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Genotype Implementation of Animals in The Context of Various Housing Technologies.

Katmakov Pyotr Sergeyevich[1]*, Gavrilenko Vladimir Petrovich[1], Bushov Alexander Vladimirovich[1], Stenkin Nikolai Ivanovich[1], and Zelenov Gennady Nikandrovich[2].

[1]Doctor of agricultural sciences, professor of the Feeding and Animal Breeding Department, FSBFEI HE "Ulyanovsk State Agricultural Academy named after P. A. Stolypin" 1, Novy Venets blvd., 432017, Ulyanovsk.
[2]Doctor of agricultural sciences, professor of the Technology of Production and Agricultural Products' Processing Department, FSBFEI HE "Ulyanovsk State Agricultural Academy named after P. A. Stolypin" 1, Novy Venets blvd., 432017, Ulyanovsk.

ABSTRACT

Research results of studying the genotype implementation of animals in the context of various housing technologies and conditions of feeding are given in the article. It has been established that on the rations, identical in the type and feeding level, with tied housing from Simmental cows more milk has been produced depending on age throughout lactations, by 370 – 473 kg in comparison with the loose housing technology, and from Holstein crossbreeds with pedigree less than 50% - greater than by 75 - 636 kg, with pedigree 50% - by 349 - 1116 kg and with pedigree more than 50% - by 306 – 943 kg. Identical productivity was shown both with loose housing and traditional tethered housing technology of the Bestuzhev breed. Holstein-Bestuzhev cows in the context of loose housing lowered milk yields depending on pedigree in the Holstein breed by 226 – 557 kg (6,0 – 13,1%). With a limited feeding level the genetic potential of animals of the Bestuzhev breed was better manifested, and with an increased feeding level optimum potential capabilities of Holstein crosses are implemented.

Keywords: genetic pool, genotype, genetic potential, pedigree, housing technology.

Corresponding author

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INTRODUCTION

At present purposeful work is conducted in the Middle Volga region to create highly productive types of animals and herds of Bestuzhev, Simmental and black and white cattle with the use of high-valuable intra pedigree resources and a gene pool of the Holstein breed.

On the basis of modern technology it is necessary to create highly productive herds of dairy cattle of the desired type which will combine successfully the optimum growth and live body weight with high milk production and milk fat, is adapted for machine milking, and also will differ in resistance to adverse effects of the environment [1-11].

Therefore, an important scientific and technical issue is to study the nature of implementation of the genetic productivity potential and other economic and biological signs in thoroughbred Simmental and Bestuzhev cows, as well as crossbreeds with various pedigree on the improving Holstein breed in different housing systems.

OBJECTS AND RESEARCH TECHNIQUE

The studies were conducted in the cattle herds of Simmental and Bestuzhev breeds at the stud farm "Rodina" and on the experimental farm of the Ulyanovsk State Agricultural Academy. Thoroughbred animals of Simmental and Bestuzhev breeds and the crossbreeds obtained from their crossing with bull sires of the Holstein breed were the object of the study.

Data of zootechnical and breeding records, catalogs of bull sires were used in work. Feeding rations were composed of according to the norms of the All Russian Institute of Livestock breeding taking into account the live body weight, productivity and physiological condition of animals.

On the experimental farm and on the commercial farm the animal housing system was loose and cubicle, in year-round stalls. The removal of manure was carried out by means of a delta scraper, US-16, milking was double machine on the milking platform UDE-16 "Elochka". The commercial and phase milk production technology has been introduced here.

The milking machine Tandem UDT-8 is used for milking cows on the stud farm "Rodina" in the context of loose housing . With traditional tied housing animals are kept tethered on these farms all the year round with double machine milking.

The digital data obtained during the studies have been processed biometrically with the use of the programs Microsoft Exel on the basis of N. A. Plokhinsky [12], E.N. Merkuryeva's techniques [13].

RESEARCH RESULTS

A decisive impact on the milk production technology was exerted by progressive methods of cow keeping. The loose housing method is considered to be more promising. Its main advantage over tied housing consists in higher performance of work of the farm personnel. However, researches of a number of authors [14,15] show that the best indicators of productivity of dairy herds are obtained in the tie stall housing system of cows. Tied housing of the dairy herd objectively creates great opportunities for rated feeding and accounting of specific features of cows in milking that promotes obtaining high dairy productivity from them.

The studies conducted on the stud farm "Rodina" with the rations identical in type and feeding level showed what in the tied housing system from Simmental cows more milk was produced depending on age in lactations by 370-473 kg, in comparison with the loose housing technology, and from Holstein crossbreeds with pedigree less than 50% - by 75 - 636 kg more, with pedigree of 50% - by 306 – 943 kg more, from crossbreeds with pedigree more than 50% - by 349 - 1116 kg more. (0,05<P<0,001) (tab. 1).

