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SEASONAL AND AGE-RELATED FEATURES OF SPERM PRODUCTION OF BREEDING BULLS-SPERMODONORS OF THE BUSHUEV BREED

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Abstract:

The studies were conducted on the zebu-like Bushuev bulls, created in Uzbekistan. The Bushuev bulls, due to their high adaptability to the hot climate of Uzbekistan, have higher quantitative and qualitative indicators of sperm productivity throughout the entire period of economic use in local conditions. In comparison with imported bulls, they showed comparative stability of sperm production indicators throughout the year, that is, by seasons of the year, and they also remained longer in the main herd, which means a satisfactory number of sperm doses received during life, despite the relatively small volume of ejaculates. In addition, cryopreserved sperm products of bulls of this breed have a better survival rate than sperm of imported bulls.

Keywords: bull-manufacturer, breed, volume of ejaculate, concentration of sperms, spermodosis.

Introduction

At the present time, in livestock breeding, the first place comes to the selection of a breeding bull that has good genetic potential to generate outstanding indicators of adaptability to local conditions, which, in turn, lead to an increase in the quality and economic efficiency of cattle breeding in a certain area. Because the most important event is to obtain high-quality sperm products from outstanding sires with the widespread use of artificial insemination in cattle breeding.

This study was aimed at studying the seasonal and breed-age characteristics of sperm of bulls of the Bushuev breed in comparison of imported bulls of different breeds, in order to determine cases of low sperm productivity in the conditions of Uzbekistan.

Materials and methods of research

The studies were conducted at the Research and Production Center of the Republic of Uzbekistan, on stud bulls aged 3 to 6 years of Holstein, Angler, Swiss and Simmental breeds, the intensity of their use varied on average from 1 to 2 times a week. Sperm from stud bulls was obtained in a special split, using a fake bull, using an artificial vagina. To obtain sperm, a

shortened artificial vagina for bulls with a disposable polyethylene sperm receptacle was used. The resulting sperm was immediately sent to the laboratory for quantitative and qualitative research. Sperm assessment was carried out according to the following indicators: ejaculate volume, sperm concentration. Based on the results obtained, an analysis of the quality indicators of sperm was carried out, and their dependence on the breed, age of sires and time of year was determined.

When determining the volume of sperm, a measuring tube was used, the concentration was determined using an SDM-6 photometer, the number of sperm, motility and morphology were examined using high-tech equipment "AndroVision" from MINITUBE, installed in the CASA system, which includes an electron microscope and a counting chamber. Using this equipment, the semen was automatically examined and diluted with Andromed synthetic ruminant medium. At the same time, sperm with a motility of at least 7 points (70% with a rectilinear translational movement) were used for sperm conservation. The diluted sperm was cooled for 10-15 minutes at room temperature and packaged in 0.25 ml bags. The results obtained were processed on a personal computer using Mf Office and EXCEL programs. Freezing of sperm doses to a temperature of -196°C was carried out using a turbo milling machine REF:16810/0000 from MINITUBE. Sperm survival was determined after 1 and 5 hours after thawing. To do this, frozen sperm in payettes was thawed in a water bath at a temperature of 36°C for 20 seconds using a Belarus TB-2-220-2P thaw. One drop of thawed sperm was applied to a preheated glass slide, covered with a coverslip and examined under a microscope at x200 magnification using AndroVision equipment.

Results of our own research

At the first stage of the study, data on the quality of sperm production of bulls aged from 3 to 7 years of Holstein, Angler, Swiss and Simmental breeds were analyzed (Table 1).

