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Research Study Result of Milk Production of Dual Purpose Bugar Khalium Cattle

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ABSTRACT

Nuclear herd of dual purpose "Bugar khaliun" breed has been rearing in Batsumber county of Tuv province. According to scientific methodology of successful breeding and selection process on the cattle herd for decades, the novel dual propose breed was approved by A-218th order of 2020 from minister of food, agriculture and light industry based on report of inspection from national committee and named as "Bugar khaliun".

Number of versions of breeding, rearing and feeding managements are available for the current novel cattle breed stock in environment of our country and most profitable version is to pasture rearing in warm seasons and enclosed barn rearing in cold seasons technology. We consider the version as pasture, semi-indoor rearing management. There are numerous examples of farms implementing the method and many of them are farms in Batsumber county of Tuv province. Cattle breeders and farmers are emphasizing on production and cultivation of forage, especially green fodder and silage preparation, utilization and accustomed the practise. In this county, total of 115 small and medium scale farms and households are breeding 23.4 thousand heads of cattle by using the current technology and methods and 12.0 thousand and 6.0 thousand heads of the cattle of dam and breeding herd are involved respectively.

Total of 1800 heads of herd of the breed had been rearing at districts of Ulaanbaatar city and bred as pure breed or utilized as improver breed for Mongolian cattle in 14 provinces of our country.

Aside from rearing Alatau as pure breed, cross breeding it with Mongolian cattle to the 3rd generation and bred appropriate strains within. Correlating to this, within the herd, we have developed independent novel breed which comprises genetic potential of high production improver breed with specific features of Mongolian cattle's resistant ability are giving production which adapted to our country environment and climate with 6 lineages of Bum, Sumer, and Mandal generations that differ in production indications.

These cattles have been reared as pure breed and also been utilized for the improver of Mongolian cattle.

Keywords: Dual propose cattle, Bugar khaliun, Alatau, New herd, Farmer, Selection criteria, Dairy production.

INTRODUCTION

Government has been implementing policy aimed to improving livestock quality and production by developing livestock husbandry regionally, correlating with its pasture capacity and fodder production by reflecting on numerous documents, projects and programs.

Today’s climate change that affecting worldwide, especially strong in Mongolia posing moderate risk to pasture livestock husbandry and we are aiming to improving productivity of Mongolian livestock by decreasing the number of livestock and improving its quality by utilizing breeds and breed sections, strains that are adapted to our environment. One of them is “Bugan khaliun” breed cattle that are adapted to geography, climate, rearing and feeding condition of Mongolia [1].

Aside from rearing Alatau as pure breed, we have conducted improvement process of Mongolian cattle to its 3rd generation in depth and bred appropriate strains within. From appropriate strains, bum, sumber, mandal lineage producing bulls were selected separately by milk production, milk fat content, live body weight and chosen by offspring and later semen were collected, 11.0 dosage were processed, stored and utilized at Central station of livestock artificial insemination (previous name). In other words, we have reared lineage bulls in glass tubes and utilized in breeding.

As a result of research and production study work implemented in long duration of time, independent novel breed which comprises genetic potential of high production improver breed with specific features of Mongolian cattle resistant ability are giving production which adapted to our country environment and climate were developed [2].

There is a necessity of providing assessment and evaluation on features of biology, husbandry, and current level of production in order to improving, securing, studying and identifying possibility of increasing milk production of Mongolian cattle [3].

According to these needs, we prioritized to study major production of Bugan khaliun cattle’s milk yield, quality, composition, milk quality index and seeking possibility of increasing them by selection process.

MATERIALS AND METHODS

Research study was conducted including selection herd of bugan khaliun breed rearing at dairy farm companies in Batsumber county of Tuv province. Control milking was carried out monthly from cow and first calf heifer of the breed for the determination of rate of milk production per cow and milk quality parameters of fat content, and protein content were identified by ‘lactoscan’ equipment by comprising average sample from each milking [4].

Average annual milk rate per cow were calculated by deducting milk yield exceeding from 305 milking days from total milk rate and early dried out cows were calculated as its presence.

Heritability coefficient was determined by using $h=2r\ m/d/$ formula based on correlation of cow and female calves and preliminary analysis were carried out using developed program and excel program [5].

Herd selection differential and selection effect were calculated by method of $SD=SD_M-SD_o/2$, and $SE=SD*h$ respectively and selection intensity was calculated using 2.7 index developed by these researchers.

Result of milk production study of Bugan khaliun cow

Milk production: Milk production parameters of Alatau and Bugan khaliun cows reared at farms in Batsumber county of Tuv province by age classification [6].