If with the traditional housing technology crossbred cows had an essential advantage in milk yield over Simmentals (depending on age in lactations by 117 – 518 kg), then in loose housing this superiority considerably decreases, and in the third lactation crossbred animals with pedigree in the Holstein breeding line of

50% and more are less productive significantly in contrast to thoroughbred counterparts by 387 – 480 kg (P< 0,05). Of all the genotypes studied earlier high half bred crosses gave a more negative response in productivity to the loose housing system.

On the experimental farm milk productivity of cows of the studied genotypes managed in the context of commercial technology was also slightly lower in comparison with counterparts of the initial genotypes lactating on a farm with traditional technology (tab. 2). Both with commercial and traditional technologies of housing, cows of the Bestuzhev breed showed almost identical productivity. The difference in milk yield in favor of the animals lactating in tied housing was only 45 kg. Crossbreeds lowered yields of milk in commercial technology, depending on pedigree in the Holstein breed by 226 – 557 kg (6,0-13,1%), milk fat was produced by them by 10,9-20,1 kg less respectively.

From crossbred cows kept in loose housing sheds and in cubicles milk was produced more in the first lactation by 512-1128 kg, in the second – by 648-848 and in the third - by 836-1129 kg, than from thoroughbred counterparts of the Bestuzhev breed. With the traditional tied housing technology the difference in milk yield in their favor was in lactations 970-1340; 884-1280 and 1200-1610 kg respectively. With the applied technologies more milk fat was produced throughout 1 and 3 lactations from crossbred cows in comparison with thoroughbred Bestuzhevs 13,0-40,4; 24,3-27,8; 25,3-37,1 kg and 32,2-45,5; 32,0-39,9; 32,0-55,1 kg respectively.

It has been established that when the pedigree level on the Holstein breed and aging increased, milk yields in crossbred cows increase more considerably, than in their thoroughbred Bestuzhev counterparts, irrespective of the housing system. But in the context of tied housing the genotype of crossbred animals is implemented better with age.

Efficiency of the genetic potential implementation of Holstein crossbreeds is in direct dependence on the feeding level of animals. The studies conducted in the herd of the experimental farm of the Ulyanovsk State Agricultural Academy with the loose housing system and keeping cows in cubicles showed that the response of thoroughbred and crossbred animals to different feeding levels is not the same. When the limited feeding level (30 centners of feed units) was applied the genetic potential of animals of the Bestuzhev breed was better manifested. In milk yield they exceeded Hostein crossbreeds by 295 kg (14,9%), in the content of fat in milk – by 0,13% and in milk fat yield – by 13,4 kg.

In the context of the increased feeding level (average and high level) the response was more expressed in high-blood Holstein cows. In milk yield they had a considerable advantage over counterparts of the Bestuzhev breed. When 50 centners of feed units were provided for one conditional head a year, more milk was produced from the Holstein crossbred cows by 1533 kg (41,2%), than from Bestuzhev cows, and at a high feeding level (70 c feed unit) the difference in milk yield in favor of Holsteins was even more significant (+2200 kg, or 42,4% in contrast to Bestuzhev counterparts). However, in the milk fat content Holstein crossbreeds were inferior to Bestuzhevs by 0,10 – 0,17%. In milk fat yield crossbred cows exceeded thoroughbred counterparts by 52,7 – 65,7kg. As we can see, this difference in favor of Holstein crossbreeds is very considerable and it is high-reliable.

It has been established that productivity adequately responds to the increased feeding level of a crossbreed, and with pedigree increase in the Holstein breed, milk yields of cows naturally rise. So, if crosses with pedigree of 75% in Holsteins (F2) exceeded half-blooded (F1) cows in milk yield for the first lactation by 588 kg, then crossbreeds with pedigree of 87,5 and 93,75% (F3 and F4) had an advantage over them already by 695 and 1259 kg, and over F2 crossbreeds by 107 and 671 kg respectively. With age the difference in productivity increases in favor of high-half bred cows. In the second lactation of a F2 cross breed exceeded crossbreeds of F1 in milk yield already by 724 kg, and crosses of F3 and F4 – by 1214 and 1598 kg, having at the same time superiority over F2 crosses by 487 and 871 kg.

Approximately the similar picture is also observed in the third lactation. As "a blood share" in the Holstein breed increases the difference between high-blood and half-blooded animals in milk yield in favor of the former increases from 336 to 711 kg.

