УДК 636.934

**Научная статья**

Открытый доступ

DOI: 10.32634/0869-8155-2022-363-10-44-47

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Поступила в редакцию:
24.06.2022

Одобрена после рецензирования:
29.08.2022

Принята к публикации:
29.09.2022

# Взаимосвязь показателей роста ремонтных телок по периодам

## РЕЗЮМЕ

**Актуальность.** В Свердловской области используется уральский тип голштинизированного черно-пестрого скота. Проведение голштинизиции выявило ряд проблем в разведении помесных животных, в том числе снижение продуктивного долголетия коров. Это ставит новые задачи по решению вопросов воспроизводства стада и выращиванию ремонтного молодняка. Изучение взаимосвязи динамики живой массы по периодам роста в разрезе линий молодняка актуально и имеет практическое значение. В результате проведенных исследований установлено, что телки линии Вис Бэк Айдиала 1013415 по живой массе во все периоды превосходят своих сверстниц из линии Рефлекшн Соверинга 198998, несмотря на то, что они выращивались в одинаковых условиях содержания и кормления и при рождении имели практически одинаковую живую массу. В 6-, 10- и 12-месячном возрасте разница по живой массе оказалась достоверной при $p \leq 0,05$–$0,01$ в пользу телок из линии Вис Бэк Айдиала 1013415. По периодам роста установлена положительная сопряженность с изменением живой массы. Корреляция между живой массой по периодам и возрастом первого осеменения отрицательная.

***Ключевые слова:*** коровы, ремонтный молодняк, живая масса, продуктивность, периоды роста, мясное животноводство

***Для цитирования:*** Горелик А.С., Горелик О.В., Миколайчик И.Н., Морозова Л.А., Чумаков В.Г., Морозов В.А., Мухамеджанова А.С. Взаимосвязь показателей роста ремонтных телок по периодам. Аграрная наука. 2022; 363 (10): 44-47. https://doi.org/10.32634/0869-8155-2022-363-10-44-47. (In English).



**Research article**

Open access

DOI: 10.32634/0869-8155-2022-363-10-44-47

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Received by the editorial office:
30.06.2022

Accepted in revised:
29.08.2022

Accepted for publication:
29.09.2022

# Correlation of growth parameters to the growth periods among the replacement heifers

## ABSTRACT

**Relevance.** In Sverdlovsk region the Ural type of Holsteinized black-and-white cattle is raised and used. Admixing of Holstein line revealed a number of problems in the breeding of crossbred livestock, including decrease of the cows' productive longevity. This poses new challenges for solving the issues of the herd reproduction and growing of young replacement livestock. The research of correlation between the dynamics of live weight gain by periods of growth along the young livestock lines is relevant and has practical significance. In result of the research it was found that the heifers of Vis Back Ideal 1013415 line outcompeted their peers from the Reflection Sovering line 198998 in terms of live weight in all periods, provided that they were raised under the same conditions, same feeding and same care; moreover all heifers had practically the same live weight at birth. At 6, 10 and 12 months of age, the difference in live weight was significant at $p \leq 0.05$–$0.01$ in favor of heifers of the Vis Back Ideal 1013415 line. According to the periods of growth, a positive conjugation of body weight changes was revealed. The correlation between live body weight by periods and the age of the first insemination is negative.

***Key words:*** cows, replacement livestock, live weight, productivity, growth periods, beef farming

***For citation:*** Gorelik A.S., Gorelik O.V., Mikolaichik I.N., Morozova L.A., Chumakov V.G., Morozov V.A., Mukhamejanova A.S. Correlation of growth parameters to the growth periods among the replacement heifers. Agrarian science. 2022; 363 (10): 44-47. https://doi.org/10.32634/0869-8155-2022-363-10-44-47

**Введение / Introduction**

In any country ensuring food security poses big challenges for the farmers, as they have to increase production yield and improve the quality of agricultural products, including products of animal origin [1–8].

Great importance is referred to development of dairy cattle breeding as a branch of livestock husbandry, where milk — the valuable food product and raw material for food industry — is obtained [9–12].

For its production, highly productive dairy cattle are used, the main livestock of which belongs to related breeds of Dutch origin — i.e. Holstein breed, Black-and-White mottled breed, etc. [13–15].

The gene pool of the Holstein breed, which is considered the best dairy breed in the world, has been widely used for a long time, for more than four decades running, and it keeps on being used to improve domestic livestock, including the Black-and-White mottled breed in order to increase abundant milk yield and to improve technological characteristics in industrial dairy production [16–18].

A wide array of Holsteinized black-and-white mottled cattle has been derived. This cattle features high proportion of Holstein breed blood, and this cattle differs in its economically useful traits and phenotypic parameters depending on the region of breeding and breed resources used for crossing. In Sverdlovsk region, the Ural type of Holsteinized black-and-white cattle is used. Despite the many positive results of holsteinization, a number of negative features were revealed also during the breeding of crossbred animals, including a decrease of the cows' productive longevity. In its turn, this poses new challenges for herd reproduction and growing of the young replacement livestock, which is increasingly required to replace the main herd [19, 20].

