http://www.moderntechno.de/index.php/meit/article/view/meit27-01-033
DOI: 10.30890/2567-5273.2023-27-01-033

THE INFLUENCE OF MATERNAL NUTRITION ON THE DURATION OF INTRAUTERINE DEVELOPMENT OF CALVES

ВПЛИВ ЖИВЛЕННЯ МАТЕРІ НА ТРИВАЛІСТЬ ВНУТРІШНЬОУТРОБНОГО РОЗВИТКУ ТЕЛЯТ

Prylipko T.M. / Приліпко Т.М.,
d.a.s., prof. / д.с.н.. проф.
ORCID: 0000-0002-8178-207X
Publons: AAF-5445-2019
Koval T.V., / Коваль Т.В.
c.a.s., as.prof. / к.с.н., доц.
ORCID: 0000-0002-7132-5887
Higher education institution « Podolsk State University»,
Kamianets-Podilskyi, Shevchenko,13,32300
Заклад вищої освіти «Подільський державний університет»

***Abstract**. Heifers of the black-spotted breed with a prolonged duration of embryonic development at the age of 20 and 90 days had the lowest live weight, the highest indicator was with an average, intermediate - with a short duration of embryogenesis. Animals with prolonged intrauterine development probably lagged behind representatives of other groups in terms of mass. The same sequence was preserved in their 6-month-old age. The low level of nutrition of females had the greatest impact on parts of the body of the fetus that develop late - the lumbar region, pelvis, chest, and least of all on the parts of the body that develop early - the head, legs. The greatest yield (4111 ± 127 kg) was obtained from Simmentals with an average duration of intrauterine development (286-296 days). At the same time, animals in which this indicator exceeded 295 days, transferred for 6 days - (the average became 289.7 ± 0.95), the weight was 2997 ± 231 kg. On animals of the Dutch breed, it was established that their productivity was directly dependent on the degree of use of feed nutrients at an early age, and the latter was inversely proportional to the duration of embryonic development. The weight of cows with an average duration of embryogenesis (266 days) was 5060 kg with a fat content in milk of 4.1%, and with its duration of 277 days - 4705 kg and 4.16%, respectively. The importance of the duration of fetal development is estimated by scientists in different ways.*

***Key words:** productivity, animals, hope, nutrients, embryonic development*

The size of newborn calves is related to the length of their embryonic period and, thus, to the amount of nutrients received from the mother during the embryonic period. The author [2,4] established that in Simmental and Lebedin cattle, the embryonic period lasted 281-292 days in calves with a relative weight of 5.5% to the mother's weight, with a weight of 5.6-4% - 285-295 days, and with a weight of more than 6.5% - 289-299 days.

To find out the role of mother's nutrition on the size of calves born, a special experiment was conducted in which three groups of similar cows of the black-and-spotted breed were fed at different levels during the calving period. It was established that larger calves were born to cows that were fed ad libitum.

Heifers of the black-spotted breed with a prolonged duration of embryonic development at the age of 20 and 90 days had the lowest live weight, the highest indicator was with an average, intermediate - with a short duration of embryogenesis. Animals with prolonged intrauterine development probably lagged behind representatives of other groups in terms of mass. The same sequence was preserved in their 6-month-old age.

Table 1 - The influence of the level of feeding of mother cows on the size of calves at birth

Level feeding cows	Gender of calves	Number calves	Mass at births, kg
Full feeding	bulls	10	47,2
	heifers	5	43,6
Average feeding	bulls	4	43,2
	heifers	11	37,4
Underfeeding	bulls	7	39,7
	heifers	7	37,1

The author [3] reports that there is a rather complex relationship between the duration of fruiting of mothers and the live weight of calves at birth. Up to a certain limit, it is direct, and after that it even goes in reverse.

However, researchers [7,8] come to the conclusion that indicators of fetal development do not provide a basis for predicting the growth rate of an animal in subsequent periods of life.

Studies in riding and trotting horses have shown that poor nutrition increases the time to fruiting and that old mares carry a fetus longer than young mares and have more premature and stillborn foals. In mares with a strong constitutional type, fertility is increased (10-11 foals in a lifetime) and a longer foal-carrying period. It is this type of mares that gives the strongest and fastest offspring. Record-breaking horses, as a rule, had a relatively long (more than 340 days) period of fetal development, that is, they were all born normally [4].

The low level of nutrition of females had the greatest impact on parts of the body of the fetus that develop late - the lumbar region, pelvis, chest, and least of all on the parts of the body that develop early - the head, legs. This conclusion once again confirmed the law of Chirvinsky-Manigonov that insufficient nutrition at one or another stage of development delays the growth and development of those organs and tissues that grow most intensively at this stage.

When evaluating an animal at birth, it is necessary to take into account its relative size to the mother's weight and the duration of embryonic development. The heredity of the features of growth energy is manifested in the fact that transferred animals, small from birth, grow slowly, while relatively large ones at birth, with a short period of embryonic development, are often fast-growing. Thus, the maturity of a newborn animal depends both on the features of the fetal period of nutrition and on the prematurity that follows.

According to other authors [2], the greatest yield (4111 ± 127 kg) was obtained from Simmentals with an average duration of intrauterine development (286-296 days). At the same time, animals in which this indicator exceeded 295 days, transferred for 6 days - (the average became 289.7 ± 0.95), the weight was 2997 ± 231 kg. The authors note the curvilinear nature of the relationship between milk yield and the duration of fetal development.

