THE DEMANDS ON CARE FOR SOWS AND PIGLETS IN FARROWING PERIOD DUE TO INCREASING LITTER SIZE AND HIGHER INCIDENCE OF SMALL PIGLETS

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Abstract

The Czech Republic ranks among the developed European countries at the level of pig reproduction indicators. Despite reduction in sows during 2018, there was practically identical number of born piglets as in 2017. This confirms the dynamics of improving reproduction indicators, reflecting intense breeding work and increasing selection pressure in pig breeding. An increasing number of piglets in the litter is associated with a number of problems, including low birth weight, low uniformity of litter and increased piglet mortality. Therefore, strategies are required to help us reduce losses and optimize high-litter breeding. There are higher demands on breeding, technology and management and require increased care for sows and piglets after delivery. In today's high-fertile sows, it is advisable to use modern technologies that are adapted to the body's framework, behavior, and production intensity.

Key Words: Pig, sow, piglet, farrowing

The selection of hyperprolific sows to increase litter size and profit, caused a significant increase in the percentage of low-birthweight piglets up to 23% (Martineau G.P. & Badouard B., 2009). These piglets also show slower growth and deterioration in the parameters of meat and pig carcass quality, resulting in an economic loss rather than an increased profit. Therefore, strategies are required to help us reduce losses and optimize high-litter breeding. Preventive measures can be carried out in sows already during pregnancy. Maintaining the optimum condition of the sows is of crucial importance, as it helps increase the performance in the lactation period, affects the percentage of cull sows, and helps with normal fetal development. We can optimize the intrauterine environment by enriching sow nutrition. Addition of lipids is advisable, which, according to the new knowledge, reduces the occurrence of low birth weight piglets and improves survival. A balanced amino acid ratio is also important, which increases litter uniformity. L-glutamine and L-carnitine can be added, as they have positive effects affect on the birth weight of piglets. There are different views on the amount of feed in the last stage of pregnancy. Generally, sows should not be overfed at the last stage of pregnancy to avoid difficult farrowing, MMA syndrome and excessive weight loss during the lactation period. According to some experiments, the diet can be reduced to 1.8 kg/day in the last third of pregnancy without affecting the birth weight of the piglets, with a positive effect on maximizing feed consumption during the lactation period (Mallman et al., 2018). In another experiment, different levels of energy were provided to pregnant sows and the weight of sows and piglets was monitored. Maximum piglet weights at birth and weaning were achieved at an energy level of 1.5 maintenance requirements of sows rather than at lower levels (1.0 or 0.5 maintenance requirements) (Ren et al., 2018).

Sows are usually moved to a farrowing crate about a week before farrowing, which is important for handling the sow and so that the sow gets used to the new environment and for adaptation of the immunological profile. Obviously, the farrowing place must be thoroughly washed and disinfected in advance, and dried, if needed, to reduce germ survival as much as possible. Likewise, the feeding system

must be cleaned, whether used for solid or liquid feed. Surviving germs often cause mammary gland inflammation in the sow. This can be a major complication in large litters, where every well-functioning teat is welcome. Similarly, bacteria may cause health problems in piglets, which are compromised due to low birth weight and unable to cope with a bacterial infection. Diarrhea is the cause of high mortality, reduced weight gain and other health complications.

It is also necessary to check the function of the drinkers before placing the sow in the farrowing room. Nursing sows consume 30-40 liters of water per day, and it is essential that the drinker has a flow rate of at least 2.5 liters per minute, more preferably 4 liters per minute, and this should be checked regularly during the lactation period. It is preferable to dispense water directly into the trough, which makes water intake easier for sows. Water temperature is also significant, and water intake is significantly higher for cold water (10°C) than warm water (25°C).

