock.

Unregulated and inefficient management of autochthonous breed population

Inadequate management of autochthonous flocks extends beyond livestock grazing practices and includes poor coordination between local government and communities in forest and meadow management and protection. The management of flocks is generally limited to the level of the individual flock owner, with very little coordination on animal health, production/marketing or supporting services. As a result, there is no coordinated management or conservation of these autochthonous populations, or

control of crossbreeding between local and exotic breeds, and complete legal framework to support such efforts. In addition, because of the absence of breeding programmes for autochthonous breed populations in Albania, householders managing such flocks continue to rely on unimproved breeds, while owners of exotic breeds are consistently provided with improved animal genetic resources. Householders also engage in an inefficient use of existing and potential feed, as very little has been done to improve growing techniques. The widespread marginalization of women continues despite the critical role that women play in this sector, most notably in the care and production.

Decision making based on inadequate information.

Awareness among policymakers and smallholders themselves of the long-term value of local breeds, including their important genetic traits (hardiness, disease resistance) and low-input needs (critical in marginal areas and for poor householders) is very low. As noted above, this translates into very limited government support for resource management for habitats important to livestock, or indeed for management, improvement and promotion of the animals themselves. Policymakers and resource managers also suffer from the absence of data necessary to design effective resource management and conservation strategies and programmes, so that even where state attention and resources are placed on effective forest and meadow management, critical data to support these efforts is frequently unavailable.

Equally problematic are the very limited advocacy and organizational capacities among smallholders. The smallholders of autochthonous flocks are not organized in associations at the local level to promote or educate themselves or others about these breeds, and most of them are unaware of the scope of the threats to these breeds, or of opportunities to improve management and production conditions. As for women who, in some cases, play a critical role in the management of flocks and products, their participation in such entities is absent.

Policy incentives and market.

Subsidies and policies firstly favour agricultural production (green houses, vineyards, olive and fruit trees plantations), putting further pressure on the remaining habitats for endemic ruminant livestock. In addition, investors that promote exotic livestock breeds over local breeds are widespread, distorting the real cost of the production of the different races that otherwise would frequently favour endemic breeds. Conversely, policy and economic incentives to support production and marketing of local breeds are largely constrained or absent. The banking/credit system is hesitated to provide financing to small-scale livestock owners.

In addition to inappropriate incentives, there are also structural economic and market constraints to the production and marketing of local ruminant livestock. Another structural impediment is the lack of any coordinated marketing strategies for local breeds, or indeed for basic market information on supply, demand, prices, etc., which greatly limits the ability of local livestock producers to expand their markets and secure optimum prices.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1. CONCLUSIONS

Agricultural sectors are major users of biodiversity but also have the potential to contribute to the protection of biodiversity. There is limited awareness of the importance of the conservation and sustainable use of AnGR among policymakers and major stakeholders in the livestock sector.

Good governance, enabling frameworks, and stewardship incentives are needed to facilitate the mainstreaming of biodiversity. Albania has not yet established the necessary measures in accordance with the Nagoya Protocol related to the monitoring of genetic resources and related user-compliance measures.

Biodiversity is key to food security and nutrition. In agricultural ecosystems, the maintenance of biological diversity is important both for food production and to conserve the ecological foundations necessary to sustain life and rural livelihoods. Albania, due to its geographical position and climatic conditions, is a country distinguished for its high level of biological diversity in plants and animals for agriculture and food. The country has a genetic potential that relies largely on autochthonous breeds of small ruminants with productive quality, and a higher resistance to environmental conditions and to different diseases compared to cultivated breeds. The trends observed, in the context of free trade with countries in the region and beyond, based on these resources on the one hand and the development of agro-tourism on the other, will be the promoters of the production system's development for autochthonous breeds and ecotypes and consequently farm sustainability.

Key factors relating to genetic erosion in autochthonous farm animal genetic resources:

- Decreasing economic interest of farmers due to the low yields of local breeds /ecotypes of farm animals. The replacement of local native animal breeds / ecotypes by exotic animal breeds.
- Crossbreeding between local native animal breeds / ecotypes and exotic animal breeds to increase productivity, sometimes with the support of agricultural extension services.
- Abandonment of autochthonous livestock raising due to production and market constraints without the competing exotic breeds. Undeveloped market for quality animal products from local breeds in the gastronomy, retail, tourism and other sectors.
- Migrating peoples, especially youths, from rural areas – especially hilly and mountain areas, which are richer in local animal genetic resources – to urban ones.
- In various regions of Albania, especially in isolated mountainous, hilly areas, many small farms use the traditional system of breeding local farm animals surviving in difficult conditions. The conservation and development of local animal breeds / ecotypes is a permanent task in Albania as there are still areas where these resources have not been monitored on traditional farms. The first step towards an efficient conservation strategy for animal genetic resources is the proper characterization of the conservation value of the different breeds.
- Lack of awareness for the vital importance of the conservation and sustainable use of local breeds for biodiversity in general, but also for the quality and culinary value of meat and milk products and their attractiveness for agro-tourism and rural culture.
- Updating the results for identifying, characterizing and cataloguing the genetic resources of local farm animals requires further capacity enhancement and qualification. We must emphasize that current experiences, applied methodology and available capacities to develop them in the context of following the Nagoya Protocol are insufficient.

Albania is member of several different international organizations and has signed and ratified conventions and international protocols in field of conservation and uses the biodiversity. One of these conventions is the Nagoya Protocol an agreement under

the Convention on Biological Diversity, which was adopted on 29 October, 2010, in Nagoya, Japan, and entered into force on 12 October, 2014. In response for developing national capacity needed to elaborate and implementing policies and programmes for conservation and sustainable economic use of agrobiodiversity, Albania has compiled the National Strategy and Action Plan for the conservation and sustainable use of AnGR, as part of the Crosscutting National Strategy for Rural Development. The evaluation of the results achieved through the implementation of these policy documents indicates the existence of difficulties and obstacles that have accompanied this process.

Among the main factors responsible for this situation are:

- Inadequacy of the legal framework (Laws, regulations, DCMs, etc.);
- Significant lack of institutional infrastructure (Zootechnical specialists, laboratory and promotional equipment);
- Insufficient level of financial resources including support schemes;
- Insufficient level of cooperation between public institutions and the farming community;
- Insufficient knowledge of the conservation and sustainable use of agrobiodiversity;
- Unsatisfactory level of appreciation for the economic and cultural values of agrobiodiversity;
- Insufficient capacity to establish effective international, regional and cross-border cooperation, etc.
- In Albania there is no database for AnGR or national register for autochthonous breeds / ecotypes of farm animals. There is currently no institutional structure for the creation and updating of the national registry or database.
- Public funding for in-situ/on-farm conservation of autochthonous animal breeds is insufficient.

Positive factors of the use of genetic resources in agriculture

- Technical support to farmers for using local breeds / ecotypes to improve productivity, and also the quality of the resulting products, including services in the frame of diversification efforts of rural income.
- Creation of new approaches for the development of rural communities that also encompass the marketing of rural and traditional culture, agro and rural tourism, rural and urban gastronomy and cultural events and practices to ensure

the economic viability of keeping local breeds.

- Women have a much higher share in agricultural activities dedicated to the conservation and sustainable use of animal genetic resources as a whole, even though, in some areas breeding is a typically male dominion. Any action directed towards capacity building and technical assistance for the conservation and sustainable use of biodiversity should therefore ensure that women are actively included and encouraged to join programmes, associations and projects.

For the conservation and sustainable use of indigenous farm animals, laws and regulations drafted do not fully address issues related to technical, economic or social aspects. The legislation is inconsistent with the international and EU legal framework, as well as with the international conventions and protocols to which Albania accedes or has ratified (Nagoya Protocol).

In Albania the conservation and sustainable use of indigenous breeds / ecotypes in farm animals is based on the farmer's own initiatives as part of the historical heritage. In general, farmers did not have legal support. Here, two breeds are excluded: buffalo and 'Shkodra' sheep with extinction status have received financial support. The most promising option for maintaining animal genetic resources is to support and provide incentives for local communities to continue herding and managing their animal genetic resources in their respective ecological contexts.

However, the implementation of the subsequent steps is more complex, as conservation strategies for farm animal genetic resources must integrate technical, economical, sociological, and political parameters. The effective management of farm animal genetic resources requires comprehensive knowledge of the breed's characteristics, including data on population size and structure, geographical distribution, the production environment, and within- and between-breed genetic diversity. A strategy for capacity building among farmers and local communities, through education and training, awareness raising, information sharing, and the dissemination of case studies is also very important.

Education about the great economic and cultural values of agrobiodiversity poses a challenge for generations of the population. Only in this way will the society take responsibility for actively participating in this ongoing and vital process.

5.2. RECOMMENDATIONS

Agrobiodiversity should be a priority at the institutional level and the importance of maintaining and sustainably using local, indigenous breeds, livestock and food production is an essential part of all public policy.

The harmonization of all these responsibilities at national level of all actors (public institutions, policymakers and decision-making bodies at central) and at local level (the community of farmers and all other stakeholders) related to the protection and sustainable development of indigenous breeds / ecotypes in farm animals is an institutional necessity. Supportive policies, efficient organizations and institutions, competent staff, long-term financial support and strong links between these components are also needed.

Analysing the current situation of autochthonous genetic resources in farm animals, the results achieved, the difficulties and the challenges for the future requires the reassessment of legislation within the framework of the Nagoya Protocol and the strengthening of public structures responsible for the protection and sustainable development breeds / indigenous ecotypes in farm animals.

Based on the above arguments I would list the following recommendations:

- In the area of legal and institutional framework, significant improvements should be made in relation to autochthonous animal genetic resources and their sustainable use.

Development of the Albanian national legislation in line with the Nagoya Protocol is a priority for the country, as well as the establishment of an information system to promote access to Albanian farm animal genetic resources.

The law and regulations must contain the following provisions:

- An institution responsible for identifying, characterizing and monitoring animal genetic resources for food and agriculture.

- A national information system for monitoring the diversity of farm animals.
- Institutions responsible for the administration of the national database.
- Institutions responsible for international and multilateral cooperation and exchange.
- A national network, national coordinator and national focal point for animal genetic resources for food and agriculture.
- MARD should support its subordinate institutions related to the protection, conservation and sustainable use of autochthonous breeds/ecotypes of farm animals.
- MARD should reorganize the Zootechnical Service, as its minimization in structure has been associated with adverse effects on the management of farm animal genetic resources in general and the conservation and sustainable use of autochthonous breeds / ecotypes in particular.

The establishment and functioning of the National Agency for the Management of Farm Animal Genetic Resources (AnGR) (Institution foreseen in the document: National Strategy and Action Plan for the Conservation and Sustainable Use of Farm Animal Genetic Resources, Tirana 2007).

- The establishment or strengthening of national authorities or management entities for the management and use of genetic resources of farm animals, which need a clear definition of their roles, powers, responsibilities, resources, etc.
- Coordination of international cooperation.

The establishment and functioning of the National Advisory Council (NAC) on "Conservation and Management of Biodiversity in Farm Animals" as an institution for determining the status of breeds at risk of extinction, as well as supporting all actions described above, including ensuring sufficient financial resources, staff and infrastructure.

