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Monitoring productivity of Kazakh Bactrian and Arvana camels of Kazakhstan population

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Abstract. The purpose of the study is to perform monitoring of camels of Kazakh Bactrian and Arvana dromedary breeds in the South West region of Kazakhstan; to determine perspective genotypes of purebred camels according to their dairy productivity. The study of class composition of the selected Arvana female camels of the 1st lactation with a milk yield of not less than 1950 kg allowed identifying 21.8% of Elite Class and 78.2% of Class I among 125 animal units. Kazakh Bactrian female camels of the first lactation are also selected with the yield of 1000 kg minimum in the number of 309 animals in the basic collective farms of camel breeding zones. It was found out that of 309 animals, 23.0% compose the Elite Class and 77.0% make the Class I. The estimation of Kazakh Bactrian female camels according to the milking capacity coefficient allowed determining that the optimal parameter for selection is Rank 1.5-1.9. It was found that in female camels according to the fertility index of Rank 1 (up to 42%), colt safety is reliably higher that compared with female camels of the same age with Rank 2 (42-47%) and Rank 3 (47% and higher).

1. Introduction

The camel husbandry has been developed in the last years. The world first large-scale camel dairy farm was established 10 years ago in Dubai, United Arab Emirates, showing increasing interest in camel milk production. Many important factors influencing milk yield are genetic and individual variation, age, parity, stage of lactation, nutrition, management, season, photoperiod, areas, technologies, etc. [1].

There are many natural desert and semi-desert pastures in Kazakhstan, which are favorable for the development of traditional livestock sections [2].

In dry desert and semi-desert zones of Kazakhstan, taking 25% of the whole territory of the county, in which growing other milk-breeding animals is difficult, camel breeding is a traditional and perspective sector of dairy husbandry [3].

In modern conditions, one of the priority areas of traditional camel breeding requires the transition from extensive to intensive industry management with the development of production technology for industry products [4].

When advancing the technology of productive camel breeding, the improvement of the process



parameters of the udder of the female camels of the Kazakh Bactrian and Dromedary is of particular importance [5].

In Kazakhstan, camels are mainly used either for meat-wool and meat-milk breeding directions. For the production of camel milk, Turkmen breed dromedaries are mainly used [6].

In camel breeding, animals selected for breeding process are paired in such a way that selection and breeding complement each other and, together with directed young animal breeding, they are effective methods of improving breeds [7].

According to Food and Agriculture Organization (FAO), camel breeding has prospects for further development as a dairy sector of productive animal husbandry [8].

Camel milk has a certain value for providing the population with natural protein products [9].

In the world, dromedaries are of the greatest value as a dairy direction of productivity, in view of the diversity of the available gene pool in the world [10, 11].

The local industry of dairy camel breeding needs to improve breeds, lines, families of animals for the production of high-quality ecologically friendly dairy products that meet the demands of the constantly changing market conditions for milking camels [12].

The purpose of the study is to perform monitoring of camels of Kazakh Bactrian and Arvana dromedary breeds in the South West region of Kazakhstan; to determine perspective genotypes of purebred camels according to their milk productivity in order to increase the milk productivity of the camel stock.

2. Materials and methods

The study is performed within a research program supported by the Ministry of Agriculture of the Republic of Kazakhstan in 2018-2020, entitled 'Development of Intensive Technology in Animal Breeding Sectors'. Our project was named 'Production of Camel Farming Products'.

The exterior assessment was performed by examining the animals in nature and based on the materials of the annual assessment of camels. The live weight was determined by weighing on fixed weighing machine with an accuracy of 1.0 kg or by calculation using the age coefficient [4].

Milk yield of female camels during the lactation was determined for 7 and 9 months of their active economic use, by carrying out monthly control milking for two adjacent days, from April to October with 7-month lactation, from April to December with 9-month lactation. The obtained digital data were averaged by dividing by two [2, 5].

The study objects were camels from various zones of productive camel breeding, which were bred in Arys-Turkestan (Usenov N. Collective Farm, Sydzybekov A. Collective Farm and Gulmayra Collective Farm), Pre-Aral (Kuladinskiy LLC (Limited Liability Company) and Korgan NB (Korgan Nurlan Bulatovich) Collective Farm), Pre-Caspian (Pervomayskoe LLC and Zhana-Tan LLC), Mangystau (Taushyk LLC), Pre-Balkhash (Kazbek-Bek Agrofarm LLC) and Karatau-Muyunkum (Bagdat Collective Farm and Karakur Agricultural Production Cooperative) zones. The complex estimation of camel productivity features was implemented based on the camel bonitation instructions (2014).

