

MONGOLIA:

THE COUNTRY REPORT ON ANIMAL GENETIC RESOURCES

Prepared by:

Dr. Bataagiin Bynie

Technical Secretary of National Consultative Committee
on Animal genetic resources of Mongolia

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PREFACE

Mongolia is located in the central part of Asia – the northern half of the World with 1564.1 thousand square km consisting of forest, mountain, steppe and Gobi desert areas. 41.3% of the territory lies within the Gobi and desert areas. The total human population is 2.4 million. This country is bordered with Russia - 3485 km in the north and with China- 4676 km in the south.

Mongolia's climate is very harsh and continental and annual average precipitation is 100-400mm, but it is varied depending on natural regions and quarters. 86-96% of the total precipitation falls in April-October. The mountainous area of the north has 209-251 cold days, of which 100-105 days' have air temperature of lower than -25 degrees. The Gobi region in the southern part has 189-192 cold days, of which air temperature is lower than -25 degrees on 16-27 occasions. There is a snow for 120-150 days in mountainous area, 70-120 days in the eastern part and for 30-60 days in Gobi region.

There are 3500 lakes and 6889 springs throughout Mongolia. The length of rivers is 67046 km, covering an area of 1.1 % of the total surface territory.

PART ONE:

The state of genetic resources in the farm animal sector

As history records, Mongolia is one of the three main regions of the World, where livestock production emerged naturally. History records that animals were fed domestically in the period of the new stone age. In the period of bronze age, or about 5000 thousand years ago, livestock husbandry gradually became the livelihood of Mongolians. As a result of many centuries of traditional breeding and selection together with the long term ecological evolution in central Asian conditions, the Mongolian breed of livestock have evolved special biological, genetic and ecological features. The Mongolian breed of livestock have features, adapted to natural and harsh climatic harsh conditions on natural pastures and is managed on pasture for all four seasons of the year.

The livestock sector plays important role in the country's economy. About 90% of agricultural gross domestic product and 30% of export revenue is produced by this sector.

1.1 Role of livestock sector in gross agricultural domestic production /%/

Indicators	Year									
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GDP	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percentage of Agriculture	16.2	31.7	35.9	37.1	38.0	36.8	34.6	37.5	37.0	33.4
Percentage of livestock products in agriculture	80.0	81.7	76.7	85.7	85.2	86.8	86.5	87.7	89.8	87.6

Source: National Statistical Yearbook

In recent years, the percentage of agricultural products in the GDP and the percentage of livestock products in agricultural production have been stable. However, the decrease in percentage in agricultural contribution in 2000 – 2001 was caused by drought and 3.5 million and 4.7 million head of animals died in 2000 and 2001 respectively. These deaths occurred during the harsh winter period (Dzud) that had had unusually high levels of snow. The number of young animals born per 100 breeding females animals was also reduced because of abortion and infertility.

1.1 Overview of the country's animal production systems and related animal biological diversity

Mongolia has practiced extensive livestock production since ancient times under extensive livestock management systems and include five species of livestock /horse, camel, cattle, sheep and goats/ for the most of the year, a system that remains until present day.

Although the Mongolian breed of livestock is adapted to the harsh natural climate and extensive grazing systems, its productivity is low and of poor quality. As a result of natural evolution, tireless efforts of experts and scientific breeding and selection work, 10 breeds, 3 breeding groups, and 3 types and 4 strains of sheep; 2 breeds, 1 breeding group of cattle; 3 breeds, 1

breeding group and 5 strains of goats; 1 breed and 3 strains of camel, and 1 breed and 3 strains of horses have been recognized. In addition there are high productivity mixed breeds of meat and milk producing cattle, broiler chickens and pigs in Mongolia.

As of the end of 2001, 285.2 thousand head of camels, 2.2 million head of horses, 2.0 million head of cattle, including 494.5 thousand head of yak, 11.9 million head of sheep, 9.6 million head of goats, 14.7 thousand pigs, 54.4 thousand chickens, 644 reindeers and 778 asses were recorded throughout Mongolia. Some 1.3% of the total cattle population, 4.8% of the sheep population and 1.3% of the goat population are highly productive. About 4.6% of the cattle population, 5.0% of the sheep population and 2.9% of the goat population are hybrids. 4.4% out of the sheep population, 5.7% of the goat population, 1.8% of all camels and 1.1% of horses population are considered super local breed.

About 83% of Mongolia's land area is used for agricultural production, 0.3% - for urban settlements, 1.1% comprising water areas, 0.2 % - for road and pipeline network and 3.3% is reserve land.

1.2 Current status of land utilization

Indicator	/mil.ha/										Trend
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	
Arable land	1.369	1.363	1.353	1.322	1.322	1.322	1.228	1.347	1.191	1.176	0
Arable land in use	0.708	0.657	0.585	0.471	0.372	0.347	0.333	0.326	0.296	0.209	--
Pasture under use	124.7	122.2	117.7	117.7	117.1	117.1	127.6	127.7	129.0	129.2	0
Agricultural land	126.1	123.5	119.1	118.4	118.4	118.4	128.8	129.1	130.3	130.5	0

Source: National Statistical Yearbook

Agricultural land includes pasture, hay making fields, arable land, fruit plots, abandoned land, land used for agricultural construction and facilities and other land for agricultural production. As of 2001, 259695 citizens and economic entities utilize 1105.13 thousand ha of land and 106921 citizens, economic entities and institutions have utilized 509.64 thousand ha of land. Moreover there are 29 foreign citizens and 39 foreign economic entities utilize land on the territory of Mongolia.

Mongolia's climate is not conducive to crop production in Mongolia and only 0.8% of the total territory is utilized for these purposes. The main cereal crop is wheat. Until 1990 the domestic flour demand was satisfied through local production alone, but in recent years only 40% of the demand has been satisfied and only one third of arable land has been cropped. Mongolia has good resources of natural pasture, but its utilization is confounded by the shortage of water. For example there is overgrazing in the central part where the human and animal populations are concentrated, but large areas of pasture is out of use in remote areas.

1.3 Current status of agricultural land use for animal production and future trends.

Indicator	/thous.ha/										Trend
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	
Food crops	611.9	586.8	516.2	414.8	366.6	343.5	329.2	321.7	294.6	208.4	-
Fodder crops	79.9	52.9	25.6	10.9	5.9	4.3	4.7	4.9	1.7	0.75	--
Mixed Food and Fodder crops	691.8	639.4	541.8	425.7	372.5	347.8	333.9	326.6	296.3	209.2	-
Natural pasture	1247 61	1222 27	1177 71	1177 47	1171 47	1171 47	1276 33	1277 85	1290 91	1292 93	0
Abandoned land	342.2	353.6	520.3	657.4	704.0	746.2	650.3	788.2	678.0	789.2	+
Forest	1532 8.3	1532 8.3	1611 0.4	1751 8.1	1751 8.1	1783 0.9	1783 0.9	1783 0.9	1783 0.9	1863 2.5	0

Note : Abandoned land was calculated by subtracting the total planted area and the total prepared fallow from the total cultivated land.

The major source of animal feed is grassland. There are 2600 types of plants in wild grassland of Hangai and Gobi regions that occupy 76.5% of Mongolia's land area. 600 types out of these are used for animal feed. Grass yields and fertility levels are very different in various regions for each species.

If the grasslands of Mongolia could be used properly, an average of 74.6 million head of the sheep equivalent units would be fed annually in 'normal' year and there could be a 30% of fluctuation in the number of livestock between climatically favorable and nonfavorable years. Feed requirements are estimated SEU as follows: One horse – 7 sheep; One cattle – 6 sheep; one camel – 5 sheep, one goat - 0.9 sheep and one sheep – 1 sheep.

1.4 Land utilization for livestock production

Classification	Area /thous.ha/	%
Private		-
State and Cooperative	129293	100.0
Total	129293	100.0

Article 6 of the Constitution of Mongolia states that "land, its basin, forest, water, animals, plants and other natural resources will be under authority of the people of Mongolia and under protection of the Mongolian State. Other land, except those owned by citizens of Mongolia and also land basin, its resources, water resources and animals and livestock are the property of State. Land that is not owned by citizens remains the property of the State. The current land law states that pasture will be allocated for, and utilized by the public. A measure for allocating land utilization around winter and spring camps by herders for 15 years have just started. The law on land ownership by citizens of Mongolia was adopted very recently and will come into force in May 2003.

1.5 . Number of households with animals

Number of livestock	No of households with animals										Trend
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	
Up to 10	64.8	58.9	48.3	46.8	43.7	39.7	35.5	31.7	28.6	31.3	-
11-30	70.8	69.2	57.0	53.8	50.6	47.1	41.0	36.8	35.9	40.4	-
31-50	49.5	50.2	43.1	42.0	40.2	37.4	34.7	33.7	31.9	35.0	-
51-100	61.5	66.3	63.4	62.9	61.1	61.5	63.7	62.9	61.3	63.1	0
101-200	29.6	42.8	51.4	53.2	53.5	55.3	65.3	67.5	67.8	59.8	+
201-500	4.8	13.7	24.6	28.2	31.4	32.9	34.5	36.3	37.6	33.4	+
501-999	-	0.4	1.3	2.1	3.1	3.7	4.1	5.1	5.4	4.6	+
1000-1499	-	0.007	0.047	0.1	0.28	0.44	0.53	0.9	1.1	0.9	+
1500-2000	-	-	-	-	0.017	0.032	0.054	0.062	0.075	0.048	0
Over 2001	-	-	-	-	0.008	0.010	0.014	0.033	0.041	0.037	0
Total	260.8				283.9	278.3	279.6	274.9	269.9	268.7	0
Herding Households	114.9	143.4	153.6	167.3	169.3	170.1	183.6	187.1	189.9	191.5	-
Number of Herders	244.9	330.1	347.9	377.1	390.5	395.4	409.6	414.4	417.7	421.4	-

Source: National Statistical Yearbook

Although number of households with livestock has been comparatively stable, number of households with up to 50 animals has decreased steadily and households with 201-500 animals have increased 7 times compared with 1991. The main reason is that herders now own their livestock and management of their own property has been improved under privatization. 72.6% or 195.1 thousand out of 268.7 households are herding families, (those households dependent on income, generated from livestock.)

As explained by Mongolian supreme court resolution 487, 1997, “Herding Family” is the group of persons who manage their own or others’ livestock constantly and earn profit and income from herding. Any member of the family, not engaged in other work under contract and mission and registered in one civil registration and information card as sharing family life and labor with each and other.

During the first phase of the transition from a centrally planned economy system to a market economy, the number of herding households and herders increased by 2.6 and 2.8 times respectively. This was explained by the fact that members of households were previously engaged in other business in urban areas became unemployed and commenced livestock production. In the future, it is expected that the livestock population will increase qualitatively, not quantitatively and number of herding families will decline, those leaving other businesses transferring in order to increase their incomes.

1.2 Assessing the state of conservation of farm animal biological diversity

The protection of animal genetic resources started on a scientific basis after the foundation of the “Department for Treatment and Processing Livestock Items” in 1923 according to a Government regulation of Mongolia. Since 1924, high productivity breeds of animals have been brought from abroad for the purpose of raising livestock production. Starting in 1930, the state owned farms initiated with cross breeding between local animals and imported pure breeds.

Artificial insemination was first attempted in 1945 and 36 breeding stations were established between 1958-1962. The foundation of the Animal Husbandry Research Institute in 1963 was an important step for development of animal breeding and selection work in Mongolia.

The Government of Mongolia established certain objectives through resolutions on “improving animal husbandry breeding works” in 1958, 1961, 1970, 1977 and 1984 and has achieved some success in the implementation of these resolutions. The Government of Mongolia approved the National program on “Improvement of Livestock Quality and Breeding Works”, by resolution 105 of 1997; “Animal Health” program – by resolution 64 of 1999 and also approved a program on “Protecting Livestock from Natural Disaster – Dزد and Drought” by resolution 47, 2001. The Parliament of Mongolia adopted the Law on “Protecting Livestock Gene Pool and Health” in 1993 and this law was amended in 2001.

Follow up measures to improve biological and economic productive features of local breeds of animals were attempted by developing super strain in the late 1960s, directed at improving productivity, quality and composition of livestock herd.

As a result of national researchers’ creative efforts and selection and breeding work that was based on scientific theory, highly productive breeds and breeding groups of livestock, that are adapted to the country’s natural conditions were created. For example :

“Orhon” meat and wool produce sheep, created in 1961 are well adapted to extensive grazing systems; have a strong and healthy body and semi-fine wool. “Baidrag” breed of sheep was created in 1983 with long and semi-coarse wool, suitable for making carpet. Between 1990-1992 “Khangai” meat and wool breed of sheep with curly and semi-fine wool, “Sumber” breed of sheep with curly wool and “Bayad”, “Gobi-Altai” and “Uzemchin” meat and wool breeds of sheep with semi-coarse wool were created.

In 1993 “Tal nutgyn tsagaan” breed of sheep with semi-fine wool, adapted to grazing steppe pasture conditions of Dornod region was created. In 1999 “Kerei” breed of fat tailed sheep which has good yield of meat and at was developed and registered.

In addition to the above, “Torguud” breed of fat backed sheep with semi-coarse wool and, “Yeruu” breed of sheep with semi-fine wool; “Tamir”, “Altanbulag”, “Khotont” and “Jargalant” breeding groups of sheep with good meat yields, and “Barga”, “Sartuul” “Sutai” and “Darkhad” local super strains of sheep have been developed.

There are also “Bayandelger”, “Erchim”, “Buural”, “Zalaa jinstiin tsagaan”, “Ulgiin Ulaan” local super breeds of goat, “Gobi Gurvan Saikhan” and “Uulyн Bor” cashmere breeds and “Unjuul” wool breeding group of goat in Mongolia.

The majority of the cattle herd consists of the Mongol breed “Selenge” and “Dornod talyn Hevshil” as local meat breeds, whilst introduced meat breeds include “Limousine”, “Hereford”, “Kazakh white head”, “kalimag”, imported milk breeds “Black and White”, “Red Steppe” milk

breeds, and highly productive meat and milk mixed breeds “Simental”, “Brown Swiss” of cattle and their hybrids have been raised. ???

One quarter of the total cattle population is comprised of yaks. Yaks are one of the special species of livestock adapted to high mountain cold climate, suitable for grazing on natural pasture, tolerant, highly productive in terms of meat. Yak’s milk yield is low, but its fat content is high. Yak population has declined in recent years. There were 852.5 thousand yaks in 1999 but, as of the end of 2001, the figure decreased by a factor of 2. Hybrids between Mongol cattle and yak are called “khainag”. “Khainag” have a very strong body, powerful and more productive than Mongol cattle and yaks in terms of meat and milk production. Khainag are heavier by 25-30% in live weight than Mongol cattle and have a milk yield is 30-40% more. Male khainag are infertile. Hybrid calves, born from Mongol cow are called “Naran khainag” and calves, born from Yak cows are called “Saran khainag”.

The Mongol breed of horse has a comparatively small body and has been raised for the dual purpose of transportation and meat. Horse breeds include “Tes”, “Galshar”, “Darkhad” and “Jargalant” strains that have very different features in terms of body conformation and productivity.

Mongolia has camels with two humps, a variety that is very rare in the World. There are “Galbyn Govyn Ulaan”, “Khanyn khetsyn huren” strains of camel in Mongolia. In the last 40 years, the camel population has declined 3 fold.