From the study, Alatau breed adult cow for improver from selection herd produced 2904.2 litres of milk with 3.8% fat content in 305 wet days, second calf heifer produced 2554.5 litres of milk with 3.9% fat content and first calf heifer produced 2142.9 litres of milk with 3.8% fat content (Table 1).

Table 1. Milk rate, in litres

Cow age (calving times)	n	Milk rate, content	Breed	
			Bugan khaliun	Improver
First calf heifer	100	Milk rate, l	2142.5 ± 172.2	2161.9 ± 181.5
		Fat content, %	3.8 ± 0.6	3.8 ± 0.6
		Butter, kg	81.4 ± 0.7	82.1 ± 0.8
		Protein, %	3.8 ± 0.2	3.8 ± 0.3
		Milk quality index, kg/l	535	557
Second calf heifer	100	Milk rate, l	2142.5 ± 172.2	2161.9 ± 181.5
		Fat content, %	3.8 ± 0.6	3.8 ± 0.6
		Butter, kg	81.4 ± 0.7	82.1 ± 0.8

		Protein, %	3.8 ± 0.2	3.8 ± 0.3
		Milk quality index, kg/l	535	557
Adult cow	100	Milk rate, l	2142.5 ± 172.2	2161.9 ± 181.5
		Fat content, %	3.8 ± 0.6	3.8 ± 0.6
		Butter, kg	81.4 ± 0.7	82.1 ± 0.8
		Protein, %	3.8 ± 0.2	3.8 ± 0.3
		Milk quality index, kg/l	535	557

Adult cow of Bugan khaliun breed produced 2718.9 litres of milk with 3.8% fat content, second calf heifer produced 2240.4 litres of milk with 3.9% fat content and first calf heifer produced 2142.0 litres of milk with 3.8% fat content as shown in Table 1 in farm condition [7].

Bugan khaliun cow's milk production is 2 to 4 times higher compared to Mongolian cow depending on age difference and adult Mongolian cow reared in the county produces total of 801.0 litres of milk including calf suckled milk and second calf heifer produces 642.0 litres and first calf heifer produces 520 litres of milk.

By our study, for an example if we compare milk rate of Mongolian cattle to Bugan khaliun cow's milk rate, milk production of first calf heifer, second calf heifer and adult cow increased by 3.6, 2.4, and 3.0 times respectively.

Milk content: Milk content, its fat content and protein content are quality assessment are adhered as general criteria for selection process and different ages of Bugan khaliun breed cow's milk fat content, protein, fat amount were determined. Although milk rate increases along with age of cow accordingly, fat content and protein amount did not change significantly.

Average fat content of Bugan khaliun cow's milk reared at those farms in the county was 3.8 to 3.9%. On the other hand, fat content of milk of Alatau breed cow which utilized as improver of the breed was 3.8 to 3.9% with age difference.

Milk rate of Mongolian cow in pasture rearing with relatively short period of wet period was low and fat content was significantly higher.

We have determined total butter amount from milk aside from milk rate, protein and fat content of Bugan khaliun cow. Total amount of butter in milk of Bugan khaliun cow were 81.4, 86.2 and 110.4 kg in first calf heifer, second calf heifer and adult cow respectively depending on cow age [8].

RESULTS AND DISCUSSION

Milk quality index: Milk quality index were calculated correlating to first calf heifer, second calf heifer and adult cow of Alatau and Bugan khaliun cow's milk rate and live body weight. By our current study, milk quality index of Bugan khaliun cow was 542 to 607. Milk quality index calculated by Ivanov NI, Kravchenko NA, indicates Alatau breed reared in Batsumber county preserved its dairy and beef dual purpose breed. Milk quality index of Bugan khaliun cow reached very close to dual purpose breed criteria. Milk quality index of Alatau breed was 608 to 646 and its first calf heifer's milk quality index was 557 (Table 2).

Table 2. Milk quality index

No	Breed	Age, by calving times					
		First calf heifer		Second calf heifer		Adult cow	
		n	Index	n	Index	n	Index
1	Bugan khaliun	100	535	100	542	100	607
2	Alatau	100	557	100	608	100	646

Selection differential, productivity: In order to conducting selection in herd based on scientific methodology is crucial by planning and determining possible annual and generational increase of selection differential and productivity.

For the approach, selection differential, productivity of Bugan khaliun and improver breed were calculated individually

with age difference. From the study, milk rate differential of first calf heifer, second calf heifer and adult cow were 848.5, 571.9, 821.9 litres respectively and herd average was 782.0 litres.

However, milk rate differential of first calf heifer, second calf heifer and adult cow were 1360.7, 1057.6 and 1012.7 respectively and herd average was 1056 litres. Selection differential of average milk rate increasing of improver breed herd were higher than those of other herds.