The dairy productivity of milk herd in farms was studied performing the control milk yield using Laktan-3 (SibAgroPribor, Russia, 2017) analyzer on a monthly basis, taking into account productivity, fat and protein content in milk. The morphofunctional parameters of the camel udder were determined by A Baimukanov method.

The cup-shaped udder has dugs of 4.0-6.0 cm long, at the base of the conical shape and widely spaced, directed downward. The round shape udder has dugs 2.0-6.0 cm long, at the base of the conical and pear-shaped, medium spaced, directed downward. Flat udder is with dugs 2.0-4.0 cm long, pear-shaped at the base, widely spaced, directed to the sides. Lobular udder has nipples 6.0 cm long and more, at the base of the pyramidal shape, widely spaced, directed to the sides. The udder lobes stand out clearly from the base to the dugs. The primitive shape of the udder has nipples up to 2.0 cm long, at the base of a pear-shaped shape, approximate, directed to the sides.

The fat content of milk was determined with Master ECO Milkotester device (Milkotester,

Bulgaria, 2017). The total protein in milk was determined using AM-2 milk analyzer (SibAgroPribor, Russia, 2017).

The process parameters of camel selection in terms of dairy productivity were set by the degree of lactation full value and its impact on milk yield and fat content. The degree of lactation full value (DLFV) in females was determined by the formula (1):

$$DLFV = \frac{AY \cdot 100}{ADY \cdot n}, \quad (1)$$

where DLFV – degree of lactation full value, AY – actual yield for the whole period of lactation, ADY – average daily yield in the third month of lactation, n – number of lactation days.

The gradation of female camels according to the degree of lactation full value was carried out in three ranks: up to 65 – 74; 75-84; 85 and up.

The milking capacity coefficient was determined by the ratio of the actual yield for the active lactation period to the body weight (2):

$$MCC = \frac{MY}{BW}, \quad (2)$$

where, MCC – milking capacity coefficient, MY – milk yield for a lactation, BW – body weight.

The gradation according to the milking capacity coefficient was made into three ranks: up to 1.4; 1.5-1.9; 2.0 and above.

The impact of fertility index on the present milk yield in our trial on Bactrian female camels of the South Kazakhstan type was determined using the standard method. The fertility index was determined by the formula suggested by Professor A Baimukanov (3):

$$F = 365(n-1) \frac{100}{N}, \quad (3)$$

where, F – fertility index, n – number of calvings, N – number of days between the first and the last colting.

The gradation according to the fertility index was made into three ranks: up to 42; 42 - 47; 47 and above.

The impact of shorn wool amount coefficient (SWAC) on the intensity of reaching the fest finish and on the body weight was defined in the growing stock of male camels born in 2017, while the shorn wool amount coefficient is calculated with the formula: (4).

$$SWAC = \frac{WAC}{BW} \cdot 100, \quad (4)$$

where SWAC – shorn wool amount coefficient, WAC – shorn wool amount, BW – body weight.

The gradation according to the shorn wool amount coefficient was made into three ranks: up to 0.8; 0.9-1.4; 1.5 and above.

3. Results and discussion

The mean body weight of milking camels in all the population was 542.5 ± 0.2 kg. Among animals of various breeds, Kazakh Bactrians have a relatively high body weight compared with the species of Arvana breed. In the comparative aspect, female camels of Pervomayskoe limited liability company have high body weight among female camels of Kazakh Bactrian breed of the same age – 685.8 ± 1.1 ($P < 0.001$); the individuals of Korgan NB Collective Farm have high body weight among female camels of Arvana breed of the same age – 589.4 ± 0.6 ($P < 0.001$). Vice versa, the lowest body weight in the first case is recorded for the mates of Taushyk LLC (Limited Liability Company) – 576.3 ± 0.2 ($P < 0.001$), and in the second case – the analogs of Sydzybekov A Collective Farm – 475.5 ± 0.05 ($P < 0.001$).