1.6. Number of livestock and other domestic animals of Mongolia /thousand heads/

Livestock species	Year									
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Camel	476.0	415.2	367.7	366.1	367.5	357.9	355.1	356.5	355.6	322.9
Horse	2259.3	2200.2	2190.3	2409.0	2648.4	2770.5	2891.4	3059.0	3163.5	2660.7
Cattle	2822.0	2818.9	2730.5	3005.2	3317.1	3476.3	3611.7	3725.8	3824.7	3097.6
Sheep	14721.0	14657.1	13779.2	13786.6	13758.6	13560.6	14148.6	14694.6	15191.3	13876.4
Goat	5249.6	5602.6	6107.0	7241.3	8520.7	9134.6	10556.7	11061.9	11033.9	10269.5
Total	25527.9	25694.0	25174.7	26808.2	28572.3	29299.9	31263.5	32897.5	33568.9	30227.5

Pig	83.3	48.5	28.6	23.4	23.5	19.1	20.8	19.9	21.9	14.7
Chicken	223.3	183.9	131.6	74.1	99.3	58.0	65.1	66.6	78.1	89.1
Reindeer	1.3	1.4	1.4	1.2	0.9	0.68	0.6	0.64	0.66	0.68

Beehive	4567	1473	1237	1386	1165	1075	977	1057	1154	1530
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Source: Mongolian Statistical yearbook.

Because of natural disasters and climatic conditions, the volume of export of meat and live animals has declined dramatically and there is a tendency of increase in the number of herders, the total population of all species, except camel has increased between 1991-2000. The goat population has increased by a factor of 2, caused by cashmere demand and price increases. The Decline in the camel population has been caused by the fact that trucks and tractors have been used for moving families from one lace to another whilst camels were slaughtered due for their rich yield of meat and fat.

1.3 Assessing the state of utilization of farm animal genetic resources

In 1990 – the beginning of the transitional period from centrally planned to a market economy, 68.2% of Mongolia’s total population of livestock was owned by the State and cooperatives, but now 97.2% has been privatized to individual herders. At that time the percentage of female breeding animals was 46.6% in total population. Cows comprised 39.6%, ewes - 51.6% and nanny goats made up 47.3%. At present the composition of livestock herd has changed and percentage of male animals has increased 43.7% of the total population. Ewes now represent 45.6% and nanny goats – 45.0%. The demand and supply for agricultural products and production is directly related human population growth.

1.7 Number of human population

Year	Population /million/	Percentage of rural population	Percentage of urban population	Total %/
1990	2.0977	42.00	58.00	100.0
1999	2.3735	41.41	58.59	100.0
2000	2.4075	42.80	57.20	100.0
Annual average growth	1.01	1.05	0.99	-

Source: Mongolian Statistical yearbook.

Although the population of Mongolia has increased by 14.8% in the last ten years, proportion between urban and rural residents has been stable. During this period, the percentage of rural population increased by 0.8 %. As projected by researchers, Mongolian population will reach 3.5 million by 2020. Majority of rural population is herders and members of herding families. As of the end of 2000, 55.9% of 421.4 thousand herders were youths between the age of 16-34, 30.9% is 35-60 years old and others are more than 61 years old.

Because of the poor infrastructure and weak communication and road systems in rural areas there is a big difference in the respective living standards. The high cost of transport to rural areas has the effect of depressing raw material and livestock prices paid to herders whilst in creating to cost of consumer goods and other services in these areas.

Because of the difficult conditions in rural areas, migration from rural to urban areas continues and there is a tendency that this migration will continue in the near future.

The main producers of livestock products and raw materials are herding households’ that are considered very competitive in terms of market structure. Agro-processing industries are limited in number and those that do exist have a monopoly and oligopoly, with their associated characteristics.

1.8 Production of main livestock commodities /thous. tn/

Product	Year									
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Meat production	248.9	251.2	216.1	203.9	211.7	259.9	240.5	268.3	289.0	310.6
Beef production	66.2	75.7	64.5	64.4	69.4	90.0	86.6	99.3	104.6	113.4
Mutton and goat's meat production	132.3	116.3	112.5	111.9	111.5	121.3	104.4	120.2	128.9	120.0
Pork production	7.9	1.8	0.7	0.7	0.6	0.3	0.2	0.2	0.3	0.9
Sheep wool	21.1	21.0	20.8	19.6	19.6	19.5	18.3	20.1	20.9	21.7
Cashmere					2.1	2.5	2.6	2.9	3.3	3.3
Milk/l/	315.7	308.1	292.9	312.5	369.6	369.8	418.6	430.8	467.0	375.6
Egg /million pcs/	38.0	18.6	10.0	3.6	3.5	4.9	6.1	8.5	9.6	6.7

Source: Mongolian Statistical Yearbook.

Before transition to a market economy, 7.6 million head of animals or 480.0 thousand tons of meat were supplied for consumption throughout the country. More than 40% of meat consumption was mutton, 30% beef, 10% horse meat, 10% goat meat and 4% camel meat. There was decline in meat production up to 1994 but since 1995, it has been increasing gradually. Increases in the volume of meat, exported meat has influenced the above trends.

Because of the extensive and seasonal characteristics of Mongolia's livestock industry and the harsh climate, animal purchases by meat processing factories and slaughtering have been carried out seasonally. There is a potential to export annually 60.0 thousand tons from meat surplus to domestic requirements.

There has been a steady increase in cashmere production, compared to 1990 supply of cashmere has increased by a factor of 2. This increase was caused by an increase in the goat population. It also has been explained by the fact that herders have free selection regarding which species of animals raised in market economy in order to improve their living standards. Although Mongolia produces one third of raw cashmere in the World, Mongolia can not influence the World cashmere prices.

A sharp decrease in pork and egg production is directly connected with the decline in pigs and chickens. Piggery and poultry production declined when state owned farms were split into small economic units during privatization, crop production was in crisis, fodder factories were closed down because of shortage of raw material and input supply.

Due to high demand for eggs, chicken and pork, they have been imported 100% from abroad.

If we estimate the demand for dairy products for the population, using standard norms per person nominated by the Ministry of Health, 55% of the total requirement is met from local production.

1.9 Imported livestock products /tons/

Products	year					
	1995	1996	1997	1998	1999	2000
Liquid milk and cream	63.9	51	15.9	46.5	162.5	2322.6
Concentrated milk and cream	346.2	354.1	530.8	395.0	550.3	707.7
Dried milk	-	294.2	392.7	291.4	364.7	345.6
Butter	40.8	17.7	96.3	134.3	80.9	54.9
Honey	13.6	9.8	13.5	23.9	24.4	31.7
Pork	1.2	1.7	0.7	21.7	-	36.4
Chicken	158.9	65.7	105.8	165.8	33.5	18.2
Egg/mil pcs/	37300.4	327.8	230.4	396.9	1540.6	12962.1
Horse /head/	6	3	3	18	-	23
Pig /head/	160	-	22	70	-	-
Chicken /head/	40000	-	5400	-	41180	5300

Source : Customs statistical data on foreign trade

Mongolia traditionally has extensive livestock production whilst dairy production has been on intensive housing in winter and spring. In spring and winter times the supply of milk and dairy products is insufficient. Condensed milk, cream and butter have been imported. Dairy processing is underdeveloped. In the last few years, the volume of milk and dairy products imported has increased because many donor countries and international communities and organizations have provided food aid and assistance to help the Government and the people of Mongolia overcome natural disasters Dzud. Horses, pigs and chickens have been imported in small quantity for breeding purposes.

1.10 Export of livestock products

Products	Years									
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Sheep wool /thous.tn/	2.2	7.3	2.6	0.8	14.9	7.7	10.7	5.4	8.7	5.2
Camel wool /thous. tn/	0.1	1.7	3.1	2.6	0.9	1.1	0.9	0.7	0.9	0.8
Goat cashmere /thous. tn/	0.6	1.7	1.4	0.6	0.6	1.1	1.4	0.9	2.0	10.5
Horse's hide /th. Pcs/	78.3	13.5	153.5	45.4	70.0	64.8	84.9	109.5	114.8	276.3
Sheep skin /th. Pcs/	131.0	1633.5	4151.4	2567.4	2004.3	1970.0	2203.6	2304.5	1984.1	2639.9
Goat skin /th.pcs/	101.0	265.0	681.9	588.2	361.4	388.0	416.1	66.6	127.8	110.5
Cattle hide /th.pcs/					309.6	266.8	276.8	311.9	461.4	1058.5
Meat /th. Tons/	21.8	11.0	7.1	5.4	2.2	3.6	7.1	8.3	15.0	16.7
Offals	495.6	3523.8	1361.8	1103.6	1288.3	3050.4	2541.6	1014.6	1024.8	869.6

Source : Customs statistical data on foreign trade :

Significant increases in the volume of livestock products export in the past few years has resulted from the fact that during transition period, agro-processing industries were unable to operate at their full capacity and some of them were closed down because of financial problems.

In the past live animal exports were prohibited, but in 2001, 948 cattle and 250 goats were exported for meat and breeding purposes respectively.

As a result of economic support extended by the Government of Mongolia to livestock raw material processing factories by declaring 2001 as the “year for promoting the national production”, there is an emerging tendency of increased local production. There are 22 factories capable of processing 62.0 thousand tons of meat per shift in Mongolia and of them, 19 have licenses to export meat.

There are 10 large scale and around 2000 small dairy processing enterprises in Mongolia. In addition, Mongolia has 46 wool, 70 skin and hide, 48 cashmere and 37 textile processing factories. If production from all these factories is renovated, export of livestock raw materials will decrease.

PART TWO: Analyzing the changing demands on national livestock production and their implications for future national policies, strategies and programs related to animal genetic resources.

Because livestock production is the main economic sector of Mongolia, development of this sector directly influences on the country's economy. The majority of food supply, export and local agro-processing factories are based on livestock production and animal originating raw materials.

2.1 Reviewing past policies, strategies, programs, and management practices

The livestock population was transferred from state and cooperative ownership to private ownership since 1990 when Mongolia adopted the principles of an open market economy. The change in livestock ownership transfer required a change in government policy and strategy. Although Government policies started to be amended at that time, livestock production remains the main livelihood of herders and its economic development is important to Government.

GDP increased by 2.4-4.0% in 1996-1999, but gross agricultural production decreased by 4.2-6.4% during the same period.

Partly due to the natural disaster-drought and dzuds, agricultural production reduced by 16.8% in 2000. The consumption of fresh milk and dairy products per person decreased during this period. It is clear that all the above factors have a big impact on livestock production development and the national long term policy implementation achievements.

The Government of Mongolia amended Legal acts and prepared a livestock production sector development policy. "Guidance and the State Policy on Rural Development" approved by the Parliament of Mongolia in 1996 has been amended for the purpose of improving living conditions of rural people and herders by intensifying extensive livestock production based on private properties in line with market conditions, supplying local needs, developing intensive livestock production in certain regions and by increasing exports.

The law on "Livestock Gene-pool Protection and Health", approved by the Parliament in 1993 was amended in 2001 in line with current conditions. Many provisions regarding protecting the livestock gene-pool were reflected in this law and some projects and programs have been carried out to implement these provisions. One of them is the National program on "Improving Livestock Quality and Breeding Services". This program was adopted by Mongolia's Government resolution 105, 1997 and under this program, many activities such as protecting livestock gene-pool; enriching genetic resources by reserving frozen semen of highly productive breed, strain and breeding groups of animals, of which genetic resources were at risk of extinction; the wide spread use of semen and embryo implants in breeding and selection work and organizing breeding animals exhibitions and auctions have been introduced.

The "Livestock Health" program was approved by the Government resolution 64, 1999 and under this program livestock' and domestic animals' health protection, treatment and preventive measures have been introduced.

The Government approved the “National Program on Protecting Livestock from Natural Disaster-Dzud and Drought” by its resolution 144 in 2001. This program aims at strengthening natural disaster-dzud and drought response and damage relief systems, creating aid and assistance delivery and distribution network and enhancing responsibility of herders, citizens with animals and all levels of administrative institutions.

The “Water” national programme was adopted by resolution 43, 1999 and its the main objectives are to ensure reliable supplies of high quality water, regenerate water resources, and to protect these from contamination.

The “White Revolution” Program has been implemented since the adoption of Government resolution 105, 1999 aimed at mobilizing local resources of the livestock sector, improving dairy product supplies to the population and increase incomes of herders and rural people by reviving traditional processing of dairy products; developing small and medium enterprises and creating favorable conditions for supply of products into markets.

The “Cashmere” Program was adopted by Government resolution 114 of 2000 with the objectives of improving the competitiveness of cashmere products through improving utilization cashmere processing factories.

The “Wool” Sub Program was approved by Government resolution 26 of 2001 and is directed at enhancing capacity of factories involved in wool, skin and hide processing.

Many infectious disease outbreaks occurred in the past few years requiring significant expenditure on treatment, disinfection and prevention from these diseases.

In conclusion, the state and government of Mongolia have taken many measures for relieving and removing constraints in the livestock sector, caused by unexpected natural disasters and diseases and thereby creating a favorable economic environment for sustainable development of the sector.

Improving livestock health is one of the main activities for protecting animal genetic resources and the Government of Mongolia has purchased Biokombinat- a company that produces medicines and chemicals using state budget funds and these medicines have been given to herders free of charge.

In the last 3 years, a total of 6.9 billion tugrugs /1.9-2.9 billion tugrugs allocated annually/ has been spent on livestock treatment and prevention measures from the state budget and an estimated 127.8 million head / 37-48 million head treated twice each year/ have been involved in the above treatment.

In the last 3 years, a total of 1.3 billion tugrugs / 300-600 million tugrugs per annum/ has been spent on protecting the main fodder source - pasture grass plants from rodents. This eradication measure covered an area of 946.0 thousand ha / 215.0-404.0 thousand ha per annum/.

Investment made in the livestock sector

	Expenditure items	Year								Trend
		1990	1995	1996	1997	1998	1999	2000	2001	
1.	Treatment and prevention measures	668,0	870,0	900,0	1900,0	1900,0	1900,0	2100,0	2900,0	+
2.	Establish basic fund of livestock fodder	-	-	-	74,9	89,2	103,5	269,3	1720,9	+
3.	Measures for protecting pastures from rodent and insect infestation	10,0	16,0	150,0	200,0	200,0	300,0	450,0	600,0	+
4.	In order to improve pasture water supply : - Rehabilitate wells Exploration work to identify shallow water sources.					260,0	300,0	402,0	391,0	
						-	-	24,0	75,0	
5.	Dzud and drought relief							1300,0 ¹		
6.	Natural disaster mitigation						437.4	1900.0	71.8	
7.	Emergency disease protection	-	-	-	-	0,4 /vaccine/	-	-	753,7 /foot and mouth disease/	

Some 651 wells were rehabilitated by 1.452,0 billion tugruqs in the last three years, of which 282.0-391.0 million tugruqs were spent each year from the budget. A further 133 wells were rehabilitated at a cost of 230.0 million tugruqs under foreign loan and by lateral assistance.

As a result of 24.0-75.0 million tugrug invested in water point exploration carried out in the past in the past two years, 783 water points were discovered. This work made it possible to develop manually operated shallow wells and establish new wells with pumps.

For the purpose of establishing the emergency fodder fund at aimag and soum levels in order to protect against natural disaster - dzud and drought responding and damage relief systems, 1.05 billion tugruqs were spent on this activity, 47.0 thousand tons of hay have been stored in aimag and soum emergency fodder fund and used in case of bad nature.