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1. Milk productivity of cows of various genotypes in view of different housing systems

Breed and pedi-gree in the improv-ing breed	Tethered housing				Loose housing			
	n	milk yield, kg	MJ, %	milk fat, kg	n	milk yield, kg	MJ, %	milk fat, kg
1 lactation								
Simmental	30	3537±152	3,77±0,021	133,3±6,4	20	3544±94	3,88±0,026	137,5±4,1
<50% КПГ	43	3792±99	3,96±0,025	150,2±4,1	39	3717±89	4,01±0,020	149,0±3,2
50%	16	4055±185	4,06±0,035	164,6±6,7	47	3669±81	3,97±0,023	145,6±3,4
>50%	12	4048±200	4,11±0,037	166,4±6,9	20	3615±154	4,01±0,030	144,6±4,5
2 lactation								
Simmental	30	4244±135	3,90±0,048	165,5±4,9	20	3771±133	3,99±0,029	150,5±4,8
<50% КПГ	43	4244±103	4,08±0,022	173,1±4,7	39	3608±112	3,97±0,024	143,2±5,5
50%	16	4299±185	4,02±0,029	172,8±6,2	47	3993±105	3,95±0,023	157,7±5,2
>50%	12	4361±198	4,05±0,031	176,6±7,1	20	4012±161	3,97±0,034	159,3±4,8
3 lactation								
Simmental	30	4489±158	3,81±0,026	171,0±5,7	20	4119±139	3,99±0,039	164,3±5,3
<50% КПГ	43	4428±128	3,96±0,026	175,3±4,8	39	4056±106	3,92±0,027	158,9±4,8
50%	16	4675±166	3,95±0,036	184,6±5,8	47	3732±117	3,93±0,031	146,7±4,6
>50%	12	4755±191	3,88±0,029	184,5±6,6	20	3639±143	4,00±0,029	145,5±5,1

*КПГ - red and spotted Holstein cows

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2. Genotype realization of thorough bred and crossbred cows in the conditions of various housing technologies

Breed and pedigree in the improving breed	Tethered housing				Loose housing			
	n	milk yield, kg	MJ, %	milk fat, kg	n	milk yield, kg	MJ, %	milk fat, kg
1 lactation								
Bestuzhevskaya	38	3250±98	3,85±0,038	125,1±4,23	38	3280±114	3,84±0,033	125,9±4,15
50%	36	3924±103	3,76±0,029	147,5±4,85	34	4250±106	3,72±0,038	158,1±4,03
75%	37	3762±83	3,67±0,034	138,1±3,72	36	4378±98	3,69±0,029	161,5±3,94
87,5%	33	4238±119	3,71±0,041	157,2±3,92	32	4572±125	3,65±0,041	166,9±4,08
93,75%	34	4378±97	3,78±0,036	165,5±4,12	35	4620±103	3,71±0,035	171,4±4,41
2 lactation								
Bestuzhevskaya	38	3672±94	3,86±0,027	141,7±4,12	38	3740±108	3,82±0,031	142,8±4,08
50%	36	4450±108	3,73±0,031	166,0±4,35	34	4624±112	3,78±0,026	174,8±3,92
75%	37	4320±88	3,73±0,034	161,1±3,68	36	4780±94	3,68±0,028	175,9±4,14
87,5%	33	4479±114	3,69±0,029	165,3±3,72	32	5015±105	3,68±0,034	181,5±4,03
93,75%	34	4520±92	3,75±0,037	169,5±4,16	35	5020±101	3,64±0,039	182,7±3,96
3 lactation								
Bestuzhevskaya	38	3884±106	3,82±0,030	148,4±4,03	38	3920±98	377±0,024	147,8±4,22
50%	36	4813±113	3,69±0,027	177,6±4,13	34	5120±106	3,72±0,033	190,5±4,05
75%	37	4720±88	3,68±0,035	173,7±4,51	36	5328±113	3,71±0,035	197,7±3,84
87,5%	33	4981±109	3,65±0,032	181,8±5,05	32	5420±122	3,65±0,026	197,8±4,36
93,75%	34	5013±97	3,70±0,029	185,5±4,83	35	5530±98	3,67±0,038	202,9±5,12

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CONCLUSIONS

Thus implementation of the genetic potential of milk productivity in thoroughbred and Holstein bred cows directly depends on the level of supply of farms with fodder and technology of their housing. Cross-breeds with a high pedigree in the Holstein breed react especially sharply to a lack of nutritious substances of the diet that requires putting feeding and management in conformity with higher biological needs of cross-bred animals.

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