The study results for dairy productivity of domestic camel breeds show that the populations of Arvana breed in Arys-Turkestan zone are different in high yield, which is 2478-2667 kg per 7-months lactation, with the average daily yields – 11.8 ± 0.1 kg and 12.7 ± 0.07 kg correspondingly. In this zone, the animals in Gulmayra Collective Farm, and Pre-Aral zone in Korgan NB Collective Farm had the yield of 1785 kg and 1365 kg correspondingly for the specified lactation period, which requires increasing their genetic potential in dairy productivity.

Among Kazakh Bactrian females, the highest yield for 7 months of lactation is recorded for camels of Taushyk LLC – 1008 kg, which are 231, 252, 273, 294, 315 and 336 kg higher than in female camels of the same age in Karakur Agricultural Production Cooperative, Bagdat Collective Farm, Zhana-Tan LLC, Pervomayskoe LLC, Kuladinskiy LLC and Kazbek-Bek LLC correspondingly. This proves the fact that selection stock breeding work performed by the scientists of Camel Breeding Department of 'South West Research and Development Institute of Animal Breeding and Plant Growing' LLC (Shymkent, Republic of Kazakhstan) has a significant impact on the stock genetic potential.

In the comparative aspect concerning fat content in milk, in all the camel farming zones Bactrian camels (5.3 ± 0.03 - $5.7 \pm 0.02\%$) have the advantage over the Arvana camels (4.0 ± 0.01 – $4.6 \pm 0.04\%$), which is their natural feature. Protein content in milk in the groups is within 2.8-3.2%. Female Kazakh Bactrian camels are notable for high shorn wool amount – 6.3 ± 0.2 – 7.6 ± 0.2 kg, which is higher than Arvana female camels by 3.3-3.8 kg.

The study of class-specific composition of the selected Arvana female camels with 1 lactation yield of 1950 kg minimum allowed identifying 21.8% of Elite Class and 78.2% of Class I among 125 animals (table 1).

Table 1. Qualitative composition of selected female camels from the basic stock of domestic breeds in various zones of the South West region.

Camel breeding zone	Base collective farms	n	Class		
			Elite, %	I, %	Total
Arys-Turkestan	Sydyzbekov A	30	23.3	76.7	100
	Usenov N	50	24	76	100
	Gulmayra	25	20	80	100
	Korgan NB	20	20	80	100
Pre-Aral	Total for Arvana	125	22.4	77.6	100
	Kuladinskiy LLC	75	24	76	100
Pre-Caspian	Zhana-Tan LLC	27	22.2	77.8	100
	Pervomayskoe LLC	40	25	75	100
	Bagdat	30	20	80	100
Karatau-Muyunkum	Karakur Agricultural Production Cooperative	35	22.8	78.2	100
Mangystau	Taushyk LLC	70	25.7	75.3	100
Pre-Balkhash	Kazbek-Bek LLC	32	15.6	84.4	100
	Total Bactrian	309	23	77	100
Total		434	22.8	77.2	100

In addition, Kazakh Bactrian female camels of the first lactation are also selected with the yield of 1000 kg minimum in the number of 309 animals in the basic collective farms of camel breeding zones. It was found out that of 309 animals, 23.0% compose the Elite Class and 77.0% make the Class I. In all the collective farms, a share of elite animals exceeds 20%, which corresponds to the process regulation for pedigree camels.

In the conditions of Taushyk LLC (Tupkargan district, Mangystau region), the average daily milk yield of Arvana camels for 210 days of lactation composed 6.8 ± 0.03 kg with the fat content in milk of

4.0±0.02%. The total yield of market milk was 1414 kg. In the conditions of Zhana-Tan LLC (3.5±0.05 kg) and Pervomayskoe LLC, the average daily yield of market milk from Kazakh Bactrian camels of the western population was practically the same (3.4±0.02 kg). However, in the conditions of Pervomayskoe LLC fat content in milk was 5.7±0.02%, and in Zhana-Tan LLC – 5.5±0.02% (table 2).

Table 2. Monitoring milk production of female camels in the Mangystau Peninsula and in Pre-Caspian Lowland.