In addition some 350.0 million tugruqs were spent on establishing more emergency hay and fodder reserve points and increasing their stock levels. The number of reserve points' have increased by 60%. In line with the objective of strengthening herders' capacity for haymaking, tools and equipment were bought through tender at 250.0 million tugruqs and have subsequently been sold.

In order to relieve the impact of damages caused by natural disaster – drought and dzud restocking activities have been undertaken using funds from donor countries' and international organizations. An estimated 1.3 billion tugruqs, spent on purchasing 103.4 thousand head of through credit to 1728 natural disaster affected households in 33 soums of 5 aimags under the WB project and 767.0 thousand head of livestock was provided to 1276 households of two aimags under an IFAD project.

Many measures have been taken by the Government in order to implement its policies, pursued with objective to ensure sustainable development of livestock production, but there is still a need

¹ 1300,0 million tugruqs were spent as a long term loan on restocking herders who lost all their animals in Dzud or left with few animals of five aimags under the world bank project

to obtain donor countries' and international organizations' assistance and investment to support this objective.

2.2. Income of herding families and their living standard

As it is evident from the classification of households with animals in 2000 statistics, households with up to 100 head of animals occupy 63.2% of the total households with animals. These can be assumed to be the "very poor" and "poor" households.

10.6% of herding households have electricity, 12.8% have TV, 8.7% have vehicles, 16.6% have one motorcycle and 1.5% have a tractor. These indicators compared to the 1995 number of households with electricity show an increase of 1.3%, whilst households with TV, vehicle and motorcycle have increased by 7.8%, 11.1% and 5.0% respectively.

Herders are now engaged in operating businesses for marketing their surplus livestock products and raw materials through barter trade and cash. Herders have learnt many things and are becoming more experienced in operating business for project.

Previously herders sold their livestock products and raw materials to independent traders only and day to day consumer goods were provided to them through a barter trade system. Now this situation has changed. Herders know to whom they need to sell their goods to and at what price, taking into account their profit. They also have penetrated nearby markets of surrounding settlements by transporting products in their own vehicles.

As seen from survey made among herders engaged in business activities 49.4% of herders have sold their livestock products and raw materials at markets in Ulaanbaatar and 8.0% sold their products out of the country across the border.

According to a 1998 survey made among herders, the average annual income of one herding family was 500.2 thousand tugrugs and the monthly income was 41.7 thousand tugrugs. At that time period annual income of herding households with over 2000 animals was 4.5 million tugrugs.

For herding families with over 1000 head of animals and those who were engaged in business in 2000-2001 some 94.8% of their annual cash income was derived from livestock production, 1.1% from manufacturing and 3.4% of their income from pensions. That study concluded that income source of herders is unstable because of their dependence on only livestock production, which is very dependent on nature and environment.

Annual incomes of those households involved in the survey was 4.6 million MNT and expenditure was 4.5 million tugrugs. The main living standard indicator of herding households with many animals, engaged in different business is the number of livestock owned, but it is not a guaranteed source of livelihood. As seen from balance of the total income and expenditure from these households, 33.4% was spent on purchasing fixed capital/asset.

It is common that herding households engaged in other business activities often have purchased trucks, saloon cars, motorcycles, satellite aerials, power generators for the purpose of increasing their living standard and expanding production.

The total income of herding families by type of animal, show that 52.8% was contributed by cashmere sales and 28.6% came from the sale of live animals, 6.4% was from the sale of skin and hides, 5.4% was from meat sales, 4.3% was from wool and 1.2% came from milk sales.

The total cash income earned by herders by type of animal, 59.5% was contributed by goats, 23.3% was derived from sheep wool, 10.4% from cattle, 3.9% - from camel and 2.9% came from horse sales.

Some herders have been hired under restocking and leasing contracts, being paid cash or salary in kind with animals.

The minimum subsistence level for herding families was estimated to be 22-23 heads of animals for household member. One family with 5 members require 110-170 head of animals.

Herding households are the main suppliers of raw materials to food processing factories. These materials are always in high demand and are a major income source for the rural population. Because these products have been sold to final producers through middlemen, income generated from their sale is spread over many entities and a small portion of the value of the product is received by herders.

If herding households have an average of 300 - 500 head of animals, they will be selfsufficient and be able to maintain profitable production. Cooperative development is very important for solving the many economic and social outstanding issues related to protecting livestock from natural risks, enhancing productivity, increasing incomes and reducing poverty and unemployment. Many initiatives have been taken to establish different types of cooperatives.

Since land is owned by the public, there are many initiatives to establish voluntarily based production and service cooperatives, that unify its members' livestock and other property.

Management, financing and structures of the new cooperatives can be established in accordance with co-op principles and profit distribution should be made based on labor sharing and property contribution of each member.

Cooperatives can be established in many fields of supply of agricultural raw materials, the provision of consumer goods and other commodities, marketing of crop and fodder production, breeding animals, undertaking primary processing, saving and credit services, veterinary services, machinery and equipment leasing, transportation and electricity, culture and art, training and promotion.

Cooperatives can be established as specialized, primary, secondary or multi-purpose.

The type and structure of cooperatives depends on characteristics of the local area, the demand and needs, distance from market and education and cultural circumstances.

At present the establishment of livestock product wholesale systems is one of the priority issues of government. Based on this system, cooperatives could deal with collection, classification, grading, numbering, packing and storing of livestock raw materials and could be established at soum and bag levels.

If such cooperatives could be established, cooperatives could use storage; warehouse; fences and weighing scales etc from old collectives and trading entities that existed under the previous centrally planned economy thereby saving the funds.

Such a cooperatives could be or wholesale center could establish the foundation for wholesale trading by selling products and commodities through its linkages with foreign and domestic buyers in Ulaanbaatar and aimag centers.

In order to maintain transparency and accountability in the activities of cooperatives, auctions should be held. It is believed that some agricultural brokers, companies and cooperatives extraordinary make profits by buying commodities at low prices and selling them at high prices. This was the reason for bankruptcy of the previous cooperatives, companies and brokers. Therefore there is distrust in voluntarily forming cooperatives.

Cooperative should be exempt from taxes to strengthen their operations. Currently cooperatives consider that tax should be levied only on livestock instead of paying additional taxes under the name of cooperative.

It is very important to promote cooperatives by providing assistance, soft loans and organizing training until they become financially strong.

Regarding the implementation of the “Wholesale Network” program, auction will be conducted inviting representative factories, trade and business entities at soum and aimag levels through computer network in order to improve livestock raw materials’ quality, thereby increasing herders’ incomes on the one hand, and on the other hand, creating favorable conditions for the supply of national factories with high quality raw materials and developing trade linkages between urban and rural areas.

2.3 Analyzing future demands and trends

Mongolia’s extensive livestock systems have a long tradition. The current livestock production and management systems need to be modernized and improved to conform with trends in World development. such as the present world development trend, market conditions of our country and rural population concentration.

Objectives of Government policies for livestock development are to ensure sustainable development of private ownership based extensive livestock production, to improve the supply of livestock raw materials to domestic needs by developing intensive livestock production and improving the well being of herders and rural people by promoting exports. Therefore sustainable development of livestock production should be achieved by developing and maintaining an intensive livestock production industry.

Intensive livestock production development means that highly productive elite breeds of animals will be raised and production will be developed under intensive and semi-intensive conditions of where they are independent of nature. It is necessary to pursue a policy of developing intensive livestock production in areas around big cities where crop and fodder production can also develop, where infrastructure is good, human population densities and concentrations are high and market demand is sufficient.

Because drought has occurred in summer due to lack of precipitation and dzuds have occurred in winter due to heavy snow in the last few years, serious problems are faced the livestock

production sector and disasters have frequently occurred. Through these disasters tens of millions of animals have died and this has influenced the country's economy and well-being of its people. Unemployment has also been increasing.

Long cold winters time and very hot summers together with changes of the World climate has negatively affected the country's crop and livestock production. This changing climatic situation of the world will continue into the future. In this period of Globalization, Mongolia needs to develop its livestock production sector following the World development trends.

2.4 Discussion of alternative Strategies in the conservation, use and development of animal genetic resource.

Based on the number of livestock, their capacity for productivity and further development, livestock and animal genetic resource protection and conservation activities will be taken in accordance with the following principles.

- Study the reasons for extinction of certain breeds, strains and breeding groups of livestock to address these problems and raise their offsprings, but if necessary, take them under the state protection.
- If number of biologically important livestock is decreasing, implement measures to protect these livestock and animals and their breeds, strains and breeding groups. To do this, genetic resources need to be enriched with frozen semen of that species for its use at a subsequent date.
- In order to improve the overall genetic status of livestock, very productive /productivity is 20-25% higher than the average of that herd or breed/ livestock from that herd should widely be used in breeding programs.
- Amongst traditional extensive livestock production areas distant from markets, improve livestock quality by undertaking breeding and selection programs, using local breeds
- Promote intensive livestock production in areas where human population density is high and crop production is established in well developed farming systems.
- Provide sufficient, safe and high quality foods to residents of urban settlements by raising high productivity pure breed and hybrid animals under intensive livestock production systems.

2.5 Outlining future national policy, strategy and management plans for the conservation, use and development of animal genetic resources

Because the livestock production is based on pasture, 96% of fodder supply is derived from natural grass lands. Shortages of fodder have often occurred due to natural disasters of droughts and dzuds. One of objectives of the Government policies is to create the possibility for increasing capability to protect genetic resources of high quality livestock and animals in the above conditions.

In order to implement this objective the Government of Mongolia is pursuing the following policies:

Protect livestock of local and highly productive breeds, strains and breeding groups by selection methods to improve their quality

Supply fodder and hay to livestock and domestic animals in case of natural disasters of drought and dzud and create emergency support systems.

Establish an emergency fodder fund reserve to be used for certain periods at aimag, soum and bag levels and build more state fodder and hay reserve storage points.

Create pasture reserve areas to be used in case of droughts and dzuds.

Increase pasture reserve area by improving water supplies to pastures, particularly to underutilized pastures

Implement activities for rehabilitating degraded pasture and protecting pasture from rodents.

Carry out various measures to improve health of livestock and domestic animals through prevention from infectious and parasitic diseases, improving livestock productivity and protecting genetic resource.

Ensure implementation of Mongolia's constitution that states "Livestock are the National wealth and they will be under the State" and of other related laws and objectives of the Government's action program.

PART THREE: Reviewing the state of national capacities and assessing future capacity building requirements

The changing demand that has taken place in the livestock sector requires the assessment of potential and constraints in implementation of measures described in the national programme on “improving livestock quality and breeding service”, “Action Program” of the Government and future policy to be pursued by the State in the sector. As well as it is required to take measures in order to strengthen the national capacity as follows :

3.1 Structure and management of livestock genetic resources

First initiative in developing the livestock sector in Mongolia was taken in 1923 by establishing the Livestock Treatment /vet service/ and Quality Improvement Board in accordance with decision made at thirty second meeting of the Government. Crossbreeding activities began when highly productive breeds of livestock were imported into the country in 1924.

Moreover, the traditional methods of selecting good quality animals from among local breeds were continued whilst pure breeds of highly productive livestock were raised since 1930. Piggery and poultry breeding and selection activities started in 1940.

In 1950, artificial insemination methods were tested and introduced on about 1 million head of animals. Since 1960, livestock population has been raised in areas, which was recognized as having superior genetic livestock according to measurable criteria.

In accordance with Resolution 18 on “Improvement of Livestock Breeding Program”, passed by the Central Committee of the Mongolian Revolutionary Party and Ministers’ Council of the People’s Republic of Mongolia in 1984, the livestock breeding service was established at national, aimag and soum levels and on breeding farms with a number of highly productive livestock, equal to 30% of the breeding female animals in each soum.

The Livestock Production and Breeding Technology Divisions were established within the structure of the Ministry of Food and Agriculture.

The head of Livestock Breeding Division was the State Chief Livestock Breeding Inspector and specialists of the division, heads of the breeding units and breeding and selection stations became the state livestock breeding inspectors.

In 1984 the office for marketing breeding animals was expanded to form the State Livestock Breeding Collective and was incorporated into the structure of the collective livestock breeding, including the selection stations. Following this restructuring, the Livestock Breeding Division of the Ministry of Food and Agriculture was committed to develop the national livestock breeding policy, supervise implementation of legislation and policies and manage breeding and selection activities in accordance with sound scientific criteria.

At the same time, the central artificial insemination station joined the State Livestock Breeding Collective and the Collective started to providing technical support and training to breeding technicians; 1400 litres of milk from each cow every-year by crossbreeding at least 40% of total cow population in 33 of the butter processing soums; of producing not less than 2000 tons of fine and semi-fine wool by raising fine and semi-fine wool sheep in 26 soums; of producing more than 40 thousand skins by raising karakul breed of sheep in 5 soums and by achieving milking

2700 litres of milk from each cow on 33 dairy farms that supply fresh milk to cities and urban settlements. As a result of these measures, the population of pure bred livestock reached 76.7 thous. head, sheep – 295.8 thous. heads, goats – 404.5 thous., pigs – 48.6 thous., chickens – 184.0 thous., reindeer 3.2 thous. and beehives – 1.5 thousand. Moreover production of main staples /meat, milk and wool/ increased by 15-25% and new raw materials and products such as fine and semi-fine wool, curly skin, pork and chicken meat, eggs and honey were produced in increased quantities.

In 1989-1991 many NGOs such as “Mongol Horse”, “Mongol Camel”, “Mongol Yak”, “Mongol Dog”, “Mongol Goat” and “Mongol Bee” were established to analyze, research data and information collection relating to each species of livestock. Currently, very few of these NGOs remain in operation. The Mongolian Union of Livestock Breeders and specialists and the Mongolian Union of Veterinarians have run intensive operations in developing branches at national, aimag, capital, soum and district levels.

Soum and district level veterinary services were privatized in 1999 and aimag breeding units were amalgamated with the Agricultural Department according to order A/85, 1999 of the Minister for Agriculture and Industry. The state budget for livestock breeding activities has been transferred into the Ministry of Food and Agriculture budget. This restructuring has caused some negative impact on the system for ensuring scientific basis of livestock breeding programs and the provision of technical support and training to livestock breeders almost collapsed. The demand for a livestock breeding program for improving quality and productivity was reduced for social reasons and the livestock genetic resources pool protection and improvement actions became stagnant.

One of the major priority goals of Government for improving livestock health and quality is to protect livestock gene-pool and improve livestock productivity. At the National level, a total of 513 vet and breeding services included 335 privatized entities and 178 newly established ones have been allocated responsibility of implementing the above goal. The results from assessment of these vet and breeding services shows that only vet services were effective.

Because the livestock population has increased quantitatively, not qualitatively, in the last few years, the percentage of pure and hybrid livestock among the total livestock population has decreased to 5.7%. Comparative productivity of livestock to that in 1990, shows that sheep wool yield has decreased by 3.3%, cashmere – by 16.6% and milk by 4.2%. The population of fine and semi-fine wool sheep has declined by 82.4-89.8% and Orhon, Yeruu, Jargalant and Sumber breeds of sheep and Unjuul breed of wool goats has decreased dramatically. This situation could have a negative impact on their gene-pool.

If we estimate the minimum demand of economic entities engaged in wool processing, around 400-500 tons of fine and semi fine wool is required annually. There is a big market for fine and semi fine sheep wool in China and Russia. This fact reinforces claim that the gene-pool of fine and semi fine wool sheep should be protected and improved.

