INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact factor: 4.295

(Volume 4, Issue 2)

Available online at: www.ijariit.com

The influence of the genotype on the longevity and the lifelong productivity of Holstein breed

Ashraf Ward
ashrafward@yahoo.com
University of Tripoli, Tripoli, Libya
Omry M. Abuargob
abuargobomry@hotmail.com
University of Tripoli, Tripoli, Libya

Ismail M. Hdud
hd_is69@hotmail.com
University of Tripoli, Tripoli, Libya
Sergey Y. Ruban
sergey@mail.ru
Institute of Animal breeding and genetic -NAAS, Kiev-Ukraine

ABSTRACT

This article is devoted to the study of the influence of the genotype on the Holstein Frisian on economic longevity and the lifelong productivity of cows. Indicators of the productive longevity of 1017 purebred Holstein Frisian and cross-bred cows with a different share of genes by Holstein breed, who left the herd of Dairy cattle at Al-hiera project for 2009 and 2010 were studied. Also, the values and orientation of the correlation links of the economic longevity period with indices of lifetime productivity of experimental cows of different genotypes were determined. It was found that in experimental animals with an increase in the genotype share of genes in the Holstein breed, a positive trend was observed to increase milk yield per day of lactation, and a negative tendency to decrease the duration of productive use, lifelong dairy productivity, and economic efficiency. In all groups, a high positive correlation was found between the duration of use of cows and lifelong milk yield, the duration of use of cows and their lifelong yield of milk fat, as well as between lifetime milk yield and a lifetime yield of milk fat. The presence of a weak correlation between the indices of milk yield per day of lactation and longevity has been established. The yield of lactation for one day was positively associated with lifelong milk yield and the yield of milk fat: in the group of black-and-white cows and hybrids with Holstein blood, not more than 50.0%, the correlation was weak, and in high-blooded hybrids - average. The most significant effect of the genotype was on the variability of indicators of lifelong milk yield and milk fat production.

Keywords: *Longevity, Genotype, Holstein breed, Lifetime milk productivity, Correlation Annotation.*

1. ANNOTATION

In the article, devoted to the study of the influence of the genotype on the Holstein breed, on the longevity and the lifetime of 1017 purebred and crossbred Holstein Frisian cows with a different share of genes in the Holstein breed.In cows of all groups were found, and the time of the milk yield, and the duration of the milk yield. Was identified a weak correlation between the milk yield per day of lactation and longevity. Milk yield was not positively associated with lifetime milk yield and yield of milk: purebred Holstein Frisian cows and crossbred cows with the share of genes of Holstein breed, not more than 50.0%, the correlation was weak, and crossbred cows with a higher proportion of genes of Holstein breed average. The results on lifetime milk production were affected by duration of productive life and increased number of culled cows, which had direct consequences on breeding and economic results. Lifetime milk production, achieved in complex conditions on cattle farms, has a great economic importance. The most significant effect of the genotype was on the variability of lifetime milk yield and lifetime production of milk fat.

2. INTRODUCTION

The efficiency of dairy cattle breeding largely depends on the intensity of use of the breeding stock. The period of economic use of cows, which largely determines not only the economy of production but also the effectiveness of selection work in herds (has a direct impact on the intensity of selection and the rate of genetic progress) is of great importance. The productive longevity of cows

depends on the size of lifelong milk yield, the quantitative and qualitative growth of the herd, the amount of capital investment for its formation and the effectiveness of their use. In modern economic conditions, the most profitable branch of livestock production is dairy cattle. One of the main conditions ensuring an increase in the production of milk is the acceleration of the rate of pedigree work aimed at the creation of herds, the animals of which meet the modern requirements for effective feed utilization, are characterized by a high level of precocity and longevity and the fullest possible realization of genetic potential [1]. In terms of industrial technology, the period of economic use of the breeding stock is shortened. The wide scale of livestock golshtinization led not only to the genetic progress of the herds in terms of productivity but also to a higher intensity of their renewal. At the same time, not only have the possibilities for breeding been drastically reduced due to a shortage of repair youngsters, but the cost of reproduction of livestock populations has also increased [2]. As is known, the main factors that influence the period of productive longevity of cows include both the overall level of feeding, and the balance of diets for nutrition, protein content, macro- and microelements, age at the time of the first calving and the degree of dissociation of the first-calves, including to record productivity. At the same time, along with the factors mentioned, a system of crossing different breeds has a significant effect on the productive longevity of cows [3]. According to the data available in the scientific literature, golshtinization of the black-motley and some other breeds of milk in the dairy direction of productivity in some cases leads to a reduction in the period of productive use and the level of lifelong productivity in hybrid animals [4, 5, 6, 7, 8]. In other studies, it has been established that an increase in the relative proportion of Holstein genes in the genotype of dairy cattle leads to improved technological performance of the udder of animals, increases the level of lifelong milk productivity and the duration of productive life of golshtinized cows [9, 10, 11, 12, 13, 14]. In the third case, it is recommended that we confine ourselves to obtaining half-breeds [15]. Therefore, it is necessary to constantly monitor the results of golshtinization in the conditions of each individual farm and, if necessary, in the course of implementing breeding programs, to make corrections.