The National Advisory Council (NQF) shall be represented by three ministries:

- The Ministry of Agriculture Rural Development (MARD),
- The Ministry of Tourism and Environment (MTE),
- The Ministry of Education, Sport and Youth (MESY)

Institutional capacity building for the support of education, research and training to tackle the characterization, inventorying, monitoring, conservation, development and sustainable use of animal genetic resources.

The establishment and functioning of the National Agency for the Management of Farm Animal Genetic Resources (AnGR)

- Establishing the legal definitions of basic concepts such as indigenous, traditional, local and autochthonous breeds, in situ and ex-situ conservation methods and programmes, gene bank and their cryopreservation, breed improvement and management of livestock breeds and organizations, books herds, genealogy books, risk status, etc.
- Develop or update national agrobiodiversity strategies and action plans for the conservation, development and sustainable use of animal genetic resources and ensure they contain a strong element of practical application.
- Draft a national action plan which should also contain information on the method and implementation of issues such as:
    1. Assessing the degree of risk of animal breeds/ecotypes and the state of use.
    2. Education and training in the field of conservation of genetic resources of farm animals.
    3. Increasing public awareness and early warning of the state and importance of preserving the genetic resources of farm animals.
    4. Assessment and monitoring of genetic variability.
    5. Actions for the conservation of animal breeds at risk of extinction.
    6. Management and development of a national gene bank, cryo-bank and an ex-situ bank in vivo.
- Establish national monitoring mechanisms and sufficient financial allocation with the participation of stakeholders and also investigate the level of crossbreed with cultivated breeds or new breeds.
- National action plans should also contain information on the method and implementation of issues such as: Provisions for the monitoring and enforcement of the CBD and the Nagoya Protocol including access and benefit sharing (ABS) of genetic resources, ABS of traditional knowledge and legal registration and protection of traditional livestock products and consent and participation of

local communities.

- Raising awareness at national level to the general public through promotional activities as well as educational activities. Raising the awareness of policymakers on the importance and value of genetic resources of farm animals in general and autochthonous ones in particular.
- Regional cooperation and exchange of published catalogues of regional breeds.
- Strengthen cross-border and regional cooperation on the conservation and use of farm animal genetic resources.

Institutional strengthening of Korça Agricultural Technology Transfer Centre

- Korça Agricultural Technology Transfer Centres has a functional task in producing breed material (male and female reproducers) of small ruminants (goats / sheep) of autochthonous and cultivated breeds. Preservation and consolidating the autochthonous genetic fund of small ruminants with high value for Albania is one of the main priorities of this centre.
- Preserve the genome of breeds at risk of extinction without affecting genetic variability through ex-situ in vivo conservation.
- Implement a genetic programme for sustainable in vivo conservation through self-development over a relatively long time (30 years) to homogenize the genetic constitution by reducing the level of inbreeding.
- Increasing the number of breeds/ecotypes at risk of extinction, in the area of origin to exit the critical phase.
- Institutional collaboration with RAEA and non-governmental organizations related to the management of autochthonous genetic resources in farm animals.

The Directorate of Livestock Technologies employs a total of six specialists out of which three are veterinary specialists, one is an agronomist specialist and two are vacancies for zootechnical specialists.

The lack of zootechnical specialists results in significant consequences for the implementation of breed conservation programmes or the sustainable development of genetic resources in general and particularly autochthonous ones. The Department of Livestock Technologies of Korça (DLTK) realizes research projects for the conservation and sustainable use of AnGR.

Since 2011, DLTK has been subjected to the first conservation programmes for two breeds and two herds which were in danger of extinction:

The “Shkodra” sheep breed – with a population of 45,
“Lara e Polisit” sheep – with a population of 60

This centre produces and distributes high genetic value reproducers to farmers, with an impact on increasing their incomes. Station specialists implement breeding programmes for local sheep and goat breeds / ecotypes such as: “Capore of Dragobia” goat, “Capore of Mokra” goat, “Bardhoke” sheep, etc.

- Preserve gene pool of endangered species without affecting genetic variation through ex-situ conservation in vivo, with a population of 45 sheep.
  Implementation of the zootechnical and genetic programme for sustainable conservation in vivo through self-development for a relatively long time (30 years) to homogenize the genetic constitution without any decrease in inbreeding levels.
- Increase the number of heads in the country of origin to emerge from the critical stage.
- Institutional cooperation with RAEA – Shkodër, Korçë, for selection of male lambs and production of reproducers, their circulation between farms and different areas to create male lines that will serve as fathers for natural breeding.

The second direction – Breeding improvement programmes of DLTK.

These programmes should be undertaken for breeding improvement of the target traits of sheep and goats (genetic diversity within population) taking into consideration the market and society for increasing the livestock production and income of our farmers. The main improvement breeds sheep breeding in the Korça Directorate of Livestock Technologies are:

- Ile de France sheep – 75,
- Awassi sheep – 90
- Saana goats – 30,
- Alpine goats – 50.

These breeds have high genetic potential in terms of milk and meat production and already exist in Albania in the nuclei of breeds organized in the DLTK and the nuclei of breeds organized by some farmers.

Numerous deficiencies in laboratory infrastructure and equipment directly related to efficiency in the implementation of conservation programmes with indigenous sheep breeds as well as breeding programmes in sheep, goats and cows were noted. Even the equipment available is out of line with outdated technologies. (These deficiencies were ascertained from the visit to the station on 26 November 2019).

Project support with some of the most valuable equipment for this centre is a necessity. Supporting the station with laboratory equipment and some other equipment related to the domestication of native sheep milk will have an impact not only on the daily operation of the station but also on the farmers who breed indigenous small ruminant breeds on their farms.

The station needs:

- One piece of laboratory equipment for performing functional milk analysis, with a broad spectrum (fat, protein, somatic cells, etc.), in order to implement the conservation and development programme for the sustainability of small ruminant breeds (sheep and goats). The selection of lambs is also based on the evaluation of the components of milk quantity and quality. Mating is also based on evaluating the milk production quality performance.
- Two portable mechanical milking machines for milking sheep herds in order to maintain the value chain.
- Two milk cooling tanks with a holding capacity of 200 litres each, for the collection and storage of milk produced from sheep flocks.
- Three portable laptops to update and process technical-zootechnical data during monitoring, and expertise performed on small ruminant livestock farms throughout Albania for the implementation of conservation and breed improvement.
- Additionally, the semen conservation laboratory with liquid nitrogen storage technology, urgently needs three containers with a capacity of 50 L, for the storage of biological material, which will affect the improvement of the breed work performed by the station.

Given the genetic erosion of these breeds as a result of unmanaged crossbreeding, animal populations have decreased, risking the disappearance of all or any of them, so preservation ex- situ and in-situ genetic funding is another argument for funding of this project for the DLTK.

AGRICULTURAL TECHNOLOGIES TRANSFER CENTRES – FUSHË KRUJA

The functional task of the ATTC is:

- The transfer of breeding technologies for farm animals: cattle, pigs and poultry. Conservation of the autochthonous genetic resources of the bovine, pigs and poultry AnGR; participation in research projects for sustainable use of AnGR, based on strategy documents (studies, programmes and action plans on biodiversity).
- Identification, conservation, collection and multiplication of autochthonous genetic resources in high-value animals for the country.
- Awareness and support of farmers for the conservation of indigenous animal resources and their sustainable use.
- Stoping the reduction of the population size and enlargement of the real (census-based) and effective population size

Currently in Albania the genetic fund for farm animals is characterized by a high level of mixing of autochthonous, local and native genes with exotic, imported breeds. After all, the efforts made to inventory this fund and evaluations carried out in accordance with the procedures recommended by FAO, establish the opportunity to present a general picture of the status of this fund.

In 2008, the Catalogue of Albanian Farm Animal Genetic Resources was published by the Ministry of Agriculture, Food and Consumer Protection. It includes detailed descriptions of 34 local autochthonous breeds/populations (20 goat breeds, seven sheep breeds, three cattle breeds, three pig breeds and a buffalo breed). The information is provided for the main morphological characteristics – conformation, production, size of population, numbers of reproducers, the production system and needs to undertake actions for conservation and sustainable use.

The analysis carried out in this mission shows that autochthonous farm animal populations have undergone significant changes, with both increases and decreases.

Based on this argument, a project on "Mapping autochthonous breeds / ecotypes for farm animals in Albania" and the Agricultural Technology and Transfer Centre- Fushë-Krujë could be the implementing institution for these reasons:

- ATTC Fushe-Kruje is the only institution that has sufficient human capacities (zootechnical specialists) technically capable and defining of indigenous breeds / ecotypes in farm animals. This team has implemented projects in conservation programmes on autochthonous genetic resources in farm animals.
- The staff of the Directorate of Land and Water have carried out the mapping of agricultural lands with the geographic identification system (GIS) in some areas of the country, with the aim of managing the parcels for the benefit of the communities gaining the necessary experience of operating the computer program.
- Regional Agricultural Extension Agency (RAEA) –Korçë, Tiranë, Shkodër, Lushnje

Regional Agricultural Extension Agencies are established by Council of Ministers Decision No. 147 Dt. 13.3.2018, which is institutionally dependent on MARD. Agencies are the ultimate actors in the structure related to the protection, conservation and sustainable development of indigenous genetic resources in farm animals. Their role is very important as it establishes contact with farming communities that breed autochthonous animal's breeds / ecotypes.

The decision to establish these agencies does not include the protection and sustainable development of autochthonous genetic resources in farm animals for the area where they operate directly, but:

- This decision should not be a reason for not carrying out activities related to the genetic resources of farm animals in general and indigenous ones in particular.
- The extension service must increase the number of zootechnical specialists in the structure to support the protection and sustainable development of autochthonous breeds / ecotypes of farm animals.
- Vacancies should be completed to suitably increase the efficiency of zootechnical specialists in regions rich in the genetic resources of farm animals in general and those of indigenous breeds / ecotypes in farm animals.
- Extension agencies need to fill vacancies for zootechnical specialists and improve the

range of the extension service structure in their favour. The lack of zootechnical specialists in extension services will be followed by significant deficiencies in the protection, conservation and development of indigenous genetic resources in farm animals.

In Albania, NGOs play a crucial role in the conservation of indigenous animal genetic resources. Specific conservation of autochthonous animal genetic resources has so far depended on NGOs and individual farmers.

Current developments in rural areas in general and in protected areas related in particular to increased demand for "local" products from indigenous farm animals do not comply with policies, strategies and action plans for the sustainable conservation and use of agrobiodiversity.

The capacity to promote and support the sustainable conservation and sustainable use of indigenous farm animals is limited.

These conditions require:

- Farmers to be recognized as the guardians of genetic resources and their contribution rewarded;
- Capacity building for all stakeholders to be a central element for agrobiodiversity management, regulation and administration
- Organic agricultural production and declarations of origin and protected geographical denominations to support the use of local animal breeds.
- The establishment of new and fostering of existent value chains with local animal breeds/ecotypes to be pushed forward and involve sectors such as agriculture, food production, gastronomy, and tourism.
- Public awareness to be raised for the importance of biodiversity in agriculture and the value of products from local animal breeds/ecotypes.
- Improving of the situation of women, which is strategically important for the overall development of the rural sector (conservation and use local animal breeds/ecotypes).
- Promotional activities, such as fairs, to be established aimed at raising public awareness for the importance of biodiversity in agriculture and the value of

products from local breeds.