The composition of livestock herd and proportion of breeding female and male animals has been distorted because of increase in the number of female livestock per male unit. The number of young animals reared per 100 females animals was 83 in 1992, but now the figure has decreased to 74 in 1999, 59 in 2000 and 56 in 2001 due to abortion and infertility. The possibility of rearing 2 million head of young animals has been missed.

One of the highest priorities is for the maintenance of a nucleus herd in which very highly productive animals will be selected from among Mongol breed of livestock that display high

tolerance and are well adapted to a harsh climate of Central Asia, that are genetically pure and will be certified under the control of the central and local institutions. On these nucleus stock It will also be required to raise their basic productivity animals by systematically expanding the scope of and protecting their gene pool.

To keep the ecological balance and tradition, measures should be taken for preventing from soil erosion and degradation at the same time as ensuring livestock sector development. It is required to increase the contribution of the livestock sector into strengthening economic independence of the country and ensuring food supply and security by developing intensive livestock production.

Actions need to be taken to strengthen the livestock gene-pool protection program. A proper system and structure is required for implementing livestock breeding policies and actions based on the private sector. As well as activities directed at retraining of personnel, intellectual investment, capacity building, market knowledge of supply and demand is needed to facilitate expanding works and services to improve the livestock gene-pool at soum, district, bag, and khoroo levels.

One of the important parts of livestock gene-pool protection activities is to freeze and conserve semen of highly productive breeds of livestock at the “National Livestock Gene-Pool Center”. This has conserved about 430,0 thousand straws of semen. Every year, under this measure the livestock gene-pool has been enriched with deep frozen semen of certain breeds of livestock. Alongside with this, artificial insemination has been practiced by households, economic entities and institutions using deep frozen semen in accordance with consumer orders.

Between 1980 - 1990 the National Livestock Gene - Pool Center produced 1,005.8 thousand doses of semen from 82 bulls, of which 505.6 thousand doses were used in artificial insemination. As a result of this activity, 127.8 thousand cows calved and 103.4 thousand calves survived. In 1988, it was recorded that 42.0 thousand cows being artificially inseminated. Activities for enriching gene-pool with semen of highly productive breeds of animals and exporting and importing semen need to be expanded further.

Financial and other support is required for breeding units to strengthen livestock gene-pool protection activities at aimag, central and regional levels and to bring the quality and quantity of the nucleus herd to an appropriate level.

The system for providing technical advice and services to households, economic entities and institutions, that are capable of rearing and raise breeding animals at the national and international levels under contract and will be established. State of the art management also needs also to be introduced for improving and protecting the livestock gene-pool by establishing the National Breeding Registration and Information Fund at the national level.

3.2 Human resources development and work methodology

A total of 8,000 personnel, including 2500 specialists with higher education diplomas in livestock science and breeding services, plus 5,500 technicians were prepared for work in this sector, means there is a good potential in terms of human resources.

Livestock breeding activities were expanded with the establishment of 14 breeding farms, 5 stations and by training more than 215 technicians. Following up the joint order 148/43, 1988 of the Minister of Agriculture and Chairman of Supreme Council of Collective Units, government provided vehicles to livestock specialists for their services - an important step for improving livestock breeding services.

As seen from Mongolian national statistical data, 1,1-1,2 thousand livestock specialists were employed in the agriculture sector of which 27,6% have University diplomas and 120 have been working with companies and cooperatives operating agricultural business. The government maintains a policy of running livestock breeding services in close cooperation between related entities and institutions. Solving the issues relating to developing management, operational procedures and training personnel to the international standards will be very important measure for realizing local potential for sustainable development in the livestock sector.

3.3 Infrastructure, facilities and technology

Infrastructure available for managing the livestock gene-pool protection improvement service is limited. Other than the radio communication sets, installed at bag level in 2001, there are no other facilities to keep communication with aimag level units or above. Currently the post service van, provides a weekly service between soum and aimag has been used in the breeding services program. In other words there is a need to develop infrastructure.

The supply of tools and equipment in the breeding services program has decreased sharply in the last ten years. Some tools /weighing scales; ribbon meter, microscope, earring tools and pincers..etc/ for measuring body shape, weight and conformation have been used in nucleus herds and the selection of male breeding animals.

Livestock gene-pool protection activities have been aimed at rearing to raise breeds and nucleus herds in the wild. As of the beginning of 2002 there were around 6.0 thousand head of very productive livestock in 850 nucleus herds containing about 50 breeds and strains of Mongolian livestock, as well as a total of 430 thousand straws of frozen semen from about 50 bulls covering 9 breeds and 20 rams and bucks has been preserved in condition of -96 C.

It will be required to streamline the legal and economic conditions for the sale of young breeding males for semen and embryo production, for the conservation and management of the gene-pool in line with market demand. In order to implement the above, it is becoming important to solve the limited financial sources situation by carrying out foreign and local projects and programs in the field of increasing quality and supply of equipment, creating information and data network and strengthening human capacities.

3.4 Information and communication system

There is an existing system for collecting livestock gene-pool data and information on livestock from households, economic entities and institutions that have nucleus herds of livestock through bag, soum, duureg, aimag, capital and Ministry for use by the Government after presentation in the national publications.

Information is summarized and presented semi-annually and annually. Information is used for determining further policy based on the registration of pure and hybrid livestock of that breed and strain, differentiated by their age and sex and analysis of losses, and performance.

Moreover, because the cattle gene-pool consists of two different species, information on yaks is recorded with greater accuracy, being recorded separately from cattle information by aimag and soum. Information includes composition of herd, reproductivity, proportion of male and female breeding animals etc.

Due to the fact that there is no unified system for recording and circulating information on the number of nucleus herds and very productive livestock, their productivity, yield and quality etc, to foreign and local users, it has been impossible to improve livestock gene-pool using this information. Mongolia has a comprehensive information system on the status of livestock disease, losses and health protection.

The Livestock Breeding Center provides technical training to aimag breeding units and collects and summarizes livestock gene-pool information from aimags. The center places orders for breeding programs through aimag units by estimating the demand and needs, based on the information and organized at soum and district levels.

In order to streamline collection and presentation of nucleus herd and very productive animals' information, it is required to create the condition for promptly providing necessary information to households, economic entities and institutions which have livestock by establishing "Breeding Registration and Information Fund" at the national level.

Broadcasting programs through short wave radio is the best way to deliver information promptly to herders on local conditions. It is very important to develop remote distance training curriculum and broadcast training through special radio programs. Radios need to be supplied to herders to receive this training.

Projects and programs for directly linking livestock breeding units with the Breeding Registration and Information Fund need to be implemented.

3.5 Training and research

A foundation for development of livestock science was set up with the opening of Livestock Breeding Training Center in 1930 and the establishment of the college of Agriculture with Vet Service and Livestock and Plant Science classes in 1933. 9 livestock technicians graduated from this college in 1934. Following up the establishment of new training institution in livestock production sector in 1930, livestock science started to develop quickly.

As far as scientific research development in the livestock sector is concerned, several expedition surveys were conducted in cooperation with Academy of Science of the ex-Soviet Union and some significant works were done to define further development strategies of the sector in the 1930s. Many technical papers were also published as a result of this work. The establishment of Agricultural Cabinet at the Scientific Institute of Mongolia was the first independent research institute in the sector. Specialists with higher education certificates enrolled after the

first graduation of vet services and zoo faculties of the University of Mongolia which was established in 1942. They graduated in 1946.

The University of Agriculture was founded in 1958 charged with the responsibility of conducting research in the livestock sector and facilitating its development to satisfy the market requirements of livestock products. The University of Agriculture has made valuable contribution into training and preparing personnel required in all aspects such as management, technological policy making and extension services development. The establishment of the Agricultural Research Institute in 1961 was a significant measure in having an independent research institute of international standard.

Furthermore, the Agricultural Research Institute expanded its activities in 1963, to two more separate units of Livestock Research and Plant and Crop Research Institutes. As a result of these research activities in the livestock gene-pool protection, this sector started its own independent research activities. Since that time, livestock science has been strengthened having an intellectual framework and material base with a capacity to undertake research, required to solve national livestock production and breeding programs related policy issues. This research sub sector has a complete operational and administrative structure supported by University and college education systems for preparing its personnel. Agricultural education system plays very important role in the country's economic development.

In the past 10 years of market oriented political, economic, and social transition, the previous scientific policies and strategies have been re-designed to move away from the state owned centralized system to private ownership within the sector to gradually meet consumers' demand and needs.

With the move to a market economy system, state support decreased and many highly qualified personnel left the sector. These personnel and specialists have now been employed in other sectors. This fact has influenced the number of qualified personnel of the sector. At the same time, due to the fact that no investment has been made by the State, equipment, tools and supply of medicines have become outdated and are in limited supply.

The stagnation in private sector development and its limited capability to adopt new technology effectively has affected the development of livestock science. Fully privatized livestock and crop production entities and agro – processing industries with mixed ownership suffered financial difficulties and decreased the demand for scientific research, stagnating livestock development .

The livestock research sector has successfully overcome these temporary constraints, focusing on developing production technology appropriate to market conditions and making management and marketing policies by pursuing the principle of updating old technology. In the last years young researches have been interested in conducting research in the fields of modern biotechnology, cell biology and genetic engineering at high level enhancing future perspectives for livestock science development. The number of livestock sector researches and experts, involved in implementation of projects and programs financed by donor countries, Government and international organizations has been increasing daily. There is also progress in creating an unified electronic network of research information exchange, delivery and collection.

Strengthening linkage between training and research activities is very important for improving research efficiency and results. Agricultural research is undertaken by 4 specialized institutions, being managed by the National University of Agriculture , 3 regional research and training branches , 4 research institution and 4 scientific work study centers with NGO status, operating

under the University . This system has employed 350 scientists , researchers and 260 professors and teachers. Field testing and research have been implemented in around 40 projects under several Government programs .

In this period of rapid development of science , technology , and information , human intellectual potential , knowledge and ability have played and will continue to play a very significant role in strengthening linkages between education and research. Dedicating human intellectual potential and knowledge to developing scientific base of State policies and activities for implementing modern concepts of ecologically oriented economic , rural and agricultural sustainable development , globalization , food supply and security and independent national economic policies in agricultural sector , particularly In livestock production sector is the country's short and medium term goal.

Following Resolution 9, 1987 entitled “Measures for Improving Efficiency of Activities of Scientific Research Institutes and Strengthening Linkages between Agricultural Research and Production” passed by the ministers` committee of the Mongolian People`s Revolutionary Party, Agricultural research institutes have conducted research activities to improve livestock management and productivity, creating new breeds and strains, preventing livestock from contagious diseases, strengthening vet services and developing technologies to improve hay yields and fodder production, soil protection and cereal production. The agricultural extension service has also been developed and had a very positive impact on the agricultural sector. The Animal Husbandry Research Institute has livestock pasture and fodder, agricultural economic and mechanization and electricity divisions and is committed to methodologically and theoretically conducting research work, done by regional research institutions and stations.

The Agricultural Scientific Committee was established under the Ministry of Agriculture in 1987. This committee was responsible for planning, coordinating, summarizing, informing, advertising and introducing the results of research work carried out by the research institutes, stations and universities and also to deal with issues of financing, personnel training, supply of facilities to research institutes and cooperation with ex –Socialist countries in the field of livestock production.

Great attention has been paid to preparing agricultural specialists, particularly livestock specialists in the Agricultural Institute that was restructured by the Government as the University of Agriculture in 1991 and as the National University of Agriculture in 1993. The National University of Agriculture has been responsible for all scientific and educational issues in the sector. This measure is considered very important for preparing national personnel in the sector and developing agriculture production in combination with traditional methodology and future requirements of the market economy.

3.6 Status of law and legislation related to livestock and animal gene-pool protection and utilization.

Since 1990 the reform has been made covering all social sectors of Mongolia to move to a market economy and many changes have taken place in structure, management and ownership of all levels of institutions, engaged in livestock gene-pool protection activities and services.

Previously the local livestock breeding institutions, served the big economic entities and they were not able to operate under open market conditions. After the privatization of livestock in 1992, 1300 livestock specialists were released from their positions within 3 years and this fact seriously affected the results of livestock breeding programs in nucleus herds of highly productive breeds and locally selected animals.

Parliament approved the law on “Livestock Gene-pool and Health Protection” in 1993 and implementation of this law has made significant contribution into solving many issues facing livestock sector in transitional period to a market economy.

The law was amended in 2001 considering market conditions and was a significant measure in ensuring development of livestock production.

This law determines the rights of the State and local government organizations which protect livestock gene-pool, inspection organizations, citizens and other economic entities. The law coordinates the relations, concerned of livestock and domestic animals’ gene-pool protection activities such as financing of the law implementation and fining those in contravention of the law.

“The main policy trends to be pursued by the State on rural development” which was approved by the resolution 32 of the Parliament in 1996 has been directed towards the intensification of food and agriculture production by effectively utilizing natural resources, ensuring proper utilization of human, financial and natural resources and to develop intensive, sustainable and effective agricultural production by improving its productivity, quality and competitiveness.

In order to ensure implementation of this policy, goals to improve the quality of whole livestock herd; found livestock gene-pool and registration and information funds, being connected with domestic and international information networks, basing on raising nuclear herd and very productive livestock has been set up.

One of the on-going programs, approved by resolution 105, 1997 in the framework of policy to be pursued by the Government for rural development is the national program on “improving livestock quality and breeding services” and the major objective of this program is to improve productivity yield and quality by creating nuclear herd with appropriate ownership and corresponding livestock breeding service to market requirements.

As mentioned in the above program, the fact that each herding family uses male breeding animals, selecting it from usual herd not from the certified nuclear herd; there is not breeding and selection work related information system; funds and tools of breeding services are in shortage and outdated and herders lack the government’s and NGOs active measures and initiatives is the main constraints facing improvement of livestock quality.

The program has been implemented with two stages from 1997-2000 and from 2001-2005 and as it has been seen from results of the first stage implementation, some measures were taken in order to strengthen livestock gene-pool protection activities, but not all these measures were

implemented at the national level to large extent, particularly works on founding breeding registration and information fund. Training and retraining of herders and livestock specialists were not done satisfactorily.

Under the program, 20 aimags and 268 soums developed sub-programs on improving livestock breeding services and with the objective of strengthening its implementation it has been required to formulate projects and seek possibilities for obtaining financial support and concessional loan from international communities. In the last 10 years young livestock herd improver and young male breeding animals have been used in mating and technical services used in breeding and selection works on scientific basis were distorted. Because a number of young animals, produced by lamb ram and kid bucks increased, animals' body has become small, quality of animals is getting worsened, easily affected by drought, dzud and disease and infertility and abortion problems have taken place often. This situation has negative impact on sustainable development of livestock production.

The professional institutions, scientists and researchers and experienced herders consider that the main requirement for improving breeding quality of livestock is to provide standard breeding male animals, selected from the nucleus herd and to create a proper proportion of breeding male animals in the herd.

Under the second stage of 2001-2005 of implementation of the national program on "improving livestock quality and breeding services", sub program "Elite breeding male animals" have been carried out in line with the goal of the government's action program, which says that livestock production will be intensified and the national agricultural production will be rehabilitated.

30.0 thousand animals of nuclear herds of around 10 breeds and strains owned by the state economic entities were transferred to breeding units, institutes and research institution together with shelters, fences, pasture and hay making fields and fixed and working capitals in accordance with the government resolution 53, 1999. Livestock for the nucleus herd have also been selected, certified and registered in every soum. As of now about 600 thousand animals have been registered as nuclear herd animals throughout the country.