The research of influence of the breed origin on growth and development of young replacement livestock is relevant and has practical importance.

The aim of the work was to study the correlation between growth rates and growth periods amoing the young replacement heifers of different lines.

**Материал и методы исследования / Materials and method**

The objects of research were the replacement heifers of Holsteinized black-and-white mottled cattle. The research was carried out in the pedigree cattle reproducing farms for breeding of Holsteinized black-and-white mottled cattle of Ural type of the Sverdlovsk region. The scope of research included all cows, that finished lactation period. For analysis the data were used from the database for zootechnical and pedigree data registration «SELEKS. Dairy cattle». The weight growth data of replacement heifers obtained by monthly weighing was analyzed. The average daily body weight gains and correlation coefficients between body weight were calculated for the periods of the livestock growth. The heifers were divided into groups depending on their breed lineage: group 1 consisted of the replacement heifers of the Vis Back Ideal line; group 2 included only heifers of Reflection Sovering breed lines.

**Результаты и обсуждение / Results and discussion**

The increase of the herd breeding value is ensured by constant introduction of better breeding young heifers into the herd. This is achieved by targeted selection and breeding work aimed to selection, deriving and intensive raising of young livestock with high genetic potential for milk productivity.

The results of raising the young replacement livestock on the farm, depending on their linear origin, are presented below in the figure 1.

The figure clearly shows that heifers of the Vis Back Ideal 1013415 line outperformed their peers from the Reflection Sovering 198998 line in terms of live weight gain in all periods of growth, despite the fact that they were raised under the same conditions of keeping and feeding, and at birth all of them had almost the same live weight. At 6, 10 and 12 months of age, the difference in live weight was significant at $p \leq 0.05–0.01$ in favor of heifers from the Vis Back Ideal 1013415 breed line.

According to the average daily gains in live weight, it is possible to conclude on the growth rate of heifers in various periods of their raising. In addition, according to the dynamics of average daily weight gains, it is possible to assess the raising system of young replacement livestock.

The figure 2 below presents data on average daily live weight gain among the replacement heifers of Holstein lines of black-and-white cattle.

The highest average daily live weight gains were observed among the heifers during the lactation period.

**Figure 1.** Dynamics of live weight gain among the replacement heifers by growth periods, kg

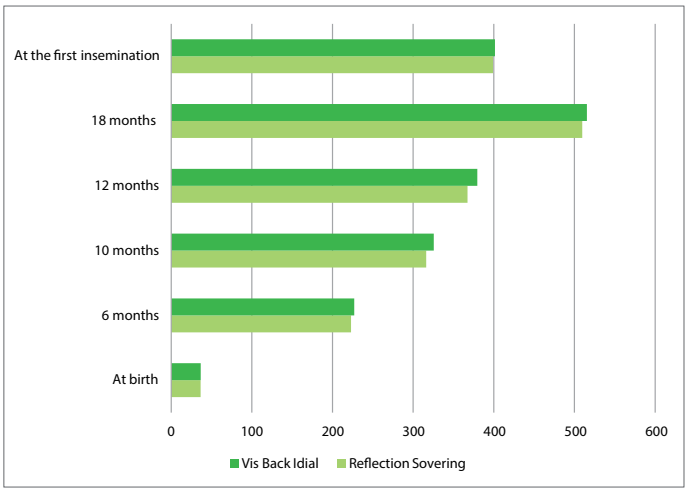
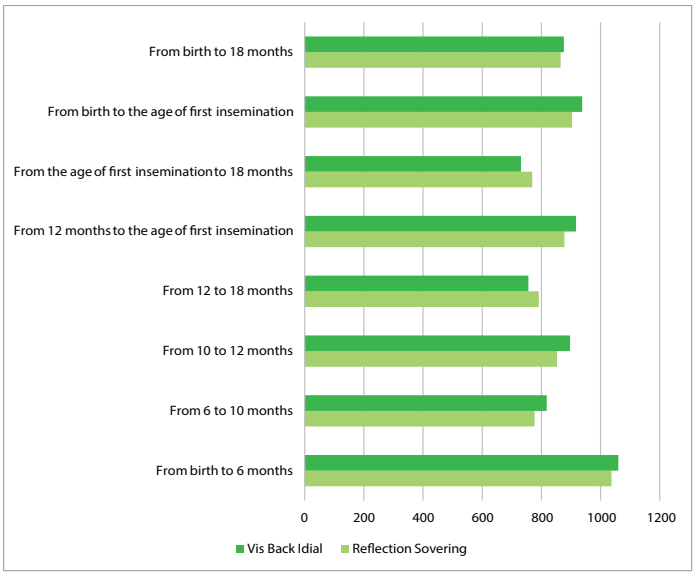



**Figure 2.** Average daily live weight gains among the replacement heifers, g



The farm operates an intensive system for raising of the young replacement livestock with average daily weight gains of 900–950 g up to the date of the first insemination, and with high average daily live weight gains during the preweaning period. This allows very early insemination of replacement heifers at the age of 12.8–13.2 months when their live weight reaches 399–401 kg in the breed lines, respectively.

