DOI: 10.37000/abbsl.2022.104.09

INFLUENCE OF MORPHOMETRIC INDICATORS OF THE PLACENTA OF DOMESTIC ANIMALS ON NEWBORN YOUNG

Zh. Koreneva, L. Rosha, I. Zapeka,
J. Mazurenko, J. Garnazhenko, I. Shovkoplyas
Odesa State Agrarian University

The placenta is a complex of tissue formations that develop from the choroid of the fetus and the uterine mucosa. The placenta is necessary for the connection of the fetus with the mother's body. The placenta plays an important role in the development of the fetus. The placenta is an organ that provides the fetus with oxygen and all nutrients; it processes the nutrients of the mother's body (hemoglobin, proteins, carbohydrates) and synthesizes new ones; provide immune protection to the fetus. Biologically active substances are synthesized in the placenta, which have a great influence on the course of pregnancy, the development of the fetus, and later on the development of the newborn. The placenta in each species of animal has its own specific features: firstly, it is the shape and size of the contact areas of the vascular membrane of the embryo with the tissues of the uterus of the female; secondly, the level of branching of the vascular membrane of the embryo in the tissues of the uterus and its penetration into the surrounding tissues of the uterus.

During pregnancy, the uterus significantly increases its size and weight, according to experts, such an increase is in the range of 10-20 times. The placenta is the main organ, thanks to which the embryo receives nutrients for further growth and development, and also receives protection from environmental factors. The degree of development of the newborn young and the ability to adapt to the external environment also depend on the mass and development of the placenta. On average, in cows 6-8 years old and a calf weighing 27-30 kg, the weight of the placenta is 18.20 ± 2.10 kg, which is 22% more than at the age of 3-6 years, and the number of cotyledons also increases by 20%.

The mass of the placenta in large white pigs increases gradually with the age of the animal and reaches its maximum mass at 2-3 farrowings. Gradually, up to 5-6 farrowing, its weight decreases, which has a negative impact on the number of litters and the development of piglets. Changes in the weight of the placenta may be associated with the gradual extinction of the influence of hormonal regulation on the level of metabolism, the action of stress factors and in connection with previous diseases.

Key words: cattle, pigs, placenta, calves, piglets.

Formulation of the problem. The Placenta is a complex of tissue formations that develop from the choroid of the fetus and the uterine mucosa. The placenta is necessary for the connection of the fetus with the mother's body. The placenta plays an important role in the development of the fetus. The placenta is an organ that provides the fetus with oxygen and all nutrients; it processes the nutrients of the

mother's body (hemoglobin, proteins, carbohydrates) and synthesizes new ones; provide immune protection to the fetus. Biologically active substances are synthesized in the placenta, which have a great influence on the course of pregnancy, the development of the fetus, and later on the development of the newborn.

The Placenta in all mammals plays a very important role, namely, it provides the connection between the embryo and the mother's body. The placenta is formed only during pregnancy, and the choroid of the fetus and the uterine mucosa play an important role in its formation. The placenta in each animal species has its own characteristics: firstly, it is the shape and size of the areas of contact between the choroid of the embryo and the tissues of the uterus of the female; secondly, the level of branching of the choroid of the embryo in the tissues of the uterus and its deepening into the surrounding tissues of the uterus.

During pregnancy, the uterus significantly increases its size and weight, according to experts, such an increase is in the range of 10-20 times. The placenta is the main organ, thanks to which the embryo receives nutrients for further growth and development, and also receives protection from environmental factors. The degree of development of the newborn young and the ability to adapt to the external environment also depend on the mass and development of the placenta. [1-6]

Analyze of recent research and publications. Studying the literature on the development of the uterus and placenta in different animal species, namely our case in cattle and pigs, as well as on the effect of the placenta on newborn young animals, we came to the conclusion that the issue remains insufficiently studied. Therefore, in our studies, we tried to study changes in the size and mass of the placenta depending on the age of pregnant animals, as well as the effect of the placenta on the development of newborn young.

The purpose of the research. Studying the influence of morphometric indicators of the placenta on the development of newborn young cattle and pigs.