3.7 International Cooperation

As compared to other sectors the international and regional cooperation on improvement and protection of livestock gene-pool has not been very satisfactory.

Under implementation of "Wool" and "Cashmere" programs breeding units of some Aimags and Soums have a good cooperation with USAID projects "Gobi Initiative" and "farmer to Farmer" and with ADB and IFAD under their financed "Poverty Alleviation" and "Cooperative development promotion" projects implementation. Unfortunately there is not any international projects being implemented in the field of livestock gene-pool protection and livestock quality improvement issues. Therefore it has been required to develop external relations and cooperation with international and regional institutions.

In future, in order to bring the livestock gene-pool protection activities to the international level foreign and local projects and programs need to be implemented with the objective of creating the most appropriate system and structure at Soum, District, Bag and Khoroo levels for implementing breeding services on scientific basis in extensive livestock production conditions.

3.1 Species of livestock being raised in Mongolia and Number of livestock population.

Horse

Name of breeds	Number of Breeds									
	Current total herd /th. Head/		At risk /head/		Widely used		Others		Extinct in the last 50 years	
	L	E	L	E	L	E	L	E	L	E
Mongol Breed	2158.9				+					
Tes	13.3				+					
Galshar	4.0						+			
Darkhad	15.6				+					

Cattle

Name of breeds	Number of Breeds									
	Current total herd /th. Head/		At risk /head/		Widely used		Others		Extinct in the last 50 years	
	L	E	L	E	L	E	L	E	L	E
Mongol Breed	1535.5				+					
Yak	494.5				+					
Selenge	8.7						+			
Dornod tal	10.9						+			
Kazakh White head	3.8						+			
Brown svic	1.2		*							
Semental	5.6	2.7					+			
Black and White	5.4	0.6		*						

Sheep

Name of breeds	Number of Breeds									
	Current total herd /th. Head/		At risk /head/		Widely used		Others		Extinct in the last 50 years	
	L	E	L	E	L	E	L	E	L	E
Mongol Breed	111775				+					
Baidrag	30.4						+			
Bayad	27.7						+			
Gobi-Altai	145.3				+					
Uzemchin	76.4				+					
Khotont	10.1						+			
Tamir	230.0				+					
Sartuul	45.1						+			
Darkhad	41.3						+			
Barga	15.8						+			
Sutai	43.6						+			
Kerei	30.0						+			
Torguud	10.3						+			
Altanbulag	9.2						+			
Sumber	3.3						+			
Orkhon	13.4						+			
Yeruu	7.1						+			
Talyn tsagaan	8.5						+			
Jargalant	3.5						+			
Khangai	8.8						+			

Goat

Name of breeds	Number of Breeds									
	Current total herd /th. Head/		At risk /head/		Widely used		Others		Extinct in the last 50 years	
	L	E	L	E	L	E	L	E	L	E
Mongol Breed	9235.5				+					
Bayandelger	24.6				+					
Ulgiin Ulaan	124.0				+					
Erchim	33.3				+					
Buural	41.7				+					
Zalaa jinst	5.8						+			
Gobi Gurvan	59.9				+					
Uuliin Bor	53.6						+			
Yunjuul	12.9						+			

Camel

Name of breeds	Number of Breeds									
	Current total herd /th. Head/		At risk /head/		Widely used		Others		Extinct in the last 50 years	
	L	E	L	E	L	E	L	E	L	E
Mongol Breed	282.4				+					
Khanyn khuren	1.3						+			
Galbyn Ulaan	1.5						+			

Domestic animals and chicken

Name of breeds	Number of Breeds									
	Current total herd /th. Head/		At risk /head/		Widely used		Others		Extinct in the last 50 years	
	L	E	L	E	L	E	L	E	L	E
Pig	14.7				+		+			
Chicken	54.3						+			
Reindeer	0.6		*				+			

L – Local and adapted breeds

E- Highly productivity breeds

Breeds at risk – means that livestock of local and adapted breeds remains only between 1000 head and livestock of highly productivity breeds remains only 20 or total number of the herd of that breed became less than 1200.

PART FOUR: Identifying national priorities for the conservation and utilization of animal genetic resources.

As compared to 1991-1992 when the livestock privatization process was completed, livestock production sector made some steps back and came into crisis in several aspects. One of these mistakes was that there was no rational policy regarding of multiplying, properly utilizing and protecting livestock and animal gene pool and time was wasted by supposing that this issue is regulated and solved by ownership and market relations, instead of correcting policy mistakes.

Livestock breeding system with three phases, which existed before the privatization process completely collapsed and institution and specialists, dealing with livestock gene pool stopped their activities. Due to this gap in the mid stage of restructuring, decisions and measures taken by the Government in respect of legal reform and policy were not delivered and implemented at lower level and livestock producers and owners of gene pool were isolated from the State policy and strategy. It should be underlined that at present issue of protecting and utilizing livestock gene-pool is still not under the professional management and its future is unclear. Concluding all mentioned at the above, it has been stressed that there is a need to prioritize issues of protecting and properly utilizing livestock gene-pool in new principal content at the national level.

4.1.1 Improve institutional development and capacity building.

Livestock breeding units are required to be restructured in terms of capacity, human resources and facilities.

- Restructure whole pack livestock management methods and technology in combination with ecological, climatic and natural changes and evolution and economic development; and at the same time strengthen local professional units.
- Disseminate technological information and organize training for livestock producers, create cooperation between “owner and professional unit” and “owner and owner” and establish model livestock breeding husbandry specialized in technology transfer in economic regions.
- Develop and differentially implement guidance and management of livestock breeding activities, combining with production system.
- Include computer analyzing of animal origin and productivity information into curriculum of Agricultural Universities and Colleges

4.1.2 Filling knowledge and information gaps.

Although market economic system was chosen without step back, It was a serious mistake that making changes in livestock production system with joint ownership was left out of attention. It has already been proved that strategy for individual management and quantitative growth is not absolutely appropriate in the society with consumption and market oriented production system. Lack of information and knowledge is also causing serious problems. Therefore :

- Immediately replace non-rational methodology for “taking more from livestock” with strategy “ give more to livestock and benefit from it”, focusing on utilizing livestock gene-pool in combination with biological proper capability.
- Move to system which considers the issue of livestock gene-pool protection not only in respect of its breed and herd but also in terms of increasing yield and productivity.

- Combine the unwritten law on competing with high quality animals and good products in market system with livestock gene-pool policy and ensure legal guarantee.

4.1.3 Maintaining and respecting traditional knowledge and experience

Events, taken place in the last years have proved that Mongolians' traditional methods and methodology for managing extensive livestock production are ecologically and environmentally friendly. It is getting clear that this concept is acceptable only in condition that number of livestock is limited and natural resources are used properly. Negative impacts of natural and other unexpected changes have ceased activities and interest to run livestock production by traditional methods and brought livestock production into risk in some aspects.

- Select "synthetic technology policy", combined with traditions at proper level, by assessing the fact that issue of protecting biological types of livestock has been contradicted currently with economic interest in many aspects.
- Solve issue of protecting genetics of local Mongol breed of livestock by traditional method and raise improved and pure breed of livestock according to combined and intensive technology.

4.1.4 Raising awareness

Because there was no systematic policies and measures taken regarding of livestock breeding works and protecting nuclear herd of local and foreign adapted breeds of animals in the last 10 years, weak knowledge and information of herders and livestock breeders were almost removed. As well as young herders' poor knowledge and experience require to expand information dissemination and advertisement with regard to livestock gene-pool protection and utilization.

- Create a network of the required information about livestock production and breeding scientific methods, management and production inputs
- Establish system of expanding the best national and local methodologies and experiences
- Introduce participatory methods of assessing information benefits, impact and timing of delivery into policy and decision making and monitoring activities.

4.1.5 Strengthening protection activities for animal genetic resources

Local and adapted breeds of livestock which are non-separable part of the World livestock genetic resources are very valuable herd, suitable for the geographic, climatic, soil and livestock management systems of Mongolia, located in the second high altitude region of the Central Asia. Therefore there is a compulsory need for raising these livestock populations according to definite policy and direction of protecting and increasing their productivity and yields.

- Rehabilitate livestock breeding system with three phases and introduce new 4 phases system as "National-aimag-soum-herder" by promoting participation of herders and citizens with animals
- Define currently existing all breeds, strains, types, and breeding groups in accordance with the International classification through new breeding works system, which will be established further. Develop and implement the national plan for utilizing and protecting them.
- Make breeding units and livestock producers participate in breeding different species of livestock with certain roles.

- Raise livestock by regions, define range of spread and separate breeding regions by the breed of herd quality improver-livestock.

Ex situ conservation

Establish new regional centres and their branches engaged in freezing and conserving semen of elite breeding male animals by equipping with new facilities

Produce embryo of highly productive dairy and meat cattle, sheep and goat according to orders

Establish new labs for transplanting embryo to camels with two humps and yaks.

Establish Mongol animals' gene-pool husbandry basing on research institutes.

In situ conservation

Transfer breeds of livestock to be raised in certain regions under authority of local breeding units and protect them.

Rehabilitate and establish the state owned farms and economic entities, engaged in raising wild camel, yak, Mongol breed of meat cattle, Mongol camel and line horse.

4.1.6 Elaborating national policy, legislation and procedure

The currently used “livestock gene-pool and health protection” law can not fulfill its role of protecting livestock gene-pool and regulating their relations because it was not elaborated on the basis of running sustainable and systematic livestock breeding activities. Rules, procedures and other acts passed following up this law meet only the present needs and so they can not create a favorable environment for considerable progress and changes in livestock breeding activities in the future.

- Intensify implementation of law on “Protecting Livestock Gene-Pool and Health” at local level
- Make amendment and some clarification on the National Programme for “Improving Livestock Quality and Breeding Services” and extend its implementation period.
- Amend procedures for protecting and utilizing livestock in order to making progress and changes in current activities.
- Extend land fee and tax relief support to herders with certificate to rear and sell breeding animals and issue guarantee for loan and banking services from local livestock breeding units.

4.2 National priorities among animal species, breeds, country's regions and rural communities.

System of producing and selling many types of consumption commodities like meat, milk, wool, cashmere and good quality breeding animals from livestock sector has existed currently in not well coordinated environment between “ producer – buyer” and this situation does not have positive impact on protecting gene-pool and improving livestock quality. Movement of livestock breed and species from one to another regions has been done through free trade out of policy framework. There were some successes and mistakes of raising local and adapted breeds of livestock in different regions, separating by their productivity and yields.

- Fix livestock breeding regions, taking into consideration consensus of NGOs of Livestock breeders' and researchers Union and Government institutions
- Establish private economic entities and farms, entitled to breed and sell pure and improved breeds of livestock and elite herd under supervision of local professional units and provide them with technical advice and guidance.
- Move to system under which hybrid and testing works are done by private economic entities and farms
- Increase productivity of the herd by strictly pursuing the procedure on making livestock classification, herd separation and replacement in cooperation with local breeding units.
- Formulate and implement the program for improving productivity of commercial herd of animals by using highly productive male breeding animals, registered as originated from the nucleus herd.
- Promote activities of herders and economic entities, which own certified nucleus herd by customs and taxation policies.

PART FIVE: Formulating recommendations for enhanced international cooperation in the field of farm animal biodiversity.

For climatic, natural and social reasons, the number of commercial livestock population has decreased dramatically and come to brim of extinction. On the other hand, the non existence of new mechanism to substitute for the previous system and poor financial situations have caused more problems to semi-intensive and intensive livestock production which requires fodder and nutritious feed items and special livestock management technology.

Majority of herders, running extensive livestock production have not been able to combat with natural disasters- Dzud and drought.

The last three years' drought and dzud and animals infectious diseases, caused by constant frequency of negative impact of the World climatic changes have shocked all society.

More increase in number of population of the privatized low productive livestock of horse, goat and sheep in the first years of social and economic transitional period to a market system influenced on degrading pasture areas which are quite rich with water resources.

As a result of implementation of many projects, being financed by FAO, UN; World bank; Asian Development Bank; International Fund for Agricultural Development; TACIS; and USAID , big contribution and investment have been made by providing animals to herders, who lost all their animals in natural disaster and foodstuff to disaster affected people.

The Government approved several programs for raising highly productive meat and dairy cattle, developing goat and sheep farms and protecting livestock gene pool, but these programs have not been implemented successfully due to financial problems.

The government of Mongolia could not use possibilities for utilizing foreign assistance and loan projects for implementing the above programs and also there is no good coordination.

5.1. Cooperation and equitable sharing of burden and benefits in conservation, characterization, and evaluation, and in genetic development.

Issue of protecting and improving livestock gene-pool is drawing attention of not only one country's government but also attention of the whole world. As far as Mongolia is concerned gene-pool of meat and dairy cattle, sheep with semi fine wool, pigs and chicken needs to be certified and gene-pool of local camel with two humps needs to be protected. Particularly the population of pure and hybrid of animals, camels and reindeers is getting reduced in the last 3 years' drought and dzud. Concluding the above situation it is required to solve outstanding issues with regard to livestock production increase and quality improvement as follows :

- Although legal environment for protecting livestock genetic resources was created in Mongolia, protection activities have not been undertaken satisfactorily due to financial problems. Therefore there is need for developing cooperation with foreign countries and international organizations in the field of following subjects.

- Create nucleus herds, registered in terms of origin and productivity basing on highly productive breed of livestock produced through selection and breeding measures and import breeding animals, semen and tools and equipment.
- Direct loan and TA projects being implemented by ADB, FAO, WB and TACIS to protecting and recreating livestock gene-pool.
- Establish regional research center for the purpose of making research on genetic factors of Mongol breed of animals, used to be managed on pasture at molecular level and found model animal husbandry economic entity.
- Establish the National Livestock gene pool committee with non-staff members at the Ministry of Food and Agriculture and expand cooperation with foreign countries and international organizations.

5.2 Co-operation in basic research and appropriate biotechnology development and transfer

Basic survey needs to be made on using molecular and genetic marker technology for revealing animals resistant ability to parasitic and other diseases and natural disasters. Moreover it has been required to make surveys and analysis and to widely use selection, genetic and biotechnological findings in improving fertility and yields of fodder plants and increasing productivity of livestock in a short period. Semen and embryo of livestock, resistant to disease, drought, Dzud and those of highly productive and rare animals will be produced and conserved.

It has been required to introduce results of foreign and domestic surveys and scientific works on livestock and fodder production and pasture utilization into practice by creating close linkage between researchers and extension staff.

5.3 Co-operation in development of information systems and communication networks

Breeding livestock origin and productivity information has been put into computer in many countries of the World and has exchanged information of highly productive breeding livestock, their semen and embryo not only locally but also with other countries being connected with computer network.

For example : Several countries of Europe have established the computer network of productivity and origin of sheep with fine and semi-fine wool, cashmere and wool goats. Program for improving productivity of livestock has been implemented covering the whole continent, not only at one country level. In the period of Globalization Mongolia needs to join in this development trend.

There is a need to create information fund of origin and productivity of nuclear herd of Mongol breeds of livestock and to be connected with the Mongolian different institutions at first stage and with the world network furthermore.

Having information fund of productivity of breeding animals, it is becoming possible to rear and exchange good quality breeding female and male animals, certified in respect of productivity and origin at camp, soum, aimag and national levels. Mongolia's livestock, managed on pasture has rich genetic resources of getting raised and improving its productivity and quality. In this period of globalization it is important to properly use these resources for improving genetic capacity of productivity of not only Mongolia's but also of other countries' livestock. In order to do this it is getting short term objective to create information network of origin and productivity of sheep and goats.