- Consideration be given to the essential role of local breeds in the sustainable development and income generation of farmers from food products made from existing animal genetic resources. Traditional breeds can be the basis for traditional brands and products that can be traded in the context of traditions and cultural events, combined with tourist participation, gastronomy and retail. These activities can serve as an incentive for young farmers to look towards a sustainable economic outlook on their farms. (For example the study by RASP entitled: "Promotion of origin-linked products as Hasi goat kids via quality sign system, in Hasi district, which are expected to generate a sustainable development of agriculture and preservation of the biodiversity").
- Network building actions to foster the creation or strengthening of breeder's organizations and other actors to participate in conservation efforts for local animal breeds. (For example the study entitled CABRA Project, 2016-2018, by GIZ-Albania).
- Regional cooperation and exchange of published regional breed catalogues. (Study: Agricultural University of Tirana)
- Cooperation and synergies to be fostered between different authorities and stakeholders (NGO activities such as LEAA, LRDC)
- The creation of a virtual platform providing collected data on autochthonous animal genetic resources, their phenotypical and genetic characteristics, population status, etc. (for example ATTC Fushë Kruja)

ANNEX

ANNEX 1

LIST OF INSTITUTIONS AND GOVERNMENTAL BODIES RELATED TO THE MANAGEMENT OF AUTOCHTHONOUS GENETIC RESOURCES IN FARM ANIMALS.

Organization	Ministry of Agriculture and Rural Development (MARD)
Contact details	**Adresa:** Sheshi Skënderbej 2, Tirana 1000
Functions related to agrobiodiversity protection	The Ministry of Agriculture and Rural Development-MARD is the national authority for the conservation and sustainable use of plant and animal genetic resources for agriculture and food. The Livestock and Rural Development Policies and Strategies (LRDP) sector is responsible for the sustainable development of livestock production in the country through the drafting of legislation, sector strategies, and development policies and programmes for the protection, improvement and preservation of the quality of animal genetic resources, to promote the growth of livestock production, the creation and propagation of breed values and the preservation of the genetic variability of farm animals.
Capacity assessment	To fulfil its responsibility there has been a national network of Agricultural Research Institutions, which in 2006 were reorganized in the form of the Agricultural Technologies and Transfer Centres (ATTC). This reorganization of the national network is not sufficiently efficient for the protection of agrobiodiversity. For the fulfilment of the responsibilities related to AnGR, the Ministry of Agriculture, 10 years ago, with the technical support of FAO established the National Network for AnGR conservation, management and sustainable use. This network was led by National Coordinator of AnGR. It was given authority to act across the whole country. Each of the 12 regional coordinators has operated in field by activating subnetworks at the regional level, consisting of animal production specialists, agricultural extension services, veterinarians, AI technicians and farmers. At regional level there are four regional agricultural extension agencies and four regional veterinary service agencies, which operate at the level of local government units. These are the public institutions with the responsibilities to support and collaborate with other stakeholders for the implementation of the programmes and projects in the field of conservation and sustainable use of AnGR. These national network reorganizations, however, are not sufficiently in the protection of agrobiodiversity. The zootechnical service in Albania is minimal in the number of specialists ranging from the Ministry to the subordinate structures.
Important activities carried out by the MARD	The Sector of Livestock and Rural Development Policies and Strategies (LRDP) put some effort into working on the programme for protection of autochthonous farm animals according to the EC regulations, but this process was recently stopped.
Need for further enhancement of capacities	The activities of the LRDP need to be redirected towards the conservation and sustainable use of AnGR.

Organization	Ministry of Tourism and Environment (MTE)
Contact details	**Address:** Blvd. Dëshmorët e Kombit, Nr. 1, 1001 Tiranë, Shqipëri.
Functions related to agrobiodiversity protection	MTM është përgjegjëse për hartimin e politikave dhe dokumenteve ligjore si dhe për zbatimin e tyre. Ministria përcakton objektivat kryesorë për mbrojtjen e biodiversitetit, përgatit programet dhe strategjitë për zbatimin e tyre, vendos rregullore të reja në këtë fushë dhe koordinon zbatimin e Strategjisë Kombëtare.
Capacity assessment	Ka në ngarkim përdorimin e qëndrueshëm të burimeve natyrore, mbrojtjen e natyrës dhe biodiversitetit, administrimin dhe zhvillimin e qëndrueshëm të pyjeve dhe kullotave etj.
Important activities carried out by the MTE	MTM bashkëpunon me MBZHR në lidhje me biodiversitetin bujqësor.
Needs for further enhancement of capacities	

Organization	National Agency of Protected Areas in Albania (NAPA)
Contact details	**Adresa:** Norbert Jokl KP:1000, Tirana, Albania; **Tel:** +355 4 225 81 20/ +35542225068; **Email:** info@akzm.gov.al http://www. akzm.gov.al
Functions related to agrobiodiversity protection	The National Agency of Protected Areas was founded by the Council of Ministers, by Decision No. 102, date 04/02/2015. It is responsible for the management, protection, development, expansion and operation of protected areas in Albania, which today account for about 16% of the country's territory. NAPA manages the network of protected areas and other natural networks as Natura2000 under management plans. NAPA monitors flora and fauna in these areas. It cooperates with Albanian and foreign experts operating in the environmental field within the research, development and management of protected natural areas in Albania. NAPA also manages the network of protected areas, designs and implements management plans for protected areas and proposes changes and improvements to the legal framework for management of the PA.
Capacity assessment	National Agency of Protected Areas has staff in its central office and in the Regional Administration of Protected Areas. In order to carry out its duties and responsibilities these institutions, with the exception of public funding, cooperate with various institutions, agencies and various international organizations.
Important activities carried out by the NAPA	**Conservation of Agrobiodiversity in Rural Albania (CABRA), (Duration: 2012 – 2017; Funded by GIZ).** The activities aim to halt the loss of biodiversity and increase the diversity of domestic animal and plant species in the northern Albanian Alps. For this to be successful, people must recognize their value and benefit from them. This is particularly the case for impoverished rural areas where many inhabitants left their homes because they saw no economic prospects. If these areas were to stimulate higher earnings and if ownership and usage rights of natural resources were strengthened, biodiversity would likely be better protected. Therefore, and to increase the overall value of the region, CABRA is promoting sustainable mountain tourism, agriculture and other businesses that create both economic and environmental benefits.
Needs for further enhancement of capacities	Fieldwork material and equipment according to the needs identified by the National Agency for Protected Areas and the Ministry of Environment,.

Organization	Agricultural Technology Transfer Centre (ATTC) of Fushë-Kruja -
Contact details	**Address:** Rruga e Rinasit - Fushë Krujë **Tel/Fax:** +355 51124356 **E-mail:** info@qttb-fk.org **Web:** www.qttb-fk.org
Functions related to agrobiodiversity protection	The ATTC (situated in central Albania) consists of three units: the Directorate of Agricultural Technologies, the Directorate of Livestock Technologies and the Directorate of Land and Water Services. The ATTC is responsible for researching and transferring technologies for fodder crops, beans, bovine, pigs, poultry and farm management, inventorying, collecting, evaluating, and storing of fodder crops and beans' PGR, conservation of the autochthon genetic resources of the bovine, pigs and poultry AnGR, participation in research projects for sustainable use of PGR and AnGR, based on strategy documents (studies, programmes and action plans on biodiversity). **The Directorate of Livestock Technologies consists of two sectors:** • **The Sector of Management Livestock Technologies;** • **The Sector of Animal Breeding Technologies;** - Its responsbilities are: - Identifying, testing, adapting and introducing new-breed animal breeding practices and their use in crossbreeds. - Identification, conservation, collection and multiplication of autochthonous genetic resources in high-value animals for Albania. - Awareness and support of farmers for the conservation of indigenous animal resources and their sustainable use. - Transfer of breeding technologies through experimentation, monitoring and testing, in line with farming systems and good farming practices and their use at farm level, to ensure efficient livestock production in accordance with food safety standards on pilot farms. - Preparation of technological packages in animal breeding (cattle, pigs and poultry). - Assessment of feed resources and adaptation of feed schemes and rations that ensure optimum use of farm-produced feeds. - Demonstration of new and improved technologies in livestock breeding. - Qualification of livestock specialists, farmers, students of agricultural sciences and other interested subjects. - Preparation of divulgative materials for livestock specialists and farmers. - Providing technical expertise in the field of livestock for the structures of the Regional Agricultural. Extension Agency (AREB), associations, farmers and agribusiness. - Active participation in policymaking and improvement of livestock legislation. - Adopting methods and protocols related to the evaluation of livestock feeds. - Providing internships for agriculture students.
Capacity assessment (human and infrastructure) and needs for improvements	**In total:** 51 employees, out of which 15 hold PhDs, field trials, various laboratories for phenotypic, agronomic and qualitative PGR and AnGR analysis, working collection of seed and soil samples. The Directorate of Livestock Technologies employs nine zootechnical specialists and a veterinary specialist. In the structure of the Centre for Livestock Technologies Directorate there are four vacancies for zootechnical specialists. The specialist recruitment system implemented by the Directorate of Public Administration (DAP) has put in place conditions such as work experience which makes it difficult to place relevant specialists in vacancies. At present, the heritage of specialists in the respective fields in these centres is not provided. Infrastructure such as computers, fuel and vehicles are in short supply, are also very old and do not provide the normal planned activities for the conservation and sustainable development of autochthonous breeds / ecotypes of farm animals. Laboratory infrastructure is not sufficient to withstand the testing of milk samples in relation to qualitative indicators for the evaluation of autochthonous breeds / ecotypes. *Requirements for further enhancement of capacities: Raising awareness (Computers, projectors, promotional materials, etc.).*

Important activities carried out by the ATTC-Fushë Krujë	In-situ/on-farm conservation programmes: Buffalo, for the period 2011-2019, funded by MARD Cattle Busha strain "Lekbibajt cows" for the period 2005-2019 funded by MARD Project on: Setting up dairy cattle herdbook: Time period: 2013 -2018, Pilot Sites: Fier, Shkodra, Lushnja, Durres and Elbasan districts. The in-situ conservation programmes were compiled and implemented as community-based conservation programmes. These in-situ conservation programmes were focused on: - Stopping the reduction of the population size and enlargement of the real (census-based) and effective population size, - Maintaining the genetic variability by a breeding and mating scheme to decrease inbreeding and genetic drift within buffalo's nucleus herd; - Improving the management of the animals at farm level and estimating the productive and reproductive performance of nucleus herd; - Supporting the farmers in establishing farmers' groups, - Supporting the improvement of farms' infrastructures, - Improving the production system.
Conducted studies	**1. The integrated development of Agro-touristic Farm (day farm) with in-situ conservation and sustainable economic use of buffalo's herd in Divjaka area, District of Lushnja, Albania.** An in-situ conservation programme, oriented to sustainable economic use for the buffalo population, started at the beginning of 2011. A buffalo herd of 108 composed of animals originated from two ex-nucleus farms was included in the programme. This species based on the number of breeding animals is categorized at risk of extinction. The short-term objectives of the programme are: - Stopping the reduction of the population size and enlargement of the real (census-based) and effective population size, - Maintaining the genetic variability through a breeding and mating scheme to decrease inbreeding and genetic drift within the buffalo's nucleus herd; - Improving the management of the animals at farm level and estimating the productive and reproductive performance of nucleus herd; - Providing access to local markets. *Long-term objectives:* - Optimizing a genetic improvement program and production system; - Developing high-quality products for niche markets; - Promoting private incentives to support and provide the sustainability of in-situ conservation programmes and economic use of this species. - Establishing a buffalo breeders association.
	2. Project: Setting up dairy cattle herdbook, Time period: 2013 -2018, Pilot sites: Fier, Shkodra, Lushnja, Durres and Elbasan districts. **Goal:** The sustainable development of dairy cattle farms through improving available genetic capacities, providing high-quality replacement heifers and applying advanced technological practices in animal management and feeding. *Project impacts:* - Methodology of sampling, data collecting and recording, according to ICAR guidelines was attained; - Productive and reproductive performance of dairy farms was assessed; - The advanced technological practices in animal management and feeding were applied; - Technical level of extension service specialists was increased. *Outputs;* - The Herdbook for 300 dairy farms was set up (The size of dairy cattle population involved was 1,800 Holstein cows and 635 Jersey cows); - Preparation of technical reports for each district and dairy herd, technological packages: - Growth of Holstein replacement heifers - Growth of Jersey replacement heifers - Holstein cow management and feeding - Jersey cow management and feeding