Researchers [9] report a negative improbable relationship ($r = 0.190 \pm 0.2430$) between milk yield and length of gestation period. Cows with a short duration of embryogenesis (270-280 days) turned out to be the most milky.

In the experiments [6] it was shown that for the duration of the intrauterine development of animals up to 280 days, 3538 kg of milk was obtained from them for the first lactation, at 281-290 days - 3169 kg, at 291-300 days - 3058 kg. On animals of the Dutch breed, it was established that their productivity was directly dependent on the degree of use of feed nutrients at an early age, and the latter was inversely proportional to the duration of embryonic development. The weight of cows with an average duration of embryogenesis (266 days) was 5060 kg with a fat content in milk of 4.1%, and with its duration of 277 days - 4705 kg and 4.16%, respectively.

To consider the relationship between the duration of embryonic development and live weight, it is proposed [1,7] to determine the index of embryonic precociousness (the ratio of the duration of embryogenesis to live weight at birth). When comparing the index with milk yield, the author observed a negative correlation between them. Similar data were obtained in other experiments. A number of authors [8] believe that the determination of its speed, i.e., the ratio of live weight at birth to the duration of intrauterine development, can give a certain idea about the peculiarities of the growth of an organism in the embryonic period. It was established that Simmental animals with an average daily embryonic growth rate of more than 0.17 kg/day had the highest yield (4750 kg), and the productivity of those whose growth rate was less than 0.10 kg/day was 2880 kg. Growth rate in the embryonic period was directly correlated with future milk productivity (r = 0.530).

The question of the influence of the duration of embryonic development of heifers on their reproductive capacity is of considerable interest. According to the authors, the physiological maturity of heifers of the black and spotted breed with a shortened period of embryonic development reached 15.4 months, in heifers with an average duration of embryonic development - in 16.7 months, and in animals with an extended duration - 17.8 months.

Conclusion. Thus, scientists evaluate the value of the duration of fetal development in different ways.

References

1. Antipin S.L., Bobrytska O.M., Yugai K.D. Ethology of farm animals: teaching manual. Kh.: KhDZVA, 2010. 136 p.

2. Bogdanov G. O., Melnychuk D. O. Actual issues of feeding agricultural animals. Scientific Bulletin of NAU. 2004. No. 74. P. 21–30.

3. Bomko V. S., Babenko S. P., Moskalyk O. Yu. Feeding of agricultural animals. Kyiv: Agrarian Education, 2010. 278 p.

4. Gnoeviy I.V. Feeding and breeding of farm animals in Ukraine. Kharkiv: Magda Ltd., 2006. 400 p.

5. Honcharenko V. Animal health formula. Agrarian week. Ukraine. 2013. No. 8–9. P. 20.

6. Handbook on complete feeding of agricultural animals / edited by I. Ibatullin, O. M. Zhukorskyi. K.: Agrarian. science, 2016. 336 p.

7. Prylipko T.M., Kalinka A.K., Manchenko T.O. Productivity of young beef cattle under different ration models in the conditions of the Carpathian foothills. Modern achievements in animal husbandry and poultry: materials of VIII All-

Ukrainian. science and practice conf. of young scientists, Kharkiv, October 16-17, 2014. Kharkiv, 2014. P. 57–60.

8. Prylipko T.M., Koval T.V. Neurohumoral regulation of metabolism in the case of indigestion in ruminants. Taurian Scientific Bulletin. Series: Agricultural Sciences. Kherson State Agrarian and Economic University. Kherson. Helvetica Publishing House. 2022. Issue 123. P. 187–192.

9. Prylipko T.M., Kostash V.B., Koval T.V. Alimentary improvement of the reproductive function of cattle: monograph. Kamianets-Podilskyi. Vit'ADruk, 2022. 390 p.

Анотація. *Телички чорно –рябої породи з подовженою тривалістю ембріонального розвитку у 20 і 90-добовому віці мали найнижчу живу масу, найвищий показник був з середньою, проміжний – з короткою тривалістю ембріогенезу. Тварини з подовженим утробним розвитком за масою вірогідно відставали від представників інших груп. Така ж послідовність збереглась і в їх 6-місячному віці. Низький рівень живлення самиць більше за все впливав на частки тулуба плоду, які пізно розвиваються – поперекову область, таз, груди і менше всього впливав на частки тіла, шо рано розвиваються – голову, ноги. Найбільший надій (4111 ± 127 кг) одержано від сименталів з середньою тривалістю утробного розвитку (286-296 діб). У той же час тварини, у яких цей показник перевищував 295 діб, переношених на 6 діб – (середня стала 289,7 ± 0,95), надій складав 2997 ± 231 кг. На тваринах голландської породи встановлено, що продуктивність їх знаходилася в прямій залежності від ступеня використання поживних речовин корму в ранньому віці, а останній зворотно пропорційний тривалості ембріонального розвитку. Надій корів з середньою тривалістю ембріогенезу (266 діб) складав 5060 кг з умістом жиру в молоці 4,1%, а при його тривалості 277 діб – відповідно 4705 кг і 4,16%. Значення тривалості утробного розвитку вченими оцінюється по-різному.*

Ключові слова: *продуктивність, тварини, надій, поживні речовини, ембріональний розвиток*