Issues related to international inspection and security; exchange and conserve breeding materials and hold exhibitions.

Methods of transplanting, conserving and storing semen and embryo are very significant for raising in short period young animals, born from elite male and female breeding livestock, certified in respect of its origin and productivity.

It is required to pursue a policy for promoting herders and economic entities by tax relief and by involving them into foreign loan and assistance and to exempt breeding animals, semen, embryo, tools, medicines and preparations from import tax.

5.4 International principles and modalities for the safe international movement, storage, access, fair exchange and trade of AnGR material.

- Join the membership of international conventions on conservation of animal genetic resources
- Exchange information and other materials of highly productive animals and breeding activities in accordance with proper procedure
- Organize regional and international exhibition and auction of very productive breeds of animals
- Improve the joint monitoring on conservation and safety of animal genetic resources.

PART SIX: Policy and management on development of animal genetic resources

The commission was established with composition of 13 members by order A/13 passed by the Minister for Food and Agriculture on 23 January 2002. Composition of this commission is represented by the Ministry of Food and Agriculture /MoFA/, Food safety and Agricultural inspection Agency /FSAIA/, University of Agriculture /UA/, Research Institute of Animal Husbandry /RIAH/, State central veterinary and hygienic laboratory /SCVHL/, National livestock gene-pool centre /NLGPC/ and also by NGOs including Mongolian livestock specialists' and breeders' Union /MLSBU/, Mongolian veterinary union /MVU/

Composition of the Commission

Chairman :	N. Batsuuri	State Secretary of MoFA
Secretary :	B. Biniye /Ph.D/	Head of Policy and Planning Division, MoFA
Member :	B. Myakhdadag	Head of Animal Breeding Division, State Veterinary and Animal Breeding Department
	I. Khanimhan	Head of External relations division, MoFA
	T. Baatar	Senior officer of Policy and Planning Division MoFA
	G. Deeshin	Officer of Animal Breeding Division, State Veterinary and Animal Breeding Department`
	Ch. Arildii	Head of division, FSAIA
	B. Erdenebaatar /Dr/	Vice president in charge of scientific research,UA
	D. Buyandalai /Ph.D/	Director of National Livestock Gene-pool center
	R. Sodnomdarjaa/Ph.D/	Director of SCVHL
	B. Minjigdorj /Dr/	head of division of RIAH
	Yo. Zagdsuren /Ph.D/	Project Director of RIAH
	N. Batjargal	Secretary of MLSBU

6.1 Reporting Animal genetic resources

A detailed work plan was discussed and approved at the first meeting of the Commission. Data and other required materials, included into the report were provided by Secretary of the commission. Content of the report was discussed during the process of writing this report. Meetings attended by all members of the commission were held on 11 March and 19 April 2002 and discussed progress and other issues related to writing the report. Data reflected in the report was collected from the National Statistical yearbook, customs information booklet, the Ministry

of Food and Agriculture, Ministry of Finance and Economy, Ministry of Nature and Environment and other related information sources.

Names, address, faxes and E-mail address of members of the commission were sent to Mr Hans Wagner of Asia and the Pacific Division of FAO, UN on 11 March 2002.

Report preparation cost estimate was made and some part of the required cost was provided by the Ministry of Food and Agriculture and financial support requesting letter attached with cost estimate and work plan was sent to Mr Gamal M. Ahmed, representative of FAO UN to China, North Korea and Mongolia on 2 April 2002. The report was written basing on manual, than prepared by FAO, UN. The report preparation progress and works done by the Commission were also discussed with Mr Gamal M. Ahmed during the visit of the Minister for food and Agriculture to China.

The meeting to discuss the draft report on AnGR was held on 23 August 2002. A attended by senior researchers and representatives from NGOs. Comments made by participants of the meeting was considered to finalize the report. The report on AnGR was discussed and approved by the meeting of the Minister's council, held on 12 September 2002.

6.2 Conclusion

Mongolia is one of the three main regions of the World, where livestock production emerged naturally. Animals were fed domestically in the period of the new stone age. In the period of bronze age, or about 5000 thousand years ago, livestock husbandry gradually became the livelihood of Mongolians.

In 1990, 68.2% of livestock population was owned by the state and cooperatives, but in the beginning of transitional period from centrally planned economy to a free market, 97.2% was privatized to individuals. Nowadays about 90% of gross agricultural products is produced by this sector and 20% of gross export products comes from livestock sector.

6.2.1 Animal genetic resources

There are 20 breeds and breed groups of sheep, 2 breeds of cattle, 8 breeds of goat and 1 breed and 3 local strains of horse and camel each in Mongolia. Moreover dual purpose breeds of cattle and highly productive exotic breeds of other types of animals, egg chicken, pigs and limited number of reindeers in the northern part imported from foreign countries were adapted to the Mongolian conditions.

The Mongol breeds of animals are very tolerant and resistant to harsh climate and adaptable to extensive pastoral conditions. As well as they have rich genetic resources for use of improving efficient biological characters and are able to be raised selecting breeding animals among from their herds. However, productivity of these Mongol breeds is not sufficient.

As a result of scientific breeding and selection measures, undertaken according to new social and economic requirements, about 10 new Mongol breeds such as sheep with fine and semi-fine wool and karakul wool, cashmere goat, meat cattle were created. These measures made considerable contribution to enriching animal genetic resources of Mongolia.

Following the World climatic changes and their negative impacts, such as drought and dzud² have occurred in the last 3 years and consequently 10 million heads of livestock were lost. This fact has caused some damages to animal genetic resources.

Because there is no improvement in livestock quality, pure breed and hybrid of animals have accounted for 5.7% of the total livestock population and number of highly productive animals such as cow, sheep with fine and semi-fine wool has decreased by 82.4-89.8%. As well as “Orhon”, “Yeruu”, “Jargalant” and “Sumber” breeds of sheep and “Unjuul” breed of wool goat have lost dramatically. These facts have influenced negatively on animal genetic resources.

Although the Mongolian Government approved several programs with regard to issues related to animal genetic resources protection and health, improvement of fodder and water supply, prevention from drought and dzud and raising highly productive animals, implementation of these programs have been stagnated due to the shortage of financing.

The issue of protecting and improving genetic resources of Mongol breeds of animals, which is one of parts of the World animal genetic resources should be under focus of not only the Government of Mongolia, but also of the region and the World.

6.2.2 State of livestock genetic resource conservation activities

System and structure of livestock gene-pool protection of Mongolia Ministry of Food and Agriculture is responsible for livestock gene-pool protection policy, the Government implementing agency - vet services and breeding department is the central organization for implementing policy and technical activities, at Aimag level - vet services and breeding division of the Agricultural department and at Soum level - the private vet and breeding services work dealing with this activities.

State inspection on protecting livestock gene-pool is made by the Central and local special authorities. The central inspection organization is the vet and breeding services division of the Government Regulatory Agency. Inspection office of the Aimag government and inspectors of Soum government work at Aimag and local levels.

For the purpose of protecting livestock gene-pool the national program on “livestock breeding service and quality improvement” in 1997, “livestock health program” in 1999, the national program on “protecting livestock from natural disaster drought and dzud” in 2001 and “Super breeding male animal” sub program in 2001 approved and have being implemented.

Under measures of protecting livestock gene-pool of nuclear herd, it has been done that livestock of nuclear herd of very highly productive breeds and strains, raised in Mongolia will be under management of respective research and training institutes and Aimag breeding divisions. As a result of this measures biological productivity of these animals have been expected to be improved.

With the objective of protecting livestock gene-pool of nuclear herd and improving their biological productivity, 120 million tugrugs are spent annually.

There are NGOs, named “The Union of livestock breeders and specialists”, “Mongol Horse”, “Mongol camel”, “Mongol yak”, “Mongol goat” and “Bee breeders” in Mongolia.

² dzud- snow cover, which makes it difficult for animals to reach grass under the snow in winter.

The law on “protecting livestock gene-pool and health” was amended and has been implemented since 2001.

This law aims to create legal environment at the national level for coordinating relations, concerned of ensuring sustainable development of livestock production sector, which is the main Mongolian traditional economic sector, particularly protecting livestock gene-pool and improving livestock quality and breeding services, corresponding them to market demands and needs.

As provided in the law system for protecting livestock gene-pool has been defined considering activities of the Central policy making state administrative organizations, policy implementing agencies and inspection institutions. Following this provision of the law, restructuring was made, but this restructuring does not meet satisfactorily the present requirements.

In accordance with orderA/85, 1999 of the Minister for Agriculture and Industry Aimag vet and breeding services joined in structure of Aimag agricultural department and Soum unit was obliged to be responsible for both vet and breeding services. But in practice Soum units have run vet services leaving the responsibility for livestock breeding and selection activities out of their attention.

One of the main objectives of measure on “improving vet services and quality of livestock” which is the most prioritized issue in food and agriculture sector of Mongolia is to protect livestock gene-pool and improve livestock quality. The newly established and privatized vet and breeding services have been engaged in the above business, but they run only vet services, leaving out breeding.

Breeding services have been run not so well and so these services have not had good impact on increasing productivity yield and quality. It has been required to learn management of breeding services in private sector based market economy system. There are no initiatives to seek any possibilities to improve the situation.

The important part of livestock gene-pool protection services is to deeply freeze, conserve and effectively utilize semen and embryos highly productive and breeds and strains of animals. At present approximately 430,0 thousand doses of semen have been frozen and kept in the national center of livestock gene-pool. In accordance with request and order of consumers, every year certain number of animals have been artificially inseminated. This insemination methods have been thought to herders.

6.3 Demand and needs and prioritized activities

As far as Mongolia is concerned, it has been prioritized to revive and certify gene-pool of beer and dual purpose breed of cattles and sheep with fine and semi-fine wool, pig and chicken and to protect gene-pool of local breed of animals and camel with two humps. Due to drought and Dzud, occurred consequently in the last 2-3 years, numbers of highly productive breeds of animals, their hybrid, reindeers and camels have decreased.

For example: Since 1990 number of population of pure breed of cattle “Black and White”, “Semental” and “Brown wrs” and beef breeds “Limousine”, “Selenge” and “Kazakh white head” and sheep with fine and semi-fine wool have decreased 82,4-89,8%. As well as Orhon, Hangai, Yuruu, Jargalant and Sumber breeds of sheep and “Unjuul” wool breed of goat have

been dramatically decreased and their gene-pool comes to edge of extinction. As compared to 1990, productivity per animal in 2002 decreased as follows: Sheep wool – by 3,3%; cashmere – by 16,6 and milk – by 4,2%.

Therefore there is a need to improve genetics of Mongolian livestock.

- Streamline livestock gene-pool management, making it suitable for market economy conditions.
- Provide technical guidance and instruction to citizens, economic entities and institutions, which own nucleus herd, able genetically to produce high quality breeding animals at the national and region levels and create service and marketing system in accordance with order and contract.
- Rehabilitate animal breeding system and transfer it into 4 level system “national-aimag-soum-herder” by using participatory approach among herders and citizens with animals.
- Update livestock management and technology taking into account the natural resources changes and ecological, climatic and economic requirements and strengthen local institutions.
- Conduct training for those who run livestock production; disseminate technological information; create cooperation between “owner and breeding institution” and “owner and owner” and establish model economic entities, specialized in technology transfer in economic regions.
- Develop animal breeding guidance and technology in line with production system
- Include computer analyzing of animal ancestor and performance information into curriculum of Agricultural Universities and Colleges
- Develop and implement the national plan on establishing animal ancestors and performance information database and network by create nucleus herd composed of selected animals of currently existing breed, strain and group.
- Expand activities for enriching gene-pool fund with semen and embryo of highly productive breeds and strains of animals through the import and export of semen.
- Implement measures for protecting gene-pool of livestock which is becoming scarce or extinct by deep freezing semen of that breed.
- Create systems for providing technical advice, recommendations and services to households, economic entities and institutions that have nucleus herds with high quality genes to be used in rearing and breeding animals at the national and regional levels by creating a livestock productivity and breeding registration and information database.
- Strengthen measures taken for protecting livestock from natural disaster and diseases, treating them and improving productivity and genetics.
- Improve capability of animals to overcome extensive livestock production risk; increase dairy, meat and egg production by developing semi-intensive and intensive livestock, poultry production.
- Increase fodder production, that is required for protecting livestock from disasters, regenerate pasture yield and improve its utilization; use waste of factories and crop production in feeding animals and create an emergency fodder fund for entities, running livestock production.
- Involve timely and completely the animal herd in veterinary services.

PART SEVEN: Conclusions and recommendations

Protection and improvement issues of genetic resources of various Mongol breeds which composes one part of the World animal genetic resources should be under focus of not only Mongolia's government but also of the World and regional communities.

It is very important to develop cooperation with foreign countries and international communities in the field of protecting, conserving and improving livestock genetic resources. Therefore we recommend followings :

- Direct activities of loan and TA projects being implemented by FAO, UN, WB, ADB and TACIS in livestock production sector at renovating and conserving livestock genetic resources.
- Establish livestock breeds registration system and information database of ancestor and performance of nucleus herds of Mongol breeds and study experience of highly developed countries and invite experts to work in Mongolia in order to be connected with the international and regional information network.
- Establish regional center to conserve and investigate genetics of Mongol breeds of livestock at molecular level in Mongolia. Under this center the model economic entity for raising nucleus herds will also be established.
- Establish the non staff national commission for livestock genetic resources under the Ministry of Food and Agriculture and expand cooperation with international communities.

Number of certified breeds

/Number of breeds/

Livestock Species	At whole herd level				Productivity evaluation	Genetic evaluation
	General study	Gene-inheritance distance	Breeds and hybrids evaluation	Evaluation		
Cattle	Cattle are raised in all geographic regions of Mongolia. 35,6% of the total cattle population comprises yaks. Mongol cattle are adapted to pasture during the whole period of the year, meat yields are good, milk yield is not so good, but very strong and fatty, color is red, brown and black	Majority of cattle are Mongol cattle. There are genetically different strains and also around 10 pure meat, dairy and mixed breeds.	Tolerance and resistance characteristics of Mongol cattle over other breeds' include greater productivity and quality. have been observed on their hybrids and mixed breeds	Taste of meat of Mongol cattle is very delicious, cost is cheap and Mongol cattle's meat is in high demand at the market.	Average alive weight of cow is 280-300 kgs, milking time is from 7-8 months, milk yield is 300-400 litres milk fat content is 4,28%, alive weight of adult castrated cattle is 374kgs, carcass weight is 176,4 kgs and slaughtering output is 52,9%	Mongol cattle is able to inherit its biological productive characters to calves.
Yak	Yak is more adapted to cold weather of high mountainous areas and more able to eat pasture grass of mountain than Mongol cattle and hainag. Yak has very thick tail and a body hair is of high quality. It also has a good meat yield. Whilst milk yield is poor but with high fat content. Meat muscle line is thick and milk fat globulose is double that of Mongol cattle. They are predominantly black, brown, blue, black and white with white colors dominant.	In terms of genetics there is almost no difference between yak breeds. Yak bulls have an effective mating life of 3-4 years in the one herd. This methodology protects from inbreeding.	Hainag which is the hybrid between yak and Mongol cattle has good body conformation, strong, very powerful and is more productive than yaks. and Mongol cattle. They weigh more than by 25-30% heavier and their milk yield is greater by 30-40%.	Yak meat has been evaluated highly at the World market and its body hair is in high demand in the textile industry.	Calf, born from Mongol cow is called "naran hainag" and those from yak cow is called "saran hainag". 800-1000 litres of milk is produced annually from each yak cow with fat content of 5.5%, the live weight of an adult castrated yak is 470 kgs and hasd slaughtering of 52,3 % yield.	It is impossible to raise pure hainag breed /male hainag is infertile / Ortoom, born from Hainag, and Baliyam, those born from Ortoom have a lower productivity. Therefore Ortoom breeds are slaughtered for meat production. Naran and Saran Hainags' cows are mated with Mongol and yak bulls in turn to increase productivity.