Months	Daily milk yield, kg			Fat content,%	Per month
	Morning yield	Evening yield	Per 24 h		
Taushyk LLC (Arvana)					
April	3.2±0.05	3.0±0.06	6.2±0.1	4.0±0.04	186
May	3.4±0.04	3.1±0.05	6.5±0.09	3.9±0.03	195
June	3.5±0.06	3.4±0.05	6.9±0.1	3.8±0.04	207
July	3.4±0.07	3.1±0.06	6.5±0.15	3.91±0.03	195
August	3.7±0.08	3.5±0.05	7.2±0.1	4.0±0.03	216
September	3.7±0.07	3.4±0.07	7.1±0.1	4.2±0.02	213
October	3.3±0.04	3.6±0.05	6.9±0.02	4.3±0.01	207
Average	3.5±0.04	3.3±0.03	6.8±0.03	4.0±0.02	202.7
Zhana-Tan LLC (Kazakh Bactrian)					
April	1.8±0.03	1.7±0.05	3.5±0.09	5.5±0.03	174
May	1.9±0.02	1.8±0.03	3.7±0.09	5.6±0.04	183
June	1.8±0.03	1.8±0.03	3.6±0.1	5.5±0.04	192
July	1.8±0.04	1.7±0.04	3.5±0.14	5.5±0.03	195
August	1.7±0.05	1.6±0.06	3.3±0.013	5.6±0.03	189
September	1.9±0.02	1.6±0.05	3.5±0.14	5.5±0.03	195
October	1.7±0.04	1.7±0.04	3.4±0.07	5.6±0.04	
Average	1.8±0.02	1.7±0.03	3.5±0.05	5.5±0.02	189
Pervomayskoe LLC (Kazakh Bactrian)					
April	1.7±0.02	1.5±0.01	3.2±0.02	5.3±0.03	96
May	1.8±0.01	1.6±0.02	3.4±0.04	5.6±0.04	102
June	1.7±0.02	1.6±0.02	3.3±0.03	5.8±0.02	99
July	1.7±0.02	1.7±0.03	3.4±0.04	5.8±0.02	102
August	1.8±0.01	1.7±0.01	3.5±0.02	5.5±0.03	105
September	1.7±0.02	1.6±0.02	3.3±0.03	5.9±0.01	99
October	1.9±0.03	1.7±0.01	3.6±0.01	5.8±0.02	108
Average	1.8±0.02	1.6±0.03	3.4±0.02	5.7±0.02	102

During 210 days of lactations, female camels in Sydzybekov A. Collective Farm produced 11.8±0.1 kg of milk with fat content of 4.2±0.01% (table 3).

Table 3. Dairy productivity of Arvana female camels of Arys-Turkestan population.

Months	Daily milk yield, kg			Fat content,%	Per month
	Morning yield	Evening yield	Per 24 h		
Sydyzbekov A. Collective Farm					
April	5.4±0.07	5.8±0.09	11.2±0.1	4.2±0.02	336
May	5.9±0.09	6.3±0.07	12.2±0.1	4.3±0.02	366
June	5.9±0.09	6.2±0.07	12.1±0.08	4.2±0.02	363
July	5.7±0.08	6.0±0.09	11.7±0.1	4.1±0.03	351
August	5.9±0.09	6.4±0.06	12.3±0.1	4.2±0.02	369
September	5.7±0.05	6.1±0.05	11.8±0.07	4.2±0.01	354
October	5.6±0.06	5.6±0.06	11.2±0.1	4.4±0.01	336
Average	5.7±0.03	6.1±0.04	11.8±0.1	4.2±0.01	353.6
Usenov N Collective Farm					
April	6.0±0.09	6.5±0.1	12.5±0.1	3.9±0.03	375
May	6.5±0.11	7.2±0.1	13.7±0.09	4.0±0.03	411
June	6.8±0.08	7.3±0.1	14.1±0.1	4.2±0.02	423
July	5.9±0.1	6.4±0.14	12.3±0.12	4.0±0.03	369
August	5.7±0.1	6.3±0.15	12.0±0.13	3.9±0.03	360
September	6.1±0.09	6.5±0.1	12.6±0.1	4.0±0.03	378
October	5.8±0.08	6.0±0.09	11.8±0.07	4.3±0.02	354
Average	6.1±0.04	6.6±0.02	12.7±0.06	4.0±0.01	381.4
Gulmayra Collective Farm					
April	4.3±0.07	3.9±0.07	8.2±0.1	3.9±0.03	246
May	4.4±0.08	4.2±0.07	8.6±0.1	4.1±0.04	258
June	4.6±0.09	4.6±0.09	9.2±0.2	4.0±0.02	276
July	4.3±0.1	4.1±0.08	8.5±0.2	4.1±0.04	255
August	4.5±0.1	4.2±0.09	8.6±0.17	3.9±0.05	261
September	4.5±0.12	4.4±0.1	8.9±0.22	4.0±0.03	267
October	4.2±0.06	4.3±0.05	8.5±0.02	4.2±0.02	255
Average	4.4±0.04	4.2±0.03	8.6±0.01	4.02±0.01	259.7