Research methods. In the study, we used weight and morphometric methods. The weight method consisted in weighing the placenta and its individual sections. Morphometric method - included the measurement of the placenta and its individual sections using measuring instruments (ruler, measuring tape and caliper).

The results of own research. Carrying out a comparative characteristic of the placenta of females of singletons and multiples (on the example of cattle and pigs), in the age aspect, some differences in morphometric indicators are noticeable. This is primarily due to certain trends, starting with the structure of the uterus and the type of placental connection.

In cattle, the placenta is syndesmochorial.

Her bicornuate form. The villi are located in the form of clusters - cotyledons. The total number of cotyledons is evenly distributed throughout the placenta, but in the pregnant part there are more of them and they are better developed.

The placenta has a good blood supply. The mass of the placenta depends on the age of the pregnant cow and the weight of the calf at birth.

Table 1. **Weight of the placenta depending on the age of cows and calves at birth (M±m).**

№ №	Age of cows	Calf weight, kg	Placenta weight, kg	Number of caruncles	Umbilical cord length, cm
1.	3 – 6	25 – 29	13,50 ± 1,49	92,6 ± 1,43	25,6± 0,54
		30 – 33	17,65 ± 0,98	110,5 ± 2,43	26,3 ± 0,27
2.	6 – 8	28 – 31	14,80 ± 1,71	97,3 ± 4,32	29,4 ± 0,63
		31 – 35	18,20 ± 2,10	117,2 ± 4,30	30,0 ± 0,48
3.	8 – 12	27 – 30	16,75 ± 1,65	102,8 ± 6,21	33,6 ± 0,98
		30 - 33	19,57 ± 1,83	108,1 ± 7,29	37,5 ± 1,65

In cows aged 3-6 years with a newborn calf weighing from 25 to 29 kg, the weight of the placenta is 13.50±1.49 kg, which has 92.6±1.43 cotyledons. With an increase in the live weight of calves at birth, the weight of the placenta also increases, so its weight is 17.65 ± 0.98 kg and the number of cotyledons also increases 110.5 ± 2.43 pcs. As a percentage - the mass of the placenta increases by 30%, and the number of cotyledons by 19%.

In cows aged 6 - 8 years with a calf weight at birth of 28–31 kg, the weight of the placenta is 14.80 ± 1.71 kg, which has 97.3 ± 4.32 cotyledons. With a weight of calves at birth of 31-35 kg, both the weight of the placenta is 18.20 ± 2.10 kg, and the number of cotyledons in it is 117.2 ± 4.30. As a percentage, respectively - 22 and 20%.

In cows aged 8-12 years and calves weighing 27-30 kg at birth, the placenta weight is 16.75±1.65 kg and contains 102.8±6.21 cotyledons. With a weight of calves at birth of 30-35 kg, the weight of the placenta is 16.75±1.65 and the number of cotyledons in it is 108.1±7.29, respectively. In percentage terms, the mass of the placenta increases by 16%, and the number of cotyledons by 5%. These changes are connected, in our opinion, with the metabolic processes both in the body of the mother and the calf, which are combined with the placenta. With an increase in the mass of the placenta, its blood supply increases. Accordingly, the fetus receives more nutrients for growth and development. These changes are evidenced by our experimental data.

In pigs, the placenta is diffuse with an epitheliochorial type of connection.

Pigs have an elongated placenta. On the surface of the placenta there are short, barely noticeable villi located in small groups.

In our experiments, we compared the mass of the placenta with the age of the sow and her weight, the number of piglets and their weight at birth. The mass of the placenta depends on the age of the sow, her weight, the number of piglets and their weight at birth.