Sheep	45% of the total population of livestock of Mongolia is made up. There are around 20 breeds, strains and breeding groups of sheep with fine, semi-fine and coarse wool and curly skin varieties.	By molecular analysis level that there are some genetic differences between breeds of sheep.	Heterozygotes are observed in some sheep breeds and strains of sheep.	With the open market system conditions, the number of sheep with fine and semi fine wool and lambs with curly skin has been decreasing and their gene-pool is becoming mixed.	The weight of an adult ram is 63,5kgs, whilst the ewe is 48,3 kgs. Wool yields of rams is 1,75kgs, whilst ewe's is 1,49kgs, "Altanbulag" sheep have the highest meat yield and live weight of a ram is 82 kgs, whilst ewe's weight is 62 kgs. The meat yield is 49,6-54,7%. Khangai breed of sheep is one of the best wool producing sheep. Adult rams 7,0kgs and ewes produce 3,4 kgs of wool.	Any breeds and strains of sheep, which was formally certified are able to transfer their valuable biological characters to their lambs.
Goats	Goats' herd occupies 36,8% of the total population of livestock of Mongolia and there are about 10 breeds and strains of goats, but local breed of goat is dominant.	It was proved that goats of all breeds and strains are different from each other not only in phenotypic characters but also in genotypes.	Cashmere goats have the potential to improve their yield of productivity and quality.	Because of high cashmere demand, the goat population has been increasing, but number of Mountain brown colored "Gurvan Saikhan" cashmere goats with thick microns and Unjuul goats with high wool yields have been decreasing and their gene-pool is at risk.	live weight of a buck of Mongol breed is 50,5 kgs in fall. Nanny goat's live weight is 39,9 kgs. Cashmere yield of an adult buck goat is 280gms, whilst nanny goats' cashmere yield is 246gms. The average buck cashmere micron is 16, nanny goat's – 14 microns, The length of cashmere is 4,5 cm, cashmere yield is 45% and has white and grey fibres. In terms of fibre yield, Uulyn bor goats have the highest yield - adult buck's cashmere yield is 740 gms, nanny goat's – 530gms fine cashmere has (17-20 micron,) and its color is brown and grey. Erchim goats have the biggest body of all locally selected elite strains with autumn live weight of bucks being 58,0 kgs and nanny's – 45,4 kgs.	Goats are more easily raised and it is very important to attain the appropriate proportion between cashmere yield, fibre characters and live weight of goats in order to do selection.

Camel	The Camel herd is in numbers decreasing. Mongolia had 879,8 thousand head of camels in 1955, but by 1995 it was 367,5 thousand, 322,9 thousand in 2000, and 285,2 thousand in 2002. Currently the camel population accounts for 1,1% of the total livestock population. Camel with two humps are a very rare breed of camel in the World, but are well adapted to gobi and desert conditions. Camels are the main livelihood of people, living in Gobi region.	The Mongol breed of camels have been selected from different herds and there are now 3 strains of camels which are slightly different in their biological characteristics.	Camels have been selected for different characteristics - wool, meat, milk and racing. The wild male camel is used for breeding and often display heterozgotic characteristics	The demand for and price of camel wool is increasing and camel's milk is very good for human health. Camel racing has attracted many people in many countries. It will be important to protect the gene-pool of camels.	The live weight of adult male breeding camels is 602 kgs, whilst female camel's is 560 kgs. The wool yield of male breeding camels is 8,1 kgs, whilst female camel's yield is 5,3 kgs. The male breeding brown camel of "Tukhum Tungalag" produces 11,4kgs and female camel's wool yield is 5,9-7,6 kgs . The weight of a male breeding camel of Galbyn Gobi variety is 620kgs and female is 563kgs. Camel used for transportation can achieve speeds of 8-9kms per hour and racing camel speeds can be 10 kms in 25 minutes. Castrate camels are able to transport 200 kgs load and travel at 4-5kms per hour. The milking period of a female camel is 12-18 months. The milk yield is very poor but very strong flavor with a high fat content.	There are certain breeding features that enable Camels to mate only in winter. Female camels have a gestation period of 405 days
Horse	The horse population accounts for 8,4% of the total livestock population of Mongolia and is traditionally used for riding and caring for livestock, hunting and draughting. Horses are also raised for racing purposes as Mongolians used to hold racing competitions during Naadam festival and other occasions. Mongolians drink airag which is the fermented mare's milk.	Mongol Horses have been selected from local pure breeds for racing, transportation, meat and milk purposes. Horses of Galshar, Darhad, Tes and Myangad strains are used as the main genetic source for improving breeding animals.	Mongol horses have a strong ability to transfer its all characters to its foals.	There is a tendency of increasing local and international horse meat market. Ferment mare's milk "airag" and dried milk are in high demand in market	Mongol horses have comparatively a small body, and very strong in draughting and transportation. Mongol horse are tireless. live weight of Stallion is 360kgs, mare's weight is 280kgs. Milk yield is 550-600liters and speeding power of adult horse is 28-29 kms in 35-40 minutes. Stallion speeds 22kms in 32-35 minutes.	Horses' breeding ability is high. Not so risky in inbreeding problem. There is often a case of abortion if pasture is not suitable.

FIG.1 *Localities of sheep breeds and strains*

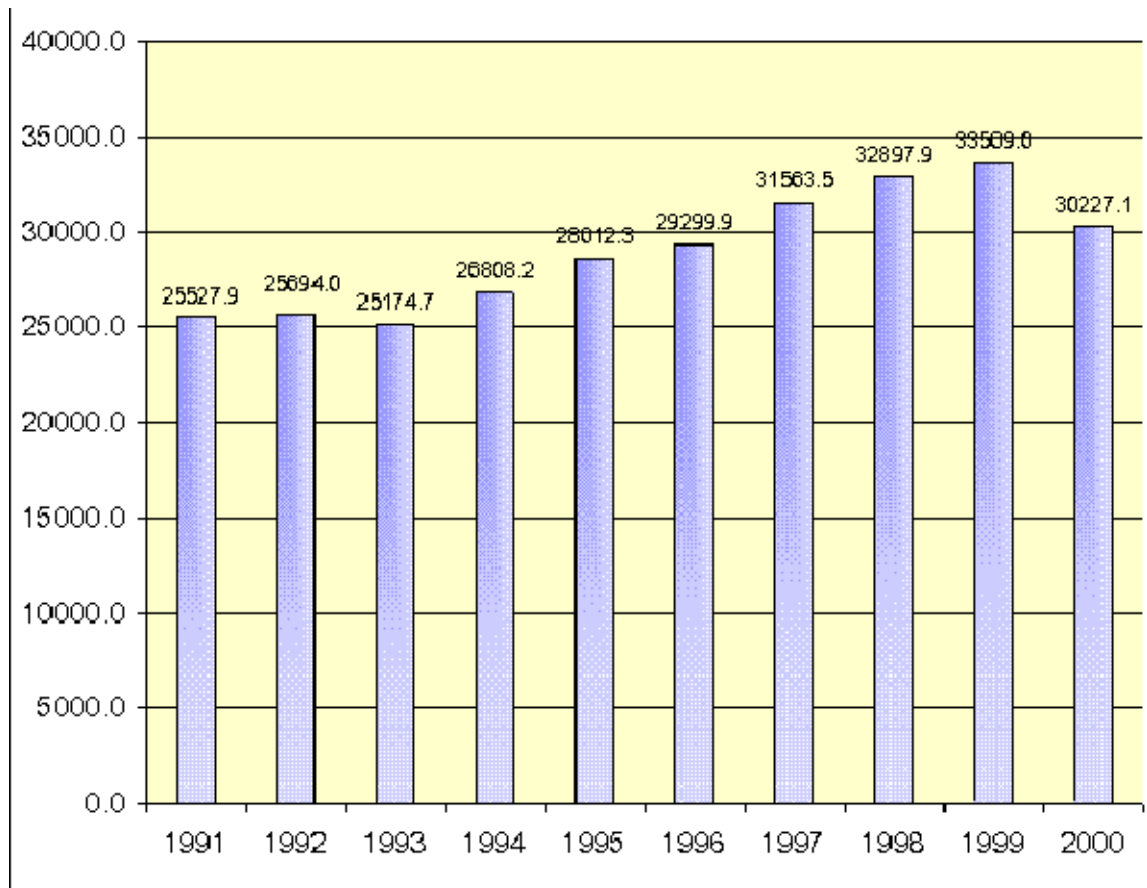


FIG. 2 *Localities of goat breeds and strains*



Livestock population of Mongolia

/thousand head/



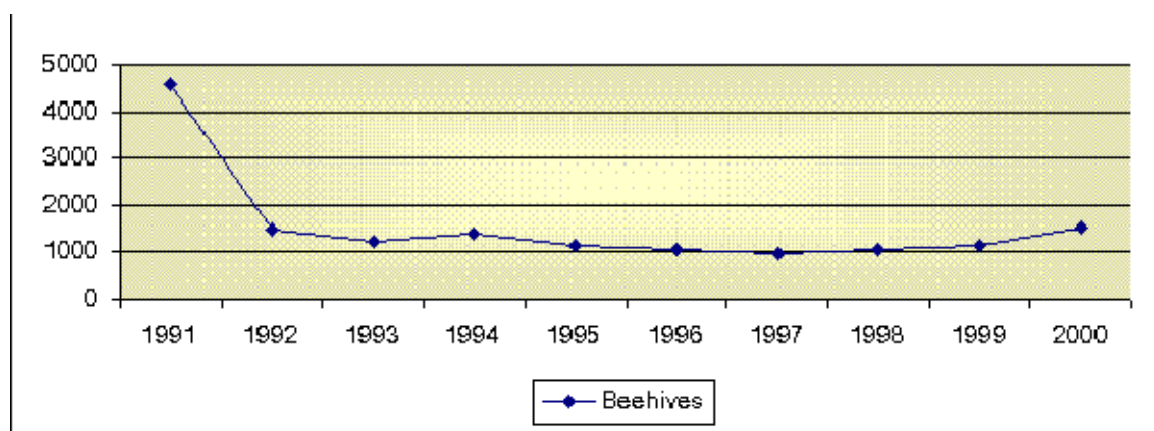
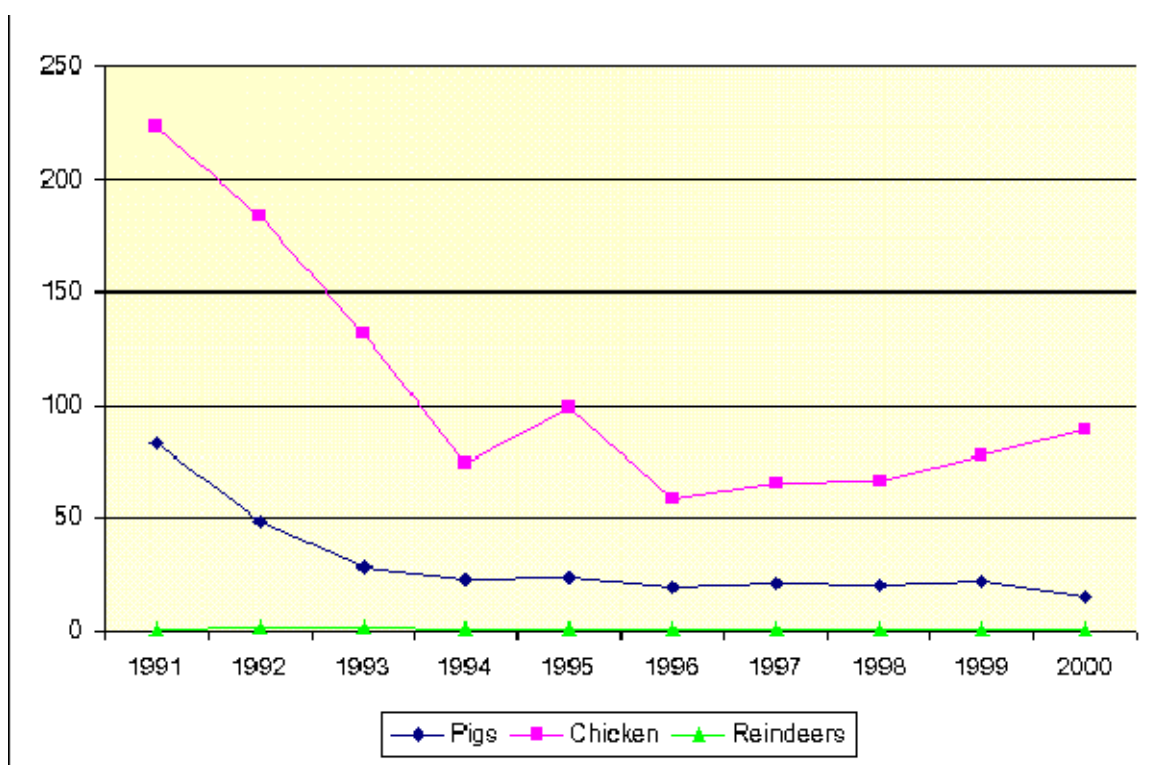
Livestock population of Mongolia /by species/
/thousand head/



Number of Domestic animals

	/thousand head/									
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>Pigs</i>	83.3	48.5	28.6	23.4	23.5	19.1	20.8	19.9	21.9	14.7
<i>Chicken</i>	223.3	183.9	131.6	74.1	99.3	58	65.1	66.6	78.1	89.1
<i>Reindeers</i>	1.3	1.4	1.4	1.2	0.9	0.68	0.6	0.64	0.66	0.68

	/head/									
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>Beehives</i>	4567	1473	1237	1386	1165	1075	977	1057	1154	1530