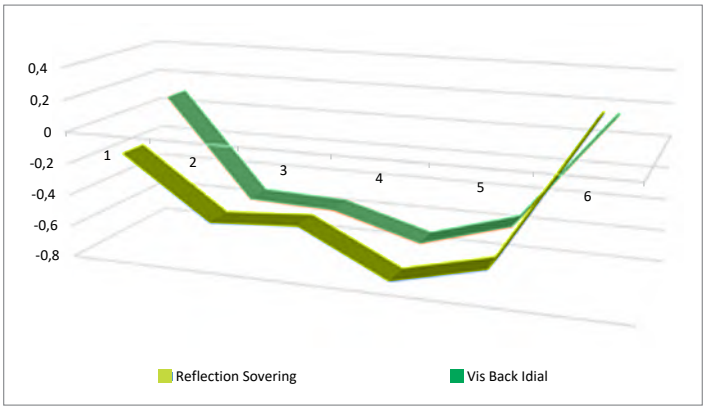
The interrelation of the researched features with each other raises interest. While researching this interrelation, we found that this interrelation in heifers of the Reflection Sovering 198998 line is medium and high positive along the growth periods, with the exception of the conjugation of live weight at birth and at age of 18 months (table 1).

Medium and high coefficients of correlation between the live weights of replacement heifers by growth periods allow predicting the weight growth and monitoring the compliance of planned weight gains with the obtained results, thereby improving the cattle raising technology. The correlation coefficient between body weight at birth and at 18 months was –0.04, so it cannot be used to predict body weight of a heifer at age of 1.5 years by its weight at birth.

Similar calculations were performed using the data of Vis Back Ideal 1013415 line (table 2).

In result of assessment of live weight conjugation among the replacement heifers of Vis Back Ideal 1013415 line, a low negative correlation was found between live weight of a heifer at birth and the live weight of a heifer at age of 10 and 12 months. In other periods the correlation is high and positive.

**Figure 3.** Correlation between the live weight of heifers and the age of the first insemination: 1) live weight at birth/the age of the first insemination; 2) live weight at 6 months/the age of the first insemination; 3) live weight at 10 months/the age of the first insemination; 4) live weight at 12 months/the age of the first insemination; 5) live weight at 18 months/the age of the first insemination; 6) live weight at the first insemination/the age of the first insemination.




Correlation coefficients were calculated between body weight parameters at certain periods of growth and the age of the first insemination.

In result an average negative conjugation between these parameters was found for the raised replacement heifers of the breed lines under research (figure 3).

The figure clearly shows that the correlation coefficient amounted to 0.10 only in case of assessing the correlation between live weight of a heifer at birth and the age of first insemination of a heifer of the Vis Back Ideal 1013415 line.

The correlation between live body weight at the first insemination and the age of the first insemination was also positive.

The coefficient of correlation was insignificant, but still higher in the group of Reflection Sovering line 198998 heifers.

*Table 1.* **The conjugation of live weight among the replacement heifers of Reflection Sovering 198998 by the periods of growth**

| Live weight | Live weight at birth, kg | Live weight at 6 months, kg | Live weight at 10 months, kg | Live weight at 12 months, kg |
|---|---|---|---|---|
| At 6 months, kg | 0.31 | 1.00 | – | – |
| At 10 months, kg | 0.29 | 0.87 | 1.00 | – |
| At 12 months, kg | 0.17 | 0.72 | 0.73 | 1.00 |
| At 18 months, kg | –0.04 | 0.44 | 0.41 | 0.60 |

*Table 2*. **The conjugation of live weight among the replacement heifers of Vis Back Ideal 1013415 by the periods of growth**

| Live weight | Live weight at birth, kg | Live weight at 6 months, kg | Live weight at 10 months, kg | Live weight at 12 months, kg |
|---|---|---|---|---|
| At 6 months, kg | 0.04 | 1.00 | – | – |
| At 10 months, kg | –0.02 | 0.83 | 1.00 | – |
| At 12 months, kg | –0.05 | 0.70 | 0.74 | 1.00 |
| At 18 months, kg | 0.07 | 0.66 | 0.52 | 0.62 |

## Выводы / Conclusion

Basing on the above-stated, it is possible to conclude that the farm operates an intensive system for raising young replacement livestock, and makes the first insemination at a very early period (13–14 months), with a heifer live weight of 399–405 kg.

A positive conjugation of live weight changes was established in reference to the periods of growth.

The correlation between live weight by periods and the age of the first insemination is negative.

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Все авторы внесли равный вклад в эту научную работу.
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Авторы заявляют об отсутствии конфликта интересов.

All authors bear responsibility for the work and presented data.
All authors have made an equal contribution to this scientific work.
The authors were equally involved in writing the manuscript and bear the equal responsibility for plagiarism.
The authors declare no conflict of interest.

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