3. MATERIAL AND METHODS

The study was conducted at Tripoli- Libran Dairy Farm Tripoli city is located in the north-western part of Libya at 32° 54' North latitude and 20° 4' East longitude, Tripoli city has a hot subtropical semi-arid climate with long, hot and dry summers with relatively wet and mild winters with a Mediterranean (dry-summer) rainfall pattern. Its summers are hot with temperatures that often exceed 38 °C (100 °F); average July temperatures are between 22 and 33 °C (72 and 91 °F). In December, temperatures have reached as low as 0 °C (32 °F), but the average remains at between 9 and 18 °C (48 and 64 °F). The research was carried out in Dairy cattle at Al-hiera project, Al-hiera region. Open housing system was the base in this farm, water was provided by automatic drinkers. The animals were kept in pens. Calves were grouped according to age or live body weight. Adult cows were divided into lactating, late pregnant and dry according to their physiological status. Feed requirement was determined according to milk yield and or body weight. Both natural and artificial mating systems were used on the farm. Well- fed heifers were considered to reach sexual maturity after their live weight becomes 370 kg that is attained normally at 16 months of age.

To conduct studies on the data of pedigree recording of the economy, data were collected on cows that left the herd for the period 2009-2010, while animals with incomplete lactation (less than 240 days) were not counted, Number of cows herds(n=1017). Based on the genotype, the cows were divided into 4 groups: 1 group - Holstein Frisian individuals (220); Group 2 - 0.1-25.0% of the genes in Holstein breed (372); Group 3 - 25.1-50.0% of the genes in Holstein breed (296); Group 4 - more than 50.0% of genes in Holstein breed (129). The digital material was processed according to using the MS Excel application on a PC.

4. RESULTS AND DISCUSSION

A study of the productive longevity of cows with a different proportion of genes in the Holstein breed showed that the highest duration of productive use was distinguished by thoroughbred black-motley cows - 3.1 lactations. Holstein crossbreeds were significantly inferior in longevity to thoroughbred black and motley cows at 0.7-1.1 lactation, while the increase in bloodiness was accompanied by a decrease in the use of cows.

Data on lifetime productivity of cows of different genotypes are presented in Table 1.

Table 1. The dairy productivity of cows of different genotypes for the entire period of use (M ± m), kg

Genotype	Number of cows, heads	Lifetime productivity		
		milk	milk fat yield	milk for 1 day of lactation
purebred Holstein breed	220	15594 ± 735.6	571.9 ± 27.14	14.6 ± 0.18
0,1-25,0% of the gene's share in Holstein breed	372	12163 ± 384.0 **	438.6 ± 14.08 **	15.2 ± 0.16 *
25,1-50,0% of the gene's share in Holstein breed	296	12033 ± 421.6 **	437.4 ± 15.46 **	15.4 ± 0.17 **
more than 50.0% of the genes belonging to Holstein breed	129	10739 ± 487.5 ***	388.4 ± 17.70 ***	15.2 ± 0.25

