



## FEASIBILITY STUDY FOR THE IMPLEMENTATION OF COMMUNITY-BASED BREEDING PROGRAM FOR CASHMERE GOATS IN ERDENEUREN SUM (VILLAGE), KHOVD PROVINCE, WESTERN MONGOLIA

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### ABSTRACT

*Aim of this survey was to reveal the feasibility to develop the Community (Village level) based breeding program in Khovd province. Erdeneuren sum was selected due to the most affected area with the degradation of pasture in this province (Report of Green Gold Project .2015), where 34 goat herders were interviewed from 4 bags. According to the educational level of herders, the larger proportion of the respondents had lower secondary (56%) and higher level. The remaining 11.7% of them were finished the primary school. This result revealed that the herders were very knowledgeable, so that potential opportunity seen for the recording of goats by them. Total of 150; 50 bucks, 3 castrated males and 97 female goats were used for the baseline survey of quantitative and qualitative traits. In the studied flocks, the large proportions of goats were red (59%) and black (67%) , but white , grey and combination with other colours were few or 4,4.7,7.3% respectively, all observed goats had short coarse hairs and with short spiry horns. Sex and age strongly influenced ( $P<0.001$ ) body weight, other linear body measurements and cashmere fineness. Chest girth has high correlation to cashmere yield and cashmere fineness. There was a strict seasonal mating with control and avoidance of inbreeding by keeping bucks in the same flock for 2 years and practiced the buying bucks from east and north regions. Therefore, the genetic structure of goats should be clarified at first, then appropriate breeding program need to be designed in this sum.*

**KEY WORDS:** Gashmere, goat, herder, breeding, management, marketing, phenotype

### INTRODUCTION

Khovd is one of the 5 aimags (provinces), located in the west of the country. The center of this province named as a Khovd and it is approximately 1425 km away from Ulan Bator city. Territory is 76.1 thous. m<sup>2</sup> with very variable terrain and high mountains of Mongol Altai, hollow of Big lakes. According to the national statistics, 15232 herders kept 1685.8 thousand of goats for cashmere and cash income. The livestock sector of Khovd contributed 135.3 billion togrog to the national GDP in 2016. There is a well known goat breed for cashmere which is called Altai Ulaan, the rest of goats are local and crossbreeds of Don breed, since there has been attempts the upgrading on the local goats to increase cashmere yield with Don breed by the Soviet State before 1990. However the local goats produce more coarse cashmere, Altai ulaan breed has special features such as bright long fine cashmere, tolerance of feed limitation and disease in dry area. The herders do live only on the increments of number goats and sheep to overcome their livelihood in this isolated area, where

the raw materials of livestock sector are sold with very low price mainly into China and much pasture degradations arisen. Due to lack of clearly defined policy or strategies in animal breeding and registration system the herders are often faced in the difficulties on the breeding practices of small ruminants. To use the special features of indigenous breed, there is need of planning and implementing viable goat breeding program that is appropriate in low input production system. There are 2 kind of approaches adapted in some developing countries. One is *community based breeding program* which is a new tool of genetic improvement program, proposed for the low input traditional smallholder farming system (Solkner et al., 1988, Wurzinger et al., 2011). Another approach is *nucleus breeding programs* are most used for small ruminants genetic improvement in tropical countries (Wollny, 2003; Tibbo et al., 2006; Muller, 2006). Therefore our aim was to reveal the feasibility to run CBBP in this sum (village).

## MATERIALS AND METHODS

The country of Mongolia is divided into 21 provinces (Mongolian: *aimag*) and the capital (*niislel*) Ulaanbaatar. Secondary subdivisions of province are called "sum" (often transcribed as *sum*). In 2016, Mongolia had 339 sums. Sums are further subdivided into 1765 bags (Mongolian Statistical Yearbook, 2016). An inception meeting held with the stakeholders such as in charge of Department of Agriculture, specialists of animal breeding and governor of sum. One sum with 4 bags of this province selected, where 34 herders were interviewed using the focus group, individual discussions for the

breeding management and marketing of cashmere product. 53 bucks, 3 castrated male and 97 female goats were recorded for the linear measurements (body weight, body length and height at withers) by using the standard format adapted from the FAO (1986). Body weight (kg) was determined by scale. The raw cashmere yield per goat was scaled and the length of cashmere was measured with the ruler after spreading out it. The cashmere fineness was analyzed with an OFDA 100 instrument. Data analysis was done by *lsmeans* and *corr.test* packages in R program.