Table 1. Indicators of sperm productivity of bulls of different breeds in the conditions of Uzbekistan

Indicators	Breeds	Age			
		III	IV	V	VI
Number of bulls by breed	Holstein	6	6	5	3
	Anglerskaya	6	6	5	4
	Bushuevskaya	6	6	6	5
	Shvitskaya	6	6	5	4
	Simmental	6	6	5	3
Total sperm received on average from 1 head, ml	Holstein	451.0±0.14	481.6±0.16	410.8±0.19	258.4±0.14
	Anglerskaya	360.0±0.21	405.6±0.14	336.1±0.22	250.8±0.25
	Bushuevskaya	350.0±0.26	395.2±0.21	374.4±0.28	307.2±0.30
	Shvitskaya	364.1±0.18	405.0±0.20	374.4±0.18	316.8±0.13
	Simmental	421.2±0.20	459.2±0.18	375±0.16	316.8±0.14
	Holstein	1.08±0.077	1.22±0.052	1.12±0.034	0.84±0.070

Concentration, billion/ml	Anglerskaya	1.2±0.052	1.60±0.048	1.36±0.028	1.07±0.036
	Bushuevskaya	1.2±0.025	1.25±0.032	1.18±0.035	1.09±0.045
	Shvitskaya	1.10±0.045	1.32±0.028	1.22±0.028	0.96±0.072
	Simmental	1.06±0.056	1.32±0.036	1.22±0.045	0.86±0.027
Number of rejected ejaculates, %	Holstein	26.20	22.60	25.30	28.44
	Anglerskaya	22.27	19.21	21.51	24.46
	Bushuevskaya	21.22	18.31	20.49	22.86
	Shvitskaya	21.75	18.76	21.00	23.80
	Simmental	22.53	19.44	21.76	25.6
Overall sperm motility, score	Holstein	8.1±0.32	9.2±0.24	8.9±0.12	7.0±0.22
	Anglerskaya	8.0±0.22	8.7±0.19	8.6±0.18	7.1±0.23
	Bushuevskaya	8.1±0.26	9.2±0.25	9.0±0.22	7.4±0.26
	Shvitskaya	8.0±0.32	8.8±0.33	8.6±0.25	7.0±0.21
	Simmental	8.0±0.16	8.7±0.18	8.5±0.26	7.0±0.21
Number of sperm doses received from 1 bull, thousand pieces.	Holstein	29.9±0.2	37.8±24.1	28.6±16.8	21.3±17.1
	Anglerskaya	27.9±10.2	31.6±17.8	29.8±9.8	24.1±14.1
	Bushuevskaya	27.5±21.3	30.6±26.8	28.2±22.8	21.3±26.8
	Shvitskaya	26.1±10.4	36.1±9.8	30.07±13.5	18.5±11.8
	Simmental	28.8±19.5	38.6±15.7	29.8±16.5	18.4±22.8
Survivability of sperm 1 hour after thawing, %	Holstein	43.8	44.6	34.5	33.8
	Anglerskaya	44.3	46.2	41.0	39.3
	Bushuevskaya	47.4	43.8	42.5	41.4
	Shvitskaya	45.2	44.9	39.3	43.2
	Simmental	43.8	44.6	34.5	40.8
Survivability of sperm 5 hours after thawing, %	Holstein	8.3	9.5	8.3	7.6
	Anglerskaya	11.4	13.3	8.4	7.9
	Bushuevskaya	18.4	18.9	12.3	8.4
	Shvitskaya	12.7	12.0	9.7	8.1
	Simmental	8.3	9.5	8.3	7.7

An analysis of Table 1 shows that during the study period from 3 to 7 years of age, on average per year, 400.45 ml was obtained from 1 bull of the Holstein breed, 338.1 ml from the Angler breed, 356.7 ml from the Bushuev breed, from Swiss 365.05 ml, Simmental 393.05 ml.

But the maximum percentage of rejected sperm fell on Holstein bulls - 25.07%, which can be explained by the increased annual sexual load, their high demands on feeding and maintenance, and most importantly, the least adaptability to the local climate. The lowest culling rates were shown by bulls of the Bushuevskaya and Schwyz breeds - 20.31% and 20.8%, respectively.

A low sperm concentration was observed in bulls of the Holstein breed (1.06 million/ml) compared to indicators in the Bushuevskaya and Angler breeds (1.04 and 1.06 million/ml, respectively).

The maximum number of sperm doses during this research period was received from bulls of the Angler breed (122 thousand sperm doses); 117.6 and 110.8 thousand sperm doses were received from bulls of the Simmental and Schwyz breeds, respectively.