Selection differential of milk productivity of different age groups within the herd were moderately different and it indicates and confirms that there are greater possibilities to implement further selection. Based on determined selection differential, annual and generational possibility of increasing productivity were calculated and summarized in Table 3. From the research, we have determined that selection productivity of first calf heifer, second calf heifer and adult cow of Bugan khaliun breed and selection productivity of milk rate after 1 generation were 491.1, 343.1 and 493.1 litres respectively. These indications were 816.4, 634.5 and 607.6 in first calf heifer, second calf heifer and adult cow of improver breed and herd average was 633.5 litres.

We have numerated selection intensity as 10% and if increased to 15%, selection result would yield high and aside from increased productivity level, possibility of rapid increase in quality is expected.

Estimations were performed as selection productivity of annual increase in milk rate of Bugan khaliun cow were 70.1, 49.0 and 70.4 litres with age difference and selection productivity of annual increase in milk rate of Alatau breed were 116.6, 90.6 and 86.6 litres in first calf heifer, second calf heifer and adult cow respectively. Herd average volume of milk rate increase was 90.3 litres and Bugan khaliun had 66.9 litres (Table 3).

Table 3. Genetic possibilities of milk production of cow

Parameters		Bugan khaliun				Improver breed			
		First calf heifer	Second calf heifer	Adult cow	Average	First calf heifer	Second calf heifer	Adult cow	Average
Productivity	Average level of the day	2142.5 ± 48.8	2440.0 ± 44.1	2718.9 ± 44.1	2367.1	2161.9 ± 103.3	2554.5 ± 100.5	2904.2 ± 37.7	2540.2
	Possible average	2329.7	2371.3	3150	2617	2400.9	2797.2	3136.6	2778.2
Selection differential		848.5	571.9	821.9	782	1360.7	1057.6	1012.7	1056
Selection capacity	After 1 generation	491.1	343.1	493.1	469.1	816.4	634.5	607.6	633.5
	Annually	70.1	49	70.4	66.9	116.6	90.6	86.6	90.3

Current average milk rate of Bugan khaliun and improver breed were examined based on materials analysed biometric methods and compared to actual possibility of milk rate and results are shown in Table 3.

From the research, we can observe that average of 2367.1 litres of milk produced from 1 cow in 305 days in farms rearing Bugan khaliun breed and utilizing 90.4% of the possibility of milk production in current rearing and feeding environment and 2540.2 litres of milk produced from 1 cow of Alatau breed and assumption forms as it is using 91.4% of the possibility of milk production in ongoing rearing and feeding environment.

CONCLUSION

Following conclusions were made based on research conducted on milk rate, quality, genetic selection study on dual purpose Bugan khaliun breed cow. In here:

- Adult cow from selection herd of dual purpose Bugan khaliun produces 2718.9 litres of milk with 3.9% fat content in 305 wet milking days in semi-indoor rearing environment, its second calf heifer produced 2240.4 litres of milk with 3.8% fat content, its first calf heifer produced 2142.2 litres of milk with 3.8% fat content and adult cow of Alatau breed which utilized as improver produced 2904.2 litres of milk with 3.8% fat content, its second calf heifer produced 2554.5 litres of milk with 3.9% fat content, its first calf heifer produces 2142.9 litres of milk with 3.8% fat content.
- Although milk rate of Bugan khaliun cow in 305 days differs in age groups, herd average is 2367 litres which is 3 times more compared to Mongolian breed cow.
- Average fat content of Bugan khaliun cow milk is 3.8 to 3.9. Whereas, fat content of milk of Alatau cow which utilized as improver to develop Bugan khaliun breed was 3.8 to 3.9% depending on age difference.

- From the study, selection differential of milk tare of 1st calf heifer, 2nd calf heifer and adult cow of Bugan khaliun breed were 848.5, 571.9 and 821.9 litres respectively and herd average was 782.0 litres. Whereas, selection differential of milk tare of 1st calf heifer, 2nd calf heifer and adult cow of Alatau breed which used as improver for the development of Bugan khaliun breed were 1360.7, 1057.6 and 1012.7 litres respectively and herd average was 1056.0 litres.
- Selection capacity after 1 generation of first calf heifer, second calf heifer and adult cow of Bugan khaliun breed, selection capacity of milk rates were 491.1, 343.1 and 493.1 respectively and first calf heifer, second calf heifer and adult cow of improver breed were 816.4, 634.5 and 607.6 litres and herd average was 633.5 litres.
- From 1 feeding cow at farms rearing Bugan khaliun breed, 2367.1 litres of milk were produced on average in 305 days which indicates 90.4% of the possibility of milk production has been utilized in current fodder and rearing environment and it is possible to reach milk production to 2617.1 litres. Whilst, 2540.2 litres of milk were produced from cow utilized as improver which is 91.4% of full potential in same feeding and rearing condition.

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