



PRE-WEANING MORTALITY IN PIGLETS

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Pre-weaning piglet mortality is a major economic and welfare issue in pig production. Pre-weaning piglet mortality varies to a large extent between farms and ranges from 5 to 35%. Piglet deaths occur mainly during the first 48 h after farrowing, crushing by the sow being the first cause. However, piglet mortality is the outcome of a set of **complex interactions between the sow, the piglet and the environment** and it is often difficult to identify a single cause.

THE HYPOTHERMIA-STARVATION-CRUSHING COMPLEX

Although several studies indicate that crushing by the sow is the ultimate cause of piglet death, crushing often results from the effects of perinatal hypothermia and starvation. Undernourished piglets spend more time close to the sow and are more likely to be crushed. The immune system of the newborn piglet is immature and consequently the acquisition of colostrum – the source of dietary energy which contains immunoglobulins– for up to 36h after birth is essential. Furthermore, starvation is often secondary to, and interacts with, the effects of perinatal hypothermia, making piglets more lethargic, less competitive at the udder and less likely to achieve a sufficient colostrum intake. The lower critical temperature of newborn piglets is 34°C and when ambient temperature is below 34 °C piglets will attempt to gain heat shivering and huddling. One of the reasons why newborn piglets are so sensitive to cold is that they lack brown adipose tissue.

IMPORTANCE OF PIGLET VITALITY AND BIRTH WEIGHT

When body reserves and thermoregulatory ability are guaranteed, the most important factor explaining piglet survival is the vitality of the piglet immediately after farrowing. Neonatal vitality could be measured by behavioural observations, including the time to reach the udder, and by physiological parameters such as muscle tone. Piglet vitality varies considerably between piglets of the same litter

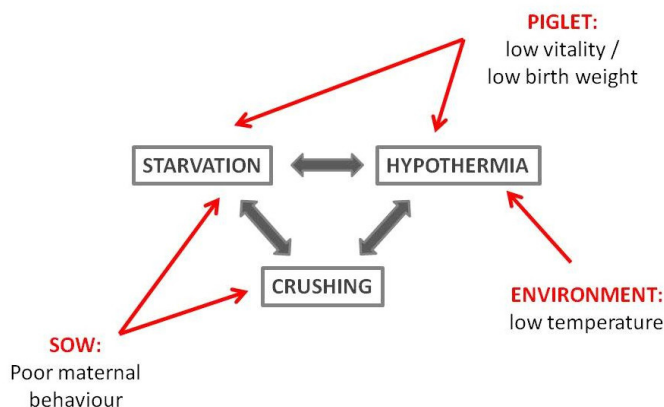
and this variation is influenced by the extent of hypoxia at birth. Last born piglets, or piglets from longer parturitions, are more likely to suffer hypoxia. Neonatal asphyxia incurs in severe acidosis and has severe negative effects on the function of vital organs. Reduced overall vitality, poor thermoregulation, failure of passive transfer of immunity, poor performance and greater susceptibility to infections are important secondary problems associated with neonatal asphyxia and acidosis.

Low birth weight piglets present both an increased risk of mortality and a reduced weight gain during lactation. For instance, piglets weighing less than 1 Kg at birth have a higher risk of dying before weaning.

