

Farrowing to weaning: A critical window for efficient and sustainable swine production

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The goal of the swine production industry is to produce more pork from fewer pigs, thereby increasing efficiency and sustainability. The management of hyperprolific sows from farrowing to weaning is critical for sow and piglet survival and consequently, their improved lifetime productivity. Hyper-prolific sows have a longer farrowing duration which requires critical attention. Pre-weaning mortality is highest within 24 h after farrowing because of sows, piglets, management and environmental related factors. Another critical step in a piglet's life is weaning. Weaning is considered one of the most stressful stages for piglets. The article provides details on challenges and management practices during these critical stages. Addressing these milestones during a pig's lifetime is essential for efficient and sustainable pig production.

Keywords: Management, Pig, Piglets, Weaning stress

PORK is the second most-consumed meat in the world. In the future, as the human population grows, the demand for pork will increase significantly, leading to scaling out of pork production. To meet the growing pork demand, the swine industry is transitioning from low to high productivity in a short time mainly because of improvements in genetics, nutrition, and management. Currently, the approximate production targets in major pork producer countries are production of 30–32 piglets/sow/year with pre-weaning mortality of below 5%, average daily gain of 400–500 g and feed conversion ratio of 2.5–3. The management of hyper-prolific sows (female pig) and their litters poses a significant challenge for the swine farm manager, particularly during the farrowing-to-weaning stage. Farrowing is defined as the total time it takes for a sow to give birth to her entire litter. The farrowing management of these pigs warrants close supervision and timely assistance to decrease the piglet mortality. In hyper-prolific sows, piglet vitality is becoming an

increasingly important management factor, with lighter piglets, and longer farrowing durations resulting in higher piglet mortality.

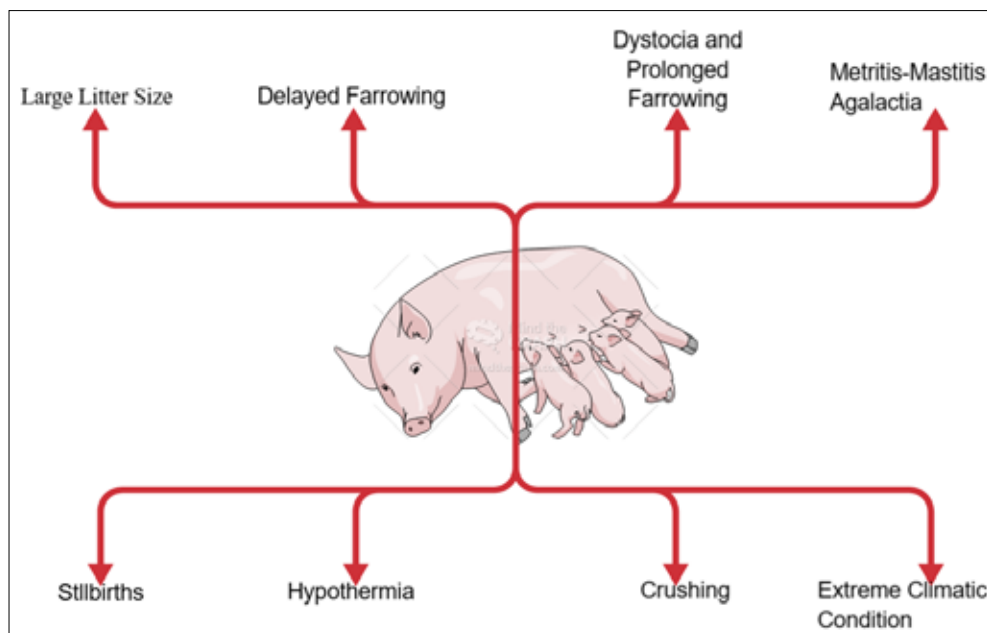
Besides, management of piglets at weaning is also a very critical step in today's swine industry because of early weaning at 21–28 days. Weaning refers to the separation of the piglets from the sow, thereby leading to the destruction of the maternal-offspring bond and also the elimination of milk from the piglets' diet. It is a critical and stressful event in a pig's life, accompanied by stress, decreased feed intake, altered gut integrity, post-weaning diarrhea, increased inflammatory cytokine levels, and impaired immunity.