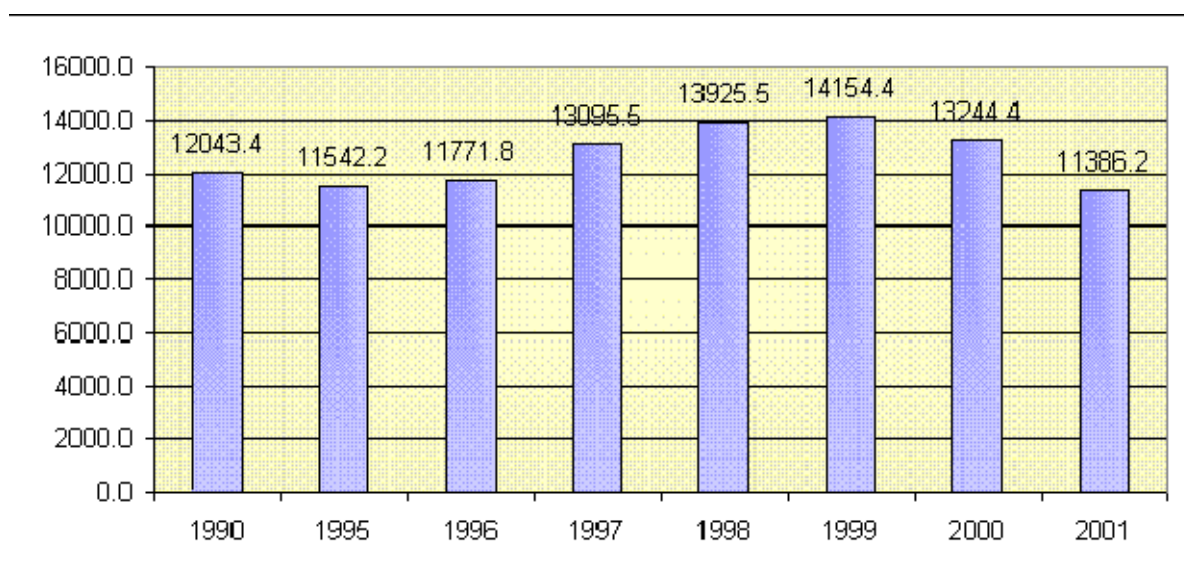
Number of female breeding animals

/thousand head/

	1990	1995	1996	1997	1998	1999	2000	2001
Total	12043.4	11542.2	11771.8	13095.5	13925.5	14154.4	13244.4	11386.2
<i>Female breeding camels</i>	140.9	101.3	98.7	97.7	97.9	101.4	94.8	85.3
<i>Mares</i>	563.5	707.1	737.0	783.2	836.6	921.5	823.1	692.1
<i>Cows</i>	1127.2	1177.8	1215.4	1370.8	1432.8	1449.8	1214.3	850.8
<i>Nanny goats</i>	2425.7	5948.3	5844.1	6370.6	6667.9	6846.5	6417.9	5438.5
<i>Ewes</i>	7786.1	3607.7	3876.6	4473.2	4890.3	4835.2	4694.3	4319.5

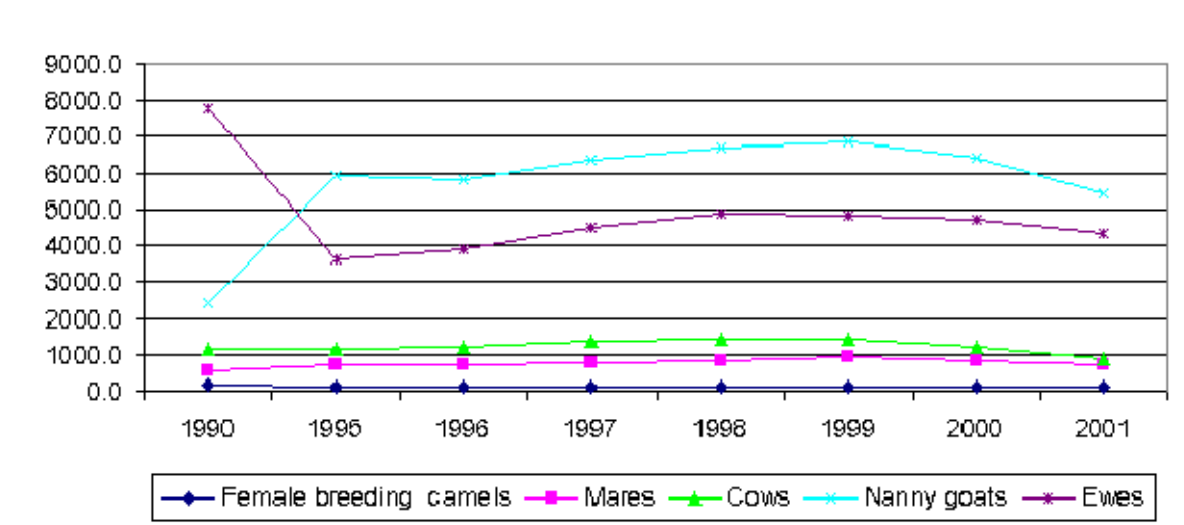
Total number of female breeding animals

/thousand head/



Number of female breeding animals /by species/

/thousand head/

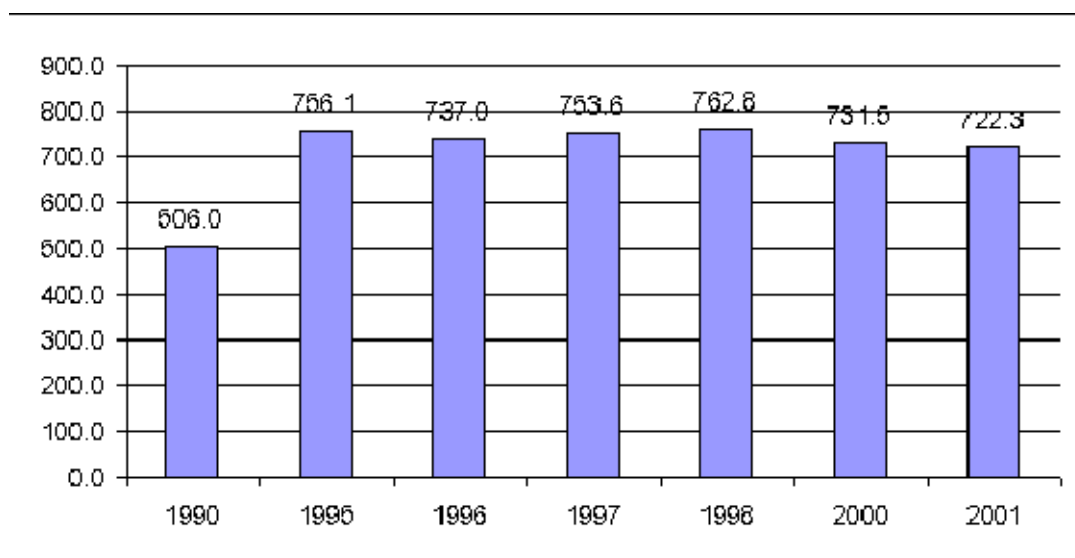


Number of high productivity livestock

	1990	1995	1996	1997	1998	2000	2001
<i>Total animals of pure breeds</i>	506.0	756.1	737.0	753.6	762.8	731.5	722.3
<i>Cattle</i>	80.5	51.4	53.5	50.2	39.8	29.1	27.4
<i>Sheep</i>	333.6	626.8	608.1	612.0	638.8	588.5	572.2
<i>Goat</i>	91.9	77.9	75.4	91.4	84.2	113.9	122.7

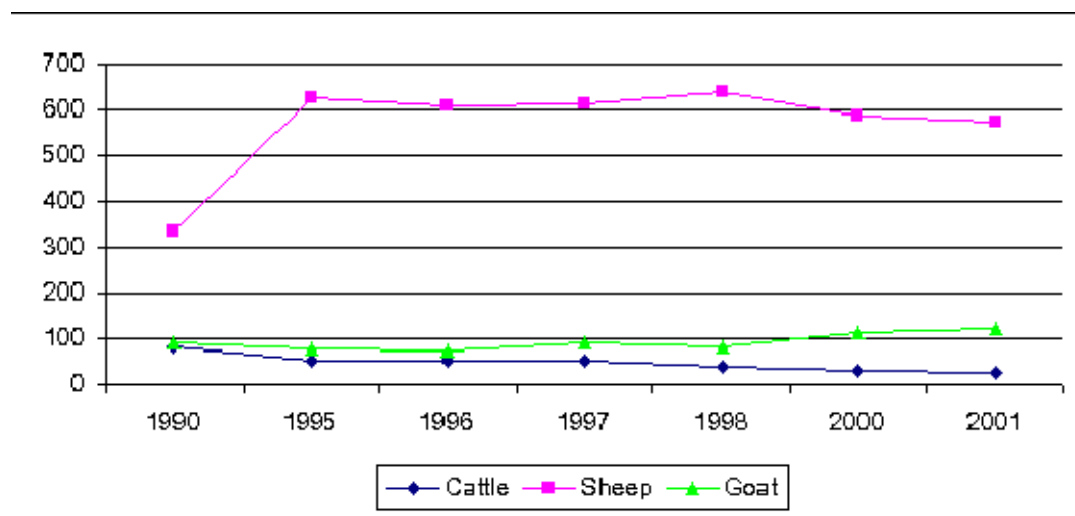
Total number of high productivity livestock

/thousand head/



Number of high productivity livestock /by species/

/thousand head/



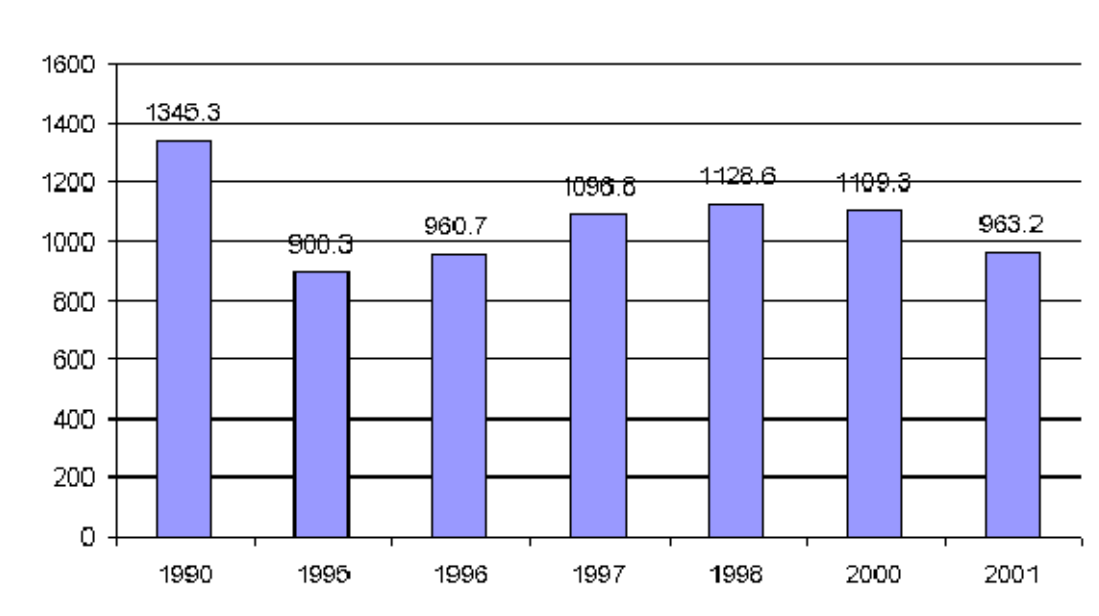
Number of hybrid livestock

/thousand head/

	1990	1995	1996	1997	1998	2000	2001
<i>Hybrid</i>	1345.3	900.3	960.7	1096.8	1128.6	1109.3	963.2
<i>Cattle</i>	171.9	112.8	115.9	125.7	119.2	106.1	94.4
<i>Sheep</i>	837.4	600.5	654.7	751.2	795	760.1	594.2
<i>Goat</i>	336	187	190.1	219.9	214.4	243.1	274.6

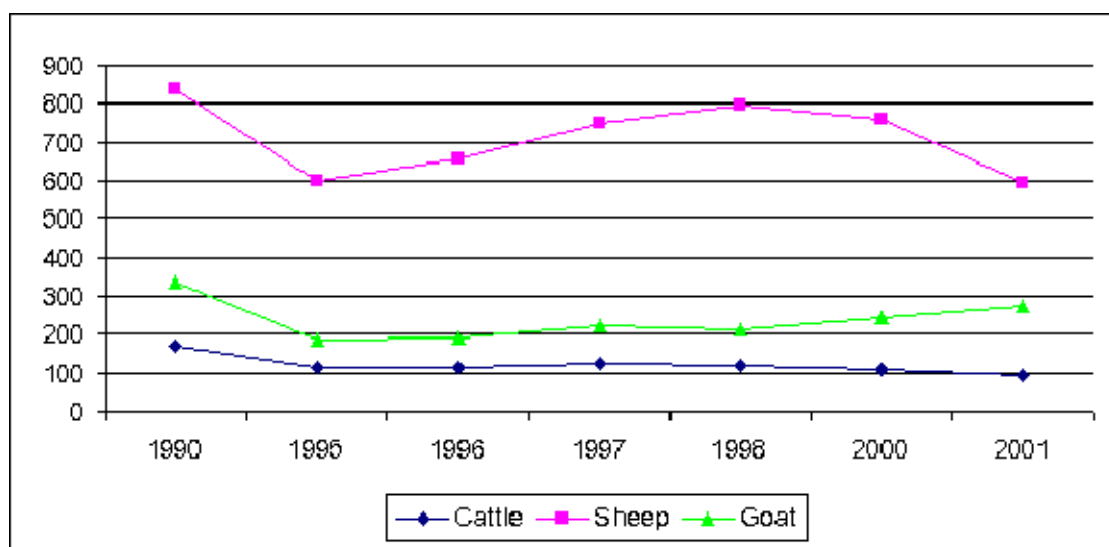
Total number of hybrid livestock

/thousand head/



Number of hybrid livestock /by species/

/thousand head/



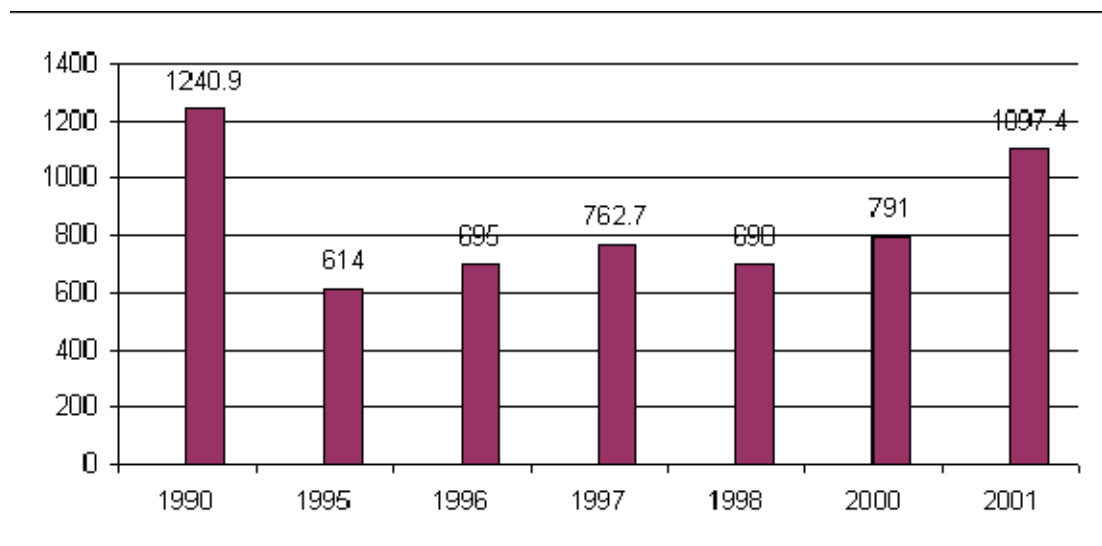
Number of livestock of local Elite breed

/thousand head/

	1990	1995	1996	1997	1998	2000	2001
Livestock of local Elite breed	1240.9	614	695	762.7	698	791	1097.4
<i>Cattle</i>	23.4	3.1	3.3	3.9	5.9	4.4	0.6
<i>Sheep</i>	1198	536.7	555	568	467.4	468.4	523.5
<i>Goat</i>	14.5	65.2	124.9	180.2	206.5	282	544.1
<i>Camel</i>	5	2	4.3	2.9	1.4	3.3	5
<i>Horse</i>	-	7	7.5	7.7	16.8	32.9	24.2

Total number of livestock of local Elite breed

/thousand head/



Number of livestock of local Elite breed /by species/

/thousand head/