Table 2. **Weight of the placenta depending on the age of the sow, its weight, the number of piglets and their weight at birth (M±m).**

№№	Age of the sow	Live weight of the sow, kg	Number of piglets in the nest	Weight of piglets at birth, kg	Weight of the placenta, kg
1.	1 - 2	140 - 150	8 – 10	1,100 – 1,200	0,970 ± 0,150
			10 – 12	1,100 – 1,200	1,105 ± 0,141
		150 - 160	8 – 10	1,100 – 1,200	1,140 ± 0,252
			10 – 12	1,100 – 1,150	1,190 ± 0,187
2.	2 – 4	140 – 150	8 – 10	1,100 – 1,200	1,185 ± 0,134
			10 – 12	0,980 – 1,100	1,197 ± 0,157
		150 - 160	8 – 10	0,960 – 1,200	0,980 ± 0,144
			10 – 12	0,960 – 1,100	1,148 ± 0,153

So, in sows aged 1-2 years with a live weight of 140-150 kg at birth of 8-10 piglets, the weight of the placenta is 0.970 ± 0.150 kg. With an increase in the number of piglets, the mass of the placenta also increases by 1.105 ± 0.141 kg as a percentage, which is 113%. With an increase in the live weight of sows at this age at the birth of 8–10 piglets, we observed an increase in the mass of the placenta to 1.140 ± 0.252 kg, and with an increase in piglets (10 – 12) - 1.190. ± 0.187 kg. As a percentage - 104%. We found placental enlargement in older pigs.

So, in pigs of 2-4 years of age with a live weight of 140-150 kg at birth of 8-10 piglets, the weight of the placenta is 1.185 ± 0.134 kg. With an increase in the number of newborn piglets (10 - 12), the weight of the placenta increases to 1.197 ± 0.157 kg. As a percentage - 101%. With an increase in the fatness of sows with a live weight of 150-160 kg at this age, the placenta also changes its weight.

So, at the birth of 8-10 piglets, the placenta has a mass of 0.980 ± 0.144 kg, and at the birth of 10-12 piglets, the mass of the placenta is 1.148 ± 0.153 kg. In percentage terms, this is 117%.

The mass of the placenta depends on the farrowing and the number of piglets in it, on the other hand, its mass has an impact on the development of the piglets. Thus, in the first farrowing, the mass of the placenta ranges from 0.970 ± 0.23 kg to 1.220 ± 0.58 kg. The number of piglets ranges from 10 to 12. At the first farrowing, in most cases, there are piglets with a small weight (0.850-0.950 g), which are hypotrophic (underdeveloped), but there are always no stillborn and mummified piglets. The safety of piglets during weaning is 8-10 piglets.

At 2-3 pregnancies, the placenta is already large and becomes more developed, so the average weight of piglets at birth was already 1.050 ± 0.31 kg to 1.210 ± 0.87 kg. An increase in the weight of the placenta affects the development of newborn piglets. We noted an increased number of piglets with an average body weight in the range of 1,100 - 1,300 kg. Due to the good development of the young, the number of piglets in the nests during weaning also increases.

At the fourth farrowing, the weight of the placenta ranges from 1.057 ± 0.21 kg to 1.210 ± 0.56 kg. Yes, an almost insignificant decrease in the mass of the placenta has a negative effect on the development of piglets. Both the number of stillborn and

mummified piglets and the number of hypotrophic piglets, increase, with an overall decrease in healthy piglets and the number of piglets at weaning.

At the fifth - sixth farrowing, the weight of the placenta decreases significantly and ranges from 0.940 ± 0.38 kg to 1.130 ± 0.47 kg. These changes have a direct impact on the decrease in the quality of offspring: the number of stillborn and mummified piglets increases - up to 2 - 3, there are also more hypotrophic piglets - 3 - 5 piglets, with a total number in the nest of 10 - 13 heads. In this regard, the number of healthy piglets decreases.

Conclusions

1. The weight of the placenta and the number of cotyledons in it depends on the age of the pregnant animal and the weight of the calf at birth. On average, in cows aged 6-8 years and calf weight 27-30 kg, the weight of the placenta is 18.20 ± 2.10 kg, which is 22% more than at the age of 3-6 years, and the number of cotyledons also increases by 20%.

2. The mass of the placenta in pigs of the large white breed increases gradually with the age of the animal and reaches the maximum mass at the 2-3 farrowing. Gradually, by the 5th-6th farrowing, its weight decreases, which has a negative effect on the number of offspring and the development of piglets.

3. The change in the weight of the placenta may be associated with the gradual fading of the effect of hormonal regulation on the level of metabolism, the effect of stress factors, and in connection with the transferred diseases.