The optimum temperature in the barn for sows is 18-22°C, and 15-25°C is acceptable. If this limit is exceeded, performance is reduced and it is therefore important to check the proper functioning of the air-conditioning system or ventilation. Low temperature is not necessary, however, drafts in the stable should be avoided to decrease the risk of MMA problems. When using the All In All Out system, it is possible to increase the temperature before the expected farrowing to 20-22°C and gradually reduce it during the lactation period to 19-21°C starting on postpartum day 4 up to 18-19°C.

In today's high-fertile sows, it is advisable to use modern technologies that are adapted to the body's framework, behavior, and production intensity in these sows. It is important to provide enough space for high-number litters and to allow good suckling conditions. In relation to the efforts to improve welfare, the traditional cage housing of farrowing or nursing sows is being abandoned. It can be replaced with open-design crates or pens or group housing, providing plenty of space to the animals, unfortunately with possible negative effects, such as higher piglet mortality, higher housing needs and worse conditions for pig keepers. This results in decreased productivity and impaired economic results of pig farming. Temporary crating offers a compromise between the needs of sows and piglets and the requirements of breeders. The new -design pens provide more space and freedom to the sow, while also trying to protect the piglets from crushing (overlying). They provide good suckling conditions by respecting the animal's natural behavior. At Institute of Animal Science Prague, we have been engaged in the development of this type of pens. The research was carried out in project of the Ministry of Agriculture, Czech Republic, QJ1610390 Housing of sows providing welfare and economy. In the experiments, sows were placed in a closed pen and from day 4, the barriers were opened and the sow had a free pen. Graph 1 shows the results of weight gain in piglets from sows in temporary crating compared to permanent cage housing (Illmann, 2019). Graph 2 shows a comparison of piglet mortality (Illmann, 2019). An important finding was that housing of sows in a temporary cage was not associated with a statistically significant reduction in weight gain of piglets or with a significant increase in piglet mortality. The result is the farrowing pen WELLUP (Rozkot et al., 2018), which will satisfy the growing demand for higher levels of pig welfare in the Czech Republic. It is a combined housing technology for nursing and farrowing sows, which combines the use of cage fixation of sows for several days with free housing for the remainder of the lactation period. Compared to the conventional technology, the alternative system of crate housing for nursing and farrowing sows are usually burdened with a markedly lower production efficiency at higher investment and operating costs and the WELLUP pen has been designed to minimize the said negative effects in practice.

Digestion and nutrition of sows

It is always necessary to monitor the consistency of excrements in sows. Optimal microflora must be maintained in the gastrointestinal tract, which has beneficial effects on the bodily condition. Its disruption increases the load and negatively affects performance. When the passage of the digestive tract in the intestinal tract slows down, waste metabolites and endotoxins may accumulate, which play an important role in the development of MMA syndrome. It is very important to avoid constipation and maintain the correct consistency of the faeces during the farrowing period. A complete feed for nursing sows should therefore

be a source of natural fiber in the form of high-quality fiber components, such as wheat bran, sprouts or dried sugar beet pulp. However, the fiber level for nursing sows must not exceed 4-5% due to negative effects on the utilization of other nutrients. Therefore, it has also been discussed when to start feeding a mixture for nursing sows. The sows have to get used to this feed, so the mixture was mostly started shortly after moving to the farrowing room. However, it has appeared that the fiber level in this mixture is too low for sows in an advanced state of pregnancy, and this causes the metabolism to slow down and other problems as mentioned above. Therefore, some breeders use a mixture for pregnant sows until farrowing and then switch to the next feed. In addition, feed companies now offer the transition mixtures balanced precisely for the farrowing period, which are used as a transition between the mixture for pregnant and nursing sows.

Care for piglets

Obviously, the optimal farrowing would be without complications and take about 3-4 hours. The truth is that small piglets are farrowed more easily due to their size, but their high number increases the duration of the farrowing and increases the risk of colostrum deficiency for the last born piglets. For hyperprolific sows, continuous monitoring should be preferred, and the keeper must be prepared to help both the piglets and the sow immediately if birth complications occur. For piglets, whether small or large, the important factors are drying and supply of colostrum as soon as possible after birth and sufficient heat.