## RESULTS

### *General characteristic of household*

In the beginning of 2017, 15232 herders totally accounted from which 5629 herders at the age of 16-

34, 8433 herders at the age of 35-59, 1470 herders at the age of above 60. 7117 or 46.7% of herders are women.

Table 1.

Percentage of Education level in the studied households

Sum, province	illiterate	1-4 years primary	5-7 years lower-secondary	8-10 years upper-secondary	11-13 years Tertiary/Further education (offers non-degree training courses)	14-year higher education (offers degree at universities)
Erdeneburen sum Khovd		11.7	56			32.3

In Erdeneburen sum ,11.7% of herds were finished the primary school, 56% and 32.3% had the lower secondary and high education. From this , high

percentage of educated people were in livestock sector, it can be more contributions to do recording for the breeding program.

### **Herd management and marketing of cashmere products**

Strict seasonal mating was predominantly controlled but there was no recording of pedigree information. Breeding season begins from late November (around 25 November) and lasts until early December. Bucks were put in the main herd for breeding for around 45 days. Around 150 to 300 bucks are kept as a buck flock (herding) in two bags of one sum. The kidding begins in early May and lasts until last of May. The castration was carried out when kids are at age of 70 and 90 days. Castration was performed as early as possible to prevent further potential pain in the kids. When it is late, kid itself or summer heat causes the further pain and contaminations on the wound of castration. A buck is not used in its born flock. The

most bucks were exchanged with other bucks from different sums and provinces for the breeding purpose to prevent inbreeding in the flock. The same buck used for 1-2 years in a flock. The kidding interval is 5 months, age at first mating is 1.5 years old, the longevity of female goat is for 6 years. The bucks were used for breeding activity up to 5 years of age. The herders often exchange the kid bucks with one another rather than buying and selling. In average, the male goat gives 350–700g and the yield of cashmere is 230 – 500 g for female, price of cashmere was set at 60'000 tugrugs in this year. It was the higher price offered than previous years, but it might be slightly declined by the over time. All of raw cashmere was exported into China, so that domestic

factories do not buy the coarse cashmere from this province.

**Phenotypic characterization of cashmere in goats**

The coat colors of goats observed for female and males of this indigenous population are presented in

table 2. The study revealed that the large proportions were red (39.3%) and black (44.6%) , but white , grey and combination with other colours were few or 4,4.7,7.3 % respectively, all observed goats had short smooth hairs and with short spiry horns.

Table 2.

**Qualitative characteristic for the surveyed flocks**

Characteristic		Males		Female		Total	
		N	%	N	%	N	%
Colours	Red	20	37.7	39	40.2	59	39.3
	Black	23	43.4	44	45.3	67	44.7
	white	4	7.5	2	2.1	6	4.
	grey	5	9.5	2	2.1	7	4.7
	others	1	1.9	10	10.3	11	7.3
Total		53	100	97	100	150	100

The least squares means and standard error of body weight, body length, height at withers and cashmere yield, length , fineness for female goats and bucks were 21.5±0.53kg, 55.9±0.5cm, 53.9±0.4cm ,

62.60±0.22cm , 370±11.4 kg, 40.4±0.63 cm, 16±0.06 cm and 31.8±0.7, 64.3±0.8, 59±0.65, 466±53.7kg, 42.3±0.9cm, 16.5±0.09 cm respectively (Table 3).

Table 3.

