Selection on lines and families of camels within Kazakh breed type of the Turkmen dromedary

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Abstract. This article is devoted to the research of productivity and monitor of breed value of lines and families of the Turkmen dromedary selected for genetic improvements. It was the first time when the selection of dromedaries within Kazakh breed used a selection according to the results of additional estimation of the index of milk production, the index of fertility and a ratio of wool clipping when they are bred on lines and families. The estimation of reproductive fertility of producers of the line "Jahn-leck 1" showed that the index of successful copulation equals to 92.4±0.6%. Females of the breeding stock Kyzyly of Turkmen dromedary had an index of milk production – 5.0±0.05, and the breeding stock «Kumkent» had an index of 4.1±0.1. Furthermore, it promotes the foundation of a selection herd of female camels of Kazakh breed having an index of lactation with the range of 90-120%, and their index of milk production varying from 4.5 to 6.5. The suggested index estimation allowed selecting females of Turkmen dromedary within the Kazakh breed having the highest index of milk production most precisely.

1. Introduction
Camel husbandry is one of the oldest branches of livestock breeding. The period of Bactrian camel domestication has been estimated as beginning in the late fourth and early third millennium before Common Era. Camels have developed special adaptations to allow them to survive in harsh climatic conditions of deserts and semi-deserts. [1, 2]. Camels have a legendary ability to endure long periods of travel without water or food; they consume thorny plants, fodder bushes and plants that are salty, bitter and prickly; they can utilize a wider variety of local plants which are unsuitable for other animals; also they can drink salty and bitter salt water [3]. Breeders of the Republic of Kalmykia, Astrakhan, Volgograd and Saratov regions, as well as the Republic of Kazakhstan raise a small and the most valuable group of hybrids of Kalmyk Bactrian camels and dromedaries or one-humped camels. These camel-raising areas are favorable for surviving and improving this breed as they generally include such factors as mild climate, plentiful vegetation and seasonal pastures [4, 5].
But the raising of camels in Kazakhstan is underdeveloped due to the following factors: low price for camel products, low level of application scientific achievements in this branch, poor routine veterinary care, the lack of a breeding center for camel husbandry with an experimental farm [6, 7]. Pure breeding of Kazakh breed type of Turkmen dromedary is and will be the main method of work with this type [8, 9]. Successful breeding work will depend on selection of males which are of pure breed, highly productive and have a good conformation.

When breeders select herds of Turkmen dromedaries raised for the production of meat and milk, they prefer large and heavy animals with long body, big conformation and long hair [10, 11]. This type of animals has a good reproductive potential and is suitable for local climate and food conditions [12]. They are able to endure temperature extremes.

The aim of this research is to develop a system of management of genetic resources of camels within the Kazakh type of Turkmen dromedary by selecting animals according to the index of milk production, index of fertility and the ratio of wool clipping when they are raised on lines and families.

2. Material and methods

Scientists studied lines and families within the Kazakh type of Turkmen dromedary which has one compressed hump. The general line from the chest should be straight forward for one third of the length of the body. Researchers monitored reproduction ability of 4 camel producers of Turkmen dromedary breed of the line ‘Jahn –leck 1’. The founder of this line was camel producer of Turkmen dromedary breed named ‘Jahn –leck 1’ born in 1980. Researchers conducted an index estimation of wool productivity of 12 female camels of Turkmen dromedary breed of the line ‘Jahn –leck 1’.

The selection of female camels of Kazakh type was conducted by the method of index selection according to the full lactation on the basis of the index of milk production. Researchers estimated the index of milk production of 6 females of Turkmen dromedary breed of breeding stock Kumkent and 7 females of the breeding stock Kyzyl. The estimation of fertility was carried out on 15 females of the breeding stock Kumkent and on 15 females of the breeding stock Kyzyl. Camel females of the first lactation with the cup shape of all four udder lobes and with the nipples pointing vertically downwards were chosen. The live weight of the selected camels was at least 495 kg.

3. Results of the research

The system of management of genetic resources of camels within the Kazakh type of Turkmen dromedary was developed by selecting according to the index of milk production, index of fertility and the ratio of wool clipping when they are raised on lines and families.