Conducted studies	**3. Study: Sustainable Conservation Of The Illyric Dwarf Cattle (Busha Type) Lekbibaj – Tropojë, Albania** The aim of the study was the conservation and implementation of several interventions of elements of farming technologies for population of Busha cattle in the area. Through the selection of male and female calves that will be used for parental generation, we consolidate a vital generation, productive heifer and bulls to be used in natural breeding. The evaluation and processing of all data collected in connection with different features values morph - biometrics, conformations, productive and reproductive performances. Daily milk production was monitored and about four milk samples for each cow were taken. Sixty milk samples were analysed using the Lactostar method for determining the constituent milk components. We performed the weighing method with a tape meter, and the data was processed using statistical methods. All-natural services are registered (data), bulls and calving (data) and on this basis the reproductive performances were processed. We compiled data on feed rations for all categories in cattle, depending on the physiological stage according to methodology. The identification of the population, characterizing phenotypic population of "Busha" cattle in the Lekbibaj area, and the monitoring of productive and reproductive performances of their populations were some of the activities carried out.

Organization	**Agricultural Technology Transfer Centre (ATTC) of Korça**
Contact details	**Address:** Rr.Voskopojes Korçë**-Albania; Phone: +355 8 2254 950; Tel/Fax: 0694898668** **Email:** rmecaj93@gmail.com **Email:** qttbkorce@yahoo.com
Functions related to agrobiodiversity protection	The ATTC (situated in south-east Albania) consists of two units: the Directorate of Agricultural Technologies and the Directorate of Livestock Technologies. ATTC is responsible for researching and transferring technologies for Seedy fruit trees (apples), potatoes and barley plants, small ruminants, and on-farm management; inventorying, collecting, evaluation, and storing PGR and AnGR; participation in research projects for conservation and sustainable use of PGR and AnGR, participation in elaboration of strategy documents (studies, programmes and action plans on biodiversity). The Livestock Technologies Directorate, is the only countrywide centre dealing with the breed improvement of Tarantese cattle and small ruminant (sheep and goats). The Department of Livestock Technologies of Korça has experience of about 45 years in the field of breeding of small ruminants and about 30 years with that of Tarantese cattle. It currently manages, preserves and consolidates pure breeds of small ruminants and purebred Tarantese cattle nationwide. *The preservation and consolidating the autochthonous genetic fund of small ruminants with high value for our country is one of the main priorities of this centre.* Given the genetic erosion of these breeds as a result of unmanaged crossbreeding, it has decreased animal populations, risking the disappearance of any or all of them, so the preservation of ex-situ and in-situ genetic funding is another argument for funding of this project in the Department of Livestock Technologies of Korça (DLTK).
Capacity assessment (human and infrastructure) and needs for improvements	Within the ATTC there are 18 employees in total, out of whom three are PhD holders. There is also trial field and various laboratories. The Directorate of Livestock Technologies consists of two sectors: - The Sector of Management Livestock Technologies; - The Sector of Animal Breeding Technologies ; The Directorate of Livestock Technologies employs a total of six specialists out of which three are veterinary specialists, one is an agronomist specialist and two are vacancies for zootechnical specialists. *The lack of zootechnical specialists results in significant consequences for the implementation of breed conservation programmes or the sustainable development of genetic resources in general and indigenous ones in particular.*

Capacity assessment (human and infrastructure) and needs for improvements	- Numerous deficiencies in laboratory infrastructure and equipment directly related to efficiency in the implementation of conservation programmes with indigenous sheep breeds as well as breeding programmes in sheep, goats and cows were noted. Even the equipment available is out of order, with outdated technologies. - These deficiencies were ascertained from the visit to the Station on 11/26/2019. - Project support with some of the most valuable equipment for this centre is a necessity. - Supporting the Station with laboratory equipment and some other equipment related to the domestication of native sheep milk will have an impact not only on the daily operation of the station but also on the farmers who breed indigenous small ruminant breeds on their farms. *1. There is an urgent need for one laboratory equipment for performing functional milk analysis, with a broad spectrum (fat, protein, somatic cells, etc.), in order to implement the conservation and development programme links. sustainability of indigenous small ruminant breeds (sheep and goats).*The selection of lambs is also based on the evaluation of the components of milk quantity and quality. Coupling is also based on evaluating the milk production quality performance. *2. For the Semen Conservation Laboratory with liquid nitrogen storage technology, there is an urgent need for three containers with a capacity of 50 L, for the storage of biological material, which will affect the improvement of the breed work performed by the station.* *3. The station needs two portable mechanical milking machines for milking sheep herds in order to maintain the value chain.* *4. The station needs two milk cooling tanks with a holding capacity of 200 litres each, for the collection and storage of milk produced from sheep flocks.* *5. The station needs three portable laptops to update and process technical-zootechnical data during monitoring and expertise performed on small ruminant livestock farms throughout our country for the implementation of conservation and breed improvement.*
Important activities carried out by the ATTC-Korçë	DLTK realizes research projects for conservation and sustainable use of AnGR. Since 2011, DLTK has been subjected to the Conservation Programmes of two breeds and two herds which were in danger of extinction: - "Shkodra" sheep breed – 45 - "Lara e Polisit" sheep – 60 This centre produces and distributes high genetic value reproducers to farmers, with an impact on increasing their incomes. The second direction of DLTK is the programmes that should be undertaken for breed improvement the target traits sheep and goats (genetic diversity within population) taking into consideration the market and society for increasing the livestock production and income of our farmers. The main improvement breeds sheep breeding in the Korça Directorate of Livestock Technologies are: - Ile de France sheep – 75 heads, - Awassi sheep – 90 heads - Saana goats – 30 heads, - Alpine goats –50 heads. These breeds have high genetic potential in terms of milk and meat production and already exist in Albania in the nuclei of breeds organized in the DLTK and the nuclei of breeds in some farmers. Station specialists implement breeding programmes for local sheep and goat breeds / ecotypes such as: "Capore of Dragobia" goat, "Capore of Mokra" goat and "Bardhoke" sheep, etc. *The production of high breed value reproducers is the main objective of their work.* The introduction of the Tarantez cattle breed into Albania both through pure breed and crossbreed has become evident and is one of the ways to increase cattle production in the mountainous areas of our country.

	DLTK's activity consists in producing and transferring technologies in livestock breeding and cattle breeding in our country and integrates farmers' demand through research and demonstration on the farm to improve breeds improvement and breeding technologies leading to increased income from their farms. This project also integrates the important component of National Extension Specialist training, training of students and students of Korça and Tirana Agricultural University, higher agricultural schools, teaching practice developments, study topics, qualification courses with potential farmers, Artificial Insemination Techniques and livestock specialists as well as seminars, demonstrations, expertise, various publications etc.
Conducted studies	**Conservation Programme for two breeds and two herds:** - "Shkodra" sheep breed – 45, - "Lara e Polisit" – 60, Preserve gene pool of endangered species without affecting genetic variation through ex-situ conservation in -vivo, with a population of 45 heads of sheep. Implementation of the zootechnical and genetic programme for sustainable conservation in vivo through self-development for a relatively long time (30 years) to homogenize the genetic constitution without any decrease inbreeding level. Increase the number of heads in the country of origin to emerge from the critical stage. Institutional cooperation with RAEA – Shkodër, Korçë for selection of male lambs and production of reproducers, their circulation between farms and different areas to create male lines that will serve as fathers for natural breeding. **Improvement Breeds Programme** - Ile de France sheep – 75 heads, - Awassi sheep – 90 heads - Saana goats – 30 heads, - Alpine goats –50 heads.

Organization	**Regional Agricultural Extension Agency (RAEA) -Lushnje**
Contact details	**Address:** Lagjja "18 Tetori", Blv. "Palmave". **Cel :** 0682235196 **Email :** dhimitraq_q@yahoo.com
Functions related to agrobiodiversity protection	RAEA – Lushnje includes Fier, Vlore and Gjirokaster Districts. RAEA – Lushnje was established by Council of Ministers Decision No. 147 Dt. 13.3.2018, institutionally dependent on MARD. - The agency's mission is to become a key player in the development of a competitive and sustainable agricultural sector in the country by working in long-term partnerships with the beneficiaries. - To provide information and advice on the technical and technological development of agricultural farms in order to increase competitiveness in agriculture. - To promote and facilitate the creation and operation of various forms of farmers' cooperation. - To organize and carry out professional training of farmers in the field of agriculture and rural development. - Provide information on standards related to environment, quality, marketing, organic farming, products with geographical indications. *The decision to establish these agencies does not include the protection and sustainable development of autochthonous genetic resources in farm animals for the area where they operate directly. But this decision should not be a reason for not carrying out activities related to the genetic resources of farm animals in general and particularly indigenous ones .*

Capacity assessment	- The agency employs 71 specialists throughout the area, of which only five are extension zootechnicians (or 7% of them) and only one is a specialist zootechnician. - Infrastructure is not sufficient to cover the whole area. *Regional Veterinary Agency Plant Protection Service – Vlore is responsible for the protection and sustainable development of indigenous farm animals in these areas.*
Important activities carried out by the RAEA-Lushnje	In the agency area there are several autochthonous breeds / ecotypes of farm animals: - **Buffalo** – Divjake, - Lushnje; - **Dwarf Cattle "Lopa Gurgucke"** – Mallakaster, Fier, - **Sheep breed "Kuoca Mallakastres"**- Mallakaster, Fier, - **Goat of Black Dukatit**- Dukat, Karaborun, Palase, Qiparo, Himare, Vlore. - **Goat of Dishat** – Markat, Dishat, Sarande, Konispol. - **Goat of Krahebardha of Greshica** – Ballsh, Fier. - **Goat of Kute** - Ngracan, Fratarit, Ballsh. - **Goat of Krahebardha Aranitasit** - Ballsh. Collaborates with ATTC – Fushë Krujë for the protection and sustainable development of the buffalo herd in the Divjaka area (for farm research).
Needs for further enhancement of capacities	*Extension service must increase the number of zootechnical specialists in the structure to support the protection and sustainable development of autochthonous breeds / ecotypes of farm animals.*

Organization	**Regional Agricultural Extension Agency (RAEA) -Shkodër**
Contact details	**Address:** Shkodër **Tel:** 0672853632 **Email:** hshimaj@yahoo.com
Functions related to agrobiodiversity protection	RAEA – Shkodër includes Lezhë, Shkodër, Kukës Districts. RAEA – Shkodër was established by Council of Ministers Decision No. 147 Dt. 13.3.2018, institutionally dependent on MARD. - The agency's mission is to become a key player in the development of a competitive and sustainable agricultural sector in the country by working in long-term partnerships with the beneficiaries. - To provide information and advice on the technical and technological development of agricultural farms in order to increase competitiveness in agriculture. - To promote and facilitate the creation and operation of various forms of farmers' cooperation. - To organize and carry out professional training of farmers in the field of agriculture and rural development. - Provide information on standards related to environment, quality, marketing, organic farming, products with geographical indications. *The decision to establish these agencies does not include the protection and sustainable development of autochthonous genetic resources in farm animals for the area where they operate directly.* *But this decision should not be a reason for not carrying out activities related to the genetic resources of farm animals in general and particularly indigenous ones.*
Capacity assessment	- The agency employs a total of 46 specialists throughout the area, of which only 13 are specialist zootechnicians. - Infrastructure is not sufficient to cover the whole area.