Challenges and management strategies during farrowing

In an intensively managed herd, the target is to get 2.5 farrowings/sow/year. This makes sow and piglet management very challenging, especially in extreme climatic conditions, and leads to a poor piglet survival rate. The gestation period of a pig is approximately 114–116 days

with little variation between farms. Sows should be transferred from breeding sheds to the farrowing pen one week before farrowing. The farrowing pen should be sanitised and fumigated before the transfer of the pig. The pig should be housed in a comfortable, well-ventilated, and clean farrowing pen with adequate space and nesting materials to improve productivity and welfare.

Implementing cooling systems, such as evaporative cooling pads, misting systems, and fans, in farrowing houses is essential for mitigating heat stress during parturition, particularly in hot climates. An optimal farrowing environment with nesting material reduces stress and shortens farrowing duration. Maintaining sows at a visual sow body condition score of 3.0–3.5 (five-point scale with 1 being too thin and 5 being overly fat) is recommended for optimised birth weight and piglet survival. Backfat thickness (moderate to high) in late pregnancy should be considered for optimal sow lactation and reproductive performance. Also, iron supplementation at the end of



Challenges during farrowing in pigs

signs include increased body temperature ($>39.5^{\circ}\text{C}$) within 24 h of farrowing, mastitis in one or more mammary glands, and lying on the sternum. It has been reported that the incidence of MMA is significantly higher in hyper-prolific sows. If left untreated for more than 48 h, irreversible negative changes occur in the mammary gland, and it further causes piglet wasting. It should be immediately treated with non-steroidal anti-inflammatory drugs along with oxytocin and supportive therapy.

In sow, peak milk yield occurs at approximately three weeks after farrowing

pregnancy is recommended as it enhances piglet weight. Increasing the feeding frequency before farrowing can reduce farrowing duration and stillborn numbers, while also increasing the longevity of the sow in the herd.

In hyper-prolific sows, a farrowing duration of 6–7 h and an inter-piglet interval of one hour is common. The increase in farrowing duration leads to an adverse impact on sows' and piglets' health and well-being. To minimise the piglet mortality during farrowing, it is generally recommended to supervise, monitor and assist the farrowing. For this, the induction of farrowing is recommended using prostaglandin so that farrowing occurs only during the day. Prostaglandins should be used within 72 h of expected farrowing only to decrease the stillbirth. If the piglet to piglet duration is more than one hour, the birth canal should be examined for obstruction, if any. If the birth canal is patent, the use of intramuscular oxytocin, along with calcium therapy, is indicated. However, oxytocin should not be used more than twice in a farrowing.

is limited, stored cow colostrum can be used (10–15 mL; three to four times a day). Piglets fight for the anterior and middle teats as they provide more milk than the posterior ones. Teat fidelity is established by the fourth day after farrowing. To manage large litters, cross-fostering is recommended within three days of farrowing, ideally within 12–24 h after birth. The large piglet should be transferred after colostrum feeding and not the runt. Also, split suckling is widely used in commercial swine production settings to increase survival and pre-weaning growth. Pre-weaning socialisation and intermittent suckling are strategies to reduce post-weaning stress in piglets.

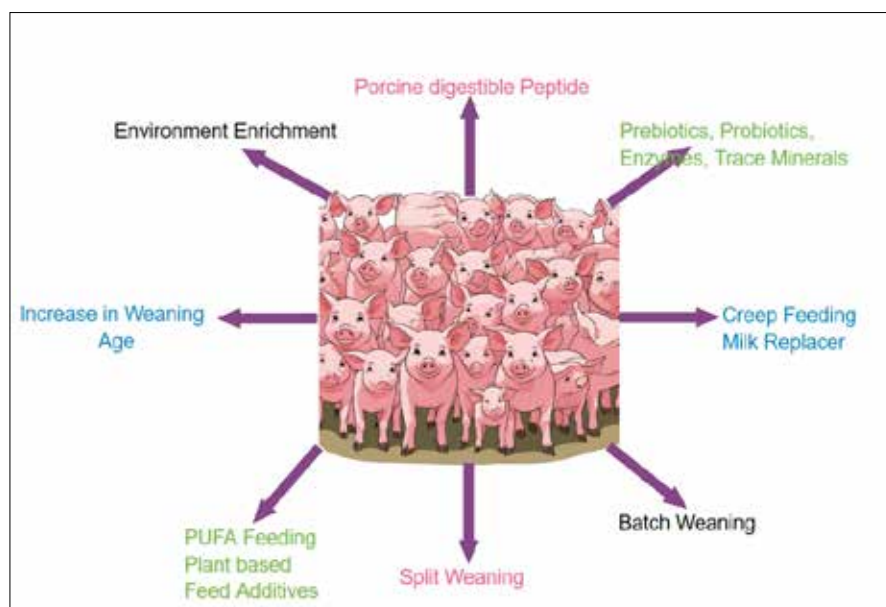
Another important problem encountered in intensive pig farms is metritis-mastitis-agalactia (MMA) syndrome or postpartum dysgalactia syndrome (PPDS), characterised by lactation failure. The clinical