Results laboratorysperm quality studies (Table 1) indicate that the highest sperm motility was observed at bulls-producers of the Bushuev breed - 8 points, when these indicators for the Holstein and Swiss breeds were 7.3 and 7.5 points, respectively.

Short the percentage of survival 1 and 5 hours after thawing was shown by the sperm of bulls of the Bushuev breed (43.8 and 18.9%, respectively), in the Holstein breed these figures were the smallest - 39.2 and 8.10%, respectively.

In terms of safety in the main herd for obtaining sperm products up to 7 years, the absolute advantage belongs to the bulls of the Bushuev breed, which amounted to 80% and after the Angler and Schwyz breeds (60%), Holstein and Simmental breeds (40%), respectively.

When studying the seasonal characteristics of sperm production in experimental animals for 4 years, it was revealed that the average annual indicators began to steadily increase during the winter season (December–February) and reached their highest point in the middle of spring.

3-Table. Seasonal indicators of sperm productivity of bulls of different breeds in Uzbekistan(X ±S x),n=6,E=30

Breeds		Volume of sperm from one bull in 1 season, ml	Concentration of sperm in 1 ml of sperm, billion/ml	Average ejaculate volume by season, ml
Winter (January)				
I	Holstein	110.1	1.1	4.25
II	Anglerskaya	93.0	1.2	3.65
Sh	Bushuevskaya	98.1	1.1	3.6
IV	Shvitskaya	100.4	1.1	3.95
V	Simmental	108.1	1.0	3.7
Spring (May)				
I	Holstein	120.1	1.2	4.45
II	Anglerskaya	101.4	1.3	3.85
Sh	Bushuevskaya	107.0	1.3	4.1
IV	Shvitskaya	109.5	1.2	4.2
V	Simmental	117.9	1.0	4.5
Summer (July)				
I	Holstein	85.9	0.9	3.6
II	Anglerskaya	75.3	1.1	3.1
Sh	Bushuevskaya	84.2	1.0	3.5
IV	Shvitskaya	79.3	0.9	3.45
V	Simmental	77.8	1.0	3.15
Autumn (October)				
I	Holstein	90.1	1.2	4.05
II	Anglerskaya	76.1	1.2	3.15
Sh	Bushuevskaya	80.3	1.1	3.45
IV	Shvitskaya	82.1	1.1	3.5
V	Simmental	88.4	1.2	3.2

P≤0.995-0.999

As a result of the positive influence of the spring season on the reproductive function of all animals, the volume of ejaculates of breeding bulls increased by an average of 9-10%, and this change was observed in accordance with the value of live weight.

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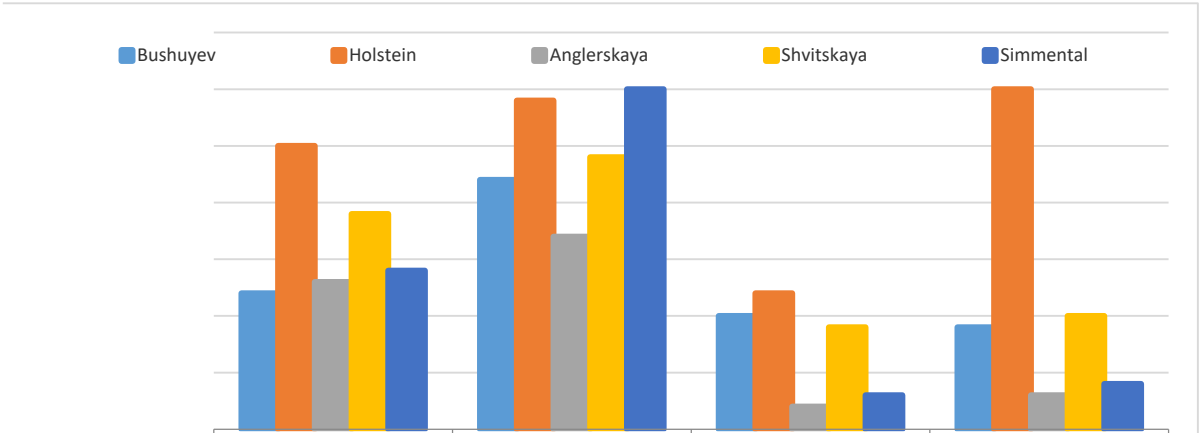