Table 1. Zootechnical characteristics of camel producers of Turkmen dromedary of the line “Jahn-leck 1”.

| Characteristics            | Camel males producers, name (№) | Average   |
|----------------------------|---------------------------------|-----------|
|                            | Jahn-leck 12                     | Jahn-leck 14 | Jahn-leck 15 | Jahn-leck 17 |
| Live weight, kg            | 695                              | 652        | 680          | 685          | 678.0±13.8  |
| Wool clipping, kg          | 5.0                              | 5.0        | 5.2          | 5.1          | 5.1±0.06    |
| Output of pure fiber, %    | 89.5                             | 89.5       | 89.0         | 89.0         | 89.3±0.7    |
| Height at the withers, cm  | 200                              | 200        | 202          | 201          | 200.8±1.2   |
| Oblique torso length, cm   | 171                              | 170        | 171          | 170          | 170.5±0.5   |
| Chest circumference, cm    | 230                              | 230        | 232          | 230          | 230.5±1.5   |
| Metacarpus circumference, cm| 23.5                             | 23.5       | 23.5         | 23.0         | 23.4±0.1    |
| The number of females bred | 25                               | 25         | 20           | 20           | 22.5±2.2    |
Camel males producers of Turkmen dromedary of the line “Jahn-leck 1” raised in partnership “Jahn-Tan” Jyloisky region of Atyrau oblast have sandy color, live weight in average 678.0±13.8 kg, wool clipping of 5.1±0.06 kg, output of pure fiber 89.3±0.7%, the measures of the body 200.8-170.5-230.5 - 23.4 cm (table 1).

The estimation of reproductive fertility of producers of the line “Jahn-leck 1” indicated that the number of females bred per head was in average 22.5±2.2 animals, the number of impregnated females equals to 20.8±1.2 animals, and index of successful copulation equals to 92.4±0.6% .

According to the results of the research, a camel producer “Jahn- Tanleck 15” having index of successful copulation of 90.0 % was withheld from breeding to a commodity herd. Three camel producers having index of successful copulation of 92-95% were selected for further breeding work.

An index estimation of wool productivity of females of Turkmen dromedary of the line “Jahn –leck1” was carried out. It was found that females of Turkmen dromedary of the line “Jahn –leck1” had live weight of 553.8±9/5 kg. The index of wool productivity of these females equals to 0.6 units and the index of wool cutting equals to 3.1±0.3 kg.

Females of Turkmen dromedary of reproductive age and the index of wool clipping of 0.6-0.8 units were chosen for further breeding and moved to the breed herd. All in all, this generation of females increased the ration of wool clipping in the range from 0.6 to 0.7 per 100 kg of live weight.

Camel females having the index of milk production ranging from 4.0 to 6.0 units were selected to the breeding stocks “Kumkent” and “Kyzyl”.

The founder of the breeding stock “Kumkent” is a female camel named “Kumkent arvana”. It was born in 1990 from leck –producer “Atyrau leck”. This female camel has live weight 555 kg, wool clipping 3.5 kg, the output of pure fiber 90%. measures of body 185-161-215-19.5 cm, an average daily milk production in the 3d and 4th months of lactation equals to 13.5 kg with fat 3.3 %, the color of hair is sandy.

The founder of the breeding stock “Kyzyl” is a female camel named “Kyzyl arvana”. It was born in 1990 from leck –producer “Zarya leck 83”. This female camel has live weight 543 kg, wool clipping 3.5 kg, the output of pure fiber 90%, measures of body 185-161-208-19.5 cm, an average daily milk production in the 3d and 4th months of lactation equals to 15.5 kg with fat 3.3 %, the color of skin is brown.

The results of the research showed that breeding stocks of Turkmen dromedary had a high index of milk production, e.g. females of breeding stock “Kyzyl” had an index of milk production 5.0±0.05, and females of breeding stock “Kumkent” had an index of milk production 4.1±0.1 (table 2).

**Table 2.** Index estimation of milk production of females of Turkmen dromedary breed.

| Features                           | Breeding stocks |       |       |       |
|------------------------------------|----------------|-------|-------|-------|
|                                    | Kumkent        | Kyzyl | Total |
| Number of animals                   | 6              | 7     | 13    |
| Live weight, kg                    | 608.2±21.4     | 562.9±17.1 | 58.5±19.25 |
| Milk production, kg                | 2515.3±28.7    | 2794.6±31.6 | 2654.9±30.1 |
| Fat in milk, %                     | 3.5±0.2        | 3.8±0.1 | 3.6±0.15 |
| Index of milk production           | 4.1±0.1        | 5.0±0.05 | 4.5±0.05 |

Furthermore, after the second lactation an additional selection according to the full lactation was carried out in order to increase the milk production of female of Turkmen dromedary within the Kazakh
breed. It provided an opportunity to establish a selection herd of females of Kazakh breed with full lactation 90-100%. The index of milk production equaled to 4.5 and 6.5 units.