with an average about 10.0 kg/day/sow. Therefore, early weaning at 21–28 days ensures minimum burden on sow health and future productivity. Piglets' mortality during farrowing and before weaning is significantly higher during the winter season. Therefore, a heating lamp in the creep area is recommended to provide a comfortable environment to piglets and thereby increase their survival chances. Drying piglets, especially with desiccants, limits amniotic fluid evaporation, further reduces heat loss. On the day of the farrowing, the naval chord of the neonate is cut with sterilised scissors and ligated, leaving approximately 5 cm intact. The naval should be disinfected with povidone-iodine. Needle teeth cutting of newborn piglets is recommended on the first or second day to avoid teat injury. To prevent the mortality due to piglet anaemia, inject 150–200 mg iron on the 4th and 11th day, preferably in the



Management strategies after farrowing

Post farrowing, colostrum feeding (200–250 g/piglet) should be ensured within 12–16 h. In large litters where colostrum availability



Strategies to reduce weaning stress

natural constituents of herbals and animal tissues. Organic acids can influence the gut microbiota and lower the incidence of diarrhoea in weaning pigs. Its supplementation seems to be most effective in the first 2–4 weeks following weaning, when the animal's immune and digestive systems are still developing.

SUMMARY

Farrowing to weaning continuum is considered as the most critical temporal window in a pigs' life. To manage large litter from hyper-prolific sows, the proper nutritional and managerial strategies are needed throughout the farrowing to weaning stage. Farrowing management includes proper biosecurity, supervision and assistance during farrowing, induced farrowing, controlled housing facilities, environmental enrichment, neonatal care, colostrums feeding and cross-fostering. Once farrowed, another challenging milestone is proper management of weaning. Therefore, nutritional and husbandry practices like creep feeding, feed supplements, plant-based extract instead of antibiotics, milk replacer, split weaning, intermittent suckling, precision farming, etc. are essential to increase piglets' growth and lifetime productivity. Ultimately, optimising piglet survival requires a holistic, system-based approach that integrates excellent stockmanship with well-designed facilities and precise nutritional strategies.

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neck region.

Strategies to cope up with weaning stress

Several management and feeding strategies have been explored for their effectiveness in the mitigation of weaning stress. Delay in the weaning age of piglets offers significant benefits. Outdoor rearing system and free farrowing houses offer more stress-free environment to the newborn.

Creep feeding to piglets at the age of 10 days or more till weaning is another proven nutritional management strategy to reduce the impact of weaning stress. In sub-tropical climate and less intensive production system, providing 900–1,000 g creeper feed before weaning till 35 days of age significantly alleviate the weaning stress. Environmental enrichment, milk replacer and pre-weaning socialisation are other strategies to improve the productivity and well-being of piglets. Milk

replacer diet before weaning has positive effect on post-weaning feed intake and growth rate as compared to milk replacer given post-weaning. Recently, bovine colostrum has emerged as substitute of milk replacer because of its high immunoglobulin level.

Further, probiotics enhance the gut health, immune system function and microbiota and thus improve production performance of pigs. The most commonly used are lactic acid bacteria (LAB), *Bifidobacteria*, and *Enterococcus*. Within the lactic acid bacteria group, *Lactobacillus* spp. is the most used probiotic. Carbohydrates such as fructo-oligosaccharides, inulin, transgalacto-oligosaccharides, and lactulose are recognised as the most common prebiotics because they are easily fermentable and thus will result in reduced luminal pH. The organic acids are recognised as weak short-chain acids and are widely distributed in nature as

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