	Winter	Spring	Summer	autumn
Bushuyev	3,6	4,1	3,5	3,45
Holstein	4,25	4,45	3,6	4,5
Anglerskaya	3,65	3,85	3,1	3,15
Shvitskaya	3,95	4,2	3,45	3,5
Simmental	3,7	4,5	3,15	3,2

1-drawing. Number of sperm obtained by season

During the summer season there was a sharp decline in indicators. This phenomenon was relatively clearly observed in Holstein bulls, in which, in comparison with the flight indicator, the volume of total sperm obtained from one bull by season of the year in the next year in the spring increased by 40%, the concentration by 33%, the average volume of one ejaculate by 24%, and in Bushuevskaya by 21%, 18% and 17%, respectively. This is due to a decrease in sperm production in the summer, when heat negatively affected animals (Table 4).

Table 2. Decrease in sperm volume in the summer season compared to spring

t/r	Breeds	Amount of reduction, ml	%
1	Holstein	34.2±1.7	28.5
2	Anglerskaya	26.1±1.5	25.7
3	Bushuevskaya	22.8±1.1	21.3
4	Shvitskaya	30.2±1.5	27.6
5	Simmental	40.1±183	34.0

At the same time, the bulls of the Bushuev breed showed the smallest decrease in indicators (22.8 ml) among the breed groups, and the smallest among the Holstein bulls (34.2 ml), which means comparative stability, that is, adaptation to hot conditions.

The results of studies of the quality of sperm in bulls of different breeds allow us to conclude that bulls of the Bushuev breed have relatively low ejaculate volume, but at the same time they have a high concentration of sperm and a relatively low percentage of sperm rejection compared to bulls of Holstein, Simmental, Angler and Swiss breed, which can be explained by the

relationship between the volume of sperm production and live weight, with adaptive stress, increased annual sexual load, and their high demands on feeding and maintenance. When comparing the sperm of bulls of different breeds, it should be noted that bulls of the Holstein and Simmental breeds have a relatively high concentration of sperm in the ejaculate with a low survival rate 1 and 5 hours after thawing, which must be taken into account when carrying out artificial insemination.

Semen quality data for stud bulls Bushuevsky breed, studied at different times of the year, allow us to judge that the maximum volume of sperm obtained during the season is observed in the winter and spring periods (98.7-110.0 ml) and vice versa, the minimum - in the summer and autumn periods (71.3 -80.3 ml).

Conclusions

Thus, an analysis of the research has shown that bulls of the Bushuev breed are characterized by maximum resistance to seasonal changes in weather conditions, especially relative heat resistance in the summer. In addition, the sperm productivity of Bushuev bulls in the spring period is noticeably higher than that of imported breeds, which can be explained by its proximity to zebu, which tend to calve and inseminate mainly in the spring.

Based on the above results, when predicting sperm productivity, the rational organization of obtaining sperm throughout the year from Bushuev bulls, it is necessary to take into account the fact that the most fruitful season of the year for obtaining high-quality and the largest amount of sperm production is winter and spring. At the same time, with regard to imported bulls, special attention should be paid to the quality of sperm in winter and spring.

Studies of changes in sperm productivity showed that from the age of 5, imported bulls are knocked out of the main herd for various reasons, which is mainly determined by adaptive load. And for bulls of the Bushuev breed, the optimal period for economic use is from 2 to 8 years, and the most fruitful period is the year between 3 and 4 years of age, during which it is possible to prepare sperm products of maximum quality and volume.

From the results of studies on survival, we can conclude that the quality of cryopreserved sperm products of bulls of the Bushuev breed is not inferior to imported bulls, and with the help of this method it is possible to effectively use the sperm of bulls of this breed to preserve, increase the number and improve the population.

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