The fertility of female of Turkmen dromedary of the Kazakh breed was not studied previously; our researchers conducted an index estimation of the fertility of females of Turkmen dromedary of the breeding stocks Kumkent and Kyzyl (table 3).

**Table 3. Fertility of females of Turkmen dromedary within the Kazakh breed.**

| Features                          | Breeding stocks | Kyzyl | Total         |
|----------------------------------|----------------|-------|---------------|
| The total number of animals      | 15             | 15    | 30            |
| The number of animals bred       | 8              | 7     | 15            |
| Index of breeding, %             | 53             | 46.6  | 49.8±2.3      |
| The number of impregnated animals| 7              | 7     | 14            |
| Index of impregnation, %         | 87.5           | 100   | 93.7±1.7      |
| Index of fertility (IF), %       | 47.4           | 47.5  | 47.3±0.2      |

The number of bred females of the Turkmen dromedary from two breeding stocks was 15. The index of breeding equaled to 49.8±2.3%. The number of impregnated animals was 14 or 51.4% of the total number of animals. The index of impregnation was in average 93.7±1.7%.

Females of the Turkmen dromedary within the Kazakh breed selected from breeding stocks exceed average index of fertility in 3.8 %. Females of the breeding stock “Kumkent” have the index of fertility 47.5% and females of the breeding stock “Kyzyl” have the index of fertility 47.3%. Twenty females having the index of fertility in the range of 47 to 48% were selected to improve the stock. Of the 20 females nine animals of the breeding stock “Kumkent” and eleven animals of the stock “Kyzyl” were chosen.

**4. Conclusion**

The research estimated the index of productivity and monitored lines and families of Turkmen dromedary selected for genetic improvements. It was the first time when the selection of dromedaries within Kazakh breed used a selection according to the results of additional estimation of the index of milk production on the basis of the ratio of milk productivity of lactated female camels.

But the estimation of reproductive performance of male producers of the line “Jahn-leck1” showed that the number of females bred was in average 22.5±2.2 animals, the number of impregnated females equaled to 20.8±1.2 animals and the index of successful copulation was 92.4±0.6%.

The breeding stock “Kyzyl” of the Turkmen dromedary showed the index of milk production 5.0±0.05 and the index of milk production of the breeding stock “Kumkent” equaled to 4.1±0.1. Furthermore, it provided an opportunity to establish a selection herd of females of Kazakh breed with full lactation 90-100%. The index of milk production equaled to 4.5 and 6.5 units.

The suggested index estimation allowed selecting females of the Turkmen dromedary within the Kazakh breed having the highest index of milk production most precisely.

**References**

[1] Ruchkina G A and Vachitova R Z 2008 *Camel Husbandry* (Kostanai: Ltd «Kostanaipoligraphia) 142
[2] Potts D 2005 Bactrian camels and bactrian-dromedary hybrids *Silk Road* 3 50-8
[3] Hare J 1997 The wild Bactrian camel Camelus bactrianus ferus in China: the need for urgent action *Oryx* 31 45-8
[4] Natyrov A K, Dordgiev V P, Bugdaev I E and Dordgiev L T 1992 Revival challenges of camel husbandry in Kalmykia *Zootechnics* 9-10 45-6
[5] Khalkhali-Evrigh R, Hafezian S H, Hedayat-Evrigh N, Farhadi A and Bakhtiarizadeh M R 2018 Genetic variants analysis of three dromedary camels sing whole genome sequencing data *PLoS
ONE 13 e0204028

[6] Baimukanov D A, Baimukanov A and Kurmantai U 2002 Heredity, repeatability and relationship of the indexes of milk productivity of females of the Kazakh Bactrian camels in the Southern environment *Bulletin of agricultural sciences of the Republic of Kazakhstan* **12** 28-30

[7] Burger P A 2016 The history of Old World camelids in the light of molecular genetics *Tropical Anim Health Prod* **48** 905-13

[8] Schaller G B 2000 *Wildlife of the Tibetan Steppes* (Univ Chicago Press) 151-62

[9] Jirimutu 2012 Genome sequences of wild and domestic bactrian camels *Nat Commun* **3** 1202

[10] Faye B and Konuspayeva, G 2012 in Camels in Asia and North Africa: Interdisciplinary Perspectives on their Past and Present Significance *Austrian Academy of Sciences Press* 33

[11] Liang Ming 2020 Whole-genome sequencing of 128 camels across Asia reveals origin and migration of domestic Bactrian camels *Communications Biology* **3** 1

[12] Musaev Z M and Torechanov A A 2006 Camel husbandry in Kazakhstan: trends and problems of development *Bulletin of agricultural sciences of the Republic of Kazakhstan* **11** 45-6