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THE FEATURES OF EMBRYONIC DEVELOPMENT OF ET CALVES HOLSTEIN BREED

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Abstract. *Based on research findings it is set that ET calves Holstein's breeds after the indexes of mean time of period of embryonic development and living mass at birth for certain renounce to the analogues got as a result of artificial insemination of dairy cattle. Thus the coefficient of changeability of living mass of new-born calves is higher and makes Cv=16,5 %. All calves are descendants of three sires: Legend 135404667, Hefti 138550394 and Kepmen 63262902. During the research of duration of embryogenesis and live weight of calves at birth, depending on their origin significant differences were not found.*

Keywords: transplantation of embryos, duration of embryogenesis, living mass, calves.

Research has found that over the past 10-15 years there has been a tendency to reduce the period of economic use of dairy cows, particularly intensive type [1,9]. And with an average duration of use of 2,5 lactations cows, cows are retiring earlier than their daughters will give offspring. Under these conditions, a herd ceases to exist as an integrated biological system and following its collapse [7]. Therefore, in order to accelerate the increase of production capacities farms bred dairy cattle should be carried out scientific research as a process and selection decisions.

Application of embryo transplantation makes it possible to get the maximum amount of descendants of high-yielding cows and accelerate the formation of breeding herd. It is an effective means of intensifying and accelerating the reproduction of genetic progress in cattle [3, 6]. It is known that during the reproductive life of a cow, which is highly productive, it would be, gives rise to an average of 4-6 calves and only half of them - are heifers. [3]

In one hormone treatment of cows-donors on average receive about five embryos. If the donor use for 3-4 times a year, this number can be reduced to 15-20. With only 10-20 cows with high milk yield, you can create repair herd of 150-400 heads during one year, and for two years with these cows you can create a family [11]. Therefore, the number of ET animals in Ukraine farms is tends to increase [2].

Transplantation of embryos based on the absence of changes in the genome of transplants developing in a strange for it body of the recipient. This fact is confirmed by long practice of transplantation of embryos of laboratory and farm animals, indicating a lack of significant differences in the development and productivity of transplants and their control peers or consolidated sisters and brothers that developed from zygotes of recipient. This applies are not only by exterior but also interior parameters [4].

However, still very little scientifically based data on the effects of interference in the embryo, the duration period of embryonic development of ET calves, their physiological maturity, continued growth and development, productivity and duration of economic use.

Research and comparison of such index as the live weight of calves at birth obtained using this method and without using it, is also a necessary step in the study of their further formation during ontogenesis. Indeed, many researchers believe that the duration of pregnancy is closely linked to the intensity increasing live weight of the fetus in the embryonic period of development, and the influence of the mother on the live weight of the calf at birth is 75% or more [12, 10].

The aim of research was to study the duration of embryonic development and live weight of newborn calves received by embryo transplantation.

Materials and methods of research. Scientific and economic experiment carried out on a herd of cattle Holstein breed in "Agro-Soyuz" Dnepropetrovsk region. Livestock kept indoors all year round in lightweight semi-open type buildings with comfortable and dry boxes for families with sand bedding. Feeding cows a year full of the same type carried forage mixture on feed tables.

For research were involved two groups of calves: I group - calves obtained by embryo transfer (n = 77) and group II - calves receiving by artificial insemination (n

= 146). The experimental animals were descendants of the same bull sires (Legend 135404 667, Hefti 138550394, Kepmen 63262902) and analogues by date of birth. All calves as their mothers were under the same conditions and feeding. The heifers by age coupling of Holstein breed were recipients.

The duration of embryonic development of calves and their live weight at birth were considered in this research work. Duration of embryogenesis of ET calves was calculated by the difference between the date of birth and date of embryo transplantation, making correction by adding index that reflects the cycle of donor cows on the date of leaching of embryos in days. Biometric processing the results of research carried out by methods of variation statistics according to N. A. Plokhynskyi [8], H. F. Lakyn [5] using standard statistical package of applied programs.

Results of research. Analysis of the research showed that the average duration of embryonic development of ET calves was shorter compared with their counterparts calves obtained by artificial insemination - by 3,13 days (P> 0,95). The degree of variability of the duration of embryogenesis of experimental herd is weak and accordingly is Cv = 2,5 and 3,3%, which suggests a relatively high genetic stability of this trait (table 1). Individual variability of the duration of embryogenesis of ET calves ranges from 253 to 294 days. Modal values of duration of embryonic development in a group of ET calves was 273 days, and in the second group - 277 days. Significant difference in duration of embryogenesis relative to sex of the fetus is not revealed.

1. Duration of embryonic development of calves, days

Group	Indicator		
	M±m	Cv, %	lim
I – research ET calves (n=77)	275,33±0,76*	2,5	253-294
II – control (n=146)	278,46±1,02	3,3	246-312

Note: * P> 0,95

It is known that the outcome quality of prenatal development calves - is lack of disease in newborns and achieve proper body weight, which will ensure the viability

and normal development of animals and further high level of productivity. In this regard were studied live weight of newborn calves.