References

1. Koreneva, Zh., Slyusarenko, B., Garnazhenko, Yu., Mazurenko, Yu., & Kovtun, Yu. (2021). Morfologicheskiye pokazateli reproduktivnykh organov sviney porody bol'shaya belaya. Agrarnyy vestnik Prichernomor'ya, (101). S.36-39. https://doi.org/10.37000/abbsl. 2021.101.06

2. Kurman F.A. Prodolzhytel′nost′ plodonoshenyya svynomatok y razvytye porosyat posle rozhdenyya // Sb. nauch.st. Khark. s-kh yn-ta. 1984. 253 s.

3. Morfolohiya sil′s′kohospodars′kykh tvaryn /Pid red. V.H. Khomycha. K.:Vyshcha osvita, 2003. 527 s.

4. Rudyk S.K., Pavlovs′kyy YU.S., Kryshtoforova B.V. Anatomiya sviys′kykh tvaryn. K.: Ahrarna osvita, 2001 . S. 335 - 342.

5. Svechyn K.B. Yndyvydual′noe razvytye sel′skokhozyaystvennykh zhyvotnykh. K.: Urozhay, 1986. 288 s.

6. Khomin S.P., Stefanyk V.YU. ta in. Biokhimichni aspekty riznoho funktsional′noho stanu matky i yaytsevodiv u koriv // Nauk.visnyk NAU. 22. K. 2000. S. 63 - 67.

ВПЛИВ МОРФОМЕТРИЧНИХ ПОКАЗНИКІВ ПЛАЦЕНТИ СВІЙСЬКИХ ТВАРИН НА НОВОНАРОДЖЕНИЙ МОЛОДНЯК

Ж. Коренєва, Л. Роша, І. Запека, Ю. Мазуренко,
Ю. Гарнаженко, І. Шовкопляс

Плацента, Placenta – це комплекс тканинних утворень, які мають розвиток з судинної оболонки плода та слизової оболонки матки для зв'язку плода з материнським організмом. Плацента це орган , який забезпечує організм плода киснем, поживними речовинами. Вона перероблює поживні речовини материнського організму (гемоглобін, білки, вуглеводи) та синтезує нові. В плаценті синтезується біологічно активні речовини, які мають великий вплив на перебіг вагітності, розвиток плода, а у подальшому і на розвиток новонародженого. Плацента у всіх ссавців відіграє дуже важливу роль, а саме забезпечує зв'язок ембріону з материнським організмом. Плацента формується тільки в період вагітності, а важливу роль у її формуванні відіграють - судинна оболонка плоду та слизова оболонка матки. Плацента у кожного виду тварин має свої певні особливості: по-перше, це форма та розмір ділянок контакту судинної оболонки ембріону з тканинами матки самиці; по-друге, рівень розгалуження судинної оболонки ембріону в тканинах матки та її заглиблення в оточуючі тканини матки.

За період вагітності матка значно збільшує свої розміри та вагу, за даними фахівців таке збільшення знаходиться в межах 10-20 разів. Плацента є основним органом завдяки якому ембріон отримує поживні речовини для подальшого росту та розвитку, а також отримує захист від чинників зовнішнього середовища. Від маси та розвитку плаценти залежить також і ступінь розвитку новонародженого молодняку та здатність пристосування до зовнішнього середовища.

Маса плаценти та кількість в ній котіледонів залежить від віку вагітної тварини та маси теляти при народженні. В середньому у корів віком 6-8 років та масі теляти 27-30 кг маса плаценти складає 18,20 ± 2,10 кг, це більше ніж у віці 3-6 років на 22%, збільшується також і кількість котіледонів на 20%. Маса плаценти у свиней породи велика біла збільшується поступово з віком тварини і досягає максимальної маси при 2-3 опоросі. Поступово до 5-6 опоросу маса її знижується, що має негативний вплив на кількість приплоду та розвиток поросят. Зміна маси плаценти може бути пов'язана з поступовим згасанням впливу гормональної регуляції на рівень обміну речовин, дією стрес факторів та в зв'язку з перенесеними захворюваннями.

Ключові слова: *велика рогата худоба, свині, плацента, телята, поросята.*