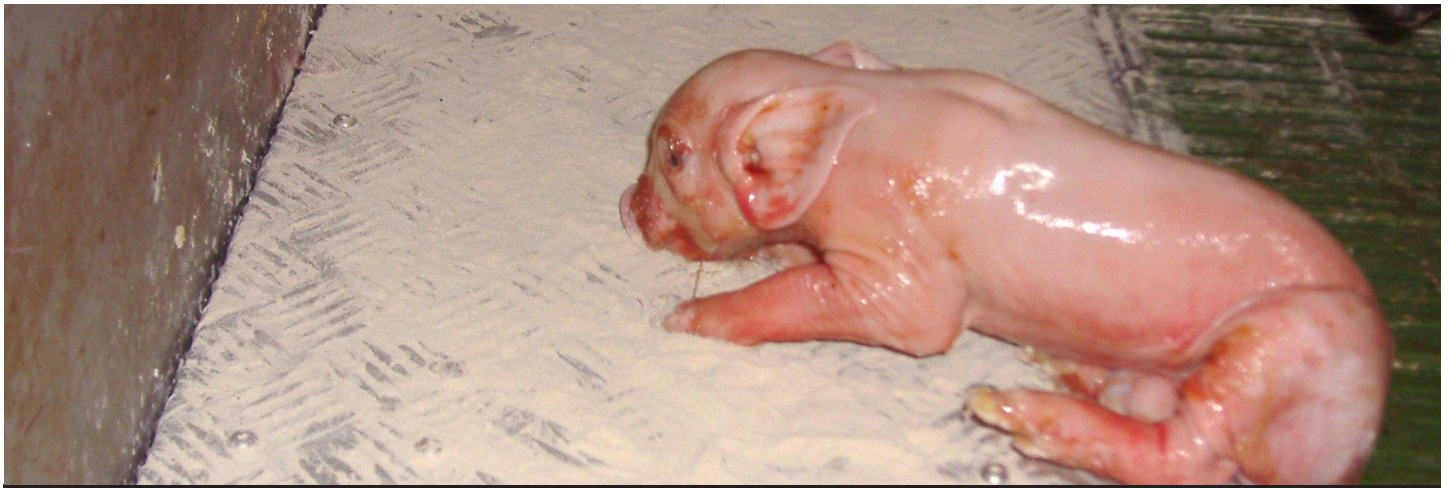
NURSING AND SUCKLING BEHAVIOUR

Each suckling event last for a total of 2 or 3 minutes, while the flow of milk from the udder lasts around 10 or 20 seconds. Piglets suckle simultaneously every 30-70 minutes and up to 20 times a day. These regular suckling bouts include five phases:

- **The first three phases** involve the communication and coordination between the sow and her litter to ensure that piglets are at the udder when milk flow begins. The sow lies down, exposes the udder and initiates a rhythmic grunting that increases gradually. Piglets compete to get access to the udder (phase1), massage the udder rhythmically (phase2) and stimulate oxytocin release from the mother by performing slow sucking movements (phase3).
- **The fourth phase** involves milk ejection. During this phase, the sow increases her rhythmic grunting and piglets perform rapid sucking movements.
- **The fifth phase** includes both massage and slow sucking movements by the piglets. The sow decreases her rhythmic grunting rate. It is suggested that piglets prepare their future milk consumption by massaging the udder after milk ejection.
- Both piglet vitality and body weight at birth determine the degree of udder stimulation and consequently the amount of milk consumed.



Interactive events occurring in the hypothermia-starvation-crushing complex (modified from Edwards, 2002).



New-born piglet looking for heat source.

“Reduced piglet vitality and poor sow maternal behaviour are the main causes leading to piglet mortality.”

IMPORTANCE OF DAM TRAITS

Different elements of maternal behaviour are relevant to piglet survival. Nest-building behaviour is important not only for parturition itself but also for the expression of an adequate maternal behaviour around parturition. Expression of nest-building behaviour has been associated with a lower mortality rate in piglets until weaning and with an increase in the duration of suckling periods. Sow restlessness affects piglet mortality because of piglet crushing and impedes early teat seeking and suckling attempts. Crushing results from the sow's movements to lie down from either a standing or sitting position, to sit up from a lying position or from rolling behaviour (changes between udder and side lying). However, the speed and nature of the sow movements appear to be an important characteristic of maternal behaviour. Sows that do not crush any of their piglets show a more protective mothering style, in terms of more nest building activity, responding faster to piglet distress calls and nosing their piglets more often during posture changes than sows that crush several piglets.

The percentage of savaging sows – sows that behave aggressively towards her piglets newborns – ranges from 1 to 15%. Savaging is considered to be more frequent in gilts than in multiparous sows and is thought to have a genetic component.

Milk production varies among sows, particularly during the first days of lactation. Insufficient milk production in sows might account for 6 to 17% of pre-weaning mortality. Lactation failures may be due to heat stress, metabolic disorders and endocrine imbalances in the sow and to health conditions such as metritis. Agalactia should be considered when more than 3 piglets from the same litter die.

SUMMARY

Piglet mortality is the outcome of a set of complex interactions between the sow, the piglet and the environment. Although crushing by the sow is the main ultimate cause of piglet death, it is often consequence of perinatal hypothermia and starvation. Piglet vitality and birth weight, as well as sow maternal behaviour, play an important role in piglet survival. Management strategies aimed at reducing sow stress and improving piglet vitality are therefore important to reduce piglet mortality.

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