Established that the average body weight of newborn ET calves high credibly inferior calves, received from artificial insemination of cows - on 3,01 kg or 8,4% (table 2). One of the factors behind this difference is the birth of 12 pairs of twins with an average live weight of calves is 28,58 ± 6,2 kg. It should also be noted that the variability of this trait also higher in the group of ET calves and is Cv = 16,5%.

2. Live weight of newborn calves, kg

Group	Indicator		
	M±m	Cv, %	lim
I – research ET calves (n=77)	32,61±0,62***	16,5	20-52
II – control (n=146)	35,62±0,34	11,4	25-45

Note: *** P> 0,999

The relationship between the duration of embryonic development of ET calves and their body weight at birth is close to zero (r = 0,045), indicating that the independent variation of features, and the peers of group II - weak negative (r = -0,121 ± 0,076).

All newborn calves are descendants of three bulls-sires: Legend 135404667, Hefti 138550394 and Kepmen 63262902. Therefore it was studied the duration of embryogenesis and live weight of calves at birth depending of their origin.

Analysis of the data showed that for the duration of embryonic development between descendants of above mentioned bulls, significant differences were not found (table 3). The variability of this trait ranged from Cv = 1,11% to Cv = 4,77%.

3. Duration of embryonic development and live weight at birth of ET calves and their analogues

Bull- sire	Indicator			
	duration of embryogenesis, days		live weight, kg	
	M±m	Cv, %	M±m	Cv, %
ETcalves				
Legend 135404667 (n=14)	273,00±2,02	2,67	33,86±0,96	10,61

Hefti 138550394 (n=8)	277,0±1,38	1,11	31,37*±0,91	8,16
Kepmen 63262902 (n=43)	272,94±2,17	4,57	31,58***±0,85	17,56
calves analogues				
Legend 135404667 (n=19)	275,83±4,42	3,92	33,33±1,13	10,73
Hefti 138550394 (n=44)	277,25±1,40	3,35	35,42±1,52	10,74
Kepmen 63262902 (n=45)	277,00±4,68	4,77	35,62±0,8	10,43

Note: * P> 0,95; *** P> 0,999

Daughters of a bull Legend 135404667 had the most large descendants among ET calves, difference between descendants of the other two sires was 2,3-2,5 kg, but this difference of newborns by body weight was not statistically probable (td = 1,89, P <0,95). It will also be noted that daughters of sires Hefti 138550394 and Kepmen 63262902 recived by embryo transfer, significantly inferior of their peers by live weight obtained by artificial insemination - on 4 kg or 13%. Variability (Cv) of experimental features of ET calves are varies over a wide range (8,16 - 17,56%) than that of counterparts (10,43 - 10,74%). Of course, in this case, one of the determining factors of variability of signs of duration of embryonic development of genetically uniform group of ET calves is the impact of the environment, which is implemented directly through the body of the recipient.

In reviewing the results of the research of the correlation of ranks (table 4) among ET heifers and their analogues daughters of bulls Legend 135404667, Hefti 138550394 and Kepmen 63262902, can be seen that the greatest correlation link was in the daughters of bull Hefti 138550394 (r_s = 0, 8) and the lowest in daughters of a bull Kepmen 63262902 (r_s = 0,346), but all results are characterized by medium, high and excluding of descendants of bull Legend 135404667 significant at P <0,05 values. Thus bulls as Hefti 138550394, Kepmen 63262902 and Legend 135404667 should be used for getting the ET heifers.

4. Correlation of ranks by indicators of live weight at birth of heifers

Indicators	Daughters of bulls-sires		
	Legend 135404667	Hefti 138550394	Kepmen 63262902
Correlation of ranks (r_s)	0,406	0,8	0,346
Error of correlation (mr_s)	0,323	0,3	0,174
The reliability of correlation (tr_s)	1,41	2,67*	2,00*

Note: * P <0,05

Correlation of ranks by indicators of live weight of calves at birth of bulls indicate that live weight of this bulls (ET bulls) and their analogues of bull Kepmen 63262902 shows a high and reliable connection $r_s = 0,679$ (P <0,05).

Conclusions. Consequently, ET calves by the mean length of embryogenesis and body weight at birth significantly inferior to their peers who received as a result of artificial insemination, accordingly - on 3,13 days (P> 0,95) and 8,4% (P> 0,999).

The live weight of newborn daughters of sires Hefti 138550394 and Kepmen 63262902 received by embryo transfer was almost on 13% lower than such sign of peers obtained through artificial insemination. Herewith the variability (Cv) of ET calves was in a wide range (8,16 - 17,56%).

The research of the correlation of ranks among ET heifers and their analogues have shown that the greatest correlation link was in the daughters of a bull Hefti 138550394 ($r_s = 0,8$) and the lowest in daughters of a bull Kepmen 63262902 ($r_s = 0,346$), but all results are characterized by averages, high and excluding the descendants of bull Legend 135404667 reliable at P <0,05 values.

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