In the Usenov N Collective Farm there were 12.7±0.06 kg of milk with fat content of 4.0±0.01%. In Gulmayra Collective Farm, milk yield was reliably lower and made the average of 8.6±0.01 kg with fat content of 4.02±0.01%. The performed monitoring shows the perspectives of extending the breeding range of Arvana dromedaries of Arys-Turkestan population in the south Kazakhstan to form milk marketing and breeding farms.

In the conditions of Bagdat Collective Farm, Kazakh Bactrian camels produce milk in the amount of 3.6±0.02 kg with fat content of 5.4±0.02%; in Karakur Agricultural Production Cooperative – 3.7±0.03 kg and 5.6±0.03% correspondingly (table 4).

The average daily milk yield in Kazakh Bactrian camels of Pre-Aral population was 3.3±0.03 kg with fat content of 5.4±0.02% on average for 210 days of lactation. The milk yield in Arvana dromedaries was 6.5±0.03 kg with fat content of 4.6±0.04% for 7 months of lactations (table 5).

It appears that camels of the Pre-Aral population are characterized by uniform parameters of milk yield, which shows the perspectives of forming milk-marketing farms with female camels of Pre-Aral population irrelevant of their breed.

Table 4. Milk production of Kazakh Bactrian female camels of South Kazakhstan type of Karatau-Muyunkum population.

Months	Daily milk yield, kg			Fat content, %	Per month
	Morning yield	Evening yield	Per 24 h		
Bagdat Collective Farm					
April	1.9±0.03	1.7±0.03	3.6±0.03	5.0±0.06	108
May	1.8±0.04	1.9±0.02	3.7±0.02	5.2±0.08	111
June	1.8±0.04	1.8±0.03	3.6±0.03	5.2±0.09	108
July	1.8±0.04	1.6±0.04	3.4±0.01	5.4±0.08	102
August	1.7±0.05	1.6±0.04	3.3±0.05	5.5±0.06	99
September	2.0±0.01	1.8±0.03	3.8±0.01	5.7±0.08	114
October	1.9±0.03	1.9±0.01	3.8±0.01	5.6±0.07	114
Average	1.8±0.03	1.8±0.03	3.6±0.02	5.4±0.02	108
Karakur Agricultural Production Cooperative					
April	1.8±0.03	1.8±0.03	3.6±0.03	5.3±0.03	108
May	2.0±0.01	1.8±0.03	3.8±0.01	5.5±0.01	114
June	2.1±0.01	1.9±0.02	4.0±0.01	5.7±0.01	120
July	1.9±0.02	1.9±0.02	3.8±0.02	5.4±0.02	114
August	1.7±0.03	1.6±0.04	3.3±0.04	5.8±0.01	99
September	1.8±0.02	1.8±0.03	3.6±0.02	5.7±0.02	108
October	2.0±0.01	1.8±0.03	3.8±0.01	5.8±0.02	114
Average	1.9±0.02	1.8±0.02	3.7±0.03	5.6±0.03	111

Table 5. Milk production of female camels of Pre-Aral population.