Important activities carried out by the RAEA-Shkodër	In the Agency area there are several autochthonous breeds / ecotypes of farm animals: - **Goat of "Velipojes"** – Velipoje, Shkodër; - **Goat "Capore e Dragobisë"** – Reç , M.Madhe; - **Goat of "Hasi"** - Has – Kukës, Reç – Shkodër; - **Goat "Spotedd of Kallmetit"** – Kallmet- Lezhë, Postribe – Shkodër; - **Sheep breed "Shkodrane"** – Shirokë, Oblike, Velipoje – Shkodër; - **Sheep breed "Bardhoka"**- Mjedë, Theth – Shkodër, Tropojë; - **Swine "White"** – Velipoje- Shkodër; - **Swine "Spotted of Shkodra"** - Velipoje- Shkodër; - **Swine "Pig with wattle"** – Velipoje- Shkodër - **Illyric Dwarf Cattle (Busha type) Lekbibaj** – Tropojë, Albania The staff have carried out promotional activities for the protection and sustainable development of indigenous breeds / ecotypes in cooperation with ATTC – F. Kruja, Korçë, and with projects and programmes operating in the field of livestock. Collaborates with ATTC –Korçë for the protection and sustainable development of the herd sheep breed "Shkodrane", sheep breed "Bardhoka", goat breed "Capore e Dragobisë" – in the Shkodër area.
Needs for further enhancement of capacities	*The extension service must increase the number of zootechnical specialists in the structure to support the protection and sustainable development of autochthonous breeds / ecotypes of farm animals.* *Vacancies should be completed to increase the efficiency of zootechnical specialists in this region, enough and rich in the genetic resources of farm animals in general and those of indigenous breeds / ecotypes in farm animals.*

Organization	**Regional Agricultural Extension Agency (RAEA) –Korçë**
Contact details	**Address:** Rr.Voskopojes Korçë-Shqipëri; **Cel:** 0692054254 **Email:** vgjolla@yahoo.com
Functions related to agrobiodiversity protection	RAEA – Korçë includes Korçë, Elbasan, Berat Districts. RAEA – Korçë was established by Council of Ministers Decision No. 147 Dt. 13.3.2018, institutionally dependent on MARD. The agency's mission is to become a key player in the development of a competitive and sustainable agricultural sector in the country by working in long-term partnerships with the beneficiaries. To provide information and advice on the technical and technological development of agricultural farms in order to increase competitiveness in agriculture. To promote and facilitate the creation and operation of various forms of farmers' cooperation. To organize and carry out professional training of farmers in the field of agriculture and rural development. Provide information on standards related to environment, quality, marketing, organic farming, products with geographical indications. The decision to establish these agencies does not include the protection and sustainable development of autochthonous genetic resources in farm animals for the area where they operate directly. But this decision should not be a reason for not carrying out activities related to the genetic resources of farm animals in general and indigenous ones in particular.
Capacity assessment	- The agency employs a total of 56 specialists throughout the area, of which only six are extension zootechnicians and two specialists zootechnicians. - Infrastructure is not sufficient to cover the whole area.

Important activities carried out by the RAEA-Korçë	In the agency area there are several autochthonous breeds / ecotypes of farm animals: - **Goat of Liqenasit** -Devoll, Prespa; - **Goat "Capore e Mokrës"**- Kalivac, Trebinje, Pogradec; - **Local cattle "Cow of Prespa"** – Liqenas. The staff has carried out promotional activities for the protection and sustainable development of indigenous breeds / ecotypes in cooperation with ATTC – Korçë, and with projects and programmes operating in the field of livestock. Collaborates with ATTC –Korçë for the protection and sustainable development of the herd goat of "Liqenasit", goat "Capore e Mokrës" – in the Korçë area.
Needs for further enhancement of capacities	*The extension service must increase the number of zootechnical specialists in the structure to support the protection and sustainable development of autochthonous breeds / ecotypes of farm animals.* *Vacancies should be completed to increase the efficiency of zootechnical specialists in this region, enough and rich in the genetic resources of farm animals in general and those of indigenous breeds / ecotypes in farm animals.*

Organization	**Regional Agricultural Extension Agency (RAEA) –Tirana**
Contact details	**Address:** Rr. Siri Kodra - Tiranë - Shqipëri; **Cel: 0697090180**
Functions related to agrobiodiversity protection	RAEA –Tirana includes Durres, Tiranë, Dibër Districts. RAEA – Tirana was established by Council of Ministers Decision No. 147 Dt. 13.3.2018, institutionally dependent on MARD. - The Agency's mission is to become a key player in the development of a competitive and sustainable agricultural sector in the country by working in long-term partnerships with the beneficiaries. - To provide information and advice on the technical and technological development of agricultural farms in order to increase competitiveness in agriculture. - To promote and facilitate the creation and operation of various forms of farmers' cooperation. - To organize and carry out professional training of farmers in the field of agriculture and rural development. - Provide information on standards related to environment, quality, marketing, organic farming, products with geographical indications. *The decision to establish these agencies does not include the protection and sustainable development of autochthonous genetic resources in farm animals for the area where they operate directly.* *But this decision should not be a reason for not carrying out activities related to the genetic resources of farm animals in general and particularly indigenous ones.*
Capacity assessment	-The agency employs a total of 45 extension specialists throughout the area, of which only four are extension zootechnicians and one is a zootechnical specialist. - Infrastructure is not sufficient to cover the whole area.
Important activities carried out by the RAEA-Tirana	In the Agency area there are several autochthonous breeds / ecotypes of farm animals: - **Goat of "Bulaci"** –Muhur, Selite, Dibër; - **Goat "Skuqe e Matit"** – Macukull, Klos- Mat; - **Goat "Maskurise"** – Rrashbull, Durres; - **Sheep "Ruda"** – Maqellare – Dibër; - **Sheep "Syska Matit"** – Baz, Rukaj – Mat. The staff have carried out promotional activities for the protection and sustainable development of indigenous breeds / ecotypes in cooperation with ATTC – F. Fruje, Korçë, and with projects and programmes operating in the field of livestock.

Needs for further enhancement of capacities	*The extension service must increase the number of zootechnical specialists in the structure to support the protection and sustainable development of autochthonous breeds / ecotypes of farm animals.* *Vacancies should be completed to increase the efficiency of zootechnical specialists in this region, enough and rich in the genetic resources of farm animals in general and those of indigenous breeds / ecotypes in farm animals.*

Organization	**Agricultural Extension Sector (AES) - Fier**
Contact details	**Address:** Fier **Cel:** 0692312901 **Email:** sherbimikeshillimor@yahoo.it
Functions related to agrobiodiversity protection	The Agricultural Extension Sector – Fier is an integral part of Regional Agricultural Extension Agency -Lushnje AES was established by Council of Ministers Decision No. 147 Dt. 13.3.2018, institutionally dependent on MARD. - The sector's mission is to become a key player in the development of a competitive and sustainable agricultural sector in the country by working in long-term partnerships with the beneficiaries. - To provide information and advice on the technical and technological development of agricultural farms in order to increase competitiveness in agriculture. - To promote and facilitate the creation and operation of various forms of farmers' cooperation. - To organize and carry out professional training of farmers in the field of agriculture and rural development. - Provide information on standards related to environment, quality, marketing, organic farming, products with geographical indications. *The decision to establish these Sector does not include the protection and sustainable development of autochthonous genetic resources in farm animals for the area where they operate directly. But this decision should not be a reason for not carrying out activities related to the genetic resources of farm animals in general and particularly indigenous ones.*
Capacity assessment	- The sector employs a total of 28 specialists throughout the area, of which only four are extension zootechnicians. - Infrastructure is not sufficient to cover the whole area. *Regional Veterinary Agency Plant Protection Service – Vlore is responsible for the protection and sustainable development of indigenous farm animals in this area.*
Important activities carried out by the RAEA-Lushnje	- **Dwarf Cattle "Lopa Gurgucke"** – Mallakaster, Fier, - **Sheep breed "Kuoca Mallakastres"**- Mallakaster, Fier, - **Goat of Krahebardha of Greshica** – Ballsh, Fier. - **Goat of Kute** – Ngracan, Fratarit, Ballsh. - **Goat of Krahebardha Aranitasit** - Ballsh. Promotional activities have been made for autochthonous breeds / ecotypes of farm animals.
Needs for further enhancement of capacities	*The extension service must increase the number of zootechnical specialists in the structure to support the protection and sustainable development of autochthonous breeds / ecotypes of farm animals.* *Mechanisms to provide newly graduated zootechnical specialists are lacking. The system of recruiting new specialists for these applied agricultural institutions should be reviewed.*

ANNEX 2

LIST OF NON-GOVERNMENTAL ORGANIZATIONS RELATED TO THE MANAGEMENT OF AUTOCHTHONOUS GENETIC RESOURCES IN FARM ANIMALS.

Brief description of the National Association for Conservation and Use of AnGR – ALBAGENE activities in relation to autochthon genetic resources.

Organization	The National Association for Conservation and Use of AnGR - ALBAGENE
Contact details	**Address:** Rr. "Abdyl Frasheri" Pall. 3/3 sh. 1, Ap. 5, AL-Tirana **E-mail:** +355 42 682140 737, +355 42 41403 kkume09@gmail.com, www.albagene.org
Functions related to agrobiodiversity protection	The ALBAGENE organization implements projects for the conservation and sustainable development of endangered farm animal breeds, indigenous breeds. Conservation projects are mainly carried on farm. Successful on-farm conservation requires the involvement of all relevant stakeholders. Through participatory action, engages with stakeholders at all levels to ensure that interests are respected and balanced.
Capacity assessment (human and infrastructure)	ALBAGENE works with governmental and intergovernmental bodies, universities, gene banks, breeders' and farmers' associations and other NGOs promoting conservation.
Important activities carried out by the association	On May 2006, ALBAGENE, in cooperation with the SAVE foundation organized an expedition at Prespa region at three boundary countries. The conclusion that was drawn at the end of this expedition was: an autochthon race, named The "Prespa Cow", exists only on the Albanian side of Prespa region. This population is in immediate danger of extinction as a result of genetic erosion. For the conservation of the breed, the introduction of herd books and of a sire management system is necessary. With only 400-500 animals and the threat of crossbreeding action has to be taken fast consisting in: - Support of reputation breeders of old breed, - Establishment of a breeding organization, organization of shows for purebred animals only, awards for breeders and animal, - Introduction of bull management (young bulls should not accompany the herds, particularly not crossbred ones), - Financial support for keeping purebred bulls, if possible, - Introduction of a herd book.