When assessing the effectiveness of using cows of different genotypes (Table 1), it was established that the maximum lifetime yield of those animals that had the maximum duration of productive use. Reliably the greatest milk yield during the whole period of exploitation was registered in animals of the first group - 15594 kg, which was higher than in the low-breed hybrids of the second group by 3431 kg (28.2%), 3561 kg (29.6%) compared to animals, 25.1-50.0% of the genes in Holstein, 4855 kg (45.2%) higher than in hybrids with more than 50.0% of Holstein genes in their genotype. Purebred Holstein Frisian cows also had the highest indicator of lifelong milk fat yield - 571.9 kg, which was significantly higher than the index of crossed animals by 133.3-183.5 kg (30.4-47.3%, P <0.01). According to the amount of milk received on average for one day of lactation, the advantage was over the crossed animals. They exceeded the purebred Holstein Frisian individuals by 0.6-0.8 kg (4.1-5.5%). To conduct effective work aimed at increasing the period of productive use, it is important to know the reasons for the premature departure of animals from the herd. In this regard, we studied the structure of the causes of the retirement of cows of different genotypes. It was established that the bulk of purebred individuals of Holstein Frisian breed was lost for other reasons (38.2%), due to diseases and injuries of the extremities (21.4%) and udder diseases (19.5%). When considering the reasons for leaving the low-blooded hybrids of the second group, it was revealed that other causes (41.4%) of the disease and limb trauma (23.1%) and gynecological diseases (15.3%) were the main reason for their departure from the herd. Mixtures with a proportion of genes in the Holstein breed were 25.1-50.0% dropped out of the herd for other reasons (36.8%), due to diseases and injuries of the extremities (25.7%), gynecological diseases (21.3%). When analyzing the reasons for the retirement of cows with the share of genes in Holstein, more than 50.0%, it was found that they were mainly rejected due to diseases and injuries of the extremities (32.6%), other causes (29.5%) and gynecological diseases (25, 6%). Consequently, under the conditions of the farm under study, golshtinized animals were more susceptible to diseases and injuries of the extremities, as well as to gynecological diseases. At the same time, it should be noted that a low percentage of cows are rejected for breeding and breeding work. Due to low productivity, 2.3 to 7.5% of all animals that were disposed of were rejected. In accordance with the stated tasks, we determined the correlation coefficients between the indicators characterizing their economic longevity and lifelong productivity in cows of different genotypes (Table 2).

Table 2. Correlation coefficients between indicators of economic longevity and lifelong productivity in cows of different genotypes

Correlated indicators	Group			
	1	2	3	4
Longevity × life-long milk yield	0.96	0.92	0.94	0.92
Longevity × life-long yield of milk fat	0.97	0.90	0.94	0.92
Diet for 1 day of lactation x longevity	0.04	-0.16	-0.13	0.13
Diet for 1 day of lactation x lifetime output of milk fat	0.20	0.03	0.06	0.32
Diet for 1 day of lactation x lifelong milk yield	0.21	0.03	0.07	0.33
Lifetime milk yield × life-long yield of milk fat	0.99	0.99	0.99	0.99

Analysis of the data in Table 2 indicates a high positive correlation between the duration of use of cows and lifelong milk yield in all groups (r = 0.92 ... 0.96). The relationship between the duration of use of cows and their lifelong yield of milk fat is also positive and high (r = 0.90 ... 0.97). The presence of a weak correlation between milk yields per lactation day and longevity was established, while in the first and fourth groups it was positive (r = 0.04 ... 0.13), while in the second and third - negative (r = -0, 16 ... -0.13).

Lactation for one day of lactation was positively associated with lifelong milk yield and milk fat yield: in the group of black-and-white cows and hybrids with Holstein bloodiness of not more than 50.0%, the correlation was of weak strength (r = 0.03 ... 0.20 and r = 0,03 ... 0,21, respectively), and for high-blooded crosses - the average force (r = 0,32 and 0,33 respectively). Closely and positively in all groups, life-long milk yield and lifetime yield of milk fat were interrelated (r = 0.99). In order to establish the effect of the "gene share of the Holstein breed" factor on the productive use of cows and their lifelong milk production, we carried out a one-factor analysis of variance. The results are shown in Table 3.

Table 3. The share of genotype influence on productive longevity and lifetime productivity of cows, %

Index	h^2
Productive longevity	9.8
Lifetime	12.3
Lifetime output of milk fat	13.1

The data in Table 3 allow us to conclude that the genotype has had a certain effect on longevity and the indices of lifelong productivity of the animals under study. At the same time, the strongest influence was on the variability of the indicators of lifelong dairy productivity: 12.3 and 13.1%. Long-term use of cows should be beneficial not only in the selection aspect but also in the economic one. Calculations showed that the most cost-effective was the productive use of black-and-white cows, characterized by maximum productive longevity. For the entire period of use from them net profit was 23.3-32.1% more than from hybrid animals.