Months	Daily milk yield, kg			Fat content, %	Per month
	Morning yield	Evening yield	Per 24 h		
Kulandinskiy LLC (Kazakh Bactrian)					
April	1.6±0.03	1.5±0.05	3.1±0.04	5.2±0.02	93
May	1.7±0.01	1.6±0.03	3.3±0.03	5.1±0.04	99
June	1.6±0.02	1.6±0.02	3.2±0.02	5.3±0.01	96
July	1.7±0.02	1.7±0.01	3.4±0.01	5.2±0.02	102
August	1.7±0.01	1.5±0.03	3.2±0.03	5.6±0.01	96
September	1.8±0.01	1.6±0.02	3.4±0.02	5.8±0.02	102
October	1.9±0.02	1.7±0.01	3.6±0.01	5.7±0.01	108
Average	1.7±0.01	1.6±0.02	3.3±0.03	5.4±0.02	99
Korgan NB Collective Farm (Arvana dromedary)					
April	3.2±0.04	3.1±0.05	6.3±0.07	4.5±0.06	189
May	3.3±0.05	3.3±0.04	6.6±0.08	4.7±0.08	198
June	3.4±0.04	3.4±0.03	6.7±0.07	4.4±0.09	201
July	3.3±0.06	3.2±0.05	6.4±0.11	4.7±0.08	192
August	3.3±0.05	3.2±0.05	6.5±0.1	4.5±0.06	195
September	3.4±0.05	3.2±0.04	6.6±0.07	4.7±0.08	198
October	3.2±0.04	3.3±0.05	6.5±0.1	4.6±0.06	195
Average	3.3±0.04	3.2±0.03	6.5±0.03	4.6±0.04	195.4

Camels of Pre-Balkhash population showed the same tend as in camels of Pre-Aral population: the uniformity of lactation curve for 210 days of dairy productivity monitoring. Kazakh Bactrian females

of Pre-Balkhash population product milk was in the amount of 3.2 ± 0.01 kg with fat content of 5.3 ± 0.03 kg on average with 2 milking per day (table 6).

Table 6. Milk production of Kazakh Bactrian female camels.

Months	Daily milk yield, kg			Fat content,%	Per month
	Morning yield	Evening yield	Per 24 h		
Kazbek-Bek Agrofarm LLC					
April	1.6±0.02	1.6±0.02	3.2±0.03	5.0±0.04	96
May	1.7±0.01	1.6±0.02	3.3±0.02	5.2±0.05	99
June	1.7±0.02	1.5±0.03	3.2±0.01	5.4±0.06	96
July	1.7±0.02	1.6±0.01	3.3±0.03	5.2±0.05	99
August	1.6±0.04	1.5±0.03	3.1±0.02	5.4±0.04	93
September	1.5±0.03	1.6±0.04	3.1±0.04	5.6±0.03	93
October	1.7±0.01	1.5±0.03	3.2±0.03	5.5±0.02	96
Average	1.6±0.02	1.6±0.02	3.2±0.01	5.3±0.03	96

In camel breeding, the reliable estimation and selection of female camel stock by dairy productivity are topical issues.

Based on this, Kazakh Bactrian female camels dairy performances were selected and their potential was estimated.

A comparative analysis of scoring milk yield was made for 60, 150, 210 and 270 days of lactation (table 7).

Table 7. Results of estimating female camels according to the lactation full value.

Period of lactation, days	Parameters	Rank 1	Rank 2	Rank 3
Degree of lactation full value,%				
		65-74	75-84	85 and higher
60	Milk yield, kg	306.1±14.2	377.5±12.9	338.1±17.1
	Fat content in milk,%	5.4±0.06	5.5±0.07	5.4±0.06
150	Milk yield, kg	765.3±22.7	943.7±17.1	845.4±25.3
	Fat content in milk,%	5.4±0.09	5.5±0.05	5.4±0.07
210	Milk yield, kg	1108.9±35.9	1156.4±41.5	1305.6±38.1
	Fat content in milk,%	5.3±0.06	5.3±0.07	5.3±0.06
270	Milk yield, kg	1281.1±27.2	1381.7±36.9	-
	Fat content in milk,%	5.3±0.07	5.3±0.08	-

It was established that female camels of Rank 3 have a shorter lactation up to 210 days, as compared with female camels of the same age of Ranks 1 and 2.

For the first 60 days of lactation, female camels of Rank 2 lactation full value (75-84%) produce 23.3% more milk than female camels of the same age of Rank 1 (65 – 74%) and 11.7% more than females of Rank 3 (85% and higher). When estimating female camels for 150 and 210 days of lactation, there is prevalence in milk yield of Rank 3 animals compared with Ranks 1 and 2. Based on the performed studies we consider the estimation of female camels by the lactation full value is necessary for 60 – 210 days of lactation.