Conducted studies	One of the secondary activities of this project will be the experimentation for the harvesting and production of green silage from reeds in Small Prespa Lake. - **Rescue of endangered pig breeds and building up farmers' network in the Velipoja Nature Reserve, Albania. Financed by GEF/UNDP and SAVE - Foundation project, 2009-2013.** The village was farmed of the endangered pig breeds population. It has been announced as a rescue station and in-situ conservation programme that was implemented until now it is a success story. - **Identification and characterization of small ruminant native breeds in South region of Albania. ALB/SGP/OP4/Y3/CORE/2009 – GEF/UNDP, 2013-2014** - **Current status of the Brachycerous cattle populations in the southeastern European countries and strategies for their sustainable conservation. Financed by European Regional Focal Point for AnGR, www.rfp-europa.org, 2011-2013**
	In-situ conservation of the native pig breeds – The expedites in the Velipoja region during 2005 have identified three native pig breeds: Siska white of Scutary, Spotted of Scutary and Pig with wattle. The breeds are in a critical status. Among the factors that affected this situation were: - Low economic interest of farmers consequently concerns of farmers to preserve these - breeds and increase number of animals have been low. - Lack of local market; - Lack of farmer`s organization and programme for conservation and development of local pig breeds. As a result, selection of reproducers, drafting and monitoring mating schemes, prevention of crossbreeding phenomenon (boars come from Monte Negro) was almost impossible. Activities and objectives of in-situ conservation programme: - Implementation of urgent measures, necessary to stop the process of genetic erosion, and decrease of the size population; - Establishment of a farm where breeding four to five sows and one to two boars for each native breed, that will serve as nucleus heard for in-situ / on-farm conservation and as a rescues centre. - Support collaboration among farmers, building up and strengthening the capacity of a local network of farmers to support in situ/on-farm conservation - Capacity building to support the marketing meat. After two years: The size of the population was quadrupled. Three nucleus farms were established. The price pig meat was 80-90% higher than usual one. The demands of consumers to this product are to be increased. The main part of the meat production is dedicated to Velipoja's tourist market. Interest of farmers to breed the native pig breeds, not only in Velipoja region but farmers from other regions, has been increased.

Brief description on Livestock Entrepreneurs Association of Albania (LEAA) activities in relation to autochthon genetic resources.

Organization	Livestock Entrepreneurs Association of Albania (LEAA)
Contact details	**Address:** Rr. Brigada VIII, P 11, Shk.1, Ap. 18. Tirana - ALBANIA **Tel/ Mob:** +355 42252732; + 355 68 2054905 ; **E-mail:** lea@albmail.com
Functions related to agrobiodiversity protection	Considering advantages of a vast diversification present in Albania, agrobiodiversity protection is key to nature, the sustained management of species, and human livelihood. Domesticated and/or wild animals comprise the core of Albania's biodiversity that in some cases is at risk, despite their importance for a healthy and quality life of human beings considering their nutritional and aesthetic values. Agrobiodiversity is mainly prone to non-intensive hilly, mountainous agriculture areas with limited sources for income generation, comprising a value that in many cases is not properly rated.

	The nature itself, diverse landscaping and weather conditions allow for a range of livestock species to be present in various areas, where in many cases the animals hold the area's toponyms, for instance "Dhija e Hasit" (Hasi goat); "Dhija e Kuqe e Matit" (Mati Red goat); "Lopa e Prespës" (Prespa cow) ; "Dhija e Bulacit" (Bulaci goat), etc. Livestock is frequently facing problems with natural fodder (pasture, meadows and forest areas) that comprise a critical part of biodiversity, such problems related to biodegradation and weak management (ownership issue). Thus, protection and preservation of autochthonous animal breeds goes side-by-side with the preservation of fodder natural reserve. A social phenomenon that needs to be considered in this respect is migration and emigration. In general, rural areas, especially the most remote ones that are shelter of local breeds, are being depleted, and shepherds at present are mainly part of the third generation. This factor makes the risk of genetic resource extinction even more present. Nevertheless, the older generation is exposing spiritual ties to heritage and tradition, managing local breeds even though in many cases it is not as profitable as improved and/or imported ones. In many cases through their products they cultivate the taste, historic and cultural values to their potential customers, especially given the recent developments of tourism potential in such remote areas.
Capacity assessment (human and infrastructure)	LEAA is an NGO established in April 1999 with the main purpose of protecting the interest and supporting the businesses of livestock farmers. The technical staff composed of one veterinarian, two animal nutritionists (zoo technicians) and one agronomist-social forester, and altogether has more than 125 years of experience in the field of animal management – cattle and small ruminants. They have more specifically the expertise on management; livestock; natural resources; agriculture; pastures; farm economic analysis, on animal nutrition; farm management; feeding; breed assessment; breed improvement, product standards and quality; farm assessment; breed assessment and analysis. Veterinarian – has the expertise on animal disease prevention and control; reproduction; animal breeding; hygiene related to animals, barn, and workers and milking. The core mandate of LEAA is provision of training courses and technical assistance on animal breed improvement; reproduction; animal health prevention and control; animal housing; standards and quality; farm economic analysis; assessment of rural areas; etc.
Important activities carried out by the association	Over the course of 20 years LEAA has implemented a portfolio of more than EUR 3 million through 29 projects, of which the following are relevant to agrobiodiversity protection: **EU/IPESA Project** – Improvement of the Performance of Extension Service in Albania (IPESA). Preparation of Cattle and Small Ruminants Manual for an efficient farm management. **GIZ/SARED** – Support to Agriculture and Rural Development in Disadvantaged Areas of Albania (SARED). LEAA has provided support on capacity development initiatives for eight small ruminant groups throughout the value chain via training courses, technical assistance, and demonstration sites. The assistance has consisted of the identification of successful local shepherds, breed improvement, and establishing/strengthening relations between producers and processors through innovative pricing mechanisms. *Specific support provided to groups managing the "Ruda" local breed in Nizhavec, Podgorie, Alarup, Blace, Bratomire, the villages of Korca Qark and Caje in Kukes Qark; group managing the "Bardhoke" local breed in Mjede village, Shkoder Qark, and the "Hasi goat" in the Malsi e Madhe area.* **Slovenian Ministry of Foreign Affairs** – Empowerment of Women in Albania to ensure equal opportunities. Strong emphasis on the empowerment of Puka rural women, in the administrative unit of Luf. A full package of training courses on the management of small ruminants has been prepared, training courses delivered, study visits organized and marketing techniques introduced in practical ways. Instructions have been provided on the day-to-day management of local goat breeds.

	USAID/FORECAST project "Improvement of Livestock Law", through the input of various actors from field level to policymakers. Albanian Partner in Microcredit PSHM "Provision of a series of training courses on economic factors in farm management". UNDP/Increase Initiative for a Sustainable Business "Area assessment on small ruminant development potentials in northern Albania". World Vision – Albania "Assessment of local breeds of small ruminants in Elbasan and Vlore areas". World Vision – Albania "Natural resources as part of biodiversity and their impact on disadvantaged people in Elbasan area". **SNV/ProMali Project funded by the Danish Foreign Affairs Ministry** – "Assessment of small ruminants condition after floods in Shkodër and proposals for emergency intervention". SNV/ProMali Project funded by the Danish Foreign Affairs Ministry – "Analysis of semi-intensive and intensive small ruminant farms to define the best model for replication". SNV/ProMali Project funded by the Danish Foreign Affairs Ministry – "Barn construction for sheep and goat better sheltering. Analysis of actual situation, layout, construction materials, costs". SNV/ProMali Project funded by the Danish Foreign Affairs Ministry – "Economic analysis in 15 farms with small ruminants". United Nations programme on Youth Employment and Migration and International Labour Organization (ILO) – "Technical assistance on transition towards formalization through increase of productivity and establishing focus group of goat farms in Gabrice, Kukës" for better management of local breeds and preservation of their values. UNDP Albania funded by the EU and the Italian Government – "Service provision on training, capacity building and practising innovative methods in support to "Qingjat e Jonit" Association." Effective and efficient management of local breeds and group connection with market was the core focus of support for member farms.
Conducted studies	*Among the relevant case studies prepared by LEAA, are the following:* - Economic analysis of goat and sheep farms. Defining the break even point in the cases of local breeds and imported breeds. - Effect of flushing in sheep farm efficiency through increasing the prolificacy in local breeds. - Impact of hygiene and standards on milk price – leading the way towards a better market for farmers, better supply for dairies and strengthening the long-term contractual relations between producers and processors. - Diseases and prophylactic measures in small ruminants in the targeted areas. - Calendar of small ruminant main events (breeding, delivery, weaning, lactation, diseases). - Study on Brucellosis small ruminants present in eight areas of Albania.

Brief description on Livestock and Rural Development Centre of Albania (LRDC) activities in relation to autochthon genetic resources.

Organization	Livestock And Rural Development Centre (LRDC)
Contact details	**Address:** Rr.Saraçeve, P. Unicon, Tirana - ALBANIA **Tel/ Mob:** +355 42226084; + 355 67 3158168; **E-mail:** fejzobegaj @yahoo.com **Web:** www.bzhr.org
	Areas of activity consist of: - Design and implementation of projects for integrated rural development in the field of agriculture, livestock and environment.