5. CONCLUSION

Thus, with the increase in bloodiness in Holstein, the tendency of increasing milk yield per lactation day was traced, but the duration of use, lifelong milk productivity and economic efficiency decreased. In order to increase the profitability of milk production while conducting breeding work with dairy cattle, it is necessary to evaluate the effectiveness of the planned breeding activities not only taking into account the increase in milk productivity indicators, but also taking into account their impact on the period of use of animals. An increase in the productive life of cows makes it possible to conduct expanded reproduction of the herd, carry out genetic improvement of animals, provide a higher level of selection and breeding work (breeding along lines and families), reduce material costs for growing and forming the main herd, increase production, reduce its cost. The period of productive use of each animal is determined by the peculiarities of its individual formation, therefore their knowledge and application make it possible to form the desired type of constitution of the individual and to increase the duration of its productive longevity.

6. REFERENCES

[1] Rudishina NM, Nekrasov G.D. Effect golshtinizatsii on dairy productivity and reproductive qualities of cows of black and motley breed. Bulletin of the Altai State Agrarian University. 2008. № 8 (46). Pp. 46-48.
[2] Moskalenko LP, Zvereva EA Features of lifetime productivity of Yaroslavl golshtinizirovannyh cows. Herald of the agrarian and industrial complex of the Upper Volga region. 2008. № 3. P. 15-17.
[3] Sharafutdinov GS, Shaydullin R.R. Productive longevity of cows of different genotypes. Scientific notes of the Kazan State Academy of Veterinary Medicine. N.E. Bauman. 2010. T. 202. P. 226-230.
[4] Korshun SI, Klimov NN Longevity and milk productivity of cows of different genotypes. Agriculture - problems and perspectives: coll. sci. tr. UO "GGAU". Grodno, 2015. 31. 31. P. 63-69.
[5] Strekozov NI, Sivkin NV Productive longevity of cows during golshtinizatsii black-cattle. Genetics and breeding of animals. 2014. № 2. P. 11-16.
[6] Kulikova SG, Yolkin N.N. Productive longevity of cows, depending on the blood content of Holstein breed and linear affiliation. Bulletin of the Novosibirsk State Agrarian University. 2010. T. 3. No. 15. P. 68-72.
[7] Pavlova TV, Kolotova AA Productivity and duration of economic use of cows of different genotypes in JSC "Alexandria" Actual problems of intensive development of cattle breeding: Sat. sci. tr. Belarusian State Agricultural Academy. Gorki, 2016. Issue. 26, part 1. Pp. 223-226.
[8] Valitov Kh.Z., Berzhanov BB, Mueller DM Productive longevity of cows of different genotypes. Actual problems of agrarian science and ways to solve them: Sat. sci. tr. Samara State Agricultural Academy. Kinel, 2016. P. 221-224.
[9] Ivanova NI, Fetisova AV, Fedoseeva NA The influence of golshtinization on longevity and lifetime yield of Kholmogory cows. Actual problems of scientific thought: Sat. articles of the International Scientific and Practical Conference. Ufa: Scientific Center "Aeterna", 2014. Part 2. Pp. 51-54.
[10] Kovtonogov MV, Kovtonogova Yu.A. The influence of golshtinization on the morphofunctional properties of the udder of black-and-motley cows in OAO Zarya of the Khabarovsk Territory. Chief livestock specialist. 2013. № 2. P. 42-47.
[11] Stepanov A.V., Checheniheina O.S. The impact of technological and genetic factors on milk productivity and the properties of the udders of cows. Bulletin of the Kurgan State Agricultural Academy. 2012. № 2 (2). Pp. 48-50.
[12] Usmanova EN, Buzmakova E.D. Milk productivity and duration of use of cows, depending on the bloodiness of Holstein. Zootechny. 2012. № 10. P. 17-18.
[13] Klimov NN, Korshun SI Efficiency of using Holsteinized black-and-white cattle for milk production. The young scientist. 2016. № 24. Pp. 143-146.

[14] Gnatyuk S., Kovalenko V.M. Vplyiv spadkostosti on the showers of productive dovgolitya in the tvarin riznikh vnutrishnogoborodnikh tipiv ukrainian chervonoi molochnyi breed. Вісник Сумського національного аграрного університету. Серія: Тваринництво. 2013. Vip. 7. P. 22-24.
[15] Yumaguzin IF Effect golshtinizatsii on the duration of economic use bestuzhevskih cows. Food security in the context of new ideas and solutions: Sat. sci. tr. State University. Shakarim of the city of Semey. Semey, 2017. pp. 354-356.