The gradation of female camels according to the milking capacity coefficient was made into the three ranks: up to 1.4; 1.5-1.9; 2.0 and higher. The study results are shown in table 8.

Based on the performed studies, we further recommend estimating female camels according to the milking capacity coefficient for 150 or 210 days of lactation.

Table 8. Results of estimating female camels according to the milking capacity coefficient.

Period of lactation, days	Parameters	Rank 1	Rank 2	Rank 3
<i>Milking capacity coefficient</i>				
		Up to 1.4	1.5-1.9	2.0 and higher
120	Milk yield, kg	385.7±17.3	529.4±15.7	623.1±24.5
	Fat content in milk,%	5.6±0.09	5.5±0.06	5.3±0.08
150	Milk yield, kg	447.8±21.6	683.6±19.8	809.2±29.1
	Fat content in milk,%	5.5±0.08	5.5±0.06	5.3±0.07
210	Milk yield, kg	820.2±32.4	941.8±25.4	928.6±25.7
	Fat content in milk,%	5.5±0.06	5.5±0.06	5.3±0.05
270	Milk yield, kg	-	1150.3±28.1	1190.7±22.4
	Fat content in milk,%	-	5.5±0.04	5.3±0.05

It was found that lactation period in female camels according to the milking capacity coefficient of Rank 1 (up to 1.4) is shortened and makes 210 days in comparison with Rank 2 (1.5-1.9) and Rank 3 (2.0 and higher) females of the same age. Based on the research, we further recommend estimating female camels according to the milking capacity coefficient for 150 or 210 days of lactation. The estimation of Kazakh Bactrian female camels according to the milking capacity coefficient allowed establishing the optimal parameter for selection of Rank 1.5-1.9 as compared to those of up to 1.4 and 2.0 and higher. It is connected with the optimal parameter of fat content in milk, equaling 5.5%.

The gradation of female camels according to the fertility index was made into three ranks: up to 42%; 42-47%; 47% and higher (table 9).

It was found that when estimating female camels according to the fertility index it is necessary to consider 120 or 210 days of lactation. After 210 days of lactation, milk yield decreases in all camels, especially of Ranks 2 and 3.

Table 9. Results of estimating female camels according to the fertility index.

Period of lactation, days	Parameters	Rank 1	Rank 2	Rank 3
<i>Fertility index,%</i>				
		Up to 42	42-47	47 and higher
60	Milk yield, kg	342.4±15.6	428.8±11.8	440.0±21.2
	Fat content in milk,%	5.6±0.05	5.5±0.06	5.5±0.06
120	Milk yield, kg	684.8±23.2	857.6±17.9	879.4±28.1
	Fat content in milk,%	5.6±0.04	5.5±0.05	5.5±0.06
210	Milk yield, kg	1180.2±26.8	1222.5±27.4	1350.3±24.5
	Fat content in milk,%	5.5±0.06	5.5±0.07	5.5±0.08
270	Milk yield, kg	1318.5±22.4	-	-
	Fat content in milk,%	5.5±0.08	-	-

It was found out that in female camels with the fertility index of Rank 1 (up to 42%), colt safety was reliably higher as compared with female camels of the same age of Rank 2 (42-47%) and Rank 3 (47% and higher). Based on the above-mentioned we think that in order to increase the fertility of female camels from 42 to 45%, it is necessary to purchase stud camels. From the point of view of selection, the captured data show in-breeding of camels in the given farm.

There is no such situation in other farms. Female camels give yield for 270 days.

When estimating and breeding camels, it is necessary to form milk-breeding stock of female camels with the degree of lactation full value of 75-84%, with the dairy productivity rank of 1.5-1.9, with the fertility index of 42-47% and of the shorn wool amount coefficient of 0.9-1.4.

4. Conclusion

Stock breeding in the south-west region of Kazakhstan is performed on a good level. To increase the effect of selection and selective differential of Kazakh Bactrian camels it is necessary to adjust the system of rotating servicing stud camel by means of exchanging with the farms from different areas of Kazakhstan. It is also necessary to enhance in-breeding monitoring in order to prevent the mortality of young camels in the first years of postembryonic development and to decrease selective differential in dairy productivity.

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