**Quantitative characteristics of cashmere in goats**

Sex and age group	N	LSM (±SE)					
		Body weight (kg)	Body length (cm)	Height at withers (cm)	Raw cashmere yield (g)	Cashmere length (mm)	Cashmere fineness (micrometre)
Sex group	2	***	***	***	***		***
Does	97	21.5±0.53 <sup>a</sup>	55.9±0.5 <sup>a</sup>	53.9±0.4 <sup>a</sup>	370±11.4	40.4±0.63 <sup>a</sup>	16±0.06 <sup>a</sup>
Bucks	53	31.8±0.7 <sup>b</sup>	64.3±0.8 <sup>b</sup>	59±0.65 <sup>b</sup>	466±53.7	42.3±0.9 <sup>a</sup>	16.5±0.09 <sup>b</sup>
Age group	2	***	***	***	*	**	***
1 to 2	54	22.8±1 <sup>a</sup>	55.8±1.1 <sup>a</sup>	53.9±0.8 <sup>a</sup>	416±22 <sup>a</sup>	40.3±1.18 <sup>a</sup>	15.8±0.12 <sup>a</sup>
3 to 5	90	31.2±1 <sup>b</sup>	62.8±1.1 <sup>b</sup>	60.4±0.9 <sup>b</sup>	483±23 <sup>b</sup>	44±1.04 <sup>b</sup>	16.9±0.3 <sup>b</sup>
Bag groups	4	***	**	***	**	*	*
Bayangol	12	25.3±1.7 <sup>a</sup>	59.4±1.8 <sup>a</sup>	55.2±1.4 <sup>a</sup>	439±36 <sup>a</sup>	41±2.0 <sup>a</sup>	16.5±0.21 <sup>a</sup>
Khongio	38	26.6±1.15 <sup>a</sup>	60.2±1.2 <sup>a</sup>	56.2±0.9 <sup>a</sup>	440±25 <sup>a</sup>	41.7±1.3 <sup>a</sup>	16.2±0.14 <sup>a</sup>
Namarzan	56	25.5±0.9 <sup>a</sup>	58±0.9 <sup>a</sup>	57.2±0.7 <sup>a</sup>	458±25 <sup>a</sup>	41.8±1.3 <sup>a</sup>	16.4±0.11 <sup>a</sup>
Shurag	44	30.6±1.15 <sup>b</sup>	59.7±1.3 <sup>a</sup>	60±0.9 <sup>b</sup>	458±19 <sup>a</sup>	44±1.04 <sup>a</sup>	16.3±0.14 <sup>a</sup>

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Sex and age had significant effect on all body measurements and on cashmere fineness and cashmere yield. The corresponding value for Shurag

bag’s goats had highest value and significant difference for body weight and height at withers.

Table 4.

**Phenotypic correlations between some linear body measurements and cashmere characteristics**

	Body weight	Height at withers	chest girth	Body length	Cashmere yield	Cashmere length	Cashmere fineness
Body weight	1						
Height at withers	0.37	1					
chest girth	0.61	0.59	1				
Body length	0.49	0.57	0.75	1			
Cashmere yield	0.4	0.35	0.5	0.21	1		
Cashmere length, mm	-0.08	0.15	-0.03	0.2	-0.05	1	
Cashmere fineness	0.36	0.32	0.5	0.4	0.4	-0.09	1

For the phenotypic correlations between some linear body measurements and cashmere characteristics specially, cashmere yield and cashmere fineness were high correlated to the chest girth measurement. There

was also high correlation ( $r=0.5$ ) between cashmere fineness and chest girth (Table 4). Chest girth has also high correlation ( $r=0.5$ ) to cashmere length, while low negative correlation ( $r=-0.03$ ) to cashmere length.

**DISCUSSION**

In Erdene buren sum, goat keepers were able to read and to write. It would be a easier to record goat performance and pedigree information during the breeding program. The mating was controlled and although goat and sheep reared together with large flock sizes, but individual flock never mixed with other flocks throughout the year. Hence there might be low level of inbreeding. The implication of this result is village (sum) level breeding scheme would be appropriate. Solomon Abegaz et.,all 2014, castration period had reported at the age of 2-4 years old for Western lowland and Abergelle, Ethopia but in Western Mongolia it is practised too early at 3-4 months old it could not be good effect for buck selection minimising of value for breeding bucks and there was not any report regarding to castration period from other regions in Mongolia. Also there was no record keeping for cashmere yield and quality of buy-in bucks. Breeding bucks' characteristics were only based on the trust between sellers and buyers. Red

and black goat coat colors were predominant and less the white, grey, combination of other colors and all observed goats had soft short hairs, since there was also huge mass of cross breeding goats with Russian Don breed by the Soviet State in 1980's as reported by government document of Khovd province . Introduction of Don Breed affected negatively on cashmere fineness and positively on cashmere yield . As the result of phenotypic correlations, there were high correlations between chest girth and cashmere yield and cashmere fineness, therefore it might be important trait for theselection of cashmere goats. The herders were satisfied with the increased cashmere yield, since there is no differentiation on pricing regarding the cashmere quality. As explained by Muller, Maria, & Johann, (2005) first criteria of choice of site for the run CBBP are farmers motivation, livelihood perspective of smallholders, genetic value of target population, prospective markets for regional products and logistic feasibility.

**CONCLUTIONS**

1. Too early castration has been practiced minimising value of breeding bucks
2. The sex and ages of goats were strongly influenced on the cashmere yeild, fineness and some linear body measurements
3. Chest girth has high correlation with the cashmere yield and cashmere fineness, but it has negative low correlation with cashmere lenght.
4. The breeding scheme should be disgned based on genetic structure study of those indeginous goats.

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