Sufficient intake of colostrum by piglets after the birth is probably the most important factor determining their survival and successful rearing and is particularly important for low birth weight piglets. Colostrum is a source of nutrients, energy for metabolism and heat production, as well as passive immunity that protects piglets until they begin to produce their own antibodies. However, small piglets are less vital and thus less able to make their way to the teats of the sow immediately after birth, while still fighting for colostrum with stronger piglets. Sufficient colostrum intake means that the piglet should receive more than 150 g/kg body weight (De Vos et al., 2014). The amount of colostrum received has a significant effect on mortality throughout the pre-weaning period. We can see a decrease in pre-weaning mortality of piglets from 64% to 10% if the amount of colostrum taken exceeds 200 g (Devillers et al., 2011). Jourquin and Morales (2018) report that the minimum survival rate is at least 30% body weight. However, in large litters, the amount of colostrum produced may be insufficient. Unfortunately, increased fertility is not accompanied by a proportional increase in the quantity of colostrum, and in fact, we have no strategy that would help us significantly increase the amount of colostrum in the sow. The possibility of how to manage colostrum deficiency is to administer colostrum substitutes. They usually contain a source of energy in the form of fat or lactose, and immunoglobulins and growth factors contained in the milk, or cow's colostrum. However, the effect of these products is not very convincing and does not always allow survival of weak piglets. The best choice is always the colostrum of the sow, specifically the one from the piglets' own mother. Even if we consider moving piglets to another sow, we should allow the piglets to receive their mother's colostrum for at least 6 hours. Small piglets that are unable to accept colostrum by themselves should be assisted by attaching to the teat or by administering colostrum so that they can receive at least a minimum amount.

Consequences of increasing litter size

Increasing litter size, variability, and the number of small piglets results, among other things, in changes in the distribution of pre-weaning mortality. Ten years ago, 70% of piglet mortality occurred on postpartum day one, while today piglet mortality is spread over a longer period of time, and losses occurring on postpartum days 2-7 have almost doubled. A possible cause may be the lack of colostrum in piglets. Perhaps the problem is that the staff identify most of the small piglets as non-viable, which they no longer need to care for, as they are not supposed to survive. In fact, however, large litters of hyperprolific sows have a higher number of small piglets, but these can be fully viable if we provide them with sufficient care. It is therefore important that the staff are able to recognize small piglets from non-viable ones and take care of them accordingly. It helps to weigh piglets during the birth where piglets weighing less than 800 g are determined to be non-viable, small piglets are all piglets weighing more than

800 g and less than 1.2 kg (Diaz et al, 2018). If small piglets identified in this manner receive sufficient colostrum and have suitable environmental conditions, including a sufficiently high temperature, their survival chances are relatively high.

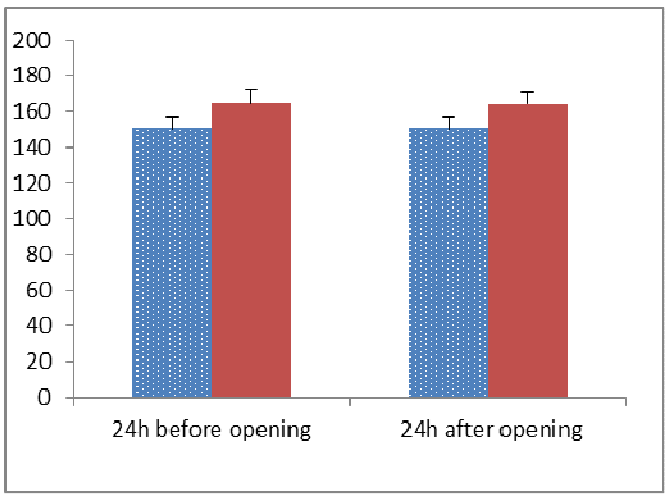
With a large variety of litters, we can use split nursing to reduce competition for colostrum and milk and allow small piglets to drink enough. If the number of piglets is higher than the number of functional teats, part of the piglets should be moved to a replacement sow. However, it is advisable not to move the piglets too much and leave them as much as possible without moving with their mother. When moving medium or large piglets, it is advisable to leave them with the mother for at least 6 hours after birth and place them with sows on their 3rd to 5th litter. Small piglets should stay with their mother for at least 12 hours and the most suitable surrogate mother for them will be the sow on her 2nd litter, which does not have too large teats. Cross-fostering, i.e. addition of piglets to other sows, can be done only in the short period after farrowing or for the whole lactation period and the weaning mortality can be reduced by 40%. However, negative effects of movements on growth and thriving of piglets was also reported. In addition, frequent moves promote transmission of viruses (PRRS, circovirus) and are stressful for both piglets and sows.