Functions related to agrobiodiversity protection	- Design and implement projects to reduce poverty in rural areas, support the needy, women, children, the elderly, minorities and people with disabilities. - Provision of technical assistance, training in the fields of agriculture, livestock, agro-processing, marketing of agricultural products and value chain. - Design and implementation of programmes for livestock breeding. - Conservation and management sustainable of natural resources, biodiversity conservation and agro-tourism support. - Involvement of the younger generation in environmental protection, Preparation of business plans; - Provides programmes for cooperation, breeding, community strengthening, technology for small farms, breeding animals, etc.
Capacity assessment (human and infrastructure)	The Livestock and Rural Development Centre (LRDC) has its permanent office in Tirana, complete with all the necessary equipment for the implementation of projects / programmes related to the protection and development of autochthonous genetic resources. The executive office has a veterinary specialist executive director, three zootechnical specialists, a veterinary specialist, a financier and associates in 23 areas of the country. Of the five specialists operating within the centre, two are scientifically Prof. and one is a specialist with a degree of Dr of the Sciences. The LRDC is a continuation of the Heifer Albania project that worked in Albania for a period of about 15 years. During these years Heifer Albania designed and implemented over 60 projects in the rural areas of Albania, Kosovo and North Macedonia. In this context, Heifer Albania has supported around 12,000 families of farm animals with breeds, inputs, technical assistance and training to develop sustainable family farms, breed livestock, and protect the environment, gender equality and community organization.
Important activities carried out by the association	LRDC has a lot of experience in the field of livestock development. Specific activities and actions are carried out on small farms. In terms of the conservation and sustainable management of natural resources, biodiversity conservation and agro-tourism support has been worked with the “Capore Dragobisë” – Valbonë goat, “Rude” – Kukës sheep, “Capore Mokrës” goat, the improved Jersey cow breed and the “Alpine” goat etc. The activities are supported by the monitoring of production, reproduction, selections of reproducers, feedstuff ration supplements, promotion of autochthonous breeds / ecotypes such as fairs, seminars and conferences. Technical Assistance and Training: LRDC has provided training consultations and sessions with farmer groups, group leaders and farmer associations and other stakeholders on livestock development issues, breed improvement, animal health protection, livestock business, agricultural cooperation and environmental protection. The Livestock and Rural Development Centre has implemented projects in the following areas: Project “for the development of Alpine goat farms in Albania”. Project “on integrated development of dairy farms in the field area” Project “support to local women’s action groups in rural areas” Project “on the development of dairy farms in hilly areas of Jersey cows” Project “for development of agro-tourism and preservation of development of local breeds” in the Thethi area, Valbones in collaboration with GTZ and GEF – Albania. Project “On the development of apiculture in rural highlands” supported by Rotary International Italy, Rotary Albania.
Conducted studies	*Project goals:* To conserve biodiversity through cultivation of autochthon/local goat “Capore e Dragobisë” as an alternative source of income for local communities. *Region:* Valbona region (Valbonë, Dragobi, Motine, Kelcyre, Rragam, Gjelaj, Quku i Dunishes)

	Objectives: - To increase community awareness on local "Capore e Dragobisë" goats - To increase community skills in making use of biodiversity to increase welfare; - To develop a farming alternative with local "Capore e Dragobisë" goats; Although production capacities are limited, "Capore e Dragobisë" play an important role in: - additional income for farmers and rural dwellers, - improved living standards and working conditions in very remote rural areas; - improving competitiveness and efficiency of primary agricultural production; - restructuring physical potential in the agro-rural sector; - providing employment opportunities in rural areas; - improved biodiversity, farm diversification, quality of rural life and alternative activities in rural areas, support agro-tourism, etc. *Specific activities to be performed:* - Identification of "Capore e Dragobisë" in area (establish database including detailed information). - Identification of the "nucleus" farms for further breeding use (identification of breeding male for natural insemination, breeding goats for production analyses, etc.); Purchasing and distribution 30 breeding goats, conduct passing on the gift. - Implementation of improved animal husbandry practices for autochthon goats; - Increasing the level of milk and meat production in "Capore e Dragobisë" herds through improving farming. Developing ideas for the rural tourism and maintenance of rural heritage related to this breed. *Capacity building:* - Offer technical and veterinary assistance monthly for farmers; - Conduct six training session with farmers; - Organize a demonstration /exchange experience with participation of farmers, specialists - from local and central institution. *Results* - 10 farmers (good breeders) selected and 10 flocks were selected (selected individually - from phenotype) - 10 high-quality Capore Dragobisë bucks and 20 young Capore Dragobisë goats were - selected, purchased and donated to farmers. - 30 kg of concentrated feed were purchased and offered to beneficiary farmers for the winter period.

Brief description on Rural Association Support Programme (RASP) activities in relation to autochthon genetic resources.

Organization	Rural Association Support Programme (RASP)
Contact details	**Address:** Rr. Dritan Hoxha, Teknoprojekt, H2 Ap28, Tiranë, Shqipëri, Web. www.rasp.org.al , **Email:** petrit@rasp.org.al, office@rasp.org.al , **Cel.** 069 2067991
Functions related to agrobiodiversity protection	*Established in 1997 under Albanian law, RASP is a specialist non-profit organization.* - Playing an active role in the preservation of natural resources, biodiversity of plants and animals and researching methods for their sustainable use. Adding value to locally-available materials and products and facilitating access to markets. - Helping to form and strengthen voluntary associations and other forms of civil society organization, which can represent and serve rural people. - Strengthen the role of women to identify their problems, the factors influencing that, and the approach towards the solution. Empowering women for a better position /standing in family and society aiming to reach the equality with men. Actively involving women and youth in decision-making and participation.

Capacity assessment (human and infrastructure)	- Increasing capacities of rural groups, youth, women and groups in need by various means of training, demonstration, legal support etc. - Organization of groups in associations and cooperatives. Providing expertise in knowing the dynamics, psychology and group issues, problem solving and management of human resources. - Developing strategies and development plans mainly in the field of rural development, agriculture, environment, tourism and agro-tourism etc. Identification and promotion of traditional resources for the tourism development in the country. - Assistance to farmers and farmers' groups in rural areas for the development and modernization of their business through the introduction of new technologies in production and communication. - RASP is prepared in following problems through all steps. Our organization carries out field observations, situation analysis, and identification of needs and preparation of project-proposals, project management, monitoring and assessment. - Public information and participation. Campaign and events for raising public awareness and sensibilization. Assistance and support for lobbying and participation in decision making. - Preparation of digital cartography in support of tourism and environment studies. Assistance in compiling and building Internet pages and in the usage of Internet c communication platforms. - Cooperation/partnership inside and outside the country. - Demonstrations, fairs, exhibitions, competitions, publications etc.
Important activities carried out by the association	**Ongoing projects:** **1. V4-WB6 Incubator for Digital Farming (IDF)** – On May 2018 a new V4 project started. The main goal of the Incubator for Digital Farming is to create a meeting place for professionals, regional and national project team members including students that are having ideas, PoC, start-ups or acting as freelancers. IDF will help both, agriculture and IT students to become more competitive by means of digital technology. IDF allow any student with start-up idea to access the latest knowledge, expertise and technology for testing and experimenting with digital innovations for agri-food purposes. **2. New EU funded project starts** – On July 2017 a new EU funded project has started. Balkan Med INNOVA is going to be implemented by a consortium of six organizations coming from five different Balkan countries. Greece, Bulgaria, FYROM, Albania, Cyprus. The overall objective of Balkan Med INNOVA is to support both existing SMEs and potential new start-ups, through training, exchange of knowledge and expertise, technology transfer; their key-persons and entrepreneurs to acquire new skills, get acquaintance with business environment at partners' countries. **3. On March 2017 RASP as part of the consortium has started implementing the project** "Collaborative platform for ICT in Agricultural Extension in the Western Balkans based on V4 best practices (AEWB-ICT)". This project is implemented with the support of Visegrad fund. Project areas are Hungary, Slovakia, Czechia, Albania, North Macedonia, Serbia. The main objective of the project is to establish a collaboration platform among key stakeholders in the agri-food sector in V4 and WB for the purpose of creating the foundations for adoption of ICTs in AE in WB, based on the experience of the V4. Exploiting regional experience in the area of ICTs in AE enables faster synchronization of the agro-food industry among partner countries resulting in higher economic development in the region. **4. On June 2016 RASP start implementing Capacity development iniciative with four farmers groups in three different regions. These initiatives are being implemented with the support of SARED.** - *Capacity development initiative on Small Ruminants VC: Dried goat meat* – This initiative is being implemented in Hasi region. In this initiative RASP is working with one farmers group in Cahan. and one with farmers group in Gjinaj, both in Hasi municipality. The purpose of this initiative is to develop a new product (dried goat meat, based on local tradition). The situation was thoroughly analysed, and the main objectives have been formulated: - Build the capacity of farmers to improve the drying process and food safety for dried meat. - Improve processing infrastructure and guarantee the standardization of the product and quality control.

Conducted studies	- Develop a promotional campaign for introducing goat dried meat in the market. This capacity-building initiative will continue for a year and a half, and will include training of farmers on technological aspects of drying process, trainings on improving managing techniques, study visit, support on developing marketing and packaging etc. An important element will be involvement of women in all aspects of capacity building, going through a tailored approach. *Capacity development iniciative on Small Ruminants VC: Increasing meat production from sheep* This initiative is being implemented in Elbasani region. In this initiative RASP is working with farmers from Shtermen. Farmers group in Shtermen has two main products. One is lamb production and the other is sheep milk production. The aim of project is increasing farmers income through improvement of farming techniques and intensification of meat production, applying intensive reproduction scheme "three lambings in two years". The main objectives of this project are: - To establish and jointly develop a perspective plan for the production and marketing of sheep meat (lambs). - To increase their technical capacity and improve their breeding techniques, nutrition and animal selection. - To introduce new technology of hormonal treatment for intensive lamb production (two lambing per year in a part of the flock). - Several farmers apply for SARED grants programme to get support for investment and equipment to be included in the value chain (processing, marketing of meat and improving the technology of breeding animals) The project **"Farm-Tour: Development of Agro-tourism in Northern Albania and Eastern Montenegro"**, is financed by the European Union under the IPA Cross-Border Cooperation Programme Albania-Montenegro is currently being implemented by RASP, as the main applicant and the partner organizations from Montenegro, Regional Tourism Organization Bjelasica & Komovi. This project's concept of agro-tourism is connected to rural areas and agriculture, including traditional practices of production, processing or usage of products. Therefore, the project is extended in areas, which are known for the development of farming activities such as in three communes of Albania, in Margegaj (Tropojë), Shishtavec (Kukës) and Fierza and in two communes in Montenegro, in Plave and Andrejevica. **Completed project** **Hasi goat meat Quality Label (Geographical Indication)** RASP has completed "Hasi goat meat Quality Label" in the framework of the Biodiversity Balkans project Conservation and valorization of biodiversity for sustainable rural development in the Balkan mountain. The goal of the project was "Promotion of origin-linked products as Hasi goat kids via quality sign system, in Hasi district, which are expected to generate a sustainable development of agriculture and preservation of the biodiversity" *Project objectives:* - To establish Hasi Goat Breed Association, validate a selection scheme and recognize as legitimate by all breeders on the basis of a participatory diagnosis of existing breeding and selection practices and an assessment of the breed performances (milk – meat - breeders); to establish a herd book is in conformity with national standards and requirements. - To build GI process around the Hasi Goat kid Meat through delimitation of the territory, specification of the product (Hasi Goat Kid Meat), selection of the most adapted label and registration of the product (as GI or Red Label), and establishment of a producer group, dissemination and publicity of the product. The project started in May 2014 and was completed in December 2016. It aims to develop and promote sustainable tourism through the establishment of pilot agro-tourism activities in the border areas of northern Albania and eastern Montenegro, based on the usage of natural and cultural resources and also in a large involvement of local government in this process. All the communes mentioned above will be involved as main partners in the project. A network of 20 pilot farms will be established in both sides of the border, in Albania and Montenegro that will serve as a model for agro-tourism, which stands on local tradition, cultural inheritance of each region in order to offer the visitors a unique tourism experience.

ANNEX 3

LEGISLATION IN THE FIELD OF ANIMAL BREEDING

- Law No. 9426/2005 "On livestock breeding", Official Journal no. 78/2005 (as amended by Law No. 9864/2008; Law No. 10137/2009; Law No. 72/2013);
- Order of the Minister no. 4, dt. 9.09.2008 on the adoption of the Regulation on "Minimum Standards of Pet Breeding (Minimum Standards of Bovine Breeding)",
- DCM no.1708/2008 "On the implementation of the programmes for in-situ protection of Autochthonous small ruminants", Official Journal no. 208/2008;
- DCM no. 436, dated 02.06.2010 "On some amendments to Decision No. 1634, dated 17.12.2008, of the Council of Ministers, 'On the determination of the procedures and the manner of financial support, for the preservation of the genetic reserve of the native breed of buffalo'"
- Order of the Minister No. 3, dated 5.08.2008, for the approval of the Regulation On "Certification of Animals Pure Breed of Cattle, Sheep, Goats, Horses, Pig Pure Breed and Hybrids, Sperm, Ovules and their Embryos".
- Order of the Minister no. 1, dated 4.03.2009, for the approval of the Regulation on "Standards for the Breeding of Pigs and Chickens".
- Order of the Minister no. 2 dt. 22. 07. 2008 on the approval of the Regulation "On the reproduction of farm animals, production and marketing of racial materials".
- Order of the Minister No. 422, dated 17.12.2009 on the approval of the Regulation "On the conditions for registration of purebred breeders of cattle, sheep, goats, horses, breed-purebred and hybrids in the genealogical record".
- Order of the Minister No. 83, dated 16.03.2010, for the approval of the Regulation "On animal breeding organizations",
- Order of the Minister No. 300, dated 8.10.2010, on the adoption of the Regulation "On methods of measuring and evaluating production and other traits and methods for assessing the genetic value of breeders of pure bovine species"
- Order of the Minister No. 333, dated 17.11.2010 for the approval of the Regulation "On the methods of measurement and evaluation of production and other traits as well as methods for the evaluation of

genetic values of breeders and goats/sheep pure-breeders".

- Order of the Minister No. 333, dated 17.11.2010 for the approval of the Regulation "On methods of measurement and evaluation of production and other traits as well as methods for the genetic evaluation of breeders and goats pure-breeders".
- Order of the Minister No. 303, dated 04.11.2011 for the approval of the Regulation "On the zootechnical standards of breed of pure bovine species"
- Order of the Minister No. 318, dated 11/11/2011 for the approval of the Regulation "On the zootechnical standards of breeding animals - pure species of sheep and goats"
- Order of the Minister No. 6, dated 09. 01. 2012 on the adoption of the Regulation "On the criteria for the use of pure breed animals of the bovine species for reproduction purposes"
- Order of the Minister no. 360, dated 27. 12. 2011 on the adoption of the Regulation "On the definition of criteria for the use of purebred species of sheep and goats for reproduction purposes".
- Order of the Minister no. 237 dated 26.07.2012 on the approval of the Regulation "On the zootechnical standards of breed-purebred pigs for breeding"
- Order of the Minister no. 298, dated 10.10.2012 on the adoption of the Regulation "On the criteria for the use of purebred pigs for breeding purposes"
- Order of the Minister no. 346 dated 13.12.2012 on the approval of the Regulation "On the criteria for the use of hybrid pigs for breeding purposes"
- Law No. 7802/2002 "On identification and registration of animals and farms"', Official Journal no. 47/2000, (as amended by Law No. 66/2013);
- DCM no. 320/2008 "On the animal identification system and the registration of farms", Official Journal no. 49/2008, (as amended by DCM no. 198/2009 and DCM no.381/2009);
- Regulation no. 1/2002 "On the system for the identification and registration of the animals and the livestock enterprises";
- DCM no.31/2016 "On the approval of the Policy Paper for the protection of biodiversity".
- Law No. 9817/2007 "On agriculture and rural development", Official Journal no. 147/2007;
- DCM n. 709/2014 approving the Intersectorial Strategy for Rural and agricultural Development. Official Journal 169/2014;
- DCM no.1708/2008 "On the implementation of the programmes for in-situ protection of autochthon ruminants", Official Journal no. 208/2008;
- Law No. 9587/2006 "On protection of biodiversity", Official Journal no. 84, (as amended by Law No. 37/2013; Law No. 68/2014);
- DCM No.147. Dt. 13.03.2018 - for the establishment, organization of Regional Agencies of Agricultural Extension.

ANNEX 4

LIST OF NATIONAL STRATEGIC AND PROGRAMME DOCUMENTS

- Strategy of Agriculture and Food approved in 2007.
- Strategic Priorities and National Action Plan for Conservation and Use of Farm Animal Genetic Resources, 2007
- National Biodiversity Strategy and an Action Plan for the Period 2015-2020, adopted in January 2016.
- Document on Strategic Policies on Biodiversity Protection, January 2016.
- Strategy of Forests and Pastures Development, 2016.
- Intersectorial Strategy for Rural and agricultural Development, 2007-2013.

ANNEX 5

LIST OF INTERNATIONAL AGREEMENTS/CONVENTIONS

- The Convention on Biological Diversity (CBD), known informally as the Biodiversity Convention, Rio de Janeiro on 5 June 1992; ratified by Albania in 1996.
- Nagoya Protocol "On Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity", Nagoya, Aichi Prefecture, Japan, from 18 to 29 October 2010, ratified by Albania in 2014.
- International Treaty on Plant Genetic Resources for Food and Agriculture ratified by Albania in 2010.
- Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean. Dec 12, 1999, Barcelona, Spain, ratified by Albania in July 26, 2001.
- Cartagena Protocol on Biosafety to the Convention on Biological Diversity. 11 September 2003, Cartagena, Columbia, ratified by Albania in 8 Feb 2005.
- The Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture, adapted by FAO, November 2011
- Albania has acceded to the Supplementary Protocol on Liability and Redress of the Cartagena Protocol on Bio-safety by the Law No. 112/2013, dated 22.11.2012.

ANNEX 6

LIST OF REFERENCES FOR ANIMAL GENETIC RESOURCES IN AGRICULTURE

- Document of Strategic Policies for the Protection of Biodiversity in Albania Tirana, December 2015, Ministria Mjedisit
- European Regional Focal Point for Animal Genetic Resources (ERFP) www.rfp-europe.org;
- Dervishej L. - An integrated approach to conservation and sustainable use of agrobiodiversity- case study from CABRA/GIZ project in Albania, XIIIth International Symposium, Tirana, 14 December 2018, Biodiversity and Sustainable Development.
- Kume K. NC of FAnGR – ALBANIA Evaluation of Current Status of Busha Cattle and develop a regional breeding programme for their conservation and sustainable economic use. ERFP Project August 2010-August 2012, 16th Annual Workshop for European National Co-coordinators' for the Management of Farm Animal Genetic Resources Creta Maris Conference Centre, Heraclion, Crete, Greece 21 August, 2010.
- Stefi G. Kontribut i Heifer Albania per ruajtjen dhe zhvillimin e qendrueshem te biodiversitetit ne Shqipëri. Referim Konferenca Biodiversiteti 27.11.2013.
- Mehmetaj A; Begaj F; Stefi G; Hoxhaj R; Ruajtja e biodiversitetit nepermjet mbareshtimit te ekotipit te dhise lokale "Capore e Dragobisë" ne kushtet e fermes, ne zonen e Valbonës. Referim Konferenca Biodiversiteti, Dhjetor 2012.
- FAO. 2013. In vivo conservation of animal genetic resources. FAO Animal Production and Health Guidelines. No. 14. Rome.
- Sustainable Agriculture for Biodiversity - Biodiversity for Sustainable Agriculture, FAO.
- Leka(Sulaj) F. Dema A. Kadalogimi i Resurseve Gjenetike Shtazore ne Zonat e Projektit CABRA, 2018, http://albanian-alps.al/sq/broshura.
- Kume K. Catalog of Albanian Farm Animal Genetic Resources, 2008.
- Leka (Sulaj) F. et al. Sustainable Conservation of the Illyric Dwarf Cattle, National Catalogue of Innovations in Albania Ideass – Innovation for Development and South Cooperation, www.ideassonline.org › pdf

› BrochureIllyricCattle . Leka (Sulaj) F, Dedndreaj L., Topi H., Zharri T. Performancat e zhvillimit trupor tek demushat, për ndërzimin natyral, në popullatën e lopëve Busha, në zonën Lekbibaj- Tropojë Qendra e Transferimit Teknologjive Bujqësore, Fushë-Krujë - XIth International Symposium- Biodiversity Conservation, December 21, 2015.

- Tahiri, F., SHehu A., Topi H. (2018): In situ conservation of buffalo's nucleus herd in Divjaka area, Albania" XIIIth International Symposium: "Biodiversity and Sustainable Development" 14.12.2018.
- Tahiri F., Dedaj K. (2015) "Results of in-situ conservation programme of buffalo's population in Albania" XIth International Symposium Biodiversity, Conservation and Sustainable Use for Rural Development. Proceedings Book, pages 15-21, Y.2015
- Tahiri F., Papa L., Kume K., (2010) "Rescue of endangered local pig breeds and building up farmers network in the Velipoja Nature Reserve, Albania, a successful conservation programme" International Symposium on "Conservation and Economic Use of Biodiversity for Rural Development" October 22, 2010, Albanian Academy, Tirana, Albania.
- Papa L, Kume K, Tahiri F (2010): The Albanian buffalo: a case study of a successful in situ conservation programme. EAAP-61st Annual meeting, Heraklion 2010, Session 34, poster 17.
- Brochure: Kume K, Papa L, Tahiri, F: Buallica e Shqiperise, Zhvillimi i kapaciteteve per ruajtjen in situ dhe perdorimin e burimeve gjenetike shtazore te fermes FAO,TCP(ALB/3001(A), 2007.
- M. Petushi, A. Doko, F. Leka (Sulaj) Albanian "Animal Genetic Resources" - International Workshop presentation "European Livestock Breeds Ark and rescues Net (ELBAR) Blagoevgrad, Bulgaria, 7-10 May 2009.
- Laknori O, Rexha T, Leka (Sulaj) F., Mitre A, Hamzaraj E, Paparisto A. "The impact of Albanian local bovine races as part of conservation biodiversity in the ischaemic heart diseases in humans".- IV International Symposium of Ecologists of Montenegro – 06-10. 10. 2010 Budva, Montenegro.
- Leka (Sulaj) F., Dedndreaj L., Laknori O. ,Topi H., - Oral presentation "The current situation of cattle Illyric Dwarf cattle (Type Busha) - in Lekbibaj-Albania and sustainable conservation strategies", International Symposium "Biodiversity and sustainable use key factor for sustainable rural development." 22. 10. 2010, Tirana .
- Leka (Sulaj) F., Dema A, Dervishej L. "Improving the protection and sustainable use of autochthonous breeds and ecotypes in farm animals, in selected mountain areas, in Albania " PROJEKTI CABRA, GIZ, TIRANË – ALBANIA, XIIIth International Symposium Tirana Biodiversity and Sustainable Development, 14 December 2018.
- Rexhaj N. Papa L. Hoda A. Kume K. The State of Local Cattle of Busha Type in Albania and Kosovo. Their Identification and Morphometric Description. Research Article Anglisticum Journal (IJLLIS), Volume: 7 | Issue: 1|

- C. Tisdell, “Socioeconomic causes of loss of animal genetic diversity: Analysis and Assessment,” Ecological Economics, vol.45, pp. 365-376, 2003.
- Adebabay K. Belew, Kassahun T., and Gurja Belay Getnet A - The State of Conservation of Animal Genetic Resources in Developing Countries: A Review,8International Journal of Pharma Medicine and Biological Sciences Vol. 5, No. 1, January 2016.
- Livestock products include milk production by categories of cow, sheep and goats. Other livestock products. www.instat.gov.al › themes › agriculture-and-fishery ›
- Jani S. Kume K. Agrobiodiversity in Southeast Europe - Assessment and Policy Recommendations.