Timely feeding of piglets

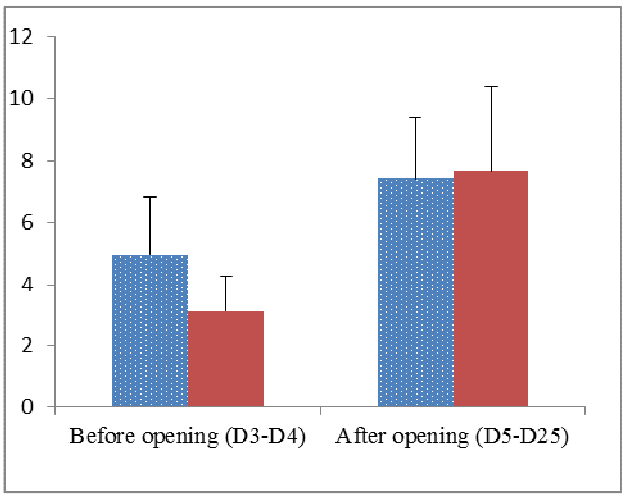
In the next days, we need to ensure, in addition to monitoring the health of the sow and piglets, sufficient heat and dryness in the shelter for the piglets and we can slowly start with the feeding. Its primary objective is for the piglets to get used to the intake of solid food and it is important to adapt the digestive tract of piglets to the herbal ingredients of the feeding stuffs. Unfortunately, small piglets have poor development and maturation of the small intestine due to limitations of intrauterine development, which impairs digestion of nutrients in the postpartum period. Recently, there has been increasing interest in biologically active substances in the colostrum and milk, which could be used as a supplement for piglets to promote small intestinal growth and maturation. These may include, for example, growth factors (IGF-1, EGF), hormones, or nucleotides. A number of them have been demonstrated to have positive effects during experiments, but their routine use in feeding stuffs is often impossible because they have not been authorized as feed supplements. Nevertheless, the knowledge of all these components of milk that could support the piglet growth is becoming increasingly important because of the percentage of low birth weight piglets.

Milk substitutes and dairy feed mixtures can be used if the sow has little milk. At the end of the lactation period, we can still change the weaning weight of small piglets by split weaning. Large piglets are weaned early so that small piglets can get some extra time with the sow. A minimum of 6 piglets should be allowed to prevent the onset of estrus in the sow.

Graph 1. Average weight gain of piglets (g) (Illmann, 2019)



Graph 2. Total mortality (%) (Illmann, 2019)



Permanently confined system Temporarily confined system

Conclusion

In the today's challenging times for pig farmers, each piglet represents a chance for increasing sales and thus maintaining the competitiveness of the breeders. However, an increasing number of piglets in the litter is associated with a number of problems, including low birth weight, low uniformity of litter and increased piglet mortality. A number of strategies are available for managing problems of small piglets. Unfortunately, most of them are usually unable to provide the same results under the same economic conditions and with the same amount of care as the breeding of optimally large litters with optimally large piglets. In addition, efforts to get the highest possible fertility in sows pose new problems. So the question arises whether to continue this development, or whether it would be advisable to end the pursuit of the highest reproductive performance before we encounter a genetic ceiling